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Plantagineae of the World

Identification keys



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On the cover: *Plantago maritima* image which has been drawn by Allysa Evans.

Note: at the moment, the text is mostly a compilation of multiple published keys, some in Latin and Spanish. Also, it is under constant development.

This book is dedicated to the public domain

To the memory of Vitaly Arnold

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Chapter 1

Key for the genera

Plantagineae is the tribe of Labiatae s.l. They are herbs, annual or perennial, or shrubs. Stems present or absent, if present, erect, glabrous or hairy. Leaves basal, usually alternate, or cauline and alternate, or cauline and opposite, simple, whole, with entire margins, often needle-like or grass-like. Flowers solitary or in scapes; bracts present. Pedicels absent or present; bracteoles absent. Flowers bisexual; sepals (3) 4, nearly distinct, calyx radially, rarely bilaterally, symmetric, cuplike, lobes oblong; corolla fleshy, white or yellow (*Aragoa*) or semitransparent (*Plantago* and *Littorella*), radially or bilaterally symmetric, spurs absent, lobes 4; stamens 2 or 4, free, equal, filaments glabrous; ovary 2-locular, placentation free-central, sometimes axile; stigma elongate. Fruits capsule or pyxis (with lid), dehiscence loculicidal (*Aragoa*) or circumscissile (*Plantago*), sometimes fruit indehiscent (*Plantago macrocarpa*, *Littorella*). Seeds (1)2–35, black or brown, oblong, wings absent. $x = 4, 5, 6, 13$.

Genera of *Plantagineae* are so radically different that identification is not actually necessary, and the following key is supplied mostly for the formal reasons.

1. Herbaceous plants, sometimes shrubs or shrublets with inconspicuous, wind-pollinated flowers, fruit is a pyxis or nut 2.
 - Shrubs with showy, white or yellow flowers, fruit is 2-locular capsule *Aragoa*
2. Water plants, naked, with reduced (only few flowers) inflorescence and unisexual flowers
 - *Littorella*
 - Flowers bisexual *Plantago*

Chapter 2

Genus *Plantago*

2.1 Key for subgenera

1. Ovary unilocular. Ovule solitary on a basal placenta. Fruit a small nut with a thick, hard wall. Flowers bisexual, crowded in a small spike, and covered by broad bracts glabrous on their backs. Sepals very narrow and with long hairs. Corolla lobes small or absent. Anther solitary. Ovule amphitropous, seed kidney-shaped. Hairs with a basal cell shorter than broad, distal cells long and thin subgen. *Bougueria*
 - Ovary bilocular, placenta on the septum with one or more ovules. Ovule hemitropous. Fruit a pyxis (very rarely a nut with a thin soft wall) 2.
2. Leaves opposite or verticillate. Internodes long. Flowers opposite or in whorls of three, arranged in short spikes. Ovary with two ovules. Fruit with two seeds. Placenta side of seed deeply concave, cotyledons in the seed perpendicular to the bract and the placenta. Hairs formed of a row of short wide cells, the basal cell not differentiated subgen. *Albicans*, sect. *Psyllium*
 - Leaves alternate. Internodes usually short, leaves in a rosette 3.
3. Ovary with two ovules. Fruit with two seeds. Placenta side of seed deeply concave, cotyledons in the seed perpendicular to the placenta side or bract. Hairs with a basal cell shorter than broad, distal cells long and thin. Leaves often linear and spike usually short in relation to scape subgen. *Albicans*
 - Ovary with one to many ovules. One to many seeds. Placenta side of seeds flat, rarely slightly concave or convex. Hairs on leaves formed of a row of short wide cells, the basal cell not differentiated. Spike often long and about equaling scape 4.
4. Corolla tube with short hairs all over. Cotyledons in the seed perpendicular to the placenta side or bract. Leaves linear to narrowly elliptic. Ovary with two to six ovules ... subgen. *Coronopus*
 - Corolla tube glabrous. The plane between the cotyledons in the seed parallel to the placenta side and bract, at least when one or two seeds are present. If many seeds are developed they may press against each other, and the plane between the cotyledons may be oblique or even perpendicular to the placenta side. Leaves broadly elliptic to linear. Ovary with two to many, rarely one ovule subgen. *Plantago*

2.2 Key for sections

1. Ovary with 1–3 ovules and a rudiment of an upper compartment on the adaxial side of the placenta. Corolla lobes longer than 1 mm. Flowers are mostly cleistogamous; corolla lobes form a beak sect. *Virginica*
 - Ovary structured otherwise. Corolla lobes short or long. Flowers are mostly chasmogamous, corolla in most (but not all) species does not form a beak 2.
2. Non-glandular hairs with joints are strongly refracting, walls between cells oblique. Hairs on leaves narrow, less than 0.04 mm sect. *Gnaphaloides*
 - Strongly refracting joints absent. Hairs on leaves (if present) variable 3.
3. The inner side of the seed is deeply concave 13.
 - The inner side of the seed is not deeply concave 4.
4. Ovary with a third compartment at the top on the adaxial side of the placenta, or with a rudiment of it, seen as a thickening at the apex on the posterior side of the ripe placenta. If this compartment absent, then there are few flowers in the inflorescence; no adventitious roots and seeds are longer than 2 mm. Sepals are glabrous on the back sect. *Mesembrynia*
 - Ovary without the third compartment, other character combinations are different 5.
5. Less than four flowers per inflorescence. Carpophore present sect. *Carpophorae*
 - Inflorescence with more than 12 flowers. Carpophore absent 6.
6. Posterior sepals with the membranaceous, very conspicuous wing on the back. Leaves are usually remaining green on drying. Corolla tube hairy. Annuals; leaves are often dentate or even dissected sect. *Coronopus*
 - Posterior sepals without a conspicuous wing on the back. Leaves dry differently. Corolla tube hairy or glabrous. Annuals or perennials; leaves with the whole margin or sometimes dentate 7.
7. Annuals. Anthers usually less than 0.5 mm long sect. *Micropsyllium*
 - Perennials. Anthers are longer than 0.5 mm 8.
8. Ovary hairy. Corolla tube hairy. Leaves usually do not remain green on drying ... sect. *Maritima*
 - Ovary glabrous. Corolla tube glabrous. Leaves usually remain green on drying 9.
9. Anthers white both when fresh and dried 10.
 - Anthers not white 11.
10. Root system mostly of primary and secondary roots sect. *Lamprosantha*
 - Root system mostly of adventitious roots sect. *Eremopsyllium*

-
11. Corolla lobes longer than 1.5 mm. Ovary with four or fewer ovules. Leaf width usually less than 25 mm sect. *Pacifica*
 – Corolla lobes shorter than 1.5 mm. Ovary usually with four or more ovules. Leaf width more than 25 mm 12.
12. Anterior sepals distinctly narrower than posterior, and differently shaped ... sect. *Leptostachys*
 – Anterior and posterior sepals similar sect. *Plantago*
13. Leaves opposite or in whorls of three 14.
 – Leaves alternate 15.
14. Perennials, typically without long glandular hairs. Inner bracts narrow. Seeds longer than 3 mm sect. *Arborescens*
 – Annuals, with long glandular hairs. Inner bracts are broad. Seeds shorter than 3 mm sect. *Psyllium*
15. Bract with the upper part scarious, acuminate. Some species with anterior sepals united for more than half of their length sect. *Lancifolia*
 – Bract without scarious, acuminate upper part. Anterior sepals always free 16.
16. Connective of anther very large, about as long as the pollen sacs. Plants densely hairy (leaf surface hardly visible), cells of non-glandular hairs jointed by a common wall with crown-like elongations sect. *Hymenopsyllium*
 – Connective of anther smaller. Plants are not densely hairy, cells of hairs without crown-shape elongations 17.
17. The nerve of anterior sepals well developed. Corolla lobes are slightly hairy on the back. The concave inner side of the seed covered by a ragged, white membrane, except for two areas to the right and left of the center. Leaves are usually remaining green on drying sect. *Albicans*
 – The nerve of anterior sepals present at base only, distal part scarious. Corolla lobes not hairy. White membrane on seeds absent. Leaves usually darken on drying sect. *Montana*

Chapter 3

Subgenus *Plantago*

3.1 Section keys

3.1.1 Key for sections

1. Ovary with 1–5 ovules and with a third compartment near the top on the adaxial side or a rudiment of it, seen as a thickening on the apex of the ripe placenta; the other ovules fixed to the side near the centre. When two seeds are present on the same side of the placenta a keel develops between them 2.
 - Ovary with one to many ovules, scattered on the placenta when more ovules are present. No compartment or rudiment of it on top of the placenta, and placenta without distinct keels separating the mature seeds 4.
2. Ovary with 5 or 4 ovules. Corolla lobes always patent during anthesis 3.
 - Ovary with 3 or 2 ovules (very rarely 1 or 4 in some ovaries). Corolla lobes often erect during anthesis and with small anthers included. North and South America sect. *Virginica*
3. Corolla lobes shiny, spike dense, with alluring appearance, a few species in Asia and in Europe sect. *Lamprosantha*
 - Corolla typically not shiny, spike does not look alluring, mostly Australia, New Zealand, plus Amsterdam and St. Paul Islands sect. *Mesembrynia*
- 4 (1). Small annuals with small flowers, linear leaves and narrow seeds. America, Asia, Europe sect. *Micropsyllium*
 - Perennial plants; leaves rarely linear, and fleshy if so 5.
5. Spikes with 1–3 rarely up to 12 flowers. South America, New Zealand, Australia, New Guinea 6.
 - Spikes usually with many flowers. Africa, Europe, Asia, N America, Oceania ... sect. *Plantago*
6. Adventitious roots 7.

- Tap root. South America, Auckland, Tasmania sect. *Oliganthos*, ser. *Oliganthos*
- 7. Scape very short, a carpophore develops during the ripening of the fruit. Flowers usually unisexual. Bracts and sepals long, membranous. The Andes and Mexico sect. *Oliganthos*, ser. *Carpophorae*
- Scape often short during anthesis and elongates during the ripening of the fruit, no carpophore develops. Flowers bisexual. Bracts and sepals either very small or with a green nerve. New Guinea, Australia, New Zealand sect. *Oliganthos*, ser. *Microcalyx*

3.1.2 Section *Lamprosantha*

1. Leaves broadly cordate or kidney-shaped *Plantago reniformis*
 - Leaves shape different 2.
2. Leaves lanceolate to linear-lanceolate, bract broadly ovate, ovules 6 *Plantago canescens*
 - Leaves more broad 3.
3. Plants often become black on drying, leaves with round base and well developed petiole, spike long, about 15 cm or longer, bract narrow with narrow keel *Plantago maxima*
 - Plants usually do not become black, leaves mostly with cuneate base which smoothly change into petiole, bract narrowly ovate with thick keel 4.
4. Width of the middle vein, measured with hairs, 0.8–1.4 mm; leaf blade translucent, light-green, marginal veins weakly developed. Spikes are 5–8 times shorter than sterile part of stalk; bracts 1.1–2.5 mm. The base of shoot is nearly naked, without dead leaf sheaths *Plantago media* subsp. *media*
 - Width of the middle vein, measured with hairs, 1.2–2.1 mm; leaf blade almost not translucent, dark-green or grayish, marginal veins well developed. Spikes are 3–6 times shorter than sterile part of stalk; bracts 1.5–3.2 mm. The base of shoot covered by dead leaf sheaths *Plantago media* subsp. *stepposa*

See Fig. 3.1.

3.1.3 Section *Plantago*

1. Ovules (6)8 to many; seeds small, angled, corolla lobes minute. Leaves wide, petiolate, spike dense, elongate. Flowers with pedicels almost absent. No taproot (ser. *Plantago* = “*Polyneuron*” sensu Pilger) *Plantago major*

This group is likely the “species swarm” where borders between taxa are not well defined. They all might belong to one species, *Plantago major* s.l. The following names might belong here: *Plantago uliginosa*, *Plantago winteri*, *Plantago himalaica*.

- Ovules usually less than 8, typically also less than 6; seeds not angled 2.
- 2. No taproot or thick vertical rhizome 3.



Figure 3.1: *Plantago media* subsp. *stepposa* (MW, Urals) and *Plantago media* subsp. *media* (US, Quebec); rulers are 1 cm.

- Taproot or thick vertical rhizome 7.
- 3. Spike short (2 and more times shorter than scape), with stem almost invisible between flowers 4.
 - Spike typically longer, flowers loose, especially in lower part of spike 6.
- 4. Plants large (more than 20 cm), with narrowly ovate or lanceolate leaves, darken when drying, Java *Plantago hasskarlii*
 - Plants smaller, with ovate or elliptic leaves, do not usually darken when drying 5.
- 5. Spikes erect, thick (5 mm and thicker), continental China *Plantago densiflora*
 - Spikes decumbent, thinner, south-east Asia (especially western Indonesia) *Plantago incisa*

Interrelationships between three above species need further clarification.
- 6 (3). Bracts short, pedicels wanting, fruit narrowly ovate *Plantago asiatica*

This is another “species swarm”, mostly of Asian forms; not well distinct also from *Plantago major*. The following names might belong here: *Plantago sawadai*, *Plantago yezoensis*, *Plantago erosa*, *Plantago centralis*, *Plantago coreana*, *Plantago taquetii*, *Plantago schneideri*, *Plantago alata*, *Plantago cavaleriei*, *Plantago formosana*, *Plantago hostifolia*, *Plantago nanchuanensis*.

 - Spike more or less loose, especially at the base where stem is visible between flowers; bracts elongated, small pedicels also present; fruit almost lanceolate *Plantago rugelii*
- 7. Ovula 3–4, raro ad 7; bractea et sepala lata, carina haud vel parum incrassata, nervis in carina conspicuis. Species unica monticola Europae orientalis, rhizomate crassiusculo (Gentianoides) *Plantago gentianoides*
 - Ovula 2–4–7; carina bractee et sepalorum plerumque in laminas laterales transiens; sepala parum diversa; lobi corollae angustiores, parum reflexi. Saepe majores, saepe rhizoma crassum, elongatum vel caulis elatus indivisus vel parum divisus; spica elongata (“Palaeopsyllium”) 8.
- 8. Foliorum lamina lata a petiolo plerumque longo vel perlongo bene discreta 9.
 - Foliorum lamina sensim in petiolum abiens vel petiolus a lamina haud discretus, folia plerumque angustiora 16.
- 9. Folia non integra 10.
 - Folia ± integra vel undulata, vel leviter lobata vel dentata 11.
- 10. Folia lobata, nervis palmatim divergentibus; rhizoma breve. Africa tropica ... *Plantago palmata*
 - Folia grosse irregulariter dentata, breviter petiolata; spica perlaxa. Africa australis *Plantago laxiflora*
- 11. Nervi laterales laminae mediano proximi illi valde approximati et paralleli; folia sicca nigrescentia. America septentrionalis *Plantago cordata*

- Nervi laterales divergentes 12.
- 12. Rhizoma perlongum; spica perlaxa. Africa tropica *Plantago fischeri*
- Rhizoma brevius 13.
- 13. Foliorum lamina basi rotundata vel cordata 14.
- Foliorum lamina in petiolum breviter angustata 15.
- 14. Foliorum lamina basi rotundata. Madagascaria *Plantago tanalensis*
- Foliorum lamina cordata. Insula Rapa *Plantago rapensis*
- 15. Ovula 2. Africa australis *Plantago longissima*
- Ovula 4. Regio mediterranea *Plantago cornuti*
- 16. Nervi mediano proximi illi approximati vel cum illo confluentes, ad medium folium paralleli, turn parum divergentes 17.
- Nervi omnino \pm paralleli vel nervi laterales regulariter parum arcuato-divergentes 18.
- 17. Plerumque alte caulescens; nervi liberi; sepala 3–3.5 mm longa. Hawaii *Plantago princeps*
- Rhizoma breve; nervi laterales mediano proximi cum illo \pm uniti; sepala 4.5 mm longa. Insula Lord Howe *Plantago hedleyi*
- 18. Planta alte vel altius caulescens 19.
- Rhizoma vel caudex plerumque brevis 20.
- 19. Planta alte caulescens; folia late oblanceolata; spicae pedunculus brevis. Juan Fernandez *Plantago fernandezia*
- Planta altius caulescens; radix primaria bene evoluta; folia latissima, glabra *Plantago rupicola*
- 20. Radix primaria parum evoluta vel demum 0. Foliorum nervi cum folio decidui 21.
- Radix primaria bene evoluta. Caudex brevis 26.
- 21. Ovula 3 vel plura. Folia glabra vel parce pilosa 22.
- Ovula 2 24.
- 22. Bractea $\frac{1}{2}$ – $\frac{2}{3}$ calycis aequans, carina perlata; caulescens. St. Helena *Plantago robusta*
- Bractea calycem aequans 23.
- 23. Folia anguste petiolatim angustata, subtus breviter pilosa. Hawaii *Plantago hawaiiensis*
- Folia latius petiolatim angustata, vel basi breviter angustata; magna in petiolum latum, plicatum angustata, petiolo basi invaginam longam, perlatam dilatato; supra glabra. Hawaii *Plantago pachyphylla*

24. Folia anguste elliptica usque obovata. Insula Auckland *Plantago aucklandica*
 – Folia lineari-lanceolata vel lanceolata 25.
25. Folia crassa; spica laxa; bractea 2.5 mm longa; sepala 3 mm longa. Africa australis *Plantago remota*

 – Folia papyracea; spica perlaxa; bractea 1–2 mm longa; sepala 2–2.5 mm longa. America septentrionalis *Plantago sparsiflora*
26. Folia tenuiter coriacea; spica laxa; semina obscure rubro-brunnea usquenigricantia, 2–3 mm longa. America septentrionalis *Plantago eriopoda*
 – Folia papyracea; spica brevis, densiuscula; semina laetius vel obscurius olivaceo-brunnea, 1.5–2 mm longa. America septentrionalis *Plantago tweedyi*
- + *Plantago africana*
 + *Plantago anatolica*
 + *Plantago chihuahuensis*
 + *Plantago corvensis*
 + *Plantago fengdouensis*
 + *Plantago griffithii*
 + *Plantago hakusanensis*
 + *Plantago humboldtiana*
 + *Plantago tatarica*

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3.1.4 Section *Holopsyllium*

Fructus indehiscens; bractea et sepala nervo angusto instructa, haud carinata. Species unica boreali-americana *Plantago macrocarpa*

3.1.5 Section *Mesembrynia*

1. Carina bractee et sepalorum lata, valde crassa 2.
 – Carina bractee et sepalorum minus incrassata, carina sepalorum plerumque anguste prominens 4.
2. Lobi corollae obtusi *Plantago drummondii*
 – Lobi corollae ovati 3.
3. Lobi corollae ovati, ± angustati, obtusiusculi *Plantago pritzelii*

- Lobi corollae ovati, longius angustati, acutati, acuti *Plantago acutiloba*
- 4. Rhizoma validum; folia cano-hirsuto-tomentosa. Insula St. Paul *Plantago stauntonii*
- Non 5.
- 5. Caule lignoso perennans, parva *Plantago tildeniae*
- Plantae acaules vel caudex brevis 6.
- 6. Indumentum longum, tenue 7.
- Indumentum brevius, plerumque rigidius vel nullum 8.
- 7. Bractea ovata; sepala apice rotundata *Plantago sericophylla*
- Bractea lanceolato-ovata; sepala superne angustata *Plantago bakeri*
- 8. Sepala 3.5–4 mm longa; folia perlonga *Plantago struthionis*
- Sepala minora 9.
- 9. Radix primaria vix evoluta *Plantago raoulii*
- Radix primaria bene evoluta 10.
- 10. Sepala postica ecarinata, mediano angusto circ. ad medium percurrente. Hungaria, Transsilvania *Plantago schwarzenbergiana*
- Sepala postica carinata 11.
- 11. Folia spathulata 12.
- Folia linearia usque elliptica 13.
- 12. Sepala postica obovato-elliptica; folia erecta *Plantago hispida*
- Sepala postica elliptica, angustata; folia decumbentia *Plantago bellidioides*
- 13. Sepala hirsuto-pilosa *Plantago varia*
- Sepala glabra vel glabrescentia 14.
- 14. Folia linearia vel lanceolato-lineararia, ad 30 cm longa; sepala 2.5–3 mm longa *Plantago gaudichaudii*
- Non 15.
- 15. Folia lanceolata, ad 1.2 cm longa; sepala 1.75–2 mm longa; spica perlaxa *Plantago debilis*
- Folia anguste elliptica; spica ± densior *Plantago depressa*, *Plantago camtschatica*

Species incertae sedis: *Plantago mitchellii*, *Plantago antarctica*, *Plantago cunninghamii*, *Plantago pentasperma*, *Plantago arachnoidea*

+ *Plantago montisdicksonii*

- + *Plantago papuana*
- + *Plantago trichophora*
- + *Plantago cladarophylla*
- + *Plantago alpestris*
- + *Plantago euryphylla*
- + *Plantago daltonii*
- + *Plantago tasmanica*
- + *Plantago turrifera*
- + *Plantago multiscapa*
- + *Plantago euana*
- + *Plantago exilis*
- + *Plantago glabrata*
- + *Plantago spathulata*
- + *Plantago udicola*
- + *Plantago picta*
- + *Plantago komarovii*
- + *Plantago krascheninnikovii*
- + *Plantago perssonii*

3.1.6 Section *Virginica*

1. Ovary with 2 ovules, capsule 2-seeded 2.
 - Ovary with 3 ovules, capsule 3-seeded. Inner side of seed slightly convex, rarely plane (*Plantago catharinaea*) 6.
2. Inner side of seed concave 3.
 - Inner side of seed flat. Hairs on scape patent or pointing slightly upwards, not appressed. Bracts triangular, 2.0–3.1 mm long. Anterior sepals 1.8–2.8 mm long. Leaves always pilose, never strongly toothed. (C. Chile) *Plantago firma*
3. Hairs on scape patent. Leaves usually pilose. Bracts 0.7–1.3 mm wide 4.
 - Hairs on scape pointing upwards, appressed. Leaves glabrous but shortly ciliate, often distinctly toothed. Bracts 1.1–1.5 mm wide, 1.4–2.6 mm long, broadly triangular. (Uruguay, N.E. Argentina) *Plantago penantha*
4. Anterior sepals obtuse, 1.5–2.4 mm long. Bracts 1.6–2.4 mm long, ovate or narrowly ovate. Seeds narrow, inner side very concave. (USA, N.E. Mexico) *Plantago virginica*

- Anterior sepals acuminate. Bracts triangular or narrowly triangular. Seeds broad, inner side not strongly concave 5.
- 5. Anterior sepals 2.7–3.6 mm long, bracts 2.5–3.2 mm long. (USA, N.E. Mexico) *Plantago rhodosperma*
- Anterior sepals 1.8–2.2 mm long, bracts 1.8–2.7 mm long. (Galapagos Islands) *Plantago galapagensis*
- 6. Anterior sepals acute. Spike with fewer flowers below than above. Leaves elliptic or obovate. Hairs on scape patent or pointing slightly upwards. (Colombia, Bogota) ... *Plantago tenuipala*
- Anterior sepals obtuse. Leaves narrowly elliptic, narrowly obovate or obovate 7.
- 7. Corolla lobes 1.1–1.6 mm long. Spikes short and dense. Hairs on scape pointing upwards. Hairs on the upper surface of the leaf noticeably longer than the marginal hairs. (S. Peru, Bolivia) *Plantago myosuroides* ssp. *humilior*
- Corolla lobes 1.6–3.6 mm long. Hairs on scape patent. Hairs on the upper surface of the leaf only slightly longer than the marginal hairs 8.
- 8. Inner side of seed convex. Anterior sepals 0.6–1.0 mm wide 9.
- Inner side of seed plane. Anterior sepals 0.9–1.4 mm wide. Taproot thin (although perennial); older plants with a thin, elongated caudex covered with long, conspicuous, brownish orange hairs. (Coast of S. Brazil) *Plantago catharinea*
- 9. Spike with flowers more or less evenly distributed. Taproot thin, never swollen above. Bracts usually triangular, 1.2–2.7 mm long, 0.6–1.4 mm wide. (Ecuador, Peru, Argentina, Paraguay, Uruguay, S. Brazil) *Plantago myosuroides* ssp. *myosuroides*
- Spike with fewer flowers below than above. Taproot often swollen above. Bracts often narrowly triangular, 1.7–3.0 mm long, 0.7–1.0 mm wide. (Paraguay, N.E. Argentina) *Plantago tomentosa* ssp. *napiformis*
- 10. Perennial, with fibrous roots or a thickened primary taproot, or several secondary taproots 11.
- 11. Thickened primary taproot or several secondary taproots present 12.
- Fibrous roots present, usually obscuring the thin primary root 39.
- 12. Hairs on scape patent or variously directed 13.
- Hairs on scape pointing upwards 26.
- 13. Leaves linear. Spike with flowers more or less evenly distributed 14.
- Leaves narrowly to broadly elliptic, obovate or ovate, 3–64 mm wide 16.
- 14. Leaves glabrous, about 4 mm wide. Ovary with 3 ovules, capsule 3-seeded. Bracts narrowly ovate, 3.5–5.0 mm long, 1.0 mm wide. (Brazil (Ilha da Trindade)) *Plantago trinitatis*

- Leaves pilose or almost glabrous. Ovary with 1–3 ovules, capsule 1-or-2 seeded. Bracts triangular, 1.1–2.0 mm wide 15.
- 15. Leaves often densely covered with slender hairs, 0.01–0.03 mm wide, 1–5 mm long. Leaves 3–16 mm wide. Bracts 2.0–4.2 mm long. (E. Paraguay, Brazil) *Plantago commersoniana*
 - Leaves with only scattered hairs, 0.02–0.04 mm wide, 0.3–1.3 mm long. Leaves 1.3–3.5 mm wide. Bracts 1.3–2.9 mm long. (S. Bolivia, N.W. Argentina) *Plantago weddelliana*
- 16. Hairs on upper surface of leaf slender, 0.01–0.03 mm wide. Primary taproot never strongly developed, often with several rather thin secondary taproots 17.
 - Hairs on upper surface of leaf (0.03–)0.06 (–0.13) mm wide 19.
- 17. Hairs 0.4–1.0 mm long. Ovary with 3 ovules, capsule 2-or 3-seeded. Leaves elliptic or narrowly elliptic. (S. Brazil) *Plantago guilleminiana*
 - Hairs 1.0–6.0 mm long 18.
- 18. Ovary with 3 ovules, capsule 3-seeded. Lamina of leaf narrowly elliptic, usually clearly distinct from the petiole. (Mexico) *Plantago floccosa*
 - Ovary with 1–3 ovules, capsule 1-or 2-seeded. Leaves usually linear, rarely narrowly elliptic, lamina not clearly distinct from the petiole. (E. Paraguay, Brazil) . . . *Plantago commersoniana*
- 19. Bracts ovate, often broadly so, 1.6–2.1 mm wide. Leaves often prominently toothed. Spike with flowers more or less evenly distributed, shorter than the scape. Taproot strongly thickened . . .
..... *Plantago orbignyana* (sspp. keyed below)
 - Bracts narrowly to broadly triangular, 0.8–1.8 mm wide. Leaves usually not prominently toothed
..... 20.
- 20. Ovary with 2 ovules; capsule 2-seeded; inner side of seed concave. (Mexico)
..... *Plantago alismatifolia*
 - Ovary with 3 ovules; capsule 3-seeded; inner side of seed flat or slightly convex 21.
- 21. Testa rugose. (S. Peru, Bolivia, Argentina, Paraguay, Uruguay, S. Brazil)
..... *Plantago tomentosa* ssp. *tomentosa*
 - Testa not rugose 22.
- 22. Fruits 3-seeded, seeds 1.7–2.3 mm long. Rhizome rarely branched. Corolla lobes erect or patent
..... 23.
 - Fruits usually 1 or 2-seeded, seeds 2.1–3.0 mm long. Rhizome and taproot thick and often branched. Corolla lobes patent 25.
- 23. Caudex short, with inconspicuous hairs. Anterior sepals 2.1–2.5 mm long, 0.7–1.0 mm wide. Corolla lobes 1.7–2.2 mm long. Bracts 0.7–1.0 mm wide. Taproot often swollen above. (Paraguay, N.E. Argentina) *Plantago tomentosa* ssp. *napiformis*

- Caudex thin and elongate or short and thick, covered with long, conspicuous brownish orange hairs. Anterior sepals 2.2–3.5 mm long, 0.9–1.7 mm wide. Corolla lobes 2.3–4.2 mm long. Bracts 1.0–2.3 mm wide 24.
- 24. Taproot thin. Caudex long and thin. Bracts 1.5–2.6 mm long, 1.0–1.4 mm wide, with a distinct hyaline margin. Leaves obovate, sometimes narrowly so. (Coast of Brazil) *Plantago catharinaea*
- Taproot thick, often swollen above. Caudex short and thick. Bracts 2.2–4.8 mm long, 1.3–2.3 mm wide, hyaline margin very narrow. Leaves ovate or elliptic, often narrowly so. (Uruguay, Argentina (S. Buenos Aires province)) *Plantago berroi*
- 25. Plant often becoming black on drying. Leaves sparsely pilose, hairs 0.5–1.3 mm long. Anterior sepals 0.9–1.2 mm wide. Seeds 2.1–3.0 mm long. (N.W. Argentina) *Plantago argentina*
- Plant remaining green on drying. Leaves usually densely hairy, hairs 1.5–3.0 mm long. Anterior sepals 1.1–1.5 mm wide. Seeds 3.1–3.3 mm long. (Argentina (S. Buenos Aires province)) *Plantago ventanensis*
- 26. Ovary with 1 or 2 ovules 27.
- Ovary with 3 or 4 ovules 30.
- 27. Leaves glabrous. Fruits 1-seeded. Bracts ovate. Taproot very strongly developed. (Uruguay, Argentina (Buenos Aires province)) *Plantago dielsiana*
- Leaves pilose 28.
- 28. Hairs on surface of leaf pointing forwards, appressed, 0.3–0.5 mm long, 0.03–0.05 mm wide. (N.W. Argentina) *Plantago jujuyensis*
- Hairs on surface of leaf variously directed, 0.3–1.6 mm long, 0.05–0.12 mm wide 29.
- 29. Ovary with 2 ovules; capsule 2-seeded, inner side of seeds concave. Hairs on upper surface of leaf 0.3–1.0 mm long. Bracts narrowly triangular. (Mexico) *Plantago alismatifolia*
- Ovary with 2 or 3 ovules; capsule 1–3-seeded, inner side of seed flat or slightly convex. Hairs on upper surface of leaf 1.0–1.6 mm long. Bracts ovate or triangular. (C. Chile) *Plantago truncata*
- 30. Spike with flowers more or less evenly distributed. Ovary with 3 or 4 ovules 31.
- Spike with fewer flowers below than above. Ovary with 3 ovules 34.
- 31. Hairs of leaves and scape often rather stiff and straight, 1.0–3.0 mm long, 0.03–0.10 mm wide. Spike about equalling the scape. Hyaline margin of bracts very narrow. Corolla lobes 2.3–4.2 mm long. Inner side of seed convex. (Uruguay, Argentina (S. Buenos Aires province)) *Plantago berroi*
- Hairs of leaves and scape rather broad, flexuous, 0.2–2.0 mm long, 0.07–0.13 mm wide. Spike shorter than the scape. Hyaline margin of bracts conspicuous. Corolla lobes 0.9–3.5 mm long. Inner side of seed flat, rarely slightly convex *Plantago orbignyana* (cont.)

32. Bracts obtuse, shortly ciliate on the margin otherwise glabrous, broadly ovate. Corolla lobes 0.9–1.5 mm long. Anterior sepals 1.7–2.1 mm long. (S. Peru, Bolivia, N.W. Argentina) *Plantago orbignyana* ssp. *orbignyana*
 – Bracts acute, usually pilose, with long cilia, ovate or broadly triangular. Corolla lobes 1.4–3.5 mm long. Anterior sepals 2.2–3.3 mm long 33.
33. Hairs on scape patent, rarely pointing upwards, never appressed. Plant generally becoming darker on drying. Leaves prominently toothed. Caudex and taproot often branched. (N.W. Argentina) *Plantago orbignyana* ssp. *niederleinii*
 – Hairs on scape usually pointing upwards, often appressed, rarely patent. Plant usually remaining green on drying. Caudex and taproot rarely branched. (Peru, Bolivia, N.W. Argentina) *Plantago orbignyana* ssp. *pseudomollior*
34. Bracts ovate. Spike often shorter than the scape 35.
 – Bracts triangular or narrowly triangular. Spike equalling or exceeding the scape. Hairs on scape usually appressed 38.
35. Hairs on scape not appressed. Leaves densely pilose 36.
 – Hairs on scape appressed. Leaves glabrous or with scattered hairs 37.
36. Leaves usually prominently toothed. Corolla lobes 1.9–2.8 mm long. Hairs on upper surface of leaf 0.10–0.16 mm wide. (Ecuador) *Plantago orbignyana* ssp. *hartwegii*
 – Leaves not prominently toothed. Corolla lobes 3.1–3.7 mm long. Hairs on upper surface of leaf 0.06–0.10 mm wide (C. Chile) *Plantago truncata*
37. Leaves pilose and ciliate. Corolla lobes 2.4–2.7 mm long. Anterior sepals 2.6–3.1 mm long. (Pacific states of USA) *Plantago subnuda*
 – Margin and usually also the surface of the leaf glabrous. Corolla lobes 1.4–1.9 mm long. Anterior sepals 1.8–2.6 mm long. (Chile) *Plantago pachyneura*
38. Very tall plants, flowering stems more than 600 mm long. Leaves 50–110 mm wide, usually glabrous and becoming black on drying. Seeds 2.6–3.0 mm long. (N.W. Argentina) *Plantago venturii*
 – Flowering stems not more than 600 mm long. Leaves 8–60 mm wide, generally pilose and remaining green on drying. Seeds 1.5–2.4 mm long. (Bolivia, N.W. Argentina) *Plantago buchtienii*
39. Hairs on scape patent. Leaves pilose. Ovary with 1 or 2 ovules. (S. Brazil) *Plantago turficola*
 – Hairs on scape pointing upwards *Plantago australis* (cont.)
40. Plant usually becoming quite black on drying; usually glabrous except for the scape. Leaves minutely toothed. Spike shorter than the scape. Bracts glabrous, broadly to narrowly ovate. Corolla lobes shorter than the anterior sepals, always patent. Ovary with 1–3 ovules; capsule 1–3-seeded 41.

- Plant remaining green on drying or turning slightly darker but never black. Bracts always ciliate 42.
- 41. Corolla lobes 1.3–2.0 mm long. Ovary with 2 or 3 ovules; capsule 1–3-seeded. Caudex with sparse brownish orange hairs. Margin of leaf always glabrous. (Colombia, Venezuela) *Plantago australis* ssp. *oreades*
- Corolla lobes 1.9–2.5 mm long. Ovary with 1–3 ovules; capsule 1-seeded. Caudex with conspicuous long, brownish orange hairs. Margin of leaf usually glabrous. (S. Brazil) *Plantago australis* ssp. *pretoana*
- 42. Ovary with 2 ovules; capsule 1-or 2-seeded. Margin of leaf glabrous. Spike much shorter than the scape. Anterior sepals triangular or narrowly so. Corolla lobes shorter than the anterior sepals, always patent. (C. Mexico) *Plantago australis* ssp. *leioloma*
- Ovary with 3 ovules; capsule usually 3-seeded 43.
- 43. Petiole about $\frac{1}{3}$ the width of the lamina. Plant often becoming darker on drying. Bracts triangular or narrowly so. Leaves pilose or glabrous, rather thick, rarely prominently toothed. (Venezuela, Colombia, Ecuador, Peru) *Plantago australis* ssp. *sodiroana*
- Petiole narrow, about $\frac{1}{4}$ the width of the lamina. Plant rarely becoming darker on drying ... 44.
- 44. Bracts narrowly triangular or triangular. Leaves rarely prominently toothed. Spike often equalling or exceeding the scape 45.
- Bracts ovate or broadly ovate. Spike usually shorter than the scape 46.
- 45. Upper surface of leaf usually glabrous, rarely with short (to 1 mm long), scattered hairs. Spike sometimes shorter than the scape, rather thick. Leaves usually thick. (By streams in unforested areas; S. Bolivia, Argentina, Uruguay and S. Brazil) *Plantago australis* ssp. *australis*
- Upper surface of leaf generally pilose, hairs more than 1 mm long. Spike often exceeding the scape, rather slender. Anterior sepals usually acute. Leaves often thin. (Forested areas; S. Brazil, Paraguay, N. Argentina and along the Cordillera to Mexico and Arizona) *Plantago australis* ssp. *hirtella*
- 46. Corolla lobes generally shorter than the anterior sepals. Leaves usually prominently toothed. (Peru, Bolivia) *Plantago australis* ssp. *pflanzii*
- Corolla lobes equalling or exceeding the anterior sepals. Leaves usually not prominently toothed 47.
- 47. Caudex with conspicuous, long, brownish orange hairs. (S. Chile, S.W. Argentina) *Plantago australis* ssp. *cumingiana*
- Caudex with inconspicuous hairs. (Brazil) *Plantago australis* ssp. *angustifolia*
- + *Plantago rahniana*
- + *Plantago bradei*
- + *Plantago cumingiana*

- + *Plantago cuzcoensis*
- + *Plantago hatschbachiana*
- + *Plantago napiformis*
- + *Plantago oreades*
- + *Plantago pretoana*
- + *Plantago veadeirensis*

3.1.7 Section *Micropsyllium*

(Pilger)

1. Ovula numerosa 2.
 - Ovula 4(–8) 4.
 2. Bractea ovata, angustata, sepala obovata 3.
 - Bractea et sepala rotundata, nervi in carina conspicui *Plantago polysperma*.
 3. Carina bractee valde incrassata, basi parum exsaccata; sepala latiora apice rotundata, angustiora valde inaequilatera; semina valde numerosa *Plantago heterophylla*
 - Carina bractee minus incrassata, haud exsaccata; sepala latiora plerumque ± angustata, angustiora minus inaequilatera *Plantago tenuiflora*
 4. Ovula 5–8; semina valde impresso-punctulata; carina bractee valida *Plantago bigelovii*
 - Ovula 4; semina ruguloso-punctata 5.
 5. Radix elongata; semina 2 mm longa *Plantago elongata*
 - Radix brevis; semina minora *Plantago pusilla*
- + *Plantago minor* Fries

(Bassett, North America)

1. Fruit 10 to 25(30) seeded; seeds 0.5–0.8 mm long *Plantago heterophylla*
- Capsule (3)4 to 9(12) seeded; seeds 0.75–2.5 mm long 2.
2. Corolla lobes mostly erect in age forming a beak; seeds 4, 0.75–1.8 mm long ... *Plantago pusilla*
- Corolla lobes spreading or reflexed in age, not forming a beak; seeds (3)4 to 9(12), 1.5–2.5 mm long 3.
3. Scape and leaves mostly erect, plants 5–15 cm high; seeds (3)4 to 5(6), roughly or finely rugose pitted, dark brown, elliptic oblong, 1.75–2.5 mm long *Plantago elongata*

- Scape and leaves mostly decumbent to semierect, plants 1.5–8 cm high; seeds (3)4 to 9(12), irregularly and coarsely pitted, dark brown to black, slightly angled in outline, 1.5–2.0 mm long *Plantago bigelovii*

3.1.8 Section *Oliganthos*

Includes sections of *Plantago* and to species and subspecies of sect. *Oliganthos* in South America south of 39°S.

1. Two ovules and seeds. Inner side of seed deeply concave. Plane between cotyledons perpendicular to inner side of seed. Bract and sepals villose on back. Corolla glabrous. (*Plantago* subgen. *Psyllium*) 2.
 - Two to many ovules and seeds. Inner side of seed flat, rarely slightly concave or convex. Flowers spirally arranged in a spike. Bract and sepals pilose or glabrous on back 3.
2. Anterior sepals united for more than half their length, scarious parts united. Green nerve of bract not reaching apex, upper part of bract scarious, acuminate. Scape sulcate. Hairs on scape not antrorse and not wider than those on leaves. Green nerve of posterior sepal often with a wing. Flowers spirally arranged in a dense spike (sect. *Lanceifolia*) *Plantago lanceolata* L.
 - Anterior sepals united at the very base only, scarious parts free. Green nerve usually reaching apex of bract and sometimes elongated. Scape not sulcate. Posterior sepals without wings. Scape covered by antrorse hairs about twice as wide as those on leaves, sometimes also a few longer patent hairs present. Flowers opposite or in whorls of three alternating on the axis sect. *Gnaphaloides*
- 3 (1). Corolla tube with short hairs. The plane between the cotyledons perpendicular to the inner side of the seed. Leaves linear, fleshy. Spike long. Ovary with 3–4 ovules, (subgen. *Coronopus*) *Plantago maritima* L.
 - Corolla glabrous. The plane between the cotyledons parallel to the inner side of the seed. Leaves ovate to linear, not fleshy. Spike long or short. Two to many ovules, (subgen. *Plantago*) 4.
4. Lamina ovate, truncate or obtuse at base, distinct from the petiole. Spike cylindrical, long. Capsule with 8–34 seeds. Bracts and sepals glabrous, (sect. *Plantago*) *Plantago major* L.
 - Lamina linear to elliptic, cuneate at base, not distinct from the petiole 5.
5. Spike usually long, cylindrical. Bract and sepals pilose on back. Anterior sepals narrower than posterior. Corolla lobes often erect, closing the corolla. 2–3 ovules, 1–3 seeds ... sect. *Virginica*
 - Spike short, with 1–12 flowers. Bract and sepals glabrous on back. Sepals equal. Corolla lobes patent. (2-)4–15 ovules 6 (sect. *Oliganthos*).
6. Apex of leaves acuminate, acumen usually colourless, flowers usually solitary 7.
 - Apex of leaves obtuse or acute, rarely acuminate, acumen green. Hairs rarely antrorse. Spike with 1–12 flowers 9.
7. Leaves usually more than 12 mm long, scape usually more than 8 mm long, with antrorse hairs, rarely glabrous 8.

- Leaves usually less than 12 mm long, connivent, scape less than 8 mm, often glabrous. The Andes, 46°–51°S *Plantago sempervivoides* .
- 8. Bract and sepals acuminate or acute, acumen not colourless. Acumen on leaves usually short. Ovules 6–8(–14). In rather dry habitats in Tierra del Fuego and SE Patagonia, 51°–54°S *Plantago correae*
- Bract and sepals usually with a colourless acumen. Acumen on leaves usually long. Ovules 3–5(–7). Often in moderately wet habitats in the Andes from (22°–)29°–52°S and in S Patagonia on the plain *Plantago uniglumis*
- 9 (6). Lamina densely lanate above, glabrous below. Petiole glabrous or ciliate. Leaves spatulate with entire margins. Spike with two flowers. W Falkland (N = 1) *Plantago moorei*
- Leaves glabrous or with scattered hairs above, especially near the teeth. Petiole glabrous. Leaves linear, elliptic or spatulate 10.
- 10. Usually more than 40 leaves in a rosette, leaves usually prostrate and glabrous. Spikes with a single flower. Moist, often salty habitats in S Patagonian lowlands *Plantago pulvinata*
- Usually less than 40 living leaves in a rosette, leaves rarely prostrate. Spike with 1–12 flowers 11.
- 11. Leaves usually less than 11 mm wide and 85 mm long. Scape longer than 115 mm. Spike with 1–9 flowers 12.
- Leaves usually more than 11 mm wide and 85 mm long. Scape longer than 115 mm. Largest spikes with 8–12 flowers. Leaves dentate. Salty meadows etc. in SE Chubut and NE Santa Cruz prov., Argentina. 45°–46°S *Plantago barbata* ssp. *gigantea*
- 12. Leaves usually wider than 3 mm. Spike usually with more than one flower 13.
- Leaves usually narrower than 3 mm . Spikes usually with a single flower 14.
- 13. Ovary never with more than 4 ovules. Leaves glabrous with margins usually entire. Anthers usually longer than 1.3 mm excluding an appendix less than 0.25 mm. Patagonia, in steppe vegetation *Plantago tehuelcha*
- Ovary usually with more than 4 ovules. Leaves often glabrous, with margins usually dentate. Anthers usually longer than 1.3 mm excluding an appendix exceeding 0.25 mm. Moist, often salty places in Patagonian lowlands 46°–52°S, in the Andes 29°–42°S, and the Magellan archipelago 49°–56°S *Plantago barbata* ssp. *barbata*
- 14 (12). Leaves rarely obtuse, usually with one or a few hairs at the very apex. The Andes 42°–52°S and Tierra del Fuego in and above the forested zone, usually in non saline habitats *Plantago barbata* ssp. *austroandina*
- Leaves usually obtuse, rarely with hairs at apex, usually in saline habitats 15.
- 15. Leaves usually shorter than 17 mm. Wool from the leaf axil rarely visible in the rosette. Corolla lobes often < 1.35 mm. Sea cliffs at Isla del Estado and the Magellan archipelago, 52°–57°S *Plantago barbata* ssp. *muscooides*

- Leaves usually longer than 17 mm. Wool from the leaf axil usually visible in the rosette. Corolla lobes often longer than 1.35 mm. Salty habitats in the lowlands of S Patagonia, Tierra del Fuego, and Falkland Islands. 49°–56°S *Plantago barbata* ssp. *monanthos*

+ *Plantago triantha*

3.1.9 Section *Microcalyx*

1. Sepala perparva, 1 mm longa; spica ad florem unicum reducta. Nova Zelandia *Plantago triandra*
 - Sepale majora 2.
2. Ovula 4 3.
 - Ovula plura 6.
3. Semina 3–4 mm longa. Patagonia (*Plantago tehuelcha*)
 - Semina minora 4.
4. Folia late spathulata *Plantago spathulata*
 - Folia lanceolata vel elliptico-lanceolata 5.
5. Bractea 2–2.5 mm longa; sepala 2 mm longa *Plantago tasmanica*
 - Bractea 3–4 mm longa, carina perlata; sepala 3 mm longa *Plantago picta*
6. Bractea et sepala ad 2 mm tantum longa; plantae perparvae 7.
 - Bractea et sepala longiora 8.
7. Folia irregulariter pilosa, lanceolata *Plantago paradoxa*
 - Folia supra hirsuto-villosa, spathulata *Plantago gunnii*
8. Bractea apice incurvata. America australis (*Plantago barbata*)
 - Bractea haud incurvata 9.
9. Folia superne longius angustata, glabra *Plantago muelleri*
 - Folia spathulata 10.
10. Folia glabra vel parce pilosa, pilis paucicellulatis, cellulis angustis; ovula 6–8
 - (*Plantago triantha*)
 - Folia ± copiose pilosa, pilis multicellulatis, cellulis plerumque non multum longioribus quam latis; ovula ad 14 *Plantago lanigera*

Species incertae sedis: *Plantago pulvinata*, *Plantago archeri*, *Plantago pachyrrhiza*

+ *Plantago novae-zelandiae*

- + *Plantago palustris*
- + *Plantago glacialis*
- + *Plantago aundensis*
- + *Plantago stenophylla*
- + *Plantago polita*
- + *Plantago depauperata*
- + *Plantago unibracteata*
- + *Plantago obconica*

3.1.10 Section *Carpophorae*

1. Leaves all dentate in most collections, or most leaves dentate; usually with prominent teeth. Leaves sometimes hairy, rarely shiny or dotted. Carpophore usually longer than 17 mm. Branched pieces of plants rarely present on herbarium sheets *Plantago tubulosa*
- Leaves all entire in some collections, rarely all dentate, and even more rarely with prominent teeth. Leaves all glabrous, often shiny and dotted. Carpophore usually shorter than 17 mm. Branched pieces of plants often present on herbarium sheets *Plantago rigida*

3.2 Regional keys

3.2.1 *Plantago* in North America

(Shipunov A. 2019. *Plantago* and *Littorella*. In: Freeman, C. and Rabeler R. (eds.) Flora of North America. 2019. Volume XVII. P. 280-293. Oxford University Press, New York and Oxford.)

1. Leaves cauline 2.
 - Leaves basal 4.
2. Perennials, sometimes woody *Plantago sempervirens*
 - Annuals 3.
3. Spikes glandular-hairy; all bracts similar *Plantago afra*
 - Spikes eglandular; proximal bracts strongly differing from distal bracts *Plantago arenaria*
4. Leaf margins usually 1- or 2-pinnatifid; scapes decumbent, sometimes erect; corolla tubes hairy *Plantago coronopus*
 - Leaf margins entire, toothed, or lobed; scapes erect or ascending; corolla tubes glabrous, rarely hairy (*Plantago maritima*) 5.
5. Annuals; leaf blades linear, narrowly lanceolate, narrowly elliptic, or almost filiform; roots tap-roots 6.

- Perennials or annuals; leaf blades ovate, elliptic, or lanceolate, sometimes cordate-ovate, lanceolate-spatulate, linear, oblanceolate, obovate, or oval; roots taproots or fibrous 16.
- 6. Seeds (3 or)4–25(–30); corollas radially symmetric, lobes 0.5–1 mm; leaf blade surfaces glabrous or hairy 7.
 - Seeds 2; corollas bilaterally or radially symmetric, lobes 1.3–3.6 mm; leaf blade surfaces lanate, sericeous, or villous, rarely glabrate or glabrous 9.
- 7. Seeds 10–25(–30), 0.5–0.8 mm *Plantago heterophylla*
 - Seeds (3 or)4–9(–12), 0.8–2.5 mm 8.
- 8. Corolla lobes spreading or reflexed, not forming a beak; seeds (3 or)4–9(–12), 1.5–2.5 mm
..... *Plantago elongata*
 - Corolla lobes erect, forming a beak; seeds 4, 0.8–1.3 mm *Plantago pusilla*
- 9. Spikes: flowers in spirals; scapes without antrorse hairs; bracts ovate or elliptic
..... *Plantago ovata*
 - Spikes: flowers in whorls or pairs; scapes with some antrorse hairs; bracts ovate, triangular, or almost linear 10.
- 10. Corollas radially symmetric, lobe bases obtuse or slightly cordate 11.
 - Corollas bilaterally symmetric, lobe bases slightly to deeply cordate 12.
- 11. Scapes with antrorse, long and short hairs; bract lengths 0.3–0.8 times sepals; corolla lobes 2–2.7 mm; California, Oregon *Plantago erecta*
 - Scapes with patent, long and antrorse, short hairs; bract lengths 0.6–2.2 times sepals; corolla lobes 3–3.6 mm; New Mexico, Texas *Plantago helleri*
- 12. Leaf blades: adaxial surfaces glabrous or sparsely villous, margins entire, rarely toothed; stems 10–40 mm 13.
 - Leaf blades: adaxial surfaces sericeous or villous, rarely lanate, margins entire or toothed; stems 0–20 mm 14.
- 13. Bract lengths 2–12 times sepals; corolla lobes: adaxials 1.4–2.3 mm, laterals symmetric; flowering spring–fall *Plantago aristata*
 - Bract lengths 0.4–0.8 times sepals; corolla lobes: adaxials 2.4–3 mm, laterals asymmetric; flowering summer *Plantago wrightiana*
- 14. Bracts ovate, lengths 0.4–0.7 times sepals; leaves 1.5–4 mm wide; anther connectives slightly elongated, apices obtuse *Plantago argyrea*
 - Bracts triangular or ovate, lengths 0.6–2 times sepals; leaves 1–4 or 4–10 mm wide; anther connectives elongated to significantly elongated, apices acute 15.

15. Bract lengths 0.6–1.4 times sepals; corolla lobes 2.2–2.5 mm; leaves 4–10 mm wide, blade margins toothed, rarely entire; flowering spring *Plantago hookeriana*
 – Bract lengths 1–2 times sepals; corolla lobes 1.6–2.1 mm; leaves 1–4 mm wide, blade margins entire, rarely toothed; flowering early summer *Plantago patagonica*
16. Corolla lobes usually forming a beak, erect or patent; annuals or perennials (usually without caudex) 17.
 – Corolla lobes not forming a beak, spreading or reflexed; perennials (sometimes with caudex), rarely annuals 22.
17. Annuals; roots taproots 18.
 – Perennials; roots taproots or fibrous 20.
18. Seeds: adaxial faces flat; bracts triangular, 2–3.1 mm; sepals 1.8–2.8 mm *Plantago firma*
 – Seeds: adaxial faces concave; bracts ovate or triangular, 1.6–3.2 mm; sepals 1.5–3.6 mm ... 19.
19. Sepals 2.7–3.6 mm, apices acuminate; bracts 2.5–3.2 mm, narrowly triangular or triangular; seeds dark red *Plantago rhodosperma*
 – Sepals 1.5–2.4 mm, apices obtuse; bracts 1.6–2.4 mm, narrowly ovate or ovate; seeds brown or yellowish brown *Plantago virginica*
20. Adaxial surfaces of leaves: hairs floccose, slender, 4–6 x 0.01–0.03 mm *Plantago floccosa*
 – Adaxial surfaces of leaves: hairs not floccose, less than 2 mm long, more than 0.03 mm wide 21.
21. Roots fibrous; sepals 2–2.5 mm *Plantago australis*
 – Roots taproots; sepals 2.6–3.1 mm *Plantago subnuda*
22. Fruits ovoid, indehiscent or dehiscence not circumscissile *Plantago macrocarpa*
 – Fruits lanceoloid, dehiscence circumscissile 23.
23. Leaf blades linear to lanceolate, veins not conspicuous; corolla tubes hairy *Plantago maritima*
 – Leaf blades lanceolate, linear, oblanceolate, oval, cordate-ovate, lanceolate-spatulate, ovate, or elliptic, veins conspicuous; corolla tubes glabrous 24.
24. Spikes grayish, whitish, or yellowish, shiny, corolla lobes of neighboring flowers often overlapping 25.
 – Spikes brownish or greenish, dull, corolla lobes of neighboring flowers not overlapping ... 27.
25. Sepals: adaxial 2 connate; scapes groove-angled *Plantago lanceolata*
 – Sepals: adaxial 2 nearly distinct; scapes not groove-angled 26.

26. Leaves ascending, 6–20 mm wide, blades linear to lanceolate or oblanceolate, surfaces hairy (hairs 1 mm) or glabrate; seeds 3–7, 1–1.8 mm *Plantago canescens*
 – Leaves prostrate, sometimes ascending, 30–70 mm wide, blades elliptic to ovate, surfaces hairy (hairs 0.5 mm); seeds 2–4, 2 mm *Plantago media*
27. Caudices absent or caudices poorly developed 28.
 – Caudices well developed, conspicuous 29.
28. Fruits (2–)4–5 mm, dehiscent at middle; seeds 5–35, 0.5–1 mm; bracts 0.5–1 mm *Plantago major*
 – Fruits 4–6(–8) mm, dehiscent proximal to middle; seeds 4 or 5(–8), 1.5–2 mm; bracts 2 mm *Plantago rugelii*
29. Leaves densely hirsute, Aleutian islands *Plantago camtschatica*
 – Leaves glabrous or sparsely hirsute 30.
30. Spikes densely flowered, rachises not clearly visible between flowers; scapes slightly surpassing leaves *Plantago tweedyi*
 – Spikes loosely flowered, rachises visible between flowers; scapes surpassing leaves 31.
31. Leaf blades: lateral veins branching from midvein distal to base *Plantago cordata*
 – Leaf blades: lateral veins branching from base 32.
32. Caudices brown-woolly; c, w United States and Canada *Plantago eriopoda*
 – Caudices glabrous; se United States *Plantago sparsiflora*

3.2.2 *Plantago* in European Russia

(Shipunov A. 2000. The genera *Plantago* L. and *Psyllium* Mill. (Plantaginaceae Juss.) in the flora of East Europe. The News of Systematics of Higher Plants. T. 32. S-Petersb. 2000, 139–152.)

1. Leaves opposite. Stems with long internodes. Inflorescences nearly capitate. Capsula with 2 big seeds 2.
 – Leaves alternate, in the rosette. Inflorescences long or short cylindrical. Capsula with 12 or bigger number of seeds 4.
2. Annuals 3.
 – Perennials with lignose stems; bracts of lower flowers are very broad, covered the most part of inflorescence base *Plantago sempervirens*
3. Bracts of lower flowers with long, narrowed appendages. Bracts of upper flowers nearly spatulate, with keel, which extend to the tip. Greyish, branching plants *Plantago arenaria*

- Bracts of lower flowers with straight appendages. Bracts of upper flowers egg-shaped, with keel, which not extend to the tip. Greenish plants, usually with rare branches *Plantago afra*
- 4. Two adaxial sepals united by nearly full length. Leaves from linear to broadly lanceolate. Spike stalk is grooved. Spikes are very compact 5.
 - Adaxial sepals free. Spike stalks cylindrical, sometimes grooved, but at last case spikes are loose 6.
- 5. Adventitious roots absent; lateral roots are thin, it width less than 0.75 mm. Rhizome short, 5-7 mm length, vertical or near vertical. Sepals 2.2–3.5 mm length *Plantago lanceolata*
 - Adventitious roots are thick, 1–2 mm. Rhizome in most cases long, 7 cm or more, nearly horizontal. Sepals about 4 mm length *Plantago altissima*
- 6. Leaves lanceolate, with lobed or toothed margins. Spike stalks adpressed to the ground, sometimes rising upward *Plantago coronopus*
 - Leaves linear or more broad, smooth edged or somewhat toothed 7.
- 7. Leaves linear or linear-lanceolate 8.
 - Leaves from broadly lanceolate to broadly elliptical, or broadly on lanceolate 14.
- 8. Corolla tube pilose *Plantago maritima*
 - Corolla tube naked 9.
- 9. Perennials with thick, often polycephalous rhizome 10.
 - Annuals 11.
- 10. Bract width is greater than length. Spike short cylindrical. Flowers large, to 1 cm length. Leaves wider than 0.5 cm, with several veins, light-green *Plantago atrata*
 - Bract length is greater than width. Spike long and narrowly cylindrical. Flowers are less than 0.5 cm. Leaves narrower than 0.5 cm, with 1 vein, grayish *Plantago krascheninnikovii*
- 11. Capsula with two seeds 12.
 - Capsula with 6–30 seeds 13.
- 12. Plant base with many long hairs. Spike nearly capitate, large. Bracts obtuse, shorter than sepals or equal to it *Plantago minuta*
 - Plant base with short hairs. Spike long cylindrical. Bracts sometimes with long (up to 1 cm) rigid awns *Plantago patagonica*
- 13. Bracts rounded, obtuse. Capsula with 12–30 seeds *Plantago polysperma*
 - Bracts egg-shaped, acute. Capsula with 6–16 seeds *Plantago tenuiflora*
- 14. Spikes are very dense. Petals white. Stamens with white or pink anthers; filaments are longer than style with stigma 15.

- Spikes are loose. Petals brown. Stamens with brown anthers; filaments are shorter than style with stigma 16.
- 15. Spikes are 0.8–1 cm in diameter. Leaves with narrow-winged petioles. Length of petiole nearly equal to leaf blade. Leaves become black in herbarium *Plantago maxima*
 - Spikes are 0.4–0.6 cm diam. Leaves without petioles or with broad-winged petioles, significantly shorter than leaf blade. Leaves do not become black in herbarium *Plantago media*
- 16. Leaves lanceolate, broadly lanceolate or narrowly elliptic. Capsula usually with 5 seeds. Tap root persists 17.
 - Leaves elliptic, broadly elliptic or obovate. Capsula with more than 5 seeds. Mature plants without tap root 18.
- 17. Perennials. Leaves petiolate, obtuse. Abaxial sepals scarious, shorter than adaxial *Plantago schwarzenbergiana*
 - Annuals. Leaves nearly sessile, acute. Sepals more or less equal *Plantago depressa*
- 18. Capsula with 4 seeds. Stigma is long, greater than 4 mm length. Rhizome short. Fresh leaves fragile, become black in herbarium. Bracts more than as 2 times shorter than sepals *Plantago cornuti*
 - Capsula with more than 6 seeds. Stigma is short, not longer than 3 mm length. Rhizome is absent or nearly absent. Leaves do not become black in herbarium. Bracts not more than 1.5 times shorter than sepals *Plantago major*

3.2.3 *Plantago* in East Asia and Western Pacific

- 1. Stem erect, with elongated internodes; leaves opposite, rarely in whorls of 3; corolla brownish *Plantago arenaria*
 - Stem absent or very short; leaves usually in basal rosette, rarely densely alternate; corolla white or yellowish 2.
- 2. Plant with only fibrous roots 3.
 - Plant with a taproot 7.
- 3. Leaf blade lanceolate to linear-lanceolate, 3–4 × as long as wide; anthers 1.8–2.2 mm *Plantago fengdouensis*
 - Leaf blade broadly ovate to broadly elliptic, less than 2 × as long as wide; anthers usually shorter 4.
- 4. Petiole broadly winged; corolla lobes ovate to broadly ovate; anthers ca. 1.5 mm *Plantago gentianoides*
 - Petiole not winged at middle; corolla lobes narrowly triangular; anthers less than 1.5 mm ... 5.

5. East Asian Pacific (from Kamchatka to Taiwan) plants of the seashores, low reaches of coastal rivers, coastal marshes, and wetlands; in all these places, prefer stony substrates. Leaves are bright green, large, coriaceous (and frequently darken when drying), at least 15 cm at length (with petiole). Spikes (together with scapes) ca. 60 cm or longer, scapes more than half of them. Fruits usually densely placed, without visible gaps (except for the lower part of the spike), globose, with ca. 10 or more seeds, about 1–1.9 mm long. Seeds usually ovate (more rarely angular), with striate ornamentation (Fig. 3.2) *Plantago japonica*
Incl. *Plantago macronipponica* from Taiwan.
- Plants with different ecology and/or combination of morphological characters: either the number of seeds is lower, or fruits have a different shape, or scapes are smaller than a rest of the spike, or sizes of leaves and spikes are smaller 6.
6. Seeds 4–6 per fruit, sometimes 8 or even 10–14, usually elongated, smooth or sometimes slightly angled, ca. 1.5–2 mm in length, black or dark brown, without prominent striate ornamentation (Fig. 3.2). Fruits dense only in the upper half of the spike (or sparse everywhere with gaps well visible between them). They frequently (but not always!) conical or narrowly conical, open below the middle and pedicellate (i.e., pedicels are well visible). As seeds are relatively long, fruits elongated together with them (imagine that you “fit” *Plantago depressa*-like long seeds into *Plantago major*-like short fruit), so they frequently slanted unevenly, with various angles (Fig. 3.3) along the axis *Plantago asiatica* s.l.
- At least three different forms exist: (1) “typical” ones with a smaller number of seeds and larger leaves, some of them (“*P. formosana*”) are probably hexaploids, some (“*P. asiatica* var. *densiuscula*”) tetraploids; (2) “southern” ones (e.g., “*P. cavaleriei*”, “*P. sawadai*”) with sparsely placed fruits, many seeds and smaller, narrow, long-petiolate leaves; these forms frequently (but not always!) have serrated or even incised leaves, and grow on altitudes > 500 m; and (3) “*P. densiflora*”-like from the southern and especially eastern provinces of continental China.
- Seeds more than 6 per fruit, typically 10–12 (up to 35!), usually unevenly angled (ovate in general shape), ca. 1–1.2 mm in length, from almost yellow to dark brown, with prominent striate ornamentation (Fig. 3.2). Fruits are typically dense along axis of the spike (except for the lowermost part). They frequently are broadly conical or almost egg-shaped, or even globose, open in the middle, and with very short (invisible without efforts) or absent pedicels. As seeds are short, fruits do not elongate much and generally slanted evenly (Fig. 3.3) along the axis *Plantago major*
- 7 (2). Leaf blade broadly ovate to elliptic, veins 7–11; petiole retrorsely pubescent; stamens adnate to near base of corolla tube 8.
- Leaf blade obovate, elliptic, lanceolate, or linear, veins 1–5 (or 7); petiole with patent, appressed upward, or rarely entangled trichomes; stamens adnate to middle of corolla tube or more apically 9.
8. Plants turning black when dry; petiole longer than or equaling blade, not winged; bracts glabrous *Plantago maxima*
- Plants not turning black when dry; petiole much shorter than blade, winged; bracts pubescent *Plantago media*
9. Corolla tube pubescent or lobes hirsute-villous outside 10.
- Corolla glabrous 11.

10. Leaf blade papery, sparsely villous; corolla lobes densely hirsute-villous outside; stamens adnate to near apex of corolla tube. *Plantago lagocephala*
 – Leaf blade leathery, sparsely strigillose or glabrous; corolla tube pubescent; stamens adnate to middle of corolla tube. *Plantago maritima*
11. Lower sepals connate to near apex; stamens adnate to middle of corolla tube. *Plantago lanceolata*
 – All sepals distinct; stamens adnate to or near apex of corolla tube 12.
12. Bracts with linear to subulate apex, much longer than flower *Plantago aristata*
 – Bracts with obtuse or acute apex, shorter, equaling, or slightly longer than flower 13.
13. Leaf blade glabrous or abaxially pubescent, vein 1; seeds 7–30 per pyxis, fusiform 14.
 – Leaf blade hairy on both surfaces, veins (1 or) 3–7; seeds 1–4 per pyxis, ellipsoid to oblong
 15.
14. Bracts broadly ovate to suborbicular; sepals broadly elliptic to orbicular; pyxis with 12–30 seeds
 *Plantago polysperma*
 – Bracts ovate; sepals obovate; pyxis with 7–15 seeds. *Plantago tenuiflora*
15. Leaf blade elliptic, ovate-lanceolate, obovate-lanceolate, or spatulate, usually more than 1 cm wide 16.
 – Leaf blade \pm linear to narrowly lanceolate or narrowly elliptic, usually less than 1 cm wide ... 18.
16. Leaf blade spatulate to obovate-lanceolate, veins (3 or) 5; flowers heteromorphic; corolla yellowish, lobes erect when flowers fertile; seeds 2 per pyxis, ventral surface grooved *Plantago virginica*
 – Leaf blade elliptic to ovate-lanceolate, rarely obovate-elliptic, veins 5 or 7; flowers homomorphic; corolla white, lobes patent to reflexed; seeds 4 per pyxis, ventral surface flat or prominent but not grooved 17.
17. Bracts triangular-ovate; corolla lobes 0.5–1 mm; anthers white; pyxis 4–5 mm *Plantago depressa*
 – Bracts ovate-elliptic; corolla lobes 1–1.5 mm; anthers reddish brown; pyxis 2.5–3 mm *Plantago camtschatica*
18. Leaf blade arachnoid or silky villous; spikes cylindrical to narrowly cylindrical 19.
 – Leaf blade villous or lanate; spikes capitate or ovoid at first but later shortly cylindrical 20.
19. Leaf blade arachnoid, veins 1 or 3, margin entire or repand-crenate; spikes 1–2.5(–5) cm; flowers dense; anthers ca. 1.2 mm *Plantago arachnoidea*
 – Leaf blade sparsely silky villous, veins 3 or 5, margin remotely and retrorsely denticulate or triangular dentate; spikes 4–10 cm; flowers usually interrupted at base; anthers ca. 2 mm
 *Plantago perssonii*

- 20. Keel not extending to apex of sepals; seeds 3 or 4 per pyxis, black, (1–)1.5–2 mm, ventral face flat; cotyledons parallel to ventral side *Plantago komarovii*
 - Keel extending to apex of sepals; seeds 1 or 2 per pyxis, yellowish brown to brown, (2–)3–4 mm, ventral face with a groove; cotyledons vertical to ventral side 21.
- 21. Plants with short stems, usually branched at base; corolla lobes orbicular-ovate *Plantago ovata*
 - Plants stemless; corolla lobes elliptic to narrowly ovate *Plantago minuta*

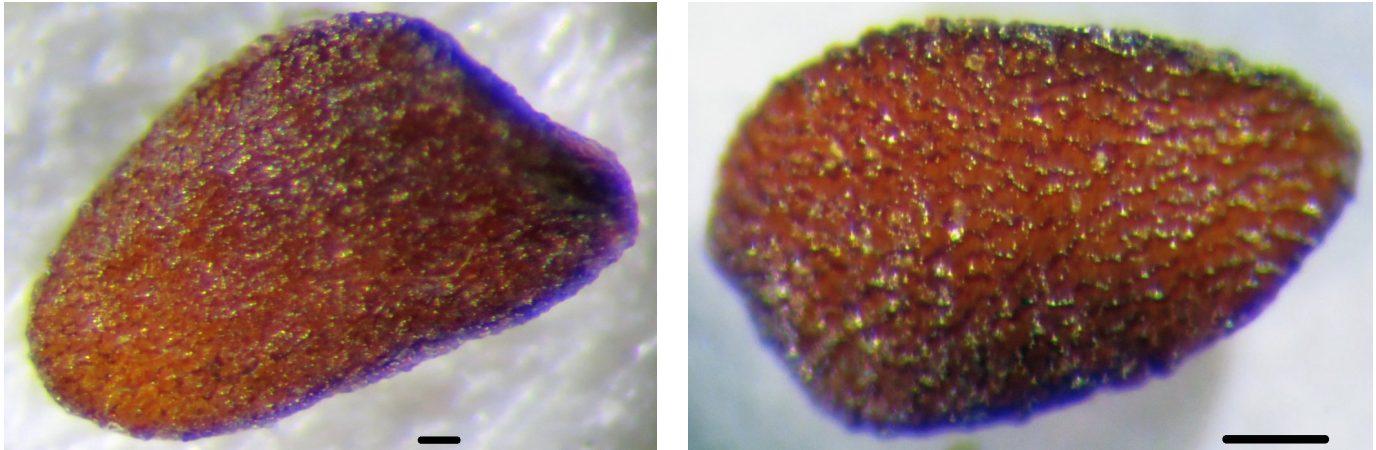


Figure 3.2: No striate ornamentation (left) vs. striate ornamentation (right). Rulers are 0.1 mm.

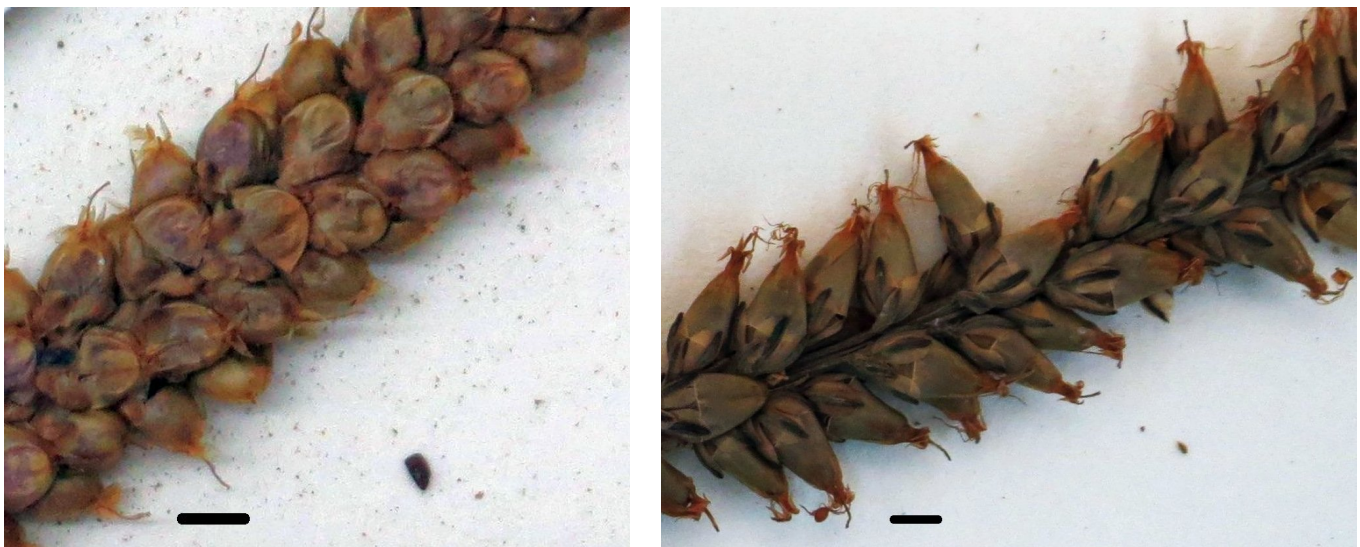


Figure 3.3: Evenly slanted fruits (left) vs. unevenly slanted (right). Rulers are 1 mm.

3.2.4 *Plantago* in Hawaii

(Wagner W.L., Herbst D.R., Sohmer S.H. 1990. Manual of the flowering plants of Hawaii. Vol 2. University of Hawaii Press, Bishop Museum Press, Honolulu.)

Robust or small perennial herbs or small shrubs; leaves moderately thick to thick and coriaceous, margins entire or minutely and remotely denticulate; montane native species.

1. Flowers spreading at nearly 90° angle to the axis, or if ascending, then leaves distinctly petio-
late; principal nerves of leaves usually converging toward base; small shrubs or robust perennial
herbs, stems ca. 0.2–25 dm long, often branched; leaf apex acute to acuminate
..... *Plantago princeps*
– Flowers strongly ascending to suberect; principal nerves of leaves subparallel to slightly con-
verging toward base; robust to small perennial herbs, stems 0–2 dm long; leaf apex acute to
bluntly acute or obtuse 2.
2. Sepals 1.6–2.2 mm long; capsules exerted from calyx; mesic to dry shrubland, often on lava
..... *Plantago hawaiiensis*
– Sepals 2.3–4 mm long; capsules included or slightly exerted from calyx; wet forest, bogs, or
sometimes alpine grassland or shrubland *Plantago pachyphylla*

3.2.5 *Plantago* in New South Wales, Australia

(Briggs B.G. 1990. 148. Plantaginaceae. In: Harden G.J. (ed.) Flora of New South Wales. Vol. 3. 592–598. University of New South Wales Press, Sydney.)

1. Spikes mostly with 1–9 flowers 2.
– Spikes with more than 10 flowers 4.
2. Leaves mostly less than 5 mm wide; scapes elongated at flowering stage with flowers held above
leaf bases, rosettes small forming a turf *Plantago glacialis*
– Leaves more than 5 mm wide; scapes very short at flowering stage so that flowers are among
the leaf bases (scapes elongating after flowering); rosettes larger (mostly 5–10 cm diam.) not
forming a turf 3.
3. Leaves glossy, usually spreading; upper bracts broad-elliptic and thick *Plantago muelleri*
– Leaves dull, usually more or less erect; upper bracts narrow-elliptic, thickened only on the keel
..... *Plantago palustris*
- 4 (2). Plants either with elongated branching leafy stems, or with leaves mostly pinnately lobed
..... 5.
– Stems not elongated and branching; leaves entire or toothed 6.
5. Leaves entire, on elongated branching stems *Plantago arenaria*
– Leaves mostly deeply pinnately or bipinnately lobed, all basal *Plantago coronopus*
6. Corolla lobes erect and rigid after flowering; ovules 3 *Plantago myosuroides*
– Corolla lobes spreading and not rigid after flowering; ovules more than 3 7.

7. Ovules and seeds 8–16; leaves with lamina ovate or broad- elliptic, petiole about as long as the lamina *Plantago major*
 – Ovules 4 or 5, seeds 1–5, leaves either with lamina narrower or petiole shorter than the lamina 8.
8. Taproot not developed 9.
 – Taproot developed 11.
9. Leaves thin-textured, more than 3 times as long as broad *Plantago cladarophylla*
 – Leaves fleshy or leathery, less than 3 times as long as broad 10.
10. Leaves mostly 3-veined, lateral veins much less conspicuous on upper surface than midvein and not extending into upper half of lamina; fruiting spikes usually 0.8–4 cm long *Plantago alpestris*
 – Leaves usually at least 5-veined, veins mostly all conspicuous on upper surface and all extending into upper half of lamina; fruiting spikes usually 4–8 cm long *Plantago euryphylla*
- 11 (8). Scapes with regular longitudinal ridges; anterior sepals fused into a 2-lobed structure with 2 veins *Plantago lanceolata*
 – Scapes not conspicuously ridged; sepals all free 12.
12. Annuals; capsules large, either 3.4–5 mm long, or with a truncate beak, or distinctly contracted below apex 13.
 – Perennials; capsules not as above 16.
13. Fruits with an almost cylindrical beak, the apex truncate and minutely lobed *Plantago turrifera*
 – Fruits acute or apex rounded, without a cylindrical beak 14.
14. Fruits large, 2.2–3.2 mm diam., not distinctly contracted below apex; bracts and sepals usually dark brown or blackish 15
 – Fruits smaller, usually 1.7–2.0 mm diam., distinctly contracted below apex; bracts and sepals pale or dark brown *Plantago cunninghamii*
15. Leaves 3–24 mm wide; capsules acute *Plantago drummondii*
 – Leaves 0.7–2 mm wide; capsules rounded *Plantago multiscapa*
- 16 (12). Sepals with a glabrous keel or with a few hairs only 17.
 – Sepals with a pilose keel 19.
17. Sepals mostly 1.5–2.0 mm long; leaves thin-textured 18.
 – Sepals mostly 2.1–2.5 mm long; leaves thick-textured *Plantago antarctica*

18. Leaves linear-elliptic to lanceolate; sepals with a rounded or flattened keel; capsules 2.5–3.8 mm long *Plantago cladarophylla*
 – Leaves oblanceolate to obovate; sepals usually sharply keeled; capsules 1.7–3.0 mm long *Plantago debilis*
- 19 (16). Sepals mostly 2.8–3.5 mm long; axils of leaves with tufts of red-brown or deep golden-brown hairs 2–6 mm long 20.
 – Sepals 1.5–2.8 mm long (rarely to 3 mm); axils of leaves with short whitish or yellowish brown hairs 21.
20. Leaves narrow-elliptic to oblong-oblanceolate, 5–10 times as long as broad, pilose with soft short hairs to 1 mm long *Plantago varia*
 – Leaves linear or very narrow-elliptic, more than 15 times as long as broad, either glabrous or pilose with long or short hairs *Plantago gaudichaudii*
21. Sepals mostly 1.5–2.2 mm long; leaves mostly oblanceolate to obovate, rarely narrower, 8–40 mm wide; spikes usually lax at maturity *Plantago debilis*
 – Sepals mostly 2.2–2.8 mm long; leaves mostly narrow-oblong to oblanceolate, 3–21 mm wide; spikes usually compact at maturity *Plantago hispida*

3.2.6 *Plantago* in New Guinea

(van Royen P. 1983. The alpine flora of New Guinea. Vol. 4. 2925–2937. J. Cramer, Vaduz.)

1. Flowers in a spike 2.
 – Flowers in a head, sometimes one flower only 6.
2. Ovules and seeds 2 in each cell *Plantago lanceolata*
 – Ovules more than 2 in each cell, seeds (2–)4–8 in each cell 3.
3. Limb of leaves ovate to elliptic, usually well over 4 by 2 cm *Plantago major*
 – Limb of leaves lanceolate to oblanceolate or spatulate, usually smaller than 4 by 2 cm, sometimes up to 32 cm long 4.
4. Limb of leaves narrowly oblanceolate, 20–32 by 0.6–1.2 cm *Plantago papuana*
 – Limb of leaves lanceolate, oblanceolate, or spatulate, 2–27 by 0.2–3 cm
5. Leaves 5–13 by 0.5–1 cm, margin entire, sparsely pilose above or glabrous. Style sparsely pilose. Corolla-lobes lanceolate, 1–1.5 by about 0.5. Seeds 4 or 5, brownish, finely punctate. Peduncles 7–17 long *Plantago trichophora*
 – Leaves 3–8 by 0.3–1.8, margin often dentate, sparsely to densely woolly above, glabrescent. Corolla-lobes ovate, about 1.5 by 1 mm. Seeds 2–4(–8), black, papillate. Peduncles 3–7 cm long *Plantago montisdicksonii*

- 6. Leaves linear, rarely linear-lanceolate, 1–2 mm wide 7.
- 7. Lower part of ovary elongating in fruit. Peduncle rarely elongating, if so then up to 16 mm long *Plantago depauperata*
 - Lower part of ovary not elongating in fruit. Peduncle elongating up to about 35 mm *Plantago polita*
- 8. Leaves narrowly lanceate, 10–40 by 0.7–3 mm *Plantago stenophylla*
 - Leaves lanceolate to narrowly lanceolate, 12–75 by 1–15 mm *Plantago aundensis*

3.2.7 *Plantago* in New Zealand

(Meudt H.M. 2012. A taxonomic revision of native New Zealand *Plantago* (Plantaginaceae). New Zealand Journal of Botany. 50: 101–178.)

- 1. Leaves few (usually ≤ 13) with 5–7 parallel veins; petiole 6 mm wide at narrowest point; leaf axillary hairs generally > 15 mm long; scapes 2–5 mm thick; flowers per inflorescence many, (44–)60–132; spikes (36–)70–136 mm long; spike length : width ratio 4.5–20:1; seeds 1(–2) per capsule. Auckland Islands above 350 m elevation only *Plantago aucklandica*
 - Leaves many (usually ≥ 11) with 0–3(5) parallel veins; petiole < 6 mm wide at narrowest point; leaf axillary hairs generally < 15 mm long; scapes < 2 mm thick; flowers per inflorescence few (1–40, rarely up to 60 in *Plantago raoulii*); spikes (when flowers > 1) 2–33 mm long; spike length : width ratio 0.6–6:1; seeds (1–)2–42 per capsule. Auckland Islands (coastal) and New Zealand 2.
- 2. Leaves (including petioles) generally < 2.0 mm wide (rarely up to 2.5 mm) at widest point, linear or triangular linear, often keeled, with length : width ratio 8:1 to 35:1; petiole 0.3–1.3 mm wide at narrowest point; base of capsule funnellform in mature fruits, elongating up to 11 mm-long *Plantago obconica*
 - Leaves (including petioles) usually > 2.0 mm wide at widest point (often much wider, up to 26 mm), of various shapes (rarely linear), not keeled, with length : width ratio 1:1 to 10:1 (rarely $> 10:1$ in some *Plantago triandra* and *Plantago raoulii*); petiole (0.4–)1.0–7.5 mm wide at narrowest point; base of capsule cup-shaped and up to 3.2 mm long, not elongating with maturity 3.
- 3. Leaf axillary hairs at centre of rosette difficult to see and short (< 3 mm long); spikes (4–)14–42 per plant; scape ribbed, and with patent type ‘g’ hairs only (Rahn 1992). Auckland Island (and Tasmania) only *Plantago triantha*
 - Leaf axillary hairs at centre of rosette easily visible as a ‘wool’ and long (2–23 mm long); spikes 1–15(–22) per plant; scape not ribbed, and with antrorse type ‘i’ trichomes (Rahn 1992) at least distally on scapes and in some cases on entire length of scape. New Zealand 4.
- 4. Leaf (including petiole) widest point at or below middle, always glabrous abaxially; only midvein visible on leaf; scapes including spikes short, generally < 42 mm long (rarely up to 80 mm long in some robust *Plantago unibracteata*), sometimes elongating at fruiting; flowers 1–2(–3) per spike; seeds 5–42 per capsule 5.

- Leaf (including petiole) widest point at or above middle, hairy or glabrous abaxially; 15 veins visible on leaf; scapes including spikes long, up to 400 mm, usually elongating at fruiting; flowers (1–)2–59 per spike; seeds usually 1–5 per capsule (up to 13 in *Plantago lanigera*) 6.
- 5. Leaf teeth usually ≥ 10 (0–24); calyx very small and often difficult to see, 0.4–1.8 mm long, 0.3–0.6(–0.8)capsule length; seeds 8–42 per capsule, all angular *Plantago triandra*
- Leaf teeth 4–10; calyx easily visible, 1.7–3.7 mm long, 0.6–1.2 × capsule length; seeds 5–23 per capsule, some angular and some rounded *Plantago unibracteata*
- 6. Bract margins (and often sepal margins as well) hairy to some degree, at least with one or few isolated trichomes at the apex or sparsely ciliate along most or all of length of margins; leaves not punctate; flowers 2–59 per spike 7.
- Bract margins and sepal margins completely glabrous (bracts rarely with isolated trichomes at apex in some *Plantago lanigera*); leaves punctate; flowers (1–)2–20 per spike 10.
- 7. Sepal margins with one or few isolated hairs at apex only, otherwise glabrous; bracts and sepals acute or obtuse; scape with antrorse type ‘i’ trichomes distally and with patent type ‘g’ trichomes proximally (but approximately one-quarter of *Plantago raoulii* specimens have very few or no type ‘g’ trichomes) 8.
- Sepal margins sparsely ciliate or with isolated hairs; bract and sepals always acute; scape with antrorse type ‘i’ trichomes only 9.
- 8. Seeds (1)–2–4 in each capsule, uniform in size, ellipsoid; rudimentary upper compartment at top of capsule absent or seedless; bract margins sparsely ciliate or with isolated hairs; calyx 2.3–3.5 mm long; corolla lobes 1.2–2.9 mm × 0.6–1.3 mm; boggy habitats 580–1600 m elevation *Plantago udicola*
- Seeds (2–)5(–6) in each capsule and of two or three size classes (one small, angular upper seed, and four larger, rounded to subangular ellipsoid seeds below); distinct upper compartment at top of capsule contains uppermost seed; bract margins with isolated hairs near tip only, otherwise glabrous; calyx 1.6–2.4 mm long; corolla lobes 0.6–1.2 mm × 0.3–0.7 mm; various grassland to open forest habitats, 0–1280 m elevation *Plantago raoulii*
- 9. Adaxial surface of bracts and sepals sparsely hairy or with isolated trichomes; trichomes on margins of bracts (and often sepals) long, obvious (0.3–1.1 mm long); darkened area surrounding midrib of adaxial sepal surface < 50% total sepal width; seeds (1–)2–4 and of uniform size. Coastal and inland areas of southeastern North Island and eastern South Island *Plantago spathulata*
- Adaxial surface of bracts and sepals glabrous; trichomes on margins of bracts and sepals minute (0.1–0.3 mm long); darkened area surrounding midrib of adaxial sepal surface > 50% total sepal width; seeds 2–4(–5) of two different size classes. Coastal areas of Gisborne, North Island *Plantago picta*
- 10. Ovules 8–13 per ovary; fully developed seeds usually 4–13 per capsule, of uniform size but of various shapes with rounded or angular edges, 0.6–1.5 mm; flowers (1–)2–5(–9) per spike *Plantago lanigera*

-
- Ovules 4 per ovary; fully developed seeds 1–4 in each capsule, always uniform and ellipsoid with rounded edges, 1.3–2.1 mm; flowers (2–)5–20 per spike *Plantago novae-zelandiae*

Chapter 4

Subgenus *Coronopus*

4.1 Section keys

4.1.1 Key for sections

1. Calyx tightly pressed against the rachis, posterior sepals with a broad wing on the nerve. Plant often annual and leaves lobed sect. *Coronopus*
 - Calyx not pressed against the rachis, posterior sepals with a keel or wing less prominent or absent. Plant perennial and leaves with scattered teeth sect. *Maritima*

4.1.2 Section *Coronopus*

1. I. Plerumque radice tenui, saepe annuae, fere semper caudex indivisus, rosula unica; plerumque plantae minores; folia plerumque valde pinnato-lobata, saepius dupliciter pinnato-lobata, raro (imprimis in formis reductis) parum divisa usque integra, rhachi plerumque angusta; inflorescentiae paucae usque multae, spicae pedunculus ascendens usque erectus, tenuis usque crassus; bractea calyce brevior usque longe setaceo-acutata; sepala antica anguste vel latius elliptica, carina crassa vel crassissima, sepala postica plicato-concava, carina angusta, ala \pm evoluta; corollae tubus parcius breviter pilosus; ovula 4–5 *Plantago coronopus*
 - II. Affinis *Plantago coronopus* subsp. *commutatae*. Bractea et sepala pilis longioribus rigidulis inspersa; corollae tubus pilis longioribus, rigidulis bene obsitus; planta parva. Africa septentr *Plantago crypsoides*
 - III. Typica a *Plantago coronopus* bene diversa, formis nonnullis (subspec. occidentalis) in formas extremas illius speciei transiens. Semper ramosa, saepe laxa, radice valida, lignosa; folia crassa, \pm spatulata, plerumque minus incisa quam in *Plantago coronopus*; spica crassa, densa, brevis; bractea longe angustata; ovula 3–4. Regio occident. mediterr *Plantago macrorhiza*
 - IV. Perennis, rhizomate valido, squamato, radice crassa; folia crassa, linearia, integra vel simpliciter irregulariter dentata; bractea et sepala \pm glabrescentia; floris structura illi *Plantago coronopus* subsp. *commutatus* simillima. Regio medit. praecipue orient.; Africa australis *Plantago crassifolia*

- V. Perennis indivisa, rosula unica; folia lanceolata, plerumque \pm regulariter valde serrato-dentata, raro magis lobulata; spica angusta, densa; bractea calyce brevior; ovula 2–3. Regio mediterr. praecipue occident *Plantago serraria*
 - VI. Praecedenti valde affinis. Annuarum; folia tenuiora, parum dentata, indumento molliore; spicae pedunculus tenuis, cum spica angulum formans; ovula 8. Insulae canarienses *Plantago aschersonii*
 - VII. *Plantago serrariae* aequae affinis. Caudex validus, brevis, saepe breviter divisus; folia crassa, brevia, vix dentata; inflorescentiae breves, prostratae, spica valde angusta, saepe parum laxa; ovula 3. Sicilia *Plantago peloritana*
 - VIII. Perennis, caudice crasso, indiviso; folia carnosa, lata, spatulata et inferne latiuscula, haud petiolatim angustata; bractea perlata; sepala bene ciliata; ovula 4–5 *Plantago subspathulata*
- + *Plantago asphodeloides*
- + *Plantago sabulosa*
- + *Plantago weldenii*

4.1.3 Section Maritima

1. Folia insigniter dentata; bractea pungenti-acutata *Plantago atlantica*
- Folia integra vel parum vel sparse dentata 2.
2. a. Rhizoma perbreve, squamatum vel magis elongatum, squamatum; folia linearia usque lanceolata, plerumque integra et eciliata (exc. var. *serpentina*), nervis conspicuis vel inconspicuis, \pm aequidistantibus; spica densa, angusta; bractea plerumque lata (angusta in var. *serpentina*), haud longe angustata; capsula conica usque rotundata *Plantago maritima*
- b. Similis var. *integrali* spec. praecedentis. Rhizoma nudum; flores parvi, sepala 1.5–1.75 mm longa; capsula rotundata. Atlas *Plantago rhizoxylon*
- c. Carina sepalorum anticorum valde unilateraliter dilatata; sepala glaberrima; spica laxa usque perlaxa; semina ad 8 mm longa. America septentr. orient *Plantago oliganthos*
- d. Bractea latissima, carina bractee et sepalorum crassa, sicca rugosa, sepala postica setuloso-ciliolata. Rhizoma squamatum; folia valde crassa, glabra, lana basali plerumque valde evoluta; spica \pm laxa. Afghanistan *Plantago eocoronopus*
- e. Flores parvi; bractea et sepala lata, satis tenuia, bene ciliolata, carina satis tenui, sepala postica *parum compressa*; corollae lobi breves; capsula brevis, rotundata. Rhizoma demum nudum, *squamis* (foliorum vaginis), *tenuibus haud persistentibus*; nervis foliorum lateralibus margini \pm approximatis *Plantago alpina*
- f. Bractea angusta, rigida, crasse carinata, bractea et sepala bene rigidule ciliolata; semina superne angustata. Rhizoma demum nudum, superne valde squamatum; folia angusta, rigida, setuloso-ciliolata, internervos prominentes longitudinaliter sulcata *Plantago holosteum*

- g. Praecedenti valde affinis, formis transitoriis conjuncta. Bractea \pm latior. Plerumque magis, saepe squarrose ramosa; folia sicca \pm nigrescentia, valde crassa et rigida, plerumque brevia, breviter angustata et latiora, marcescentia diu conservata, ramis igitur vix omnino glabratis; spicae pedunculus brevis, validus, crassior *Plantago subulata*
 - h. Affinis praecedentibus. Bractea rigidissima, acutata; sepala longius rigide ciliata. Demum laxe ramosa, ramis nudis; folia sicca \pm glaucescentia, valde rigida, arcuata (exc. var. *tenuior*), longe rigide hirsuta; spicae pedunculus elongatus. Iberia *Plantago radicata*
 - i. Species alpina *Plantago subulatae* affinis; sepala et bractea tenuiter ciliata; flores parvi; bractea lata; humilis, caespitosa, folia saepe pilosa. Corsica *Plantago insularis*
 - k. Bractea et sepala satis tenuia, parce ciliolulata, sepala postica plicato-concava; corollae lobi parvi, tenuiter membranacei; folia brevia, angusta, nervis subtus prominentibus, lateralibus margini valde approximatis; planta parva. Iberia *Plantago penyalarensis*
- + *Plantago carnosae*

Chapter 5

Subgenus *Albicans* and allies

5.1 Section keys

5.1.1 Key for sections

1. Anterior sepals united for more than half their length. Upper part of bract scarious and acuminate. Scape sulcate with hairs antrorse. Posterior sepals with a wing on the nerve sect. *Lanceifolia*
– Anterior sepals united at the very base only. The nerve reaching the apex of the bracts. Scape not sulcate. Posterior sepals without wings 2.
2. Green nerve of anterior sepals present at base only, the rest scarious. Posterior sepals similar to anterior. Bract very wide, completely covering sepals sect. *Montana*
– Green nerve of anterior sepals reaching apex, or almost so. Posterior and anterior sepals dissimilar 3.
3. Posterior sepals with a green nerve in the lower half only, the rest scarious. Posterior sepals shorter, narrower and more flat than the anterior sepals. Green nerve on the anterior sepals with a sharp keel or wing. Flowers in a dense spike sect. *Bauphula*
– Green nerve of all sepals reaching apex. Posterior sepals of equal length but wider than anterior sepals. Anterior sepals without a sharp keel 4.
4. Connective of the anthers very wide and as long as a pollen sac. Long glandular hairs often present besides both short and longer hairs. Flowers spirally arranged in a dense spike sect. *Hymenopsyllium*
– Connective of the anthers smaller. Long glandular hair absent 5.
5. Hairs on scape patent or woolly, not or insignificantly wider than those on the leaves. Flowers spirally arranged, crowded or scattered in a spike. Corolla lobes usually acuminate or apiculate, never cordate at base. The concave side of the seeds partly covered by a ragged white membrane, except for two areas to the left and right of the centre. Mediterranean, Central Asia sect. *Albicans*

- Hairs on scape antrorse, usually distinctly wider than those on the leaves. Flowers opposite or in whorls of three, alternating in an open or dense cylindrical spike; a single species with 1–9 flowers in a head. Corolla lobes rarely acuminate or apiculate, usually acute or obtuse, sometimes cordate at base. The concave side of seed with an impressed mark just above and one below the centre. North and South America sect. *Gnaphaloides*

5.1.2 Section *Montana*

1. Carina sepalorum percurrens 2.
 - Carina sepalorum haud percurrens, saepius basi tantum notata, ceterum sepala enervia 4.
2. Folia sensim angustata 3.
 - Folia glabrata vel varie pilosa; hractea glabra vel dorso in carina tantum pilosula *Plantago atrata*
3. Folia lanato-tomentosa vel parcius lanata; hractea ubique ± copiose pilis inspersa *Plantago monosperma*
 - Folia abrupte apiculata, apiculo glabro, folia ceterum sericeo-lanato-tomentosa *Plantago nivalis*
- 4 (1). Corollae lobi 4 mm longi, angusti; anthera parum exserta, 0.5 mm longa 5.
 - Bractea rotundato-ovata, breviter angustata *Plantago cafra*
5. Bractea latior quam longa, transverse elliptica *Plantago loeflingii*
 - Corollae lobi late rotundato-ovati; anthera 1.5 mm longa *Plantago notata*

5.1.3 Section *Lanceifolia*

(Pilger)

1. Bractea et sepala glabra vel parce pilosa; corollae lobi breviter vel vix acutati.
 - Bractea et sepala hirsuto-pilosa; corollae lobi distincte acuminati, acutissimi *Plantago lagopus*
2. Sepala antica bene connata, sepalum duplex late obovatum, emarginatum usque hilobatum.
 - Sepala antica parum connata; carina in sepalis posticis haud percurrens; radicellae perlongae, crassae *Plantago lacustris*
3. Radicellae tenues 4.
 - Radicellae crassiusculae, carnosae 5.
4. Plantae parvae usque satis elatae, acaules; folia glabrescentia vel varie pilosa; spica anguste cylindracea vel reducta; sepala 3–3.5 mm longa *Plantago lanceolata*

- Caulescens, partes inferiores pedunculorum ad caulem persistentes; spica brevis, crassa; sepala 3.5–4 mm longa, postica apice angustata *Plantago leiopetala*
- 5. Plantae elatae; folia glabrescentia; spicae pedunculus multisulcatus, spicabrevis, crassa; sepala 4 mm longa *Plantago altissima*
- Plantae minores; folia sericeo-pilosa; spicae pedunculus parum sulcatus; sepalum duplex apice angustatum, parum vel vix incisum vel irregulariter emarginatum usque lobatum, carinis approximatis vel coalitis; corollae lobinitiduli *Plantago argentea*

* * *

(Hassemer)

1. Bract and sepals densely hirsute. Corolla lobes long-acuminate *Plantago lagopus*
 - Bract and sepals glabrous to glabrescent, or shortly pilose on the keel and around the base. Corolla lobes obtuse to acute 2.
2. Leaves 10–15-nerved. Bract and sepals pilose on the keel and around the base *Plantago malato-belizii*
 - Leaves 3–7-nerved. Bract and sepals glabrous to glabrescent 3.
3. Secondary roots unthickened, less than 0.75 mm wide *Plantago lanceolata*
 - Secondary roots thickened, somewhat succulent, more than 0.75 mm wide 4.
4. Anterior sepals connate for more than two-thirds of their length 5.
 - Anterior sepals connate for less than two-thirds of their length 6.
5. Caudex growing horizontally. Leaves glabrous to glabrescent. Scape normally deeply sulcate. Spikes 3–5 cm long. Bract 4.5–7.0 mm long *Plantago altissima*
 - Caudex growing vertically or obliquely. Leaves sericeous. Scape shallowly sulcate. Spikes 0.5–2.0 cm long. Bract 2.5–5.0 mm long *Plantago argentea*
6. Caudex short, rather inconspicuous. Bract long-acuminate, cuspidate. Keel of posterior sepals pilose, conspicuous up to the apex *Plantago maireana*
 - Caudex elongated, very conspicuous in older plants. Bract short-acuminate. Keel of posterior sepals glabrous, becoming inconspicuous before reaching the apex *Plantago pilgeriana*

5.1.4 Section *Bauphula*

Plantago amplexicaulis

5.1.5 Section *Hymenopsyllium*

1. Corollae lobi rotundato-ovati; spicae pedunculus longe lanuginosus, demum recurvatus, brevis
..... *Plantago cretica*
 - Corollae lobi lanceolato-ovati 2.
 2. Bractea rotundato-ovata vel rotundato-elliptica; spicae pedunculus glanduligero-pilosus
..... *Plantago cyrenaica*
 - Bractea e basi ovata ± longe angustata; spicae pedunculus haud glanduligero-pilosus
..... *Plantago bellardii*
- + *Plantago benisnassenii*

* * *

1. Plants covered with whitish hairs; leaves 25–30 × 2–3 mm; sepals ciliate on margins and dorsally
..... *Plantago benisnassenii*
- Plants covered with brownish hairs; leaves 35–65 × 3–5 mm; sepals ciliate dorsally, but not on
margins 2.
2. Inflorescence 1–2 cm long and 0.5 cm wide *Plantago bellardii*
- Inflorescence more than 0.7 cm wide 3.
3. Leaves 35–45 × 3–4 mm; inflorescence peduncle 1–1.5 cm long; spikes 0.7–0.9 cm, ovate
..... *Plantago cyrenaica*
- Leaves 50–65 × 4–7 mm; inflorescence peduncle 0.5–1 cm long; spikes 0.5–0.8 cm, ovoid
..... *Plantago cretica*

5.1.6 Section *Albicans*

1. Bract broadly elliptic, often covering the calyx laterally. Corolla lobes with margins not or
slightly involute, not touching one another laterally. Corolla tube rarely exposed above the
mature fruit, covered by the reflexed lobes 2.
- Bract ovate or triangular, laterally not completely covering calyx. Corolla lobes usually with
involute margins, often touching one another. Corolla tube extended above the mature fruit,
not covered by the lobes 3.
2. Bract obtuse at apex, with green nerve widest near apex. Anterior sepals very asymmetric and
with hairs very asymmetrically placed. Anthers 1.8–3.1 mm long. Few ovules develop to mature
seeds. Corolla lobes inconspicuously hairy on the back ser. *Albicanes*
- Bract usually retuse at apex, with green nerve widest at or below the middle. Anterior sepals
slightly asymmetric, glabrous or with hairs usually placed asymmetrically. Anthers 0.9–1.3 mm
long. Most ovules develop into seeds. Corolla lobes glabrous ser. *Ovatae*

3. Corolla lobes densely hairy on the lower surface, lobes usually patent, acuminate. Sepals usually with hairs placed asymmetrically ser. *Ciliatae*
 – Corolla lobes insignificantly hairy on the back, acute or slightly acuminate. Sepals glabrous or with hairs placed symmetrically ser. *Minutae*

Series *Ovatae*

Plantago ovata

Series *Minutae*

1. Corolla glabra. Carina sepalorum percurrens. Sepala aequaliter pilosa vel glabra. Corollae lobi anguste ovati vel ovati 2.
 – Corollae tubus tomentoso-villosus 4.
 2. Folia lanceolata; bractea late ovata; spica demum perlaxa, elongata *Plantago stocksii*
 – Folia anguste vel angustissime linearia 3.
 3. Bractea et sepala pilosa; corollae lobi irregulariter denticulati *Plantago lessingii*
 – Bractea et sepala glabra *Plantago minuta*
 4. Bractea cymbiformis, rotundato-ovata; sepala postica obovata *Plantago lachnantha*
 – Bractea ovata; sepala postica ovata *Plantago evacina*

Series *Albicantes*

1. Corollae lobi lanceolato-ovati, longius angustati *Plantago cylindrica*
 – Corollae lobi lati, breviter angustati et acutati 2.
 2. Perennis, lignosa; corollae lobi 3 mm longi *Plantago albicans*
 – Annuua corollae lobi 2 mm longi *Plantago boissieri*
 + *Plantago annua*
 + *Plantago baltistanica*

Series *Ciliatae*

Corollae tubus glaber, lobi pilosi.

1. Lobi corollae 1 mm longi, longissime pilosi; planta parva *Plantago lagocephala*
 – Lobi corollae majores 2.
 2. Folia linearia vel lanceolato-lineararia; bractea saepe longe acuminata *Plantago akkensis*

- Folia spathulata 3.
- 3. Sepala 3 mm longa; semina 2.5 mm longa; indumentum copiosum *Plantago ciliata*
- Sepala 5 mm longa; semina 3.5 mm longa; indumentum parcum *Plantago tunetana*
- + *Plantago sharifii*
- + *Plantago psammophila*
- + *Plantago orzuiensis*

5.1.7 Section *Gnaphaloides*

- 1. Annuals. Flower usually cleistogamic with small anthers on short filament 2.
- Perennials. Flowers chasmogamic, anthers usually large, on long filaments. Green nerve of bracts rarely extended, and lowermost bract rarely significantly longer than the rest 3.
- 2. Corolla lobes cuneate at base, not more than 1.5 times as wide at the widest place than at base and 1.5–4 times longer than wide. Corolla actinomorphic. Chile, Peru ser. *Hispidulae*
- Corolla lobes cordate, truncate or obtuse at base, more than twice as wide at the widest place than at base, and 0.8–1.5 times longer than wide. Bracts, especially on the lowermost flowers, often with the green nerve elongated. Corolla zygomorphic or actinomorphic. North America and Argentina ser. *Gnaphaloides*
- 3. Corolla zygomorphic, posterior lobe bent from a point 0.4–1.1 mm higher than the bending of the other lobes and usually much smaller. Anterior corolla lobe usually cordate at base, rarely obtuse or cuneate, posterior lobe cuneate. Chile, Argentina, Uruguay, southern Brazil ser. *Brasilienses*
- Corolla actinomorphic or slightly zygomorphic, posterior lobe bent from a point less than 0.2 mm higher than the other lobes. Corolla lobes cuneate, obtuse or truncate at base. Mexico, Guatemala, the Andes, east Argentina ser. *Sericeae*

Series *Gnaphaloides*

- 1. Corolla usually actinomorphic, all lobes similar, not or only slightly cordate at base 2.
- Corolla zygomorphic, lobes cordate at base, the posterior usually erect and bent at a point 0.2 mm higher than the other lobes, which are reflexed 3.
- 2. Long and short hairs on scape pointing upwards. Bract short, usually about V2 length of sepals. Corolla lobes (1.1-)2.0–2.7 mm long. Plant greenish on drying. California and Baja California at altitudes usually below 500 m *Plantago erecta*
- Long hairs on scape patent, short hairs pointing upwards. Bract usually longer than sepals. Corolla lobes (2.7-)3.0–3.6 mm long. Plant dark on drying. Texas, New Mexico at altitudes 100–1000 m *Plantago helleri*

3. Upper surface of leaves glabrous or rarely with scattered hairs. Teeth never conspicuous. Stem often 10–25 mm long. Plant usually dark on drying 4.
 – Upper surface of leaves usually densely hairy, rarely glabrate. Stem rarely to 10 mm long ... 5.
4. Bract usually shorter than sepals. Anterior corolla lobe (2.1-)2.4–3.4 mm long, lateral lobes very asymmetric. Arizona, Texas, Mississippi, Alabama, Georgia, Florida, N. and S. Carolina at altitudes below 1500 m *Plantago wrightiana*
 – Bract usually much exceeding sepals. Anterior corolla lobe 1.4–2.3 mm long, lateral lobes symmetric, USA east of 100°W, south of 45°N at altitudes usually below 400 m ... *Plantago aristata*
5. Plant rarely dark on drying. Bract triangular, acute or acuminate. Connective above anther usually much elongated, acute, Altitudinal range 0–2000 m 6.
 – Plant usually dark on drying, appearing grey through the indumentum, leaves rarely glabrescent (Mexico). Bract ovate, acute, shorter than sepals. Leaves (1.0-)1.5–4(-6) mm wide. Anterior corolla lobe 1.7–2.4 mm long, lateral lobes slightly asymmetrical. Connective usually only slightly elongated above anther, often obtuse. New Mexico, Arizona, and NW. Mexico at altitudes 2000–2500 m *Plantago argyrea*
6. Bract usually longer than sepals. Anterior corolla lobe usually less than 2 mm long (in N. Am. 1.4–1.8(-2.0), in S. Am. 1.6–2.1(-2.6) mm), lateral lobes symmetrical or almost so. When scape is ascending or decumbent, then spike longer than scape. Leaves 1-4(-7) mm wide, margins entire, rarely with few inconspicuous teeth. Flowering in N. Am. mainly June-July. C. and S. Argentina, grasslands of USA, adjacent Canada and Mexico *Plantago patagonica*
 – Bract usually shorter than sepals. Anterior corolla lobe usually exceeding 2 mm (1.7–3.0), when 1.7–1.9 mm then scape ascending. Spike shorter than scape. Lateral corolla lobe asymmetric. Leaves (2-)4–10(-18) mm wide, margins usually with a few long teeth. Flowering April and May. Southern Texas, adjacent New Mexico and Mexico *Plantago hookeriana*

Series *Sericeae*

1. Flowers (1-) 2–5 (-9) in a head 4–8 mm long, no rachis developed. Corolla lobes channeled, acute or acuminate, cuneate at base, (1.3-) 1.6–2.3 (-2.9) mm long, 1.8–2.6 times longer than wide. Stem usually short, unbranched or branched, rarely elongated, much branched, woody, and with short leaves. C Peru *Plantago lamprophylla*
 – Flowers 1–54 in a spike, rachis developed if more than 2 flowers are present 2.
2. Corolla lobes 4.4–5.8 mm long, about equalling anterior sepals. Aerial stem branched, short or usually long and more or less woody. Leaves flat, 1.0–5.2 mm wide, sericeous, lanate or villose, and usually black on drying. Scape erect (1.1-) 1.6–2.8 times longer than leaves. Spike with 2–6 (-15) flowers C Chile, SW Argentina *Plantago grandiflora*
 – Corolla lobes 1.2–3.9 mm long, shorter than sepals 3.

3. Green part of bract less than $\frac{1}{4}$ as wide as the membranous part on each side, and often not reaching apex. Anterior sepals 4.6–5.8 mm long. Spike with 2–3 flowers. Stem woody, much branched, to 0.7 m high. Scape erect, shorter than the sericeous, 0.8–1.2 mm wide, involute, stiff leaves. E Argentina *Plantago bismarckii*
- Green part of bract more than $\frac{1}{2}$ as wide as the membranous part on each side, reaching apex. Anterior sepals 2.0–4.6 mm long 4.
4. Anterior corolla lobe ovate or elliptic, truncate or obtuse at base, very rarely cuneate. Leaves usually widest about $\frac{1}{4}$ from apex. Stem short, usually slightly branched, without adventitious roots. Leaves villose, lanate or sericeous, rarely glabrous, rarely turning black on drying, not shiny. The various spikes of a plant usually flowering successively. Mexico, Guatemala, (Venezuela) *Plantago nivea*
- Anterior corolla lobe cuneate at base, usually elliptic. Leaves usually widest near the middle 5.
5. Leaves on upper surface glabrous, rarely villose with long, scattered hairs; margins and lower surface usually villose; i.e. leaves either glabrous or with more hairs on lower than on upper surface. Stem often with adventitious roots. Leaves usually black and shiny on drying 6.
- Leaves with a sericeous or lanate indumentum, either dense and persistent or partly lost, primarily on the lower surface, rarely completely lost on most leaves; i.e. at least some leaves either with a dense indumentum all over or with more hairs on upper surface. Leaves very rarely also villose and rarely black and shiny on drying. Adventitious roots absent. Mexico, Venezuela, Colombia, Ecuador, Peru, Bolivia, NW Argentina *Plantago sericea*
6. Stem much branched, to 60 mm long. Broadest hairs on scape 40–70 μm wide, leaves usually with many hairs along margins and few or no hairs elsewhere. Primary root usually thick more or less fleshy and with thick secondary roots, adventitious roots few and thin. Scape shorter than leaves. All spikes of a plant usually flowering simultaneously. C Mexico ... *Plantago toluensis*
- Stem usually unbranched, at least when elongated, to 30 mm long. Primary root usually thin, not fleshy. Adventitious roots often prominent. Broadest hairs on scape 22–40 μm wide. Scape usually longer than leaves. The various spikes of a plant usually flowering successively. Venezuela, Colombia, Ecuador, N and C Peru *Plantago linearis*

***Plantago sericea*, key to subspecies and varieties**

1. Corolla lobes cupola-shaped, obtuse or acute. Spike 4–95 mm long with 1–54 flowers 2.
- Corolla lobes channeled, acute or acuminate. Spike 3–16 mm long with 2–18 flowers 8.
2. Largest spike usually exceeding 30 mm. Often an unbranched woody stem to 0.5 m long, ca. 10 mm thick. Spike before flowering often covered by long woolly hairs. Corolla lobes 2.7–3.7 mm long. Leaves with a lanate, rarely sericeous and never silvery indumentum, or leaves also or sometimes only villose, or glabrescent. Venezuela, N Colombia *Plantago sericea* ssp. *perreymondii*
- Spikes rarely exceeding 30 mm. Young spikes not covered by long woolly hairs. Corolla lobes 1.3–3.7 mm long. Leaves rarely lanate 3.

3. Spike 7–11 mm long, scape 20–40 times longer. Corolla lobes 3.3–3.7 mm long, obtuse or acute. Anterior sepals 3.5–4.2 mm long. Stem woody, 60–130 mm long. Leaves 90–130 mm long, 2–4 mm wide, flat. Mexico *Plantago sericea* ssp. *caulescens*
 – Spike 4–25(–42) mm long, scape 1–18(–23) times longer. Corolla lobes 1.3–3.0(–3.3) mm long, Anterior sepals 2.3–4.2 mm long. S America 4.
4. Scape usually decumbent or ascending, and shorter than leaves. Corolla lobes obtuse 1.3–1.9 mm long. Stem short, rarely branched. Leaves usually partly glabrescent. S Peru, N Chile, Bolivia, NW Argentina *Plantago sericea* ssp. *sericans*
 – Scape usually erect. Corolla lobes 1.4–3.3 mm long, obtuse or acute 5.
5. Scape 0.3–1.0(–1.8) times the length of leaves, 1–11 times longer than spike. Indumentum of leaves usually silvery. Corolla lobes obtuse or acute, usually ovate 6.
 – Scape (0.7–)1.1–2.5(–5.0) times longer than leaves, (3–)6–18(–23) times longer than spike. Indumentum of leaves rarely silvery. Stem usually branched, either short or elongated and slightly woody. Corolla lobes obtuse, elliptic 7.
6. Spike 7–25(–2) mm long with (4–)9–24(–36) flowers. Apex of leaf naked, usually peeping through the indumentum. Venezuela, E Colombia *Plantago sericea* ssp. *argyrophylla*
 – Spike 4–7(–20) mm long with (1–)2–4(–15) flowers. Apex of leaf rarely peeping through the indumentum. Ecuador *Plantago sericea* ssp. *nubigena*
7. Stem or branches about 3 mm thick, internodes elongated. Leaves (0.4–)0.7–1.3(–3.3) mm wide, often glabrate, black on drying. C Peru (E Colombia see note below)
 *Plantago sericea* ssp. *sericea* var. *sericea*
 – Stem or branches about 5 mm thick, internodes usually short. Leaves (0.6–)1.0–5.3(–10) mm wide, rarely glabrate, not black on drying. Peru, Bolivia, NW Argentina
 *Plantago sericea* ssp. *sericea* var. *lanuginosa*
8. Scape 1.4–2.2 times longer than leaves, erect. Stem short, to 20 mm, branched or not. Leaves 1.0–2.2 mm wide, flat or involute, not stiff. Spike 7–16 mm long with 4–18 flowers. C Peru *Plantago sericea* ssp. *sericea* var. *huacayensis*
 – Scape 0.3–1.1 times the length of leaves, erect or ascending. Stem rather thick, often elongated, 20–75 mm long, branched, woody. Leaves 1.0–1.5 mm wide, involute, often stiff. Spike 3–12 mm long with 2–9 flowers. S Peru and adjacent Bolivia *Plantago sericea* ssp. *polyclada*

Series *Hispidulae*

1. Connective of anther usually not elongated above pollen sacs, truncate or obtuse at apex. Hairs on leaves 1–4.5 mm long, not appressed. Testa shiny. Peru *Plantago limensis*
 – Connective of anther elongated above pollen sacs, acute at apex. Hairs on leaves 0.2–1.0 mm long. Chile.
2. Testa of seed pitted, not shiny, seeds usually less than twice as long as wide. Anterior sepals rarely acuminate 3.

- Testa smooth, shiny, seeds more than twice as long as wide. Scape less than twice as long as leaves. Anterior sepals acuminate 4.
- 3. Anterior sepals 2.5–3.5 mm long, 1.5–2.8 mm wide, obtuse. Scape usually ascending and less than twice as long as leaves. Seeds 2.0–3.5 mm long, 0.9–2.0 mm wide, usually two in each capsule *Plantago litorea*
- Anterior sepals 4.0–5.3 mm long, 1.7–3.0 mm wide, usually acute. Scape usually erect and more than twice as long as leaves. Seeds 3.1–5.8 mm long, 1.6–2.8 mm wide, often only one developed in each capsule *Plantago hispidula*
- 4. Corolla lobes less than 2lh times as long as wide. Hairs on leaves appressed. Seeds often strongly compressed laterally. Chile (continent) *Plantago rancaguae*
- Corolla lobes more than thrice as long as wide. Hairs on leaves not appressed. Seeds not strongly compressed laterally. San Ambrosio Island *Plantago lundborgii*

Series *Brasilienses*

(incl. other Argentinean and Chilean taxa of sect. Gnaphaloides)

1. Annuals. Flowers usually cleistogamic with small anthers on short filaments. Bract especially of lowermost flowers often with the green nerve elongated
 - Perennials. Flowers chasmogamic, anthers large, on long filaments. Green nerve of bract rarely extended and lowermost bract not longer than the rest 3.
2. Corolla actinomorphic, lobes cuneate at base. Chile, Peru ser. *Hispidulae*
 - Corolla zygomorphic, all four lobes cordate at base. C and S Argentina *Plantago patagonica* (ser. Gnaphaloides)
3. Anterior corolla lobe usually cordate at base, rarely obtuse and never cuneate. Posterior lobe different, cuneate at base and bent from a point > 0.4 mm higher than the bending of the other lobes. Anterior corolla lobe > 1.2 times as wide as the posterior lobe ser. *Brasilienses*
 - Anterior corolla lobe cuneate at base, rarely obtuse, posterior lobe similar, bent from a point not higher than 0.4 mm above the bending of the other lobes. Anterior corolla lobe < 1.2 times as wide as the posterior lobe (ser. *Sericeae*) 6.
4. Flowers small, anterior sepals < 2.6 mm long, anterior corolla lobe < 2.5 mm long. Scape ascending and < 1.2 times as long as the leaves. C Argentina *Plantago densa*
 - Flowers larger, anterior sepals > 2.6 mm long, anterior corolla lobe > 2.5 mm long. Scape erect or ascending, usually > 1.2 times as long as the leaves
5. Branches elongated, woody. A much-branched shrub to 0.5 m high and up to 10 years old. Flowers large, anterior sepals usually > 3.75 mm long. Anterior corolla lobe usually > 3.3 mm long, either obtuse or cordate at base, < 1.4 times as wide as the posterior lobe. Seeds > 3.2 mm long. Scapes erect. Argentina, Buenos Aires Province *Plantago tandilensis*

- Branches short or elongated, slightly woody. Plants usually 2–3, rarely more than 4 years old. Flowers smaller, anterior sepals usually < 3.75 mm long. Anterior corolla lobe usually < 3.3 mm long and cordate, rarely obtuse at base, > 1.4 times as wide as the posterior lobe. Seeds usually < 3.2 mm long. Scapes erect or ascending *Plantago brasiliensis*
 - 6. Anterior sepals usually > 4.0 mm long and anterior corolla lobe > 3.0 mm 7.
 - Anterior sepals usually < 4.0 mm long and anterior corolla lobe usually < 3.0 mm (*Plantago sericea*) 8.
 - 7. Scapes shorter than leaves and < 10 times as long as the spike. Anterior corolla lobe < 4.0 mm long. Argentina, Buenos Aires Province *Plantago bismarckii*
 - Scapes longer than leaves and > 10 times as long as the spikes. Anterior corolla lobe > 4.0 mm long. S Chile, SW Argentina *Plantago grandiflora*
 - 8. Corolla lobes short, < 2.0 mm long. Anterior sepals usually > 1.6 times as long as the corolla lobes. Scape decumbent, ascending, or rarely erect. Peru, Bolivia, N Chile, NW Argentina *Plantago sericea* ssp. *sericans*
 - Corolla lobes longer, usually > 2.0 mm long. Anterior sepals usually < 1.6 times as long as the corolla lobes. Scape erect or ascending 9.
 - 9. Corolla actinomorphic, all lobes bent at the same level. Anterior sepals often > 1.3 times as long as the anterior corolla lobe. Scape long, often < 1.7 times as long as the leaves. Peru, Bolivia, NW Argentina *Plantago sericea* ssp. *sericea* var. *lanuginosa*
 - Corolla slightly zygomorphic, posterior corolla lobe bent from a point 0.2–0.4 mm higher than the other lobes. Anterior sepals often < 1.3 times as long as the anterior corolla lobe. Scape often > 1.7 times longer than leaves 10.
 - 10. Green part (nerve) of anterior sepals about ½ of width. Anterior sepals small, < 3.26 mm long, < 1.2 times as long as the anterior corolla lobe. Anterior corolla lobe < 1.8 times as long as wide. C and S Chile *Plantago sericea* ssp. *araucana*
 - Green part of anterior sepals about ¼ of width. Anterior sepals large, > 3.26 mm long, > 1.2 times as long as the corolla lobes. Anterior corolla lobe narrow, > 1.8 times as long as wide. N Chile *Plantago johnstonii*
- + *Plantago pyrophila*
 + *Plantago nebularis*
 + *Plantago zoellneriana*

5.1.8 Section *Psyllium*

- 1. Annuae 2.
 - Perennes 6.
- 2. Sepala antica posticis longiora; bractee inferiores foliaceae, crassae; corollaetubus haud rugulosus; semina parva, lata, crassa *Plantago squarrosa*

- Sepala antica et postica aequilonga 3.
- 3. Bractee inferiores in carina lata haud bene a laminis lateralibus distincta praetermedianum nervis lateralibus a basi lata divergentibus instructae 4.
- Bractee inferiores simpliciter carinatae 5.
- 4. Bractee superiores e basi lata angustatae; corollae tubus latus, urceolatus, corolla in fauce et ad basin loborum bene brunneo-tincta *Plantago phaeostoma*
- Bractee superiores late spathulatae; corollae tubus angustus *Plantago arenaria*
- 5. Sepala anguste lanceolata vel lanceolata; bractea longe tenuiter acuminata; antherae parvae; folia angustissime linearia vel filiformia *Plantago exigua*
- Sepala lanceolata vel ovata; bractea brevius acuminata; folia linearia usque lanceolata *Plantago afra*
- 6. Bractee inferiores perlatae, praeter carinam nervis e basi lata orientibus instructae; semina brunnea, crassa, haud nitentia, facie hili valde crasse marginata *Plantago sempervirens*
- Bractee inferiores \pm angustiores, simpliciter carinatae; semina rubro-brunnea, nitentia, haud ita crassa 7.
- 7. Rami florentes internodiis elongatis; spica usque cylindracea, multiflora *Plantago euphratica*
- Rami florentes internodiis brevibus; spica brevis, pauciflora 8.
- 8. Folia velutino-hirta *Plantago webbii*
- Folia \pm pilis brevioribus vel longioribus rigidulis obtecta usque fere glabrescentia 9.
- 9. Rami demum cortice laevi, laete flavescente obtecti. Sinai *Plantago sinaica*
- Rami demum cortice \pm laevi, cinereo-brunneo vel brunneo obtecti 10.
- 10. Folia usque lanceolata, rigida; internodia ad ramorum partem inferiorem perbrevia. Algeria, Marocco *Plantago mauritanica*
- Folia anguste linearia, haud rigida; internodia ad ramorum partem inferiorem longiora. Teneriffa, Madeira *Plantago arborescens*
- + *Plantago maris-mortui*
- + *Plantago asperrima*
- + *Plantago famarae*
- + *Plantago chamaepsyllium*

5.1.9 Section *Bougueria*

Plantago nubicola

Chapter 6

Genus *Littorella*

1. Flores feminei in pedunculo 2(-3), parum supra basin pedunculi siti; bractea floris pseudoterminalis masculi in pedunculo medio sita 2.
 - Flores feminei in pedunculo medio siti 3-8(-10); bractea floris pseudoterminalis masculi flori approximata, perlata *Littorella australis*
2. Folia circ. cylindracea, parum compressa; sepala floris masculi 4-5 mm longa; fructus tuberculato-rugulosus *Littorella uniflora*
 - Folia planiuscula; sepala floris masculi 2.5-4 mm longa; fructus sublaevis vel rugulosus *Littorella americana*

Chapter 7

Genus *Aragoa*

1. Plantas con flores pendulas, corola amarilla con tubo al menos 1.5 veces mas largo que los lobulos (Luteoaragoa) *Aragoa perez-arbelaeziana*
 - Plantas con flores no pendulas, corola blanca con tubo de igual o menor longitud que lobulos 2.
2. Hojas con cilios marginales (*Ciliatae*) 5.
 - Hojas sin cilios marginales 3.
3. Ramas primarias ascendentes o erecto-patentes, ramas secundarias y terciarias frecuentemente subopuestas o alternas, hojas coriáceas, densamente imbricado-adpresas, de seccion concava o plana en el haz y convexa en el envés en la madurez; pedicelos fructiferos muy cortos (raramente de hasta 1.5 mm), semillas con ala corta (de menor anchura que la parte central carnosa de la semilla) (*Cupressina*) 9.
 - Ramas primarias generalmente divaricadas o patentes, ramas secundarias y terciarias opuestas o verticiladas, hojas coriáceas o no, de seccion variada muy raramente convexo-concava, pedicelos fructiferos de varias longitudes, semillas con ala ancha. (de igual o mayor anchura que el ancho de la parte central carnosa de la semilla) 4.
4. Plantas con ramas generalmente de mas de 8 mm de diametro, ramas secundarias y terciarias largas y opuestas, hojas desarrolladas, patentes o reclinadas con respecto al eje, coriáceas o subcoriáceas, generalmente de mas de 7 mm de longitud y 1 mm de anchura en la madurez, pedicelo fructifero generalmente 1–2(–2.5) mm (*Abietina*) 12.
 - Plantas con ramas generalmente graciles (de menos de 8 mm de diametro), ramas secundarias frecuentemente con abundante proliferation de ramas terciarias y cuaternarias opuestas, hojas desarrolladas patentes, erecto-patentes o adpresas, hojas no coriáceas o subcoriáceas, generalmente de menos de 7 mm de longitud y de 1 mm de anchura en la madurez, pedicelos fructiferos por lo general de 2–6 mm (*Lycopodioides*) 15.

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5. Ejes de las ramas terminales glabros; hojas de las ramas jóvenes estrechamente lineares, de 0.3–0.4 mm de anchura, con escaso brillo, con sección transversal trigona, planas en el haz con costa media resaltada y obtusa, corola con pelos glandulares cortos y dispersos en el $\frac{1}{3}$ basal de los lobulos *Aragoa funckii*
- Ejes de las ramas jóvenes en mayor o menor grado algodonosos; hojas de las ramas jóvenes estrechamente oblongas, obovoides, lanceoladas o linear-lanceoladas, de más de 0.5 mm de anchura, nitidas, con sección transversal acanalada cóncavo-convexa (hazenves), indumento de la corola de diferente tipo y ubicación 6.
6. Hojas adultas del eje principal de más de 6.5 mm de longitud, con algunas foveolas-punteaduras, sépalos fructíferos de más de 3.5 mm de longitud. tubo de la corola de más de 3 mm de longitud, con abundante indumento algodonoso en los $\frac{2}{3}$ superiores internos (*Aragoa kogiorum*) 7.
- Hojas adultas del eje principal generalmente de menos de 5.5 mm de longitud, sin foveolas-punteaduras, sépalos fructíferos de menos de 2.5 mm de longitud, tubo de la corola de 2 mm de longitud. con un anillo de pelos en la base (*Aragoa lucidula*) 8.
7. Plantas con ramificación secundaria y terciaria muy densa, intrincada, hojas de las ramas jóvenes generalmente sin quilla resaltada en el envés, tubo de la corola sin indumento algodonoso disperso en la cara externa, tubulos de la corola obovoide-espatulados de 5–7 × 2.5 mm, estilo completamente desarrollado de hasta 5 mm *Aragoa kogiorum* subsp. *kogiorum*
- Plantas con ramificación secundaria y terciaria poco densa, hojas de las ramas jóvenes con quilla generalmente resaltada en el envés, tubo de la corola con indumento algodonoso disperso en la cara externa, lobulos de la corola anchamente obovados, de 6–6.5 × 4–4.5 mm, estilo adulto de hasta 3.5 mm *Aragoa kogiorum* subsp. *sevillae*
8. Ramas jóvenes de 1.5–3.5(–5) mm de diámetro, hojas jóvenes de 2–2.6(–3) × 0.8 mm, tanto hojas jóvenes como desarrolladas, oblongas y obtusas en el apice, con escasos pelos en el envés *Aragoa lucidula* subsp. *lucidula*
- Ramas jóvenes de (4–)4.5–8 mm de diámetro, hojas jóvenes de 3.5–4.5 × 0.9–1.3 mm, tanto hojas jóvenes como desarrolladas lanceoladas, agudas en el apice. densamente lanosas en el envés *Aragoa lucidula* subsp. *lanata*

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- 9 (3). Hojas del eje principal estrecha o anchamente triangular-subuladas de al menos 1.2 mm de anchura en su zona media, envés con quilla en la mitad distal, foveolas-punteaduras inexistentes o muy escasas 2–6, corola (tubo y tubulos) de 10 mm o más de longitud. estilo completamente desarrollado de al menos 5 mm de longitud 10.
- Hojas del eje principal lanceoladas o linear-lanceoladas de hasta 1.1 mm de anchura en la zona media, envés con quilla en toda su longitud y foveolas-punteaduras siempre presentes en el envés, corola (tubo y lobulos) de menos de 9 mm de longitud 9.

10. Plantas densamente ramificadas en la parte superior, hojas del eje principal anchamente triangular-subuladas de $5-5.5 \times 1.7-2$ mm, agudas, sin foveolas-punteaduras, lobulos de la corola de $7 \times 3.5-4$ mm, con (2-)3-4 semillas por loculo *Aragoa cupressina*
- Plantas laxamente ramosas en la parte superior, hojas del eje principal estrechamente triangular-subuladas de $4-6 \times 1.1-1.6$ mm de anchura, romas, generalmente con 2-6 foveolas-punteaduras en el envés, lobulos de la corola de $6-8 \times 2.5-3$ mm, con 3-6(-7) semillas por loculo *Aragoa cleefii*
11. Hojas del eje principal, angulosas en el dorso, pero con quilla no diferenciada de la lamina, ni surco central en el haz, sepalos de 3.1-3.6 mm de longitud. corola de 5-6.5 mm de longitud, glabra en la cara interna *Aragoa castroviejoii*
- Hojas del eje principal, con quilla resaltada en el envés. con surco central en el haz, sepalos de 4.5-4.7 mm de longitud, corola de 6-8 mm de longitud, con indumento algodonoso en la mitad superior del tubo y en la base de los lobulos *Aragoa romeroi*

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- 12 (4). Hojas desarrolladas espatuladas, de 2.5-3.5 mm de anchura, delgadas, de seccion linear, plana *Aragoa dugandii*
- Hojas desarrolladas no espatuladas, de menos de 2 mm de anchura, de seccion biconvexa, planoconvexa o concavoconvexa (haz-envés) 13.
13. Corola no vellosa en la garganta, indumento compuesto linicamente por algunas glandulas sesiles (*Aragoa occidentalis*) 14.
- Corola abundantemente vellosa en la garganta 16.
14. Partes superiores de la planta sin ramas cortas de tercer orden desarrolladas, hojas de las ramas jovenes imbricado-ascendentes, por lo general agudas, hojas desarrolladas con seccion convexo-planas o mas raramente lenticular (haz-envés), sepalos de $4-4.3 \times 1.7-2$ mm *Aragoa occidentalis* subsp. *occidentalis*
- Partes superiores de la planta con ramas cortas de tercer orden desarrolladas, hojas de las ramas jovenes patentas o reclinadas, por lo general obtusas, hojas desarrolladas con seccion lenticular o transverso-r6mbica, con ambas costillas (en haz y envés) resaltadas, sepalos de $3.6-3.8 \times 1.5-1.8$ mm *Aragoa occidentalis* subsp. *refracta*

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- 15 (4). Hojas jovenes (de las ramas de ultimo orden) de hasta 0.9 mm de anchura, hojas desarrolladas con seccion convexo-recurvada en el haz y concava en el envés, este transversalmente estriado-corrugado de forma irregular en la mitad o $\frac{2}{3}$ inferiores *Aragoa corrugatifolia*
- Hojas jovenes (de las ramas de ultimo orden) de 1.1-1.6 mm de anchura, hojas desarrolladas con seccion claramente planoconvexa o biconvexa, lamina no estriado-corrugada en el envés *Aragoa abietina*

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- 16 (13). Sepalos de hasta 3.5(-4) mm, corola glabra en la garganta, tubo de la corola de hasta 3 mm de longitud, estilo completamente desarrollado de hasta 3 mm de longitud 17.
- Sepalos de mas de (3.8-)4 mm, corola pelosa en la garganta, tubo de mas de 3 mm de longitud, estilo completamente desarrollado de mas de 3.5 de longitud 19.
17. Caliz de 3.2-4 mm de longitud, corola de 6.5-10 mm de longitud, lobulos de la corola de 4.5 mm o mas de longitud, estilo completamente desarrollado de 2.5-3 mm ... *Aragoa cundinamarcensis*
- Caliz de 2.5-3.3 (raramente hasta 3.5) mm de longitud, corola menor de 6.5 mm de longitud, lobulos de la corola de hasta 4 mm de longitud, estilo completamente desarrollado de hasta 2.2 mm 18.
18. Hoja madura de 5-6 × 0.9-1 mm de longitud, con seccion rombico-transversa, pedicelo en el fruto de mas de 2.8-3 mm, estilo de 1-1.8 mm, capsula madura de mas de 4.5 mm de longitud *Aragoa parviflora*
- Hoja madura de 4-5 × 0.6-0.7 mm de longitud, con seccion biconvexa, subtrigona, con costilla dorsal muy marcada (conica) y costilla ventral redondeada, poco pronunciada, pedicelo en el fruto menor de 2 mm, caliz de (3-)3.3-3.5 mm de longitud, estilo de 2-2.2 mm, capsula madura de hasta 4.5 mm de longitud *Aragoa abscondita*
- 19 (16). Hojas no coriáceas, tubo de la corola de 4-6 mm de longitud, filamentos estaminales de 3-4 mm de long 20.
- Hojas coriáceas o subcoriáceas, tubo de la corola de 3-4 mm de longitud, filamentos estaminales de 2.5-3 mm 21.
20. Ramas generalmente de 2-3 mm de diametro (con la columna de hojas), hojas incurvo-imbricadas o ascendentes con respecto al tallo, hojas adultas de 3.3-4 × 0.7 mm, costilla dorsal grande obtusamente conica, generalmente con un mamelon o gibosidad en el envés en la zona de union al eje, sepalos de 5-5.5 mm *Aragoa lycopodioides*
- Ramas de 4-6 mm de diametro (con la columna de hojas), hojas ascendentes o erecto-patentes con respecto a el eje. hojas adultas de 6-8 × 1.1-1.2 mm, con costilla dorsal y ventral aplanadas, sepalos de 4.2-4.5 mm *Aragoa picachensis*
21. Ramas primarias y secundarias patentes o erecto-patentes con respecto al eje (angulo de 70-90°), hojas desarrolladas del eje principal planas o planoconcavas en el envés, con quilla central muy resaltada, y haz convexa con costa muy pronunciada (rebasando ampliamente los margenes de la hoja) *Aragoa hammenii*
- Ramas primarias y secundarias ascendentes o adpresas, hojas desarrolladas del eje principal convexas en el envés con quilla central mis o menos pronunciada, haz concava o planoconcava con costa escasamente pronunciada (no rebasando los margenes de la hoja) *Aragoa tamana*

+ *Aragoa* × *chingacensis* = *Aragoa abietina* × *Aragoa cundinamarcensis*

+ *Aragoa* × *diazii* = *Aragoa corrugatifolia* × *Aragoa cundinamarcensis*

+ *Aragoa* × *funzana* = *Aragoa cleefii* × *Aragoa cundinamarcensis*

+ *Aragoa* × *jaramilloi* = *Aragoa abietina* × *Aragoa cupressina*

Appendix A

Plantagineae classification

Genus 1. *Aragoa* Kunth

Sectio Ciliatae Fern.Alonso

1(1). *Aragoa lucidula* S.F.Blake

Sectio Aragoa

1(2). *Aragoa abietina* Kunth

2(3). *Aragoa abscondita* Fern.Alonso

3(4). *Aragoa castroviejoi* Fern.Alonso

4(5). *Aragoa cleefii* Fern.Alonso

5(6). *Aragoa corrugatifolia* Fern.Alonso

6(7). *Aragoa cundinamarcensis* Fern.Alonso

7(8). *Aragoa cupressina* Kunth

8(9). *Aragoa dugandii* Romero

9(10). *Aragoa funckii* Fern.Alonso

10(11). *Aragoa hammenii* Fern.Alonso

11(12). *Aragoa kogiorum* Romero

12(13). *Aragoa lycopodioides* Benth. ex Oliver

13(14). *Aragoa occidentalis* Pennell

14(15). *Aragoa parviflora* Fern.Alonso & Castrov.

15(16). *Aragoa perez-arbelaeziana* Romero

16(17). *Aragoa picachensis* Fern.Alonso

17(18). *Aragoa romeroi* Fern.Alonso

- 18(19). *Aragoa tamana* Fern.Alonso
 19(20). *Aragoa* × *chingacensis* Fern.Alonso¹
 20(21). *Aragoa* × *diazii* Fern.Alonso²
 21(22). *Aragoa* × *funzana* Fern.Alonso³
 22(23). *Aragoa* × *jaramilloi* Fern.Alonso⁴

Genus 2. *Littorella* P.J.Bergius

- 1(24). *Littorella americana* Fernald⁵
 2(25). *Littorella australis* Griseb. ex Benth. & Hook.f.⁶
 3(26). *Littorella uniflora* (L.) Asch.⁷

Genus 3. *Plantago* L.

Subgenus *Coronopus* (Lam. & DC.) Rahn

Sectio *Coronopus*

- 1(27). *Plantago asphodeloides* Svent
 2(28). *Plantago coronopus* L.⁸
 3(29). *Plantago carnosus* Lam.
 4(30). *Plantago crassifolia* Forssk.
 5(31). *Plantago crypsoides* Boiss.⁹
 6(32). *Plantago macrorhiza* Poir.
 7(33). *Plantago serraria* L.¹⁰
 8(34). *Plantago subspathulata* Pilg.

Sectio *Maritima* H.Dietr.

- 1(35). *Plantago alpina* L.¹¹
 2(36). *Plantago eocoronopus* Pilg.

¹*Aragoa abietina* × *Aragoa cundinamarcensis*

²*Aragoa corrugatifolia* × *Aragoa cundinamarcensis*

³*Aragoa cleefii* × *Aragoa cundinamarcensis*

⁴*Aragoa abietina* × *Aragoa cupressina*

⁵= *Plantago americana* (Fernald) Rahn

⁶= *Plantago araucana* Rahn

⁷= *Plantago uniflora* L.

⁸= *Plantago aschersonii* Bolle; = *Plantago cupanii* Guss.

⁹= *Plantago weldenii* Rchnb. sed.m.; = *Plantago commutata* Guss. sed.m.; = *Plantago sabulosa* Danin & Raus. sed.m.

¹⁰= *Plantago peloritana* Lojac

¹¹= *Plantago dardanae* Rexhepi & D. Dimitrov; = *Plantago penyalarensis* Pau

3(37). *Plantago maritima* L.¹²

4(38). *Plantago rhizoxylon* Emb.

5(39). *Plantago subulata* L.¹³

Subgenus *Plantago*

Sectio *Micropsyllium* Decne.

1(40). *Plantago elongata* Pursh¹⁴

2(41). *Plantago heterophylla* Nutt.¹⁵

3(42). *Plantago oelandica* Shipunov, nom.nov.prop.¹⁶

4(43). *Plantago polysperma* Kar. & Kir.

5(44). *Plantago pusilla* Nutt.

6(45). *Plantago tenuiflora* Waldst. & Kit.

Sectio *Eremopsyllium* Pilg.

1(46). *Plantago gentianoides* Sibth. & Sm.

2(47). *Plantago reniformis* Beck

Sectio *Lamprosantha* Decne.

1(48). *Plantago arachnoidea* Schrenk ex Fisch. & C.A.Mey.

2(49). *Plantago canescens* Adams¹⁷

3(50). *Plantago krascheninnikovii* Ye. V. Serg.

4(51). *Plantago maxima* Juss. ex Jacq.

5(52). *Plantago media* L.¹⁸

6(53). *Plantago perssonii* Pilg.

7(54). *Plantago schwarzenbergiana* Schur

Sectio *Leptostachys* Decne.

1(55). *Plantago africana* Verdc.

2(56). *Plantago fischeri* Engl.

¹²= *Plantago atlantica* Batt.; = *Plantago juncooides* Lam.; = *Plantago neumannii* Opiz; = *Plantago oliganthos* Roem. & Schult.; = *Plantago salsa* Pall.; = *Plantago schrenkii* C. Koch.; = *Plantago serpentina* All.; = *Plantago strictissima* L.; = *Plantago subpolaris* Andr.

¹³= *Plantago algarbiensis* Samp., stat.m.; = *Plantago almogravensis* Franco; = *Plantago carinata* Schrad. ex Mert. & W.D.J.Koch; = *Plantago holosteum* Scop.; = *Plantago insularis* (Godr.) Nyman; = *Plantago radicata* Hoffmans. & Link

¹⁴= *Plantago bigelovii* A. Gray

¹⁵= *Plantago hybrida* Bart.

¹⁶= *Plantago minor* Fr., nom.illeg., non *Plantago minor* Gilib.

¹⁷= *Plantago jurtzevii* Tzvel.

¹⁸= *Plantago urvillei* Opiz, stat.m.; = *Plantago brutia* Ten.

- 3(57). *Plantago laxiflora* Decne.
 4(58). *Plantago longissima* Decne.¹⁹
 5(59). *Plantago palmata* Hook.f.
 6(60). *Plantago remota* Lam.²⁰
 7(61). *Plantago tanalensis* Baker

Sectio Mesembrynia Decne.

- 1(62). *Plantago alpestris* B.G.Briggs & al.
 2(63). *Plantago antarctica* Decne.
 3(64). *Plantago aucklandica* Hook.f.
 4(65). *Plantago aundensis* P. Royen
 5(66). *Plantago bellidioides* Decne.
 6(67). *Plantago cladarophylla* B.G.Briggs & al.
 7(68). *Plantago cunninghamii* Decne.²¹
 8(69). *Plantago daltonii* Decne.
 9(70). *Plantago debilis* R.Br.
 10(71). *Plantago depauperata* Merr. & Perry
 11(72). *Plantago drummondii* Decne.²²
 12(73). *Plantago euana* Hurlim.
 13(74). *Plantago euryphylla* B.G.Briggs & al.
 14(75). *Plantago exilis* Decne.
 15(76). *Plantago gaudichaudii* Barnéoud²³
 16(77). *Plantago glabrata* Hook.f.
 17(78). *Plantago glacialis* B.G.Briggs & al.
 18(79). *Plantago gunnii* Hook.f.
 19(80). *Plantago hedleyi* Maiden
 20(81). *Plantago hispida* R.Br.²⁴
 21(82). *Plantago lanigera* Hook.f.
 22(83). *Plantago montisdicksonii* P. Royen

¹⁹= *Plantago zeyheri* auct., nom.nud.

²⁰= *Plantago capensis* Bojer

²¹= *Plantago mitchellii* Decne.

²²= *Plantago pritzelii* Pilg.

²³= *Plantago sericophylla* Decne.; = *Plantago bakeri* Pilg.

²⁴= *Plantago tildeniae* Pilg.

- 23(84). *Plantago muelleri* Pilg.
 24(85). *Plantago multiscapa* B.G.Briggs
 25(86). *Plantago novae-zelandiae* L.B. Moore
 26(87). *Plantago obconica* Sykes
 27(88). *Plantago palustris* L.R.Fraser & Vickery
 28(89). *Plantago papuana* P. Royen
 29(90). *Plantago paradoxa* Hook.f.
 30(91). *Plantago pentasperma* Hemsl.
 31(92). *Plantago picta* Colenso
 32(93). *Plantago polita* Craven
 33(94). *Plantago raoulii* Decne.
 34(95). *Plantago robusta* Roxb., sed.m.
 35(96). *Plantago spathulata* Hook.f.
 36(97). *Plantago stauntonii* Reichardt
 37(98). *Plantago stenophylla* Merr. & L.M.Perry
 38(99). *Plantago tasmanica* Hook.f.
 39(100). *Plantago triandra* Berggr.²⁵
 40(101). *Plantago triantha* Spreng.
 41(102). *Plantago trichophora* Merr. & L.M.Perry
 42(103). *Plantago turrifera* B.G.Briggs & al.
 43(104). *Plantago udicola* Meudt & Garn.-Jones
 44(105). *Plantago unibracteata* Rahn²⁶
 45(106). *Plantago varia* R.Br.²⁷

Sectio *Plantago*

- 1(107). *Plantago cornuti* Gouan²⁸
 2(108). *Plantago griffithii* Decne.²⁹
 3(109). *Plantago major* L.³⁰

²⁵= *Plantago masoniae* Cheesem.

²⁶= *Plantago uniflora* Hook.f., non L.

²⁷= *Plantago acutiloba* Pilg.; = *Plantago struthionis* A.Cunn. ex Decne.

²⁸= *Plantago exaltata* Hornem.

²⁹= *Plantago aitchisonii* Pilg.

³⁰= *Plantago himalaica* Pilg., stat.m.; = *Plantago brachyphylla* Edgew. ex Decne.; = *Plantago uliginosa* F. W. Schmidt, stat.m.; = *Plantago winteri* Wirtg.

4(110). *Plantago japonica* Franch. & Sav., stat.m.³¹

5(111). *Plantago tatarica* Decne.

Sectio Heptaneuron Decne.

1(112). *Plantago cordata* Lam.

Sectio Carpophorae Rahn

1(113). *Plantago rigida* Kunth

2(114). *Plantago tubulosa* Decne.

Sectio Pacifica Hassemer

1(115). *Plantago anatolica* Tutel & R.R.Mill

2(116). *Plantago asiatica* L.³²

3(117). *Plantago camtschatica* Link

4(118). *Plantago chihuahuensis* Shipunov sp.nov.

5(119). *Plantago depressa* Willd.

6(120). *Plantago eriopoda* Torr.³³

7(121). *Plantago hakusanensis* Koidz.

8(122). *Plantago hasskarlii* Decne.

9(123). *Plantago hawaiiensis* (A. Gray) Pilg.

10(124). *Plantago incisa* Hassk.³⁴

11(125). *Plantago komarovii* Pavlov

12(126). *Plantago pachyphylla* A. Gray³⁵

13(127). *Plantago princeps* Cham. & Schtdl.³⁶

14(128). *Plantago rapensis* Pilg.

15(129). *Plantago rugelii* Decne.

16(130). *Plantago rupicola* Pilg.

17(131). *Plantago sparsiflora* Michx.

³¹= *Plantago macronipponica* Yamamoto

³²= *Plantago alata* Nakai; = *Plantago cavaleriei* H.Lév.; = *Plantago centralis* Pilg.; = *Plantago coreana* H.Lév.; = *Plantago erosa* Wall.; = *Plantago fengdouensis* (Z.E Chao & Yong Wang) Yong Wang & Z.Yu Li, stat.m.; = *Plantago formosana* Tateishi & Masam.; = *Plantago hostifolia* Nakai & Kitag.; = *Plantago multistachya* S.H.Oh; = *Plantago nanchuanensis* J.Z. Liu, nom.nud.; = *Plantago popovii* Tzvel.; = *Plantago sawadai* Yamam.; = *Plantago schneideri* Pilg.; = *Plantago taquetii* H.Lév.; = *Plantago yakushimensis* Masam.; = *Plantago yezoensis* Pilg.; = *Plantago zhongdainensis* J.Z.Liu, sed.m., nom.nud.

³³= *Plantago shastensis* Greene

³⁴= *Plantago densiflora* J.Z. Liu, sed.m.

³⁵= *Plantago muscicola* Pilg.; = *Plantago hillebrandii* Pilg.; = *Plantago glabrifolia* (Rock) Pilg.; = *Plantago melanochrous* Pilg.; = *Plantago krajinae* Pilg.; = *Plantago grayana* Pilg.

³⁶= *Plantago longibracteata* (Mann) Tessene, nom.nud.

18(132). *Plantago tweedyi* A. Gray

Sectio Holopsyllium Pilg.

1(133). *Plantago macrocarpa* Cham. & Schldtl.

Sectio Virginica Decne. & Steinh. ex Barnéoud

1(134). *Plantago alismatifolia* Pilg.

2(135). *Plantago argentina* Pilg.

3(136). *Plantago australis* Lam.³⁷

4(137). *Plantago barbata* G. Forst³⁸

5(138). *Plantago berroi* Pilg.

6(139). *Plantago bradei* Pilg.

7(140). *Plantago buchtienii* Pilg.

8(141). *Plantago catharinea* Decne.

9(142). *Plantago commersoniana* Decne. & Barnéoud

10(143). *Plantago correae* Rahn

11(144). *Plantago corvensis* Hassemer³⁹

12(145). *Plantago cumingiana* Fisch. & C.A.Mey.

13(146). *Plantago cuzcoensis* Shipunov, sp.nov.

14(147). *Plantago dielsiana* Pilg.

15(148). *Plantago fernandezia* Barnéoud

16(149). *Plantago firma* Kunze ex Walp.⁴⁰

17(150). *Plantago floccosa* Decne.

18(151). *Plantago galapagensis* Rahn

19(152). *Plantago guilleminiana* Decne.

20(153). *Plantago hatschbachiana* Hassemer

21(154). *Plantago humboldtiana* Hassemer

22(155). *Plantago jujuyensis* Rahn

23(156). *Plantago moorei* Rahn

24(157). *Plantago myosuros* Lam.

25(158). *Plantago napiformis* (Rahn) Hassemer

³⁷= *Plantago candollei* Raf.; = *Plantago deppeana* Vatke, sed.m.; = *Plantago hirtella* Kunth; = *Plantago schiedeana* Decne.

³⁸= *Plantago monanthos* D'Urville, p.p.

³⁹= *Plantago aparadensis* D. Falkenberg

⁴⁰= *Plantago skottsbergii* Pilg.

- 26(159). *Plantago orbignyana* Decne.⁴¹
 27(160). *Plantago oreades* Decne.
 28(161). *Plantago pachyneura* Steud.
 29(162). *Plantago penantha* Griseb.
 30(163). *Plantago pretoana* (Rahn) Hassemer
 31(164). *Plantago pulvinata* Speg.
 32(165). *Plantago pyrophila* Villarroel & J. R. I. Wood
 33(166). *Plantago rahniiana* Hassemer & R. Trevis.
 34(167). *Plantago rhodosperma* Decne.
 35(168). *Plantago sempervivoides* Dusen
 36(169). *Plantago subnuda* Pilg., stat.m.
 37(170). *Plantago tehuelcha* Speg.
 38(171). *Plantago tenuipala* (Rahn) Rahn
 39(172). *Plantago tomentosa* Lam.⁴²
 40(173). *Plantago trinitatis* Rahn
 41(174). *Plantago truncata* Cham. & Schltld.
 42(175). *Plantago turficola* Rahn
 43(176). *Plantago uniglumis* Wallr. ex Walp.⁴³
 44(177). *Plantago veadeirensis* Hassemer
 45(178). *Plantago ventanensis* Pilg.
 46(179). *Plantago venturii* Pilg.
 47(180). *Plantago virginica* L.
 48(181). *Plantago weddelliana* Decne.

Subgenus *Bougueria* (Decne.) Rahn

- 49(182). *Plantago nubicola* (Decne.) Rahn

Subgenus *Albicans* Rahn

Sectio *Hymenopsyllium* Pilg.

- 1(183). *Plantago bellardii* All.⁴⁴
 2(184). *Plantago benisnassenii* Romo & al.

⁴¹= *Plantago hartwegii* Decne.

⁴²= *Plantago paralias* Decne.

⁴³= *Plantago monanthos* D'Urville, p.p.

⁴⁴= *Plantago bellardi* L.

3(185). *Plantago ciliata* Desf.

4(186). *Plantago cretica* L.

5(187). *Plantago cyrenaica* E.A.Durand & Barratte

Sectio Montana Barnéoud

1(188). *Plantago atrata* Hoppe⁴⁵

2(189). *Plantago cafra* Decne.⁴⁶

3(190). *Plantago monosperma* Pourr.

4(191). *Plantago nivalis* Boiss.

Sectio Lancifolia Barnéoud

1(192). *Plantago altissima* L.

2(193). *Plantago argentea* Chaix⁴⁷

3(194). *Plantago pilgeriana* Hassemer⁴⁸

4(195). *Plantago lagopus* L.⁴⁹

5(196). *Plantago lanceolata* L.⁵⁰

6(197). *Plantago malato-belizii* Lawalree

7(198). *Plantago loeflingii* L.⁵¹

Sectio Albicans Barnéoud

1(199). *Plantago akkensis* Coss.

2(200). *Plantago albicans* L.

3(201). *Plantago amplexicaulis* Cav.⁵²

4(202). *Plantago annua* Ryding

5(203). *Plantago baltistanica* Hartmann

6(204). *Plantago boissieri* Hausskn. & Bornm.

7(205). *Plantago cylindrica* Forssk.

8(206). *Plantago lachnantha* Bunge⁵³

9(207). *Plantago lagocephala* Bunge

⁴⁵= *Plantago discolor* Gand.; = *Plantago fuscescens* Jord.; = *Plantago saxatilis* Bieb.

⁴⁶= *Plantago libyca* Beg. & Vacc.; = *Plantago capillaris* E. Mey. ex Decne.

⁴⁷= *Plantago serpentinicola* Reich.

⁴⁸= *Plantago lacustris* Maire, nom.illeg.; = *Plantago maireana* Hassemer

⁴⁹= *Plantago lusitanica* L.

⁵⁰= *Plantago dubia* L.; = *Plantago leiopetala* Lowe = *Plantago podlechii* Akhani

⁵¹= *Plantago scabrifolia* Thieb., sed.m.

⁵²= *Plantago bauphula* Edgew.

⁵³= *Plantago evacina* Boiss.

- 10(208). *Plantago minuta* Pall.⁵⁴
 11(209). *Plantago notata* Lag.
 12(210). *Plantago orzuiensis* Mohsenz. & al.
 13(211). *Plantago ovata* Forssk.⁵⁵
 14(212). *Plantago psammophila* Agnew & Chal.-Kabi
 15(213). *Plantago sharifii* Rech.f. & Esfand., sed.m.
 16(214). *Plantago stocksii* Boiss.
 17(215). *Plantago tunetana* Murb.

Sectio Gnaphaloides Barnéoud

- 1(216). *Plantago argyrea* Morris
 2(217). *Plantago aristata* Michx.
 3(218). *Plantago bismarckii* Niederl.
 4(219). *Plantago brasiliensis* Sims
 5(220). *Plantago densa* Pilg.
 6(221). *Plantago erecta* Morris⁵⁶
 7(222). *Plantago grandiflora* Meyen⁵⁷
 8(223). *Plantago helleri* Small
 9(224). *Plantago hispidula* Ruiz & Pav.
 10(225). *Plantago hookeriana* Decne.
 11(226). *Plantago johnstonii* Pilg.
 12(227). *Plantago lamprophylla* Pilg.
 13(228). *Plantago limensis* Pers.⁵⁸
 14(229). *Plantago linearis* Kunth
 15(230). *Plantago litorea* Phil.
 16(231). *Plantago lundborgii* Sparre.
 17(232). *Plantago nebularis* Hassemer
 18(233). *Plantago nivea* Kunth
 19(234). *Plantago patagonica* Jacq.⁵⁹

⁵⁴= *Plantago lessingii* Fisch. & C.A. Mey.

⁵⁵= *Plantago fastigiata* Morris

⁵⁶= *Plantago speciosa* Morris

⁵⁷= *Plantago macrantha* Decne.

⁵⁸= *Plantago tacnensis* Pilg.

⁵⁹= *Plantago purshii* Roem. ex Schult.; = *Plantago spinulosa* Decne.

- 20(235). *Plantago rancaguae* Steud.
 21(236). *Plantago sericea* Ruiz & Pav.⁶⁰
 22(237). *Plantago tandilensis* Pilg.
 23(238). *Plantago tolucensis* Pilg.
 24(239). *Plantago wrightiana* Decne.
 25(240). *Plantago zoellneriana* Hassemer

Subgenus *Psyllium* (Mill.) Harms & Reiche

Sectio *Arborescens* Shipunov sect.nov.

- 1(241). *Plantago arborescens* Poir.⁶¹
 2(242). *Plantago asperrima* Gand. ex Hervier⁶²
 3(243). *Plantago famarae* Svent
 4(244). *Plantago mauritanica* Boiss. & Reut.
 5(245). *Plantago sempervirens* Crantz⁶³
 6(246). *Plantago sinaica* Barnéoud⁶⁴
 7(247). *Plantago webbii* Barnéoud

Sectio *Psyllium* Juss.

- 1(248). *Plantago afra* L.⁶⁵
 2(249). *Plantago arenaria* Waldst. & Kit.⁶⁶
 3(250). *Plantago chamaepsyllium* Zohary
 4(251). *Plantago euphratica* Barnéoud
 5(252). *Plantago exigua* Murray⁶⁷
 6(253). *Plantago maris-mortui* Eig
 7(254). *Plantago phaeostoma* Boiss. & Heldr.
 8(255). *Plantago squarrosa* Murray⁶⁸

⁶⁰ = *Plantago alopecurus* Decne.; = *Plantago argyrophylla* Decne.; = *Plantago caricina* Decne.; = *Plantago macbridei* Pilg., sed.m.; = *Plantago nubigena* Kunth; = *Plantago perreymondii* Barn.; = *Plantago polyclada* Pilg.

⁶¹ = *Plantago costae* Menezes; = *Plantago maderensis* Decne.

⁶² = *Plantago assoana* Senn.

⁶³ = *Plantago suffruticosa* Lam.

⁶⁴ = *Plantago arabica* Boiss.

⁶⁵ = *Plantago cynops* L. 1753, non L. 1762, nom.ambig. = *Plantago psyllium* L. 1762, non L. 1753, nom.ambig.; = *Plantago squalida* Salisb.; = *Plantago rugosa* Hochst. ex Steud.

⁶⁶ = *Plantago indica* L. 1759, nom.prop.rej.; = *Plantago psyllium* L. 1753, nom.ambig.; = *Plantago scabra* Moench, nom.illeg.

⁶⁷ = *Plantago pumila* L.f.

⁶⁸ = *Plantago sarcophylla* Boiss. ex Decne.