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## Potentilla L. s.l. (Rosaceae) in Flora Europae Orientalis (Notes on Potentilla XVIII)

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### ABSTRACT

SOJÁK, J. (2005). Potentilla L. s.l. (Rosaceae) in Flora Europae Orientalis (Notes on Potentilla XVIII). *Candollea* 60: 59-78. In English, English and French abstracts.

Some mistakes and inaccuracies occurring in the account of *Potentilla* L. in *Flora Europae Orientalis* are rectified. Wherever possible controversial problems are avoided. This paper discusses amongst others: 1) the names of sections and the description of the insertion and shape of styles; 2) the inappropriate distinguishing characters in the key; 3) the identification of *P. lyngei* Jurtzev & Soják with *P. sommerfeltii* Lehm. and *P. tergemina* Soják with *P. hypoleuca* Turcz.; 4) the revival of *P. ruthenica* Willd.; 5) the occurrence of *P. multifida* L. in Lapland and *P. pensylvanica* L. in the surroundings of the Ladoga Lake.

### RÉSUMÉ

SOJÁK, J. (2005). Potentilla L. s.l. (Rosaceae) dans Flora Europae Orientalis (Notes sur le genre Potentilla XVIII). *Candollea* 60: 59-78. En anglais, résumés en anglais et français.

Des erreurs et des inexactitudes présentes dans le traitement de *Potentilla* L. dans *Flora Europae Orientalis* sont corrigées. Les problèmes sujets à controverse ne sont pas traités dans la mesure du possible. Ce papier discute, entre autres: 1) des noms de sections et de la description de l'insertion et de la taille des styles; 2) de l'inadéquation des caractères distinctifs utilisés dans la clé de détermination; 3) de l'identification de *P. lyngei* Jurtzev & Soják avec *P. sommerfeltii* Lehm. et de *P. tergemina* Soják avec *P. hypoleuca* Turcz.; 4) de la renaissance de *P. ruthenica* Willd.; 5) de la présence de *P. multifida* L. en Laponie et de *P. pensylvanica* L. dans les alentours du lac Ladoga.

**KEY-WORDS:** *Potentilla* – East Europe – Taxonomy

### Introduction

The account of *Potentilla* L. s.l. in *Flora Europae Orientalis* (KAMELIN, 2001) contains mistakes, inaccuracies, speculations and hypotheses presented as facts without doubts. Because they are likely to be adopted by other Russian authors and considered by botanists in Central and Western Europe, it is useful to publish the following notes on some of the statements. The *Flora* is important because it covers about a half of Europe and is published also in English.

To avoid polemic, this paper focuses on facts that are indisputable and verifiable. Problems allowing for different approaches are deliberately omitted. Therefore notes on taxa of the sect. *Rectae* (Th. Wolf) Juz., *P. humifusa* Willd. s.l. and *P. argentea* L. s.l. are deleted. Those relating to questionable groups and species, as e.g. *Collinae* Zimmeter, *P. thuringiaca* Bernh. ex Link s.l. and others are reduced. But some indisputable facts are beyond discussion such as:

- the determination of type specimens of *P. sommerfeltii* Lehm., *P. hypoleuca* Turcz. and *P. ruthenica* Willd.,
- the terminal styles in *Potentilla* s.l.,
- the incorrect names of sections and their authorships,
- the occurrence of natural intersectional hybrids in *P. reptans* L. and sect. *Geoides* Tausch (sect. *Closterostyles* Torr. & A. Gray),
- the absence of *P. multifida* L. and occurrence of *P. arctica* Rouy in northern Sweden,
- the presence of “genes” of *P. conferta* Bunge in plants from the coast of Lake Ladoga.

### Notes on the delimitation of the genus

Kamelin's ideas of genera and subgenera of *Potentillinae* are obviously inconsistent with the classification based on morphological method (SOJÁK, 1989) confirmed by phylogenetical method on the basis of DNA ITSs (ERIKSSON & al., 1998) and by other molecular methods (ERIKSSON & al., 2003; KURTTO & ERIKSSON, 2003). The members of two different evolutionary lines of a tribe, i.e. *Fragaria-Sibbaldia* line and *Potentilla* s.str. line, are merged in one genus and groups *Fragariastrum* Sér. and *Bifurcae* (Th. Wolf) Grossh. (the sections of *Potentilla*), *Dasiphora* Raf. and *Schistophyllidium* Juz. ex Fed. (a separate genera) are placed at the same level and referred to *Potentilla*. *Potentilla rupestris* L. group (*Drymocallis* Fourr. ex Rydb.) belonging to the relationship of *Fragaria* is referred to *Potentilla*. The assertion that species of the *Drymocallis* group are “closely linked with other groups of *Potentilla* especially by means of hybridization” is certainly not true. Hybridization of members of this group with members of other groups of *Potentilla* is not possible in nature and has not been recorded until now. Similarly, the statement that “genesis of this group (i.e. *Drymocallis*) took place within the genus *Potentilla*” is hardly probable. The statement that Kamelin is acquainted with “all the most complicated groups of American species (i.e. subspecies, note by J. S.)” of the group *Drymocallis* is hardly true.

### Styles and stigmas

In the descriptions of the genus and nine sections, styles are described as terminal. None of the c. 430 species of *Potentilla* s.l. has terminal styles. If *Potentilla* had such styles, it should be moved to the proximity of *Coluria* R. Br. of the tribe *Dryadeae* (see Fig. 5 a-b). Terminal styles were found in none of the c. 1600 species of the tribe *Potentilleae* (cf. SOJÁK, 2005). Within the *Potentilleae*, only *Chamaerhodos* Bunge and *Aphanes* L. (and perhaps some *Alchemillas* as well) have basal styles. *Dasiphora* Raf. has styles somewhat removed from the base; they are usually described as subbasal, which is correct.

*Potentilla* sect. *Duchesnea* (Sm.) Dikshit & Panigrahi [*P. indica* (Andrews) Th. Wolf agg.] is said to have lateral styles and that *Potentilla* sect. *Potentilla* [*P. reptans* L. – *P. erecta* (L.) Raeusch. group] should have terminal styles. This is a bad mistake. Position of the styles is quite the same in both groups. It is subterminal. Both groups were therefore referred to the same grex (WOLF, 1908) or subgenus (DIKSHIT & PANIGRAHI, 1998).

Styles of *Potentilla* sect. *Potentilla* are usually not thickened at the base. This is a diacritical character of the section and WOLF (1908) therefore placed these species in the group “*Potentillae Gomphostylae*”. The styles are not thickened near the apex as well; their diameter is equal in the whole length (*P. erecta*, *P. anglica* Laichard.); in *P. reptans*, they can be sometimes slightly widened towards the apex.

*Potentilla* subg. *Chenopotentilla* (*P. anserina* group) should have, according to Kamelin, a non-thickened stigma. The truth is different, because *P. anserina* L. and the species closely related to it have distinctly thickened stigmas (see SOJÁK, 2005: Fig. 3/8).

### Names of sections and subgenera

Names of sections are treated arbitrarily and uncritically. RYDBERG (1896a, b) did not described sections *Multifidae* and *Niveae* in the rank of section, but referred to them, even later, as “groups”. The first to classify them as sections was JUZEPCZUK (1941). Similarly, groups *Tanacetifoliae*, *Chrysanthae* and *Aureae* were designated as “greges” by WOLF (1903, 1908) and were first treated as sections also by JUZEPCZUK (1941).

Section *Multifidae* (Rydb.) Juz. should be called sect. *Pensylvanicae* Poeperl. in Asch. & Graebn. The name of sect. *Argenteae* (Th. Wolf) Juz. has to be replaced by the name of sect. *Terminales* (Döll) Gren. & Godr. (sect. *Makropotentilla* Beck). The name of sect. *Grandiflorae* (Th. Wolf) Juz. has to be changed into *Quinquefolium* Tausch (sect. *Aurastrum* Beck). The author of sect. *Tormentilla* is Tausch, not Rydberg. Section *Campestres* (Poeperl.) Juz. has to be called sect. *Lupinoides* Tausch. Kamelin recognizes Tausch’s name *Geoides* Tausch but none of other Tausch’s names of sections, even though they were published in exactly the same way (cf. TAUSCH, 1823; SOJÁK, 1987b). Section “*Rivales* Th. Wolf” should be cited as sect. *Rivales* Poeperl. in Asch. & Grebn. The name *Tropidophyllum* Neck. does not exist.

“*Potentilla* subg. *Chenopotentilla* Focke” was clearly designated as section by FOCKE (1889: 413), not subgenus. If this group is treated as subgenus, its correct name is *Potentilla* subg. *Argentina* (Lam.) Jepson.

*Potentilla* sect. *Leptostylae* (Th. Wolf) Janchen is an invalidate name (Art. 33.3 of the *St Louis Code*). The correct name is *Potentilla* sect. *Pentaphylloides* Tausch (= sect. *Anserina* Gaudin; cf. SOJÁK, 1987b).

*Potentilla* subg. *Dasiphora* (Raf.) Panigrahi & Dikshit has to be cited as *Potentilla* subg. *Dasiphora* (Raf.) Jepson.

### Failures of the key

Kamelin’s statement that *P. erecta* (L.) Raeusch. has leaflets covered with stellate hairs (leads 6b and 8a, p. 397) is a bad blunder. No comment is necessary.

Section *Tormentilla* (L.) Rydb. (correctly Tausch) is recognized on p. 397 but not on p. 415. Section *Closterostyles* Torr. & A. Gray is recognized on p.409 but not on p. 400.

*Potentilla inclinata* Vill. has not petals approximately as long as calyx (lead 64).

Three species of *P. multifida* L. agg. cannot be determined (lead 20).

The only reliable difference between *P. chamissonis* Hultén and *P. arenosa* (Turcz.) Juz. (different indumentum of petiole) is not at all mentioned (lead 36). Only characters subject to variation are given.

As distinguishing characters between *P. crantzii* (Crantz) Beck ex Fritsch and *P. aurea* L., yellow petals with an orange spot at base (*P. aurea*) or petals bright yellow to lemon yellow without a spot (*P. crantzii* = *P. verna* sensu Kamelin) are considered. In fact, *P. crantzii* has usually yolk-yellow petals (in most regions exclusively) with a conspicuous orange spot. The differences in the colour of petals in various species are given repeatedly. These are at variance with my observation both from nature and cultivation and with the herbarium specimens.

*Potentilla aurea* differs from *P. crantzii* substantially by the different indumentum of petioles and stalks; this character has been omitted here (lead 73).

None of the distinguishing characters between *P. gelida* C. A. Mey. and *P. hyparctica* Malte (leads 40-41) were taken over from the excellent study from JURTZEV (1984: 144-145) or from an other reliable source. Varying characters are used instead:

- *Potentilla hyparctica* can have the leaflets glabrous above and sparsely hairy beneath (just as the stalks; these can be with appressed hairs), and the leaflet edge are said to be the same type of hairs as in *P. gelida* (including the tooth tips);

- no significant and constant differences have been mentioned, namely the different insertion of leaf bases on the caudex (Fig. 2 B-C) and the size of flower organs;
- *Potentilla gelida* has always distichous leaves, relatively large anthers (0.4-0.9 mm) and rather long styles (1-1.5 mm);
- *Potentilla hyparctica* has always polystichous leaves (divergence 2/5), small anthers (0.3-0.4 mm) and short styles (0.5-0.9 mm);
- the different phyllotaxy especially represents a taxonomically important and constant character (to this difference I turned attention of Dr. Jurtzev, who after verification included it into his determination key; see JURTZEV [1984: 144]).

For the distinction of *P. tobolensis* Th. Wolf ex Juz. from *P. approximata* Bunge inappropriate characters have been chosen, because exceptions exist. Only the typical forms can be determined reliably, because both of them usually have equally long and equally coloured petals. Sometimes they can have the same colour (i.e. greyish-white) of the leaflets. The fundamental difference consists in the shape of leaves.

*Potentilla tobolensis* has always trisect terminal leaflet with decurrent lateral segments, the lateral two segments it has by fours in seeming whorl, the leaflets are dentate less than the half to the midrib, the hairs of petioles are 0.3-1.5 mm long (beside the short ones) (Fig. 1 B-C). *P. approximata* has undivided terminal leaflet, all leaflets are sessile or shortly decurrent, the leaflets are not by fours and are usually more than the half divided (Fig. 1 F-G).

*Potentilla tobolensis* is a fully stabilized hybrid species derived from *P. argentea* x *P. supina* subsp. *costata* Soják, whereas *P. approximata* arose as a product of the crossing *P. argentea* L. x *P. conferta* Bunge. I verified both of them experimentally and obtained exact copies of natural species by hybridization of supposed parental species (Fig. 1 A-D, Fig. 1 E-H).

None of the characters given under lead 47 applies: the characters are badly chosen and the real differences (size of petals and anthers, shape of the middle leaflet of autumnal leaves, etc.) are not mentioned. Neither taxon can be identified.

Differences agree between *P. argentea* L. and *P. virgata* Lehm. (lead 49) but exceptions occur. *Potentilla virgata* e.g. can occasionally have quinate leaves with a few short shallow teeth (Fig. 1 J); such form are particularly frequent in southern Mongolia but can turn up in Russia as well. The absolutely constant difference between these species is not at all mentioned; *Potentilla virgata* has straight appressed hairs on the petioles whereas *P. argentea* has, besides straight hairs, numerous flexuose to subcrispate, at least partly patent hairs.

According to lead 52, *P. wiemanniana* Günther & Schummel should have 5-7 pairs of teeth on the leaflets, but the fact is that their number is the lowest of all Russian species of the *Collinae* Zimmeter (usually 2-3). This is evidenced by the syntype specimen deposited in LE.

The most important difference between sections *Rectae* (Th. Wolf) Juz. on one side and *Chrysanthae* (Th. Wolf) Juz. and *Aureae* (Th. Wolf) Juz. on the other, i.e. either terminal or lateral stems, is not mentioned (lead 56). Some individuals can therefore be identified only with difficulty.

The *Chrysanthae* are said to have longer styles than the *Aureae* (lead 66). In fact, all *Aureae* in eastern Europe have the styles 0.4-1.4 mm long, the *Chrysanthae* 0.5-1.3 mm (i.e. on the average rather shorter than the *Aureae*).

The styles in sect. *Aureae* are said to be extended towards the apex, which is allegedly the difference from sect. *Chrysanthae* (lead 66). However, the upper part of the style and the stigma is often equal in the species of both sections. What is sometimes different is the basis of style (but mainly in the *P. thuringiaca-chrysantha* complex), which has not been mentioned in the key (see Fig. 4 a-e, Fig. 4 f-h).

The styles of the species of sect. *Aureae* are said to be widened towards the apex, with wide, but slightly separated stigma. The styles of sect. *Chrysanthae* are said to be gradually narrowing towards the apex, thin and longer, but the stigma is distinctly widened. This is the only difference between both sections which is given in the key (lead 66).

Virtually both the styles and the stigmas in the species of sections *Aureae* and *Chrysanthae* often are equal. In most East European species of the sect. *Aureae*, the styles towards the apex are sometimes widened, in other cases not-widened (sometimes both types can be found on the same specimen) (see Fig. 4 a-e). In sect. *Chrysanthae*, they are either narrowing towards the top (*P. thuringiaca*-*P. chrysantha* complex) or they are often not narrowing (*P. longipes* Ledeb. and *P. stipularis* L.) (see Fig. 4 f-h). The width of styles of both sections is in substance the same, their length is usually the same as well. The use of these characters as the only difference in the key is quite unsuitable. Thus, by using the differences given in lead 66, it is impossible to determine three species, other 5-6 species can be determined in some cases only.

However, the user cannot reach to the above-mentioned lead 66 of Kamelin's key at all, because as early as in lead 54 he would inevitably determine 6-7 species of *Aureae* and 4-5 species of *Chrysanthae* as belonging to sect. *Rivales*. Three East-European species of sect. *Aureae* namely have the petals 5-7 mm long (i.e. less than the required 8 mm), three other species have the petals 5-8 mm long. Analogous is the situation in the *Chrysanthae*, where two species have the petals 4-7 mm and 2-3 species 4-8 mm long.

As no distinguishing characters other than the length of petals (lead 54) and the shape of style and possibly of stigma are given, 10-11 species of both sections cannot be determined.

An important difference between *P. tabernaemontani* Asch. and the couple *P. aurea* – *P. crantzii*, viz. basal leaves polystichous in the first and distichous in the latter two (Fig. 2 A, Fig. 2 C), is not at all mentioned (lead 72; cf. SOJÁK [1960: 388, 380]). *P. tabernaemontani* and *P. crantzii* are not closely related. Their similarity is the result of the evolutionary convergence. They arose from different ancestors. *Potentilla crantzii* is doubtlessly derived from the Asian *P. gelida* (and related to *P. aurea* from *P. ternata* K. Koch). In my opinion, *P. tabernaemontani* has developed from the plants of hybrid combination of *P. incana* x *P. heptaphylla* as a result of gradual extinction of hairs having sparse tiny bristles on the bases ("Zackenhaare" in WOLF 1908; see *P. gaudinii* f. *astelligera* Th. Wolf, SOJÁK [1960: 388] and SOJÁK [1995: 293]). Besides the aberrant prostrate branches of caudex, all the other differences given here are subject to variation and therefore they are not reliable.

Important differences between *P. patula* Waldst. & Kit. and *P. humifusa* Willd. agg., i.e. the deviating shape of episeals and indumentum of sepals are not mentioned (lead 74). *Potentilla patula* occasionally can have pedicellate glands on the petioles and calyces. Such form was edited, e.g. in the exsiccata collection Herb. Fl. Ross. no 212 (Yekaterinoslav = Dnipropetrovsk, coll. Akinfiev 1898).

## Notes on some species

### *Potentilla sommerfeltii* Lehm. and *P. lyngei* Jurtzev & Soják

Kamelin changed the name *P. lyngei* to *P. sommerfeltii* without having considered the original description of Lehmann's plant (LEHMANN, 1849: 6-7), its perfect illustration (LEHMANN, 1856) and type specimen. Lehmann's plant has leaves with two pairs of leaflets corresponding to *P. pulchella* R. Br. (for which it has so far been taken) and small petals, while *P. lyngei* has three pairs of leaflets and large petals. In the description of *P. sommerfeltii*, no three-paired leaves are mentioned and the leaves are described as two-paired (some ternate). The truthful illustration (Fig. 3 C) shows a plant having all basal leaves with two pairs of leaflets and flowers with small petals, but Kamelin incomprehensibly attempts, after about ninety years of oblivion, to introduce Lehmann's name for *P. lyngei*, a large flowered species with three-paired leaves (Fig. 3 F, Fig. 3 J). No reason for the change is given.

The holotype of *P. sommerfeltii*, preserved in Lehmann's herbarium (PR), has six leaves of which two are two-paired, one almost quaternate and three are ternate (probably the detached lower cauline leaves). Petals are 5 mm long. The type sheet contains no leaf with three pairs of leaflets

and no flower with petals 7.5-8 mm long. The holotype of *P. sommerfeltii* (Fig. 3 A-B, Fig. 3 H) is in full agreement with both type specimens of *P. pulchella* in BM (Fig. 3 D-E, Fig. 3 I) and cannot very well be identified with *P. lyngei*.

To my knowledge, *P. lyngei* does not occur in Zemlya Frantsa-Iosifa and Kolguyev Island. Its occurrence on Vaygach Island has to be verified.

### ***Potentilla multifida* L.**

According to Kamelin, *P. multifida* is said to be absent in Scandinavia and Swedish plants from Lappland should belong to *P. arctica* Rouy. This is a bad mistake. *P. arctica* is beyond any doubt an endemic of the Kandalakshkiy Zaliv (Kola), and *P. multifida* s.str. occurs in Lappland. Both species are clearly defined in terms of morphology. Specimens of both species are deposited in all important herbaria. Over 300 correctly identified specimens of *P. multifida* s.str. and nine specimens of *P. arctica* from locus classicus are available for comparison at LE.

*Potentilla multifida* has sepals of lower flowers 3.5-6 x 1-2.5 mm, hairs of petioles 0.2-1 mm long, appressed (Fig. 6 A). In *P. arctica*, sepals of lower flowers are 5-8.5 x 2-4 mm, hairs of petioles (0.5-)1-2.5 mm long, subappressed or erecto-patent (Fig. 6 D). No transitional forms exist.

Important and possibly autochthonous occurrence of *P. multifida* s.str. in Murmanskaya Oblast' (S Kola, Turiy Pen., 1959, *Sinkova* 56, LE) is omitted. This station lies about 1200 km apart from the nearest possible Russian locality in the Ural region (it has been reported, but no specimen is available in LE, MHA or MW; possibly the nearest occurrences are as far as in Caucasus and Altai Mts. and only *P. tergemina* probably occurs in the Ural, even though KURBATSKY [1988] reports *P. multifida* s.str. from there).

Kamelin (in GUBANOV, 1996), as the only modern author, recognizes *P. tenella* Turcz. at the species level. This position is untenable. Plants from lower altitudes understandably have taller stems and longer, narrower segments of leaflets than those from the mountains. It may suffice to transfer the plants to a garden for them to change.

### ***Potentilla multifida* L. agg.**

Kamelin finishes his commentary on *P. multifida* aggregate (p. 440) by saying that "in consequence of these works by J. Soják, the circle has closed and the understanding of individual races (i.e. species, note by J. S.) of the relationship of *P. multifida* is now impossible". This is surprising because *P. multifida* agg. is not a difficult or a critical group (as for instance *Rectae* or *Niveae*); on the contrary, it is rather simple, presenting no serious problems. In the whole area from Turiy Peninsula (S Kola) to Vladivostok, only two species are more frequent: *Potentilla multifida* (leaves two-paired, indumentum appressed) and *P. tergemina* Soják (leaves three-paired, indumentum patent). Besides, in the region from the Baikal Lake to the northern Kamchatka, *P. bimundorum* Soják (leaves three-paired, indumentum subappressed) is scattered. In addition, *P. ornithopoda* Tausch occurs in some parts of southern Siberia, but I did not describe it, and its distinct character was recognized – after more than 100 years – by HANDEL-MAZZETTI (1939). Considering that this species does not hybridize with *P. multifida* (owing to different ploidy levels; see MĚSÍČEK & SOJÁK, 1992) and is morphologically distinct (cf. SOJÁK, 1988), its correct identification is not difficult even in areas where both species occur together.

The arctic *P. anachoretica* Soják is not at all similar to other species of the aggregate, having large petals and branched caudex. The American endemic *P. rubricaulis* Lehm. (= *P. hookeriana* Lehm. e typo, *P. quinquefolia* Rydb.) is derived from *P. arenosa* (Turcz.) Juz. x *P. litoralis* Rydb. and is easy to identify considering indumentum of petioles and shape of leaves and leaflets. The same can be said about all other hybrids of *P. multifida* agg. x sect. *Niveae* (Rydb.) Juz.

On p. 440 one can read that "... the taxon *P. bimundorum* can be used only for the denotation of recent hybrids of *P. multifida* and *P. hypoleuca*" (in the sense of Kamelin, i.e. *P. tergemina*).

In fact, the predominant part of the distribution area of *P. bimundorum* is situated in regions never reached by any of the ancestral species (e.g. North America), and the locus classicus of *P. bimundorum* is situated in the region where no other species of *P. multifida* agg. grows.

Kamelin's confusion of the problems of *P. multifida* agg. is evidenced by the exsiccate identified by him in Gerb. Fl. SSSR (formerly Herb. Fl. Ross.) no. 5582 (see NECHAEVA, 1977) where *P. ornithopoda* Tausch (appressed indumentum) is mistaken for *P. tergemina* Soják (patent indumentum) in spite of the fact that the correctly determined *P. tergemina* has been edited in the same set of exsiccates under no. 5468 (see SOJÁK, 1975).

Using the key, *P. multifida* cannot be identified at all. The only distinguishing character (lead 20) is indumentum: stems and petioles should have only flexuose hairs, straight hairs should be missing. On the contrary, fact is that *P. multifida* has petioles and lower parts of stems with only straight hairs (Fig. 6 A-B). The remaining two species of this aggregate cannot be identified either. They never have flexuose hairs on the petioles and in the lower part of the stem. It follows from the commentary on p. 440 that this is not an oversight: we are told that "... the doubtlessly basic species – *P. multifida* can also be represented by the forms without straight (or longer, but not straight) hairs in indumentum" (*sic!*). Even the "true tomentose indumentum" is mentioned, but we are not told where and in which species it should occur. It follows however from the context that the petioles and stems of *P. multifida* s.l. are concerned. But petioles only with straight hairs are the most important diacritic character of the entire aggregate, being absolutely constant. Flexuose or crispate hairs can only occur in hybrid species derived from hybrids of this aggregate with members of other sections, i.e. *Niveae* or *Terminales* (Döll) Gren. & Godr. [*Argenteae* (Th. Wolf) Juz.]. Following is a key to *P. multifida* agg. in the territory of Russia.

1. Hairs of petioles appressed or erecto-subpatent ..... 2
  - 1a. Hairs of petioles patent ..... *P. tergemina* Soják
2. Flowers 0.9-1.1(-1.5) cm in diameter, petals as long as sepals or little longer (4-6 mm long), their borders not touching each other, caudex not branched ..... 3
  - 2a. Flowers 1.5-2.2 cm in diameter, petals distinctly longer than sepals (6-9 mm long), their borders widely overlapping, caudex copiously branched ..... *P. anachoretica* Soják
3. Terminal leaflet with 3-5 pairs of segments ..... 4
  - 3a. Terminal leaflet with (4-)5-8(-10) pairs of segments ..... *P. ornithopoda* Tausch
4. Leaves with 3 pairs of leaflets or 2- and 3-paired leaves mixed, petioles with (0.5-) 1-2.5 mm long, erecto-subpatent (as well as with ± appressed) hairs, sepals of lower flowers ± 2-4 mm wide, achenes (1.2-)1.3-1.5 mm long ..... 5
  - 4a. Leaves with 2 pairs of leaflets, petioles with 0.2-0.7(-1) mm long appressed hairs, sepals of lower flowers ± 1-2.5 mm wide, achenes 1-1.2 mm long ..... *P. multifida* L.
5. Leaves often 2- and 3-paired mixed, pairs often approximate (0.3-2 mm), sometimes remote, middle undivided part along the midrib (1.5-)2-6 mm wide, bases of styles strongly thickened ..... *P. arctica* Rouy
  - 5a. Leaves with 3 pairs of ± remote leaflets, leaflets divided almost to the midrib, i.e. the middle undivided part of leaflet along the midrib 0.6-1.5(-2) mm wide, bases of styles slightly thickened ..... *P. bimundorum* Soják

#### ***Potentilla hypoleuca* Turcz. and *P. tergemina* Soják**

Kamelin groundlessly changed the commonly used name of the Siberian *P. tergemina* to *P. hypoleuca* (not-used for almost 150 years) without having inspected type specimens of *P. hypoleuca* deposited in the building where he works. Before describing *P. tergemina*, I examined the holotype of *P. multifida* in LINN (no. 655.6) and both type specimens of *P. hypoleuca* in LE (even though a type

specimen is also found in PR). I have verified that the type specimens of both last-mentioned taxa are identical. *Potentilla hypoleuca* is a common form of *P. multifida* occurring often at lower altitudes of Siberia and in northern Mongolia.

I chose the plant from PR as lectotype of *P. hypoleuca* (SOJÁK, 2004) because its label is all written by Turczaninow's hand (the name of the species is not additionally written by Maximowicz as in LE) and its lower cauline leaves are well developed. The indumentum of the petioles and leaf and leaflets shape in the lectotype of *P. hypoleuca*, in the holotype of *P. tergemina* and, for comparison, in *P. multifida* s.str., can be seen in Fig. 4 A-E, Fig. 4 G and Fig. 6 A-C.

### ***Potentilla pensylvanica* L.**

*Potentilla pensylvanica* is said to be missing near Lake Ladoga and plants collected there many times should be "hybridogeneous forms" which "in any case... bear genes of *P. conferta* Bunge (not *P. pensylvanica*)". This is undoubtedly a bad mistake. Plants collected nearby Lake Ladoga clearly represent typical *P. pensylvanica* and are quite identical with Siberian populations of this species. No "genes of *P. conferta*" are visible. It is easy to distinguish both species, and for a correct determination over 320 herbarium sheets of *P. pensylvanica* and over 160 sheets of *P. conferta* are available in LE. *Potentilla pensylvanica* from the vicinity of Lake Ladoga was also edited in exsiccata collection Plantae Finland. Exs. no. 1979 under the name of *P. strigosa* Pall. (a name used previously for *P. pensylvanica*) and this specimen is also available in LE.

Kamelin takes delight in speculating about evolution and hybridization of species of which he has little or no information. An example is his commentary on *P. pensylvanica* (p. 442). This commentary as a whole is not trust-worthy. In fact,

- *Potentilla pensylvanica* can not hybridize with *P. multifida* s.l. in Siberia or with *P. sericea* L. s.l. in the Cordilleras (this complex does not occur in America);
- no hybrids *P. pensylvanica* × *P. bipinnatifida* Dougl. are known; *Potentilla bipinnatifida* is with certainty not a "hybridogenous species";
- *Potentilla pensylvanica* does not hybridize with *P. litoralis* Rydb.;
- hybridization of *P. pensylvanica* with *P. arachnoidea* Dougl. ex Lehm. is mentioned, but the latter is a synonym of the former (cf. SOJÁK, 1987a).

Both specimens designated as *P. pensylvanica* in Linnaeus's herbarium (LINN no. 655.12 and 655.13) are cultivated garden forms of *P. pensylvanica*; none of them is "so-called *P. hispanica* Zimm." from Spain. Both species cannot be mistaken because of their dissimilar petals (*P. pensylvanica* 5 mm, *P. hispanica* 7-15 mm long), leaflets and petioles.

The important fact that *P. strigosa* Pall. ex Tratt. is omitted; this name is used for a long time in Russian post-war literature and belongs to a hybrid species derived from *P. pensylvanica* × *P. sanguisorba* Willd.; Pallas' plant is referred erroneously to the synonymy of *P. pensylvanica*. These problems were solved long ago on the basis of identification of Pallas' type specimen (SOJÁK, 1987a; CZEREPANOV, 1995).

### ***Potentilla ruthenica* Willd.**

After over 150 years of oblivion or listing in synonymy, Kamelin revived, besides *P. norvegica* L. and *P. intermedia* L., a third related species, *P. ruthenica*. But no such species exists: Willdenow's *P. ruthenica* is a mixture of *P. norvegica* and *P. intermedia*. Judging from characters in his key and synonyms given, Kamelin's *P. ruthenica* also is a mixture of both Linnean species.

From the four type specimens designated as *P. ruthenica* by Willdenow in B-WILLD, two sheets belong to a typical *P. intermedia* and two to a common form of *P. norvegica*. One type specimen in Lehmann's herbarium [(in PR) sent by D. F. K. Schlechtendal from Willdenow's herbarium] is a fine specimen of *P. norvegica* f. *pinguis* Petunn. Probably Willdenow had this in mind when describing his species, because only its leaves possibly can be regarded as pinnate (Fig. 5 F).

In *P. norvegica* as well as in *P. intermedia*, some plants (or rather individual leaves) can have a trisect middle leaflet. In other characters, e.g. indumentum and particularly shape of leaves, both species are principally different: leaves of *P. norvegica* are ternate (Fig. 5 C and Fig. 5 G), those of *P. intermedia* are quinate (Fig. 5 B and Fig. 5 D-E). Both Willdenow and Kamelin were misled by the trisect middle leaflet occurring sometimes in both species.

*Potentilla norvegica* f. *pinguis* and *P. norvegica* f. *norvegica* can in no case be treated as separate species. *Potentilla norvegica* f. *pinguis* never forms populations, occurring as scattered individuals among typical plants of *P. norvegica*. In cultivation, achenes of *P. n. f. norvegica* can produce *P. n. f. pinguis* and the other way round.

Experimental hybridization of *P. n. f. norvegica* with *P. argentea* var. *argentea* yields plants identical with *P. intermedia* with trisect middle leaflets of some leaves (Fig. 5 B) even though both parent plants have undivided middle leaflets (original observation by the present author).

*Potentilla ruthenica*, no matter how conceived, cannot with certainty be “undoubtedly close to *P. amurensis*”, which is remotely related to *P. supina* L. The name *P. amurensis* Maxim. belongs with certainty to *P. heynii* Roth (based on comparison of type specimens), not only “probably” as told.

### ***Potentilla agrimonioides* M. Bieb.**

The description of the geographical distribution of *P. agrimonioides* in *Flora Europae Orientalis* differs principally from that given by JUZEPCZUK (1941) and all other Russian authors. But as no source is mentioned, impression can be gained that this is an original ascertainment. This is not possible, however, because differences between *P. agrimonioides* and *P. pensylvanica* are unknown to Kamelin, as evidenced by distinguishing characters under lead 25 of his key. Of the c. 230 specimens of *P. agrimonioides* I studied in LE, MHA, MW, TBI, TB, SUCH, TASH and PR, none had 7-8 paired leaves. Both *P. agrimonioides* and *P. pensylvanica* have three to five pairs of leaflets (Fig. 1 K and Fig. 1 L; see also SOJÁK, 1987a: 291). *Potentilla agrimonioides* is a fully stabilized hybrid species derived from *P. pensylvanica* x *P. sericea* (Fig. 1 K-M).

### ***Potentilla reptans* L.**

It is a bad mistake to assert that the excessive variability of *P. reptans* is “partly connected with hybridization including species of other sections”. Such hybrids have never been found in nature and since long ago it has been a well known fact that *P. reptans* cannot hybridize with species of other sections in nature. As early as WOLF (1908: 666) emphasized that “die Arten dieser Gruppe (*Tormentillen*-Gruppe, remark J. S.) bilden Bastarde nur unter sich, niemals mit Spezies anderer Gruppen”.

Hybridization within sect. *Potentilla* is frequent in Central and Western Europe but it does not affect “evolution” of *P. reptans*. This species is isolated neither in the section nor in the genus, as Kamelin thinks, *P. flagellaris* Willd. and *P. hemsleyana* Th. Wolf being undoubtedly closely related.

### ***Potentilla macrantha* Ledeb. and *P. evestita* Th. Wolf**

*Potentilla jacutica* Juz. is incorrectly identified with *P. evestita* Th. Wolf. The correct name of *P. jacutica* Juz. is *P. macrantha* Ledeb. according to the type deposited in LE. It may suffice to compare their calyces and the difference is obvious: the two are specifically different. All four parental species are also clear.

There are substantial characters to distinguish plants from the Ural and northern Siberia from those from Central Asia and mountains of southern Siberia. Both hybrid species not only could, but had to originate independently in various regions, i.e. polytopically. Ural localities belong beyond any doubt to the northern *P. macrantha* whereas south Siberian and Central Asian localities belong to more southern *P. evestita*.

It is fallacious to suppose that *P. chrysantha* Bernh. ex Link was one of the parental species of *P. evestita*.

***Potentilla crebridens* Juz. and *P. arenosa* (Turcz.) Juz.**

The name *P. hemicyophila* (Jurtzev) Soják used does not exist. Similarly, the name *P. tomentulosa* Jurtzev (“tomentosula”) subsp. *hemicyophila* Jurtzev has been never proposed (cf. KAMELIN, 2001 : 445).

With certainty *Potentilla crebridens* subsp. *hemicyophila* Jurtzev is neither “hybridogenous” nor “species”. Nor can it be “apomictic race”, because it hybridizes frequently in its whole distribution area with species of sect. *Niveae* (and sometimes even with the species of other sections). Who did find the race to be apomictic?

The statement that typical forms of *P. arenosa* only occur in Buryatiya area, Transbaicalia and northern Mongolia is at variance with comprehensive collections from northern parts of Asia by Petrovsky and Jurtzev in LE.

***Potentilla inclinata* Vill. and *P. pindicola* Hausskn.**

Kamelin divided *P. inclinata* (as currently circumscribed) into two species: *P. canescens* Besser (leaflets with tomentose indumentum beneath) and *P. inclinata* Vill. (tomentose indumentum missing), without having seen the type of *P. inclinata*. Within the entire distribution area of this strongly polymorphic hybrid species, the indumentum of the underside of the leaflets oscillates from sparse, bent to dense, flexuose-crispate hairs. It is untenable to separate these two taxa in the rank of species on the basis of different leaflet indumentum.

The concept of *P. inclinata* is completely confused. It should have shallow teeth of leaflets according to the key, but it follows from the synonymy (including *P. pindicola*) and geographical distribution given (vicinity of Sevastopol) that they should be deep, reaching almost to the midrib (as in *P. laciniosa* Waldst & Kit.; cf. lead 62 of the key; in addition, it should have the same indumentum as *P. laciniosa*!).

It seems that *P. inclinata* (type GRM, photo!) = *P. canescens* (type LE!, PR!) is distributed in the more southern parts of the former USSR, whereas *P. pindicola* (types JE!, K!, LE!, PRC!, W!) is confined to southern Ukraine [(Crimea); several records in MHA and MW].

***Potentilla thuringiaca* Bernh. ex Link**

The division of *P. thuringiaca* into three species is questionable. The correlation between leaf shape and number and shape of teeth of leaflets, differences in the glandular character of the upper part of stem and differences in the number of leaflets could not be confirmed on the material deposited in Central European herbaria. At least *P. thuringiaca* and *P. parviflora* Gaudin represent forms or varieties of one species. *Potentilla goldbachii* Rupr. may be, to a certain extent, a result of seasonal heterophylly.

In no case *P. delphinensis* Gren. et Godr. can be a “parallel race” of the *P. parviflora* relationships because it belongs to a quite different section (*sic!*). It has styles twice as long (2-2.5 mm instead of 1.1-1.3 mm).

In no case *P. buquoiana* Knaf can be identical with *P. leiocarpa* Vis. & Pančič and *P. pseudochrysantha* Borbás because it has septenate leaves and is a form of the *P. thuringiaca* complex. The other two taxa with quininate leaves are identical with *P. chrysantha* Trevir. subsp. *amphibola* (Schur) Soják.

***Potentilla gordiagini* Juz.**

Kamelin accepts *P. gordiagini* as a hybrid species derived from a cross of *P. canescens* (= *P. inclinata*) x *P. goldbachii* (= *P. thuringiaca*). Should this be true, this taxon would have to be named *P. moeszii* Jáv. ex Prodan. But much more likely parent combination (considering the indumentum of the underside of the leaflets) is *P. argentea* x *P. thuringiaca*, the correct name of which is *P. leteae* Prodan. If we accept that one of the parental species, i.e. the Russian

*P. goldbachii*, is specifically different from the Central European *P. thuringiaca*, as do the majority of Russian authors, the oldest name for the Russian hybrid species would be *P. porciusii* Prodán, which corresponds to the combination given by Prodán. However none of the three hybrid species can be safely identified in herbarium material.

It is unconsidered to detach hybrid combination from the Ural area from local populations arisen polytopically in other regions from the same parent pair as separate species because of their wide and overlapping variation; and this is even impossible according to Art. H.4 of the *St Louis Code*. Nor is it possible to appeal to apomixis which has not yet been proved in this case.

### ***Collinae*** Zimmeter group

On no account *P. lindackeri* Tausch can be a product of hybridization of *P. canescens* (*P. inclinata*) and *P. thuringiaca* s.l. This is convincingly contradicted by its morphological characters (shortly creeping branches of caudex, shorter and thicker pedicels of flowers, etc.) as well as by the distribution of *P. thuringiaca* and *P. lindackeri* in Bohemia and Sachsen (Saxony); these two species exclude each other by their distributions. Hybrid populations of *P. inclinata* x *P. thuringiaca* s.l. could be found in the Ural area.

If *P. lindackeri* would the result from the hybridization *P. inclinata* x *P. thuringiaca* sensu auct. medioeurop., its name would have to be the correct name for *P. gordiagini* according to Art. H. 4. of the *St Louis Code*. In my opinion, *P. lindackeri* is derived from the combination *P. argentea* x *P. tabernaemontani*.

As the lectotype of *P. lindackeri* I designate here the Tausch's type specimen from the vicinity of Prague deposited in LE. All original material in PRC and PR is not very suitable for lectotypification.

*Potentilla aspegrenii* Kurtto (*P. sordida* Fr. ex Aspegren, *nom. superfl.*) is not a synonym of *P. collina* Wibel; it belongs to the *P. lindackeri* complex.

*Potentilla silesiaca* R. Uechtr. and *P. wiemanniana* Günther & Schummel are not identical. On the contrary, they are substantially different as is evident from the isotypes kept in LE.

### ***Potentilla crantzii*** (Crantz) Beck ex Fritsch

Kamelin decided to reject the name *P. crantzii*, so far commonly used, and replace it with the name *P. verna* L. Other contemporary authors, including the authors of *Flora Europaea* (BALL & al., 1968: 44) do not use this name (it concerns *nomen ambiguum*). The change proposed would only be a permanent source of useless confusion. It is not necessary to propose the name *P. verna* L. for rejection, because it was referred to synonymy of *P. grandiflora* L. based on the recent lectotypification (RICO & ORTEGA, 2002).

### ***Potentilla tabernaemontani*** Asch. and ***P. neumanniana*** Rchb.

The sparsely stellate-hairy hybrid species, formerly called *P. pusilla* Host (earlier *P. puberula* Krašán), is divided in two species by Kamelin, *P. pusilla* (eglandular) and *P. neumanniana* (glandular). This is contradicted by my observations in the field and material gathered in Central European herbaria. Both glandular and eglandular forms occur in all European species of the *Aureae-Vernae* and *Aureae-Opacae*, even in taxa not mentioned in literature (e.g. in *P. patula* Waldst. et Kit. in the former USSR; records in LE) and have no taxonomic significance. Until now, including the monographer WOLF (1908), they have been treated as intraspecific units, most often as forms. This corresponds to the situation in nature where both glandular and eglandular forms can be found together in one local population.

At the present time, most authors use the name *P. neumanniana* for *P. tabernaemontani* (basing on the data by WOLF [1908: 594]). Kamelin applied Reichenbach's name to a sparsely stellate-hairy hybrid species without quoting any source or reasons for change. On the contrary, he adds a detailed commentary describing the indumentum of original Reichenbach's plants without having seen

them, thus creating an impression that he studied the type specimens. To my knowledge, only one type specimen of *P. neumanniana* is preserved (in W; Kamelin did not see it), all other specimens having been destroyed during revolution of 1848 in Dresden (personal communication by A. Polatschek of 16 March 1987). The preserved specimen has some hairs on leaflets with sparse tiny bristles on their bases, i.e. strongly reduced stellate hairs (SOJÁK, 1995).

The use of the name *P. pusilla* for the stellate-hairy plant, i.e. in the sense of *P. puberula*, is most doubtful. The type material of *P. pusilla* is missing. Wolf, who was the last to see it (WOLF, 1908: 601), found no stellate hairs and denoted it therefore *P. verna* sensu Wolf (= *P. tabernaemontani* Asch.). If the concept by BALL & al. (1968) (i.e. *P. cinerea* Chaix ex Vill., incl. *P. incana* P. Gaertn., B. Mey. & Scherb., *P. tommasiniana* F. W. Schultz and *P. velutina* Lehm.) is accepted, the oldest name for the sparsely stellate hybrid species is *P. filiformis* Vill. (SOJÁK, 1995).

### ***Potentilla bifurca* L. s.l.**

*Potentilla semiglabra* Juz. and *P. orientalis* Juz. are listed as synonyms of *P. bifurca*. But *P. semiglabra* is a good species with constant characters and own distribution area. *Potentilla orientalis* has also been treated either as species or subspecies. Transitions among these three taxa occur in places where their primary distribution areas overlap and where hybridization can be expected, or in synanthropic habitats in European Russia.

The commentary on *P. bifurca* mentions a possibility of two subspecies. *P. semiglabra* is referred to the same subspecies as *P. orientalis* without considering the fact that in all the territory from Rumania to Hebei (China) and southern Mongolia only plants with characters of *P. orientalis* occur but not of *P. semiglabra*.

JUZEP CZUK (1941) did not typify *P. bifurca*. The species was typified as late as 1988, in the agreement with Juzepczuk's concept. Based on lectotype (LINN 655.10, left plant), the type subspecies cannot be *P. orientalis* (SOJÁK, 1988). The terms "typification" and "typify" are repeatedly used in the sense which is in contradiction with Art. 7-10 of the *St Louis Code* (the typification and restriction are mistaken).

### **Miscellaneous notes**

In six species Kamelin quotes as authors of their names "Willd. ex Schlecht.". The correct quotation is "Willd. in D. F. K. Schltl.". The author of valid publication is not Schlechtendal (son) but D. F. K. Schlechtendal (father), and the author both of the names and the diagnoses of species were not elaborated by D. F. K. Schlechtendal, but by Willdenow himself (cf. Art. 46.2 Note 1 of the *St Louis Code*).

The group *Dasiphora* allegedly has glabrous receptacle. On the contrary, however, its receptacle is very densely long-hairy; this was the ground why Rafinesque separated *Dasiphora* from *Potentilla* as a genus and derived its name from this character.

*Potentilla eversmanniana* Fisch. ex Ledeb. with certainty is not an "hybridogenous race" and the less so it is derived from the combination *P. multifida* L. x *P. conferta* Bunge. This is unambiguously excluded by its characters (including indumentum of petioles, number of leaflets, etc.) and my results of experimental crossing of *P. conferta* and *P. multifida* with various species of sect. *Pensylvanicae* (*Multifidae*). The quoted name *P. eversmanniana* Fisch. ex Claus in Goebel is *nomen nudum*. For correct authors see e.g. BALL & al. (1968), CZEREPANOV (1981, 1995) and others.

*Potentilla vulgarica* Juz. is said to be an "hybridogenous race". No reason is given, no parents are mentioned. Not only here but in many other instances, we are not told why some clear and indisputable species are races, not species (not everything should be substantiated by "Komarov's species concept").

*Potentilla angarensis* Popov and *P. omissa* Soják do not arise "rather frequently" in Mongolia because they do not occur there at all (my own field observations; cf. also GUBANOV, 1996).

The name *P. glaucescens* Willd. in D. F. K. Schldl. is used for plants of *P. incana* P. Gaertn., B. Mey. & Scherb. s.l. with mixed ternate and quinate leaves. In his description of this species, Willdenow gives only pentamerous leaves and both type specimens (B-WILLD and PR) have no ternate basal leaves. The type locality (near the river Samara) is not certain. The relation between the eastern *P. glaucescens* and western *P. tommasiniana* F. W. Schultz is not at all clear and neither is their rank.

In the territory from southern Europe and Africa to Central Asia, not only one subspecies of *P. supina* L. (conspicuously hairy, with a conic outgrowth on the achene) occurs, as Kamelin assures. All three basic subspecies of this species occur here and, in addition, four transitional subspecies (perhaps of hybrid origin) which have the same indumentum and conic outgrowth. The density of indumentum is dependent on the conditions of the habitat. The differences consist in diverse sculpture of achenes.

*Potentilla monspeliensis* L. is decidedly not “closer to *P. rivalis* than to *P. norvegica*”. On the contrary, it has a substantially different leaf type. Leaves of *P. monspeliensis* are ternate, whereas those of *P. rivalis* are quinate-digitate. Therefore *P. monspeliensis* has not four outer leaflets of a leaf in a whorl, but it can have a solitary trisect middle leaflet.

If *P. tobolensis* Th. Wolf ex Pavlov (*desc. ross.*) were really published in 1935, it should be cited as *P. tobolensis* Th. Wolf ex Juz. 1955 (*descr. lat.*). But most Petersburg botanists maintain that “signed for print 15 December 1934” (given in the last page) is to be recognized as the date of opening the publication in the sense of Art. 31. and 36. of the *St Louis Code* because no other clue is available; and it cannot be proved theoretically that the book was printed, bound and distributed within two weeks. I am disinclined to accept this opinion.

Taxonomically meaningless *P. foliosa* Sommier & Levier in R. Keller from the Caucasus is treated as a separate species in *Flora Europae Orientalis* but *P. jailae* Juz. (Crimea and western Turkey) is not recognized not even as a “special race”, because it “fully fits into the framework of variation of the more southern races of *P. rupestris* proper”. This hardly acceptable opinion has recently (after publication *Flora Europae Orientalis*) been taken over by KURTTO & ERIKSSON (2003).

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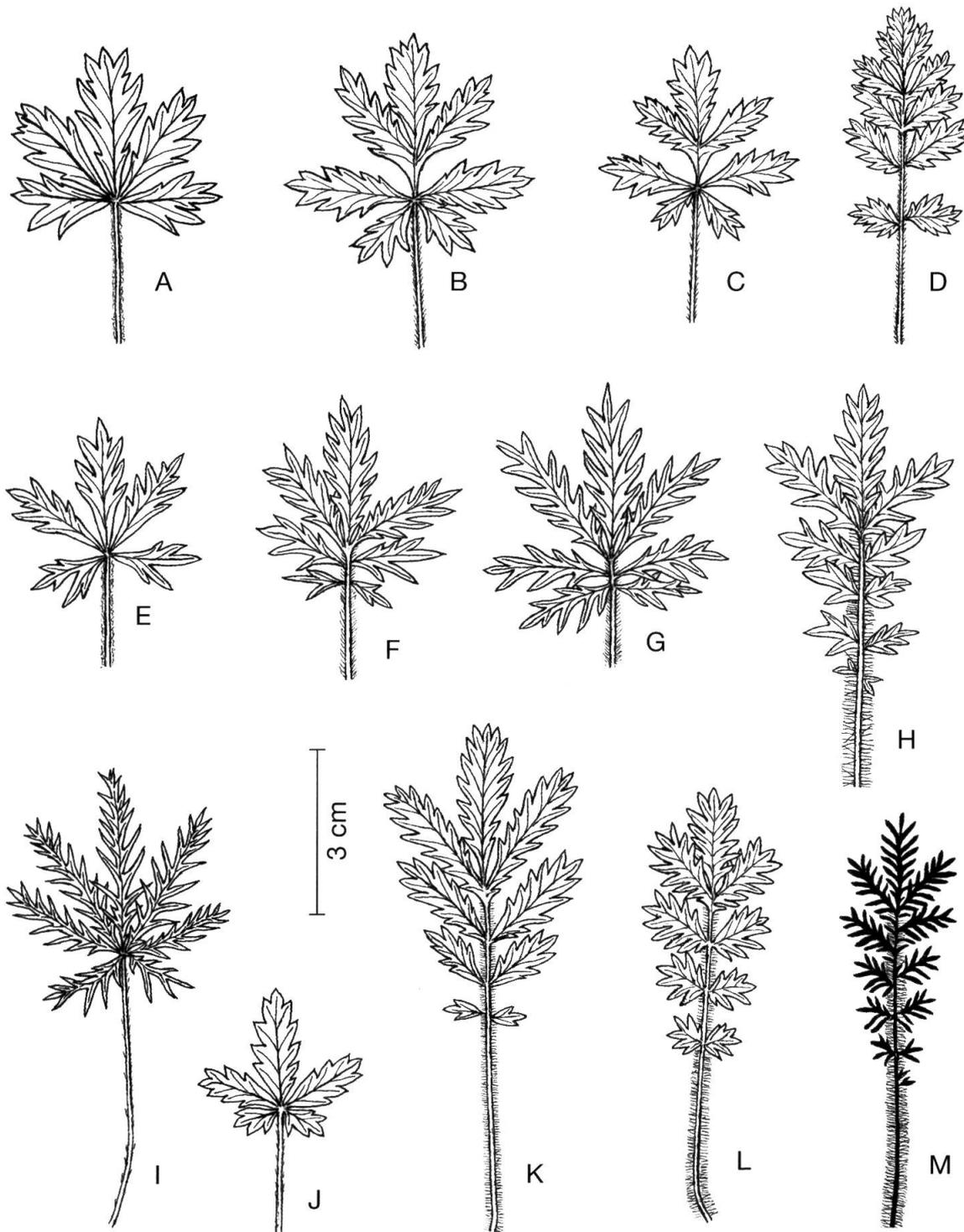


Fig. 1. – Culine leaves (A-H): **A.** *Potentilla argentea* L. from Siberia [1961 Soják]; **B.** *P. argentea* x *P. supina* subsp. *costata* (= *P. toboensis*) from experimental crossing [1962 Soják]; **C.** *P. toboensis* Th. Wolf from Siberia [1965 Soják]; **D.** *P. supina* subsp. *costata* Soják from Siberia [1961 Soják]; **E.** *P. argentea* L. from Siberia [1961 Soják]; **F.** *P. approximata* Bunge from Siberia [1950 Litvina PR 577156]; **G.** *P. argentea* x *P. conferta* (= *P. approximata*) from experimental crossing [1972 Soják]; **H.** *P. conferta* Bunge from Mongolia [1966 Soják 7305]. Basal leaves (I-M): **I.** *P. virgata* Lehm., typical form from Kazakhstan [1972 Soják]; **J.** *P. virgata* Lehm., atypical form resembling *P. argentea* from Mongolia [1976 Hilbig & Schamsran]; **K.** *P. pensylvanica* from Mongolia [1966 Soják 7794]; **L.** *P. agrimonioides* M. Bieb. (= *P. pensylvanica* x *P. sericea*) from Mongolia [1966 Soják 7741]; **M.** *P. sericea* L. from Mongolia [1965 Soják] [after specimens in PR]. (Drawn by the author).

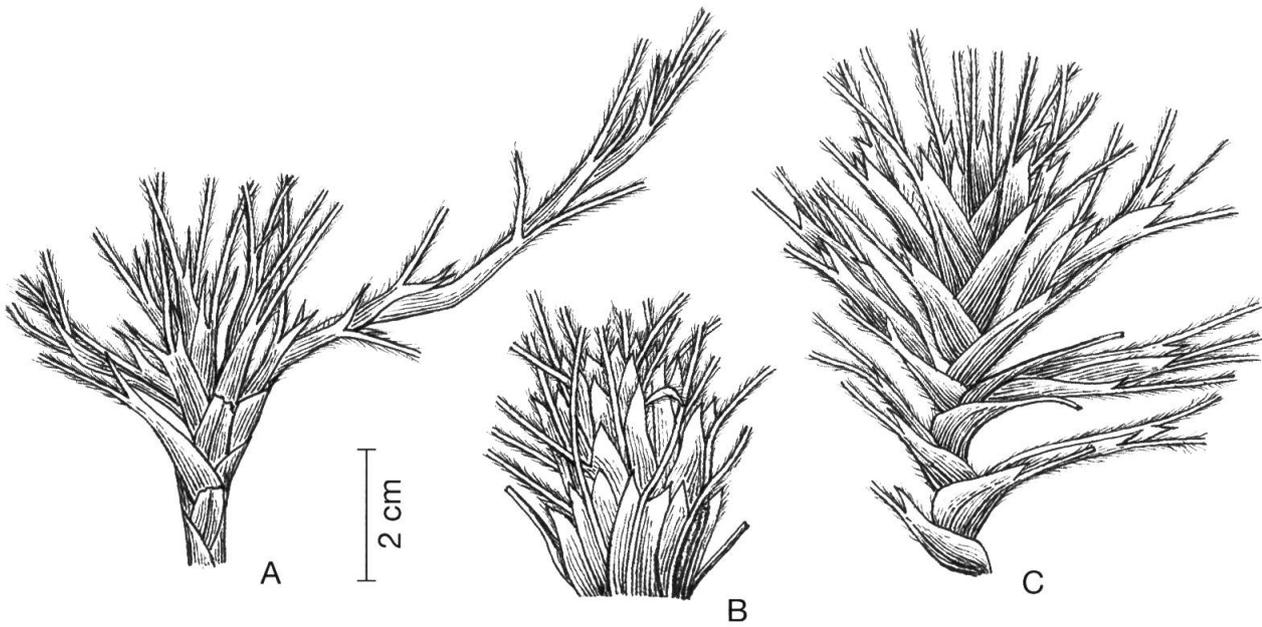


Fig. 2. – Leaf bases position on the caudex: **A.** *Potentilla tabernaemontani* Asch.; **B.** *P. hyparctica* Malte; **C.** *P. crantzii* (Crantz) Beck ex Fritsch (the same case occurs in *P. gelida* C. A. Mey.). (Drawn by the author).

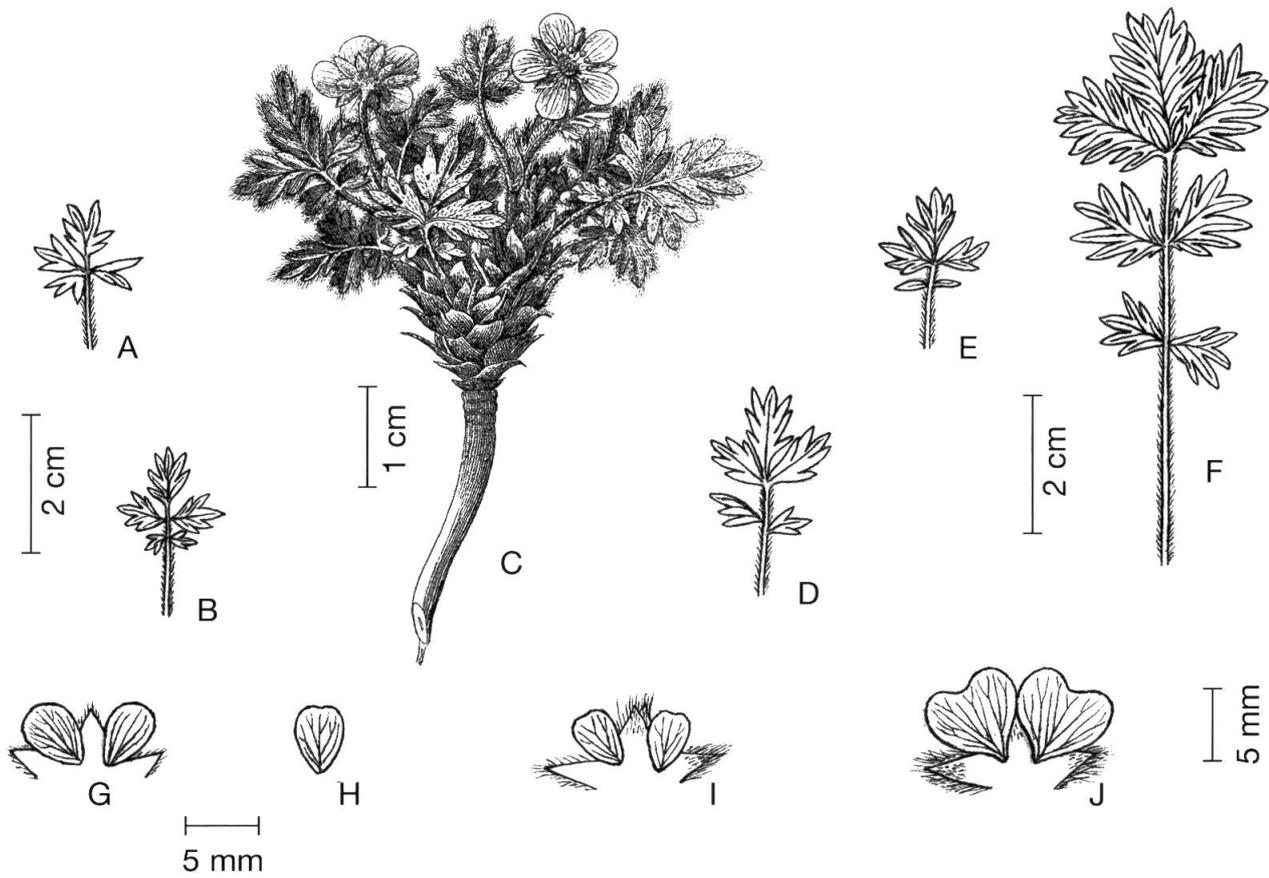


Fig. 3. – Basal leaves: **A–B.** *Potentilla sommerfeltii* Lehm. from type (= *P. pulchella*); **C.** *P. sommerfeltii* Lehm. (= *P. pulchella*), reproduction of Lehmann's drawing (LEHMANN, 1856); **D–E.** *P. pulchella* R. Br. from type; **F.** *P. lyngei* Jurtzev & Soják from Lynge's coll. Petals: **G.** *P. sommerfeltii* Lehm. (= *P. pulchella*) after Lehmann's drawing; **H.** *P. sommerfeltii* (= *P. pulchella*) from type; **I.** *P. pulchella* R. Br. from type; **J.** *P. lyngei* Jurtzev & Soják from Lynge's coll. [**A, B, D, E, F** after specimens deposited in PR; **D, E, I** after the types in BM]. (Drawn by the author).

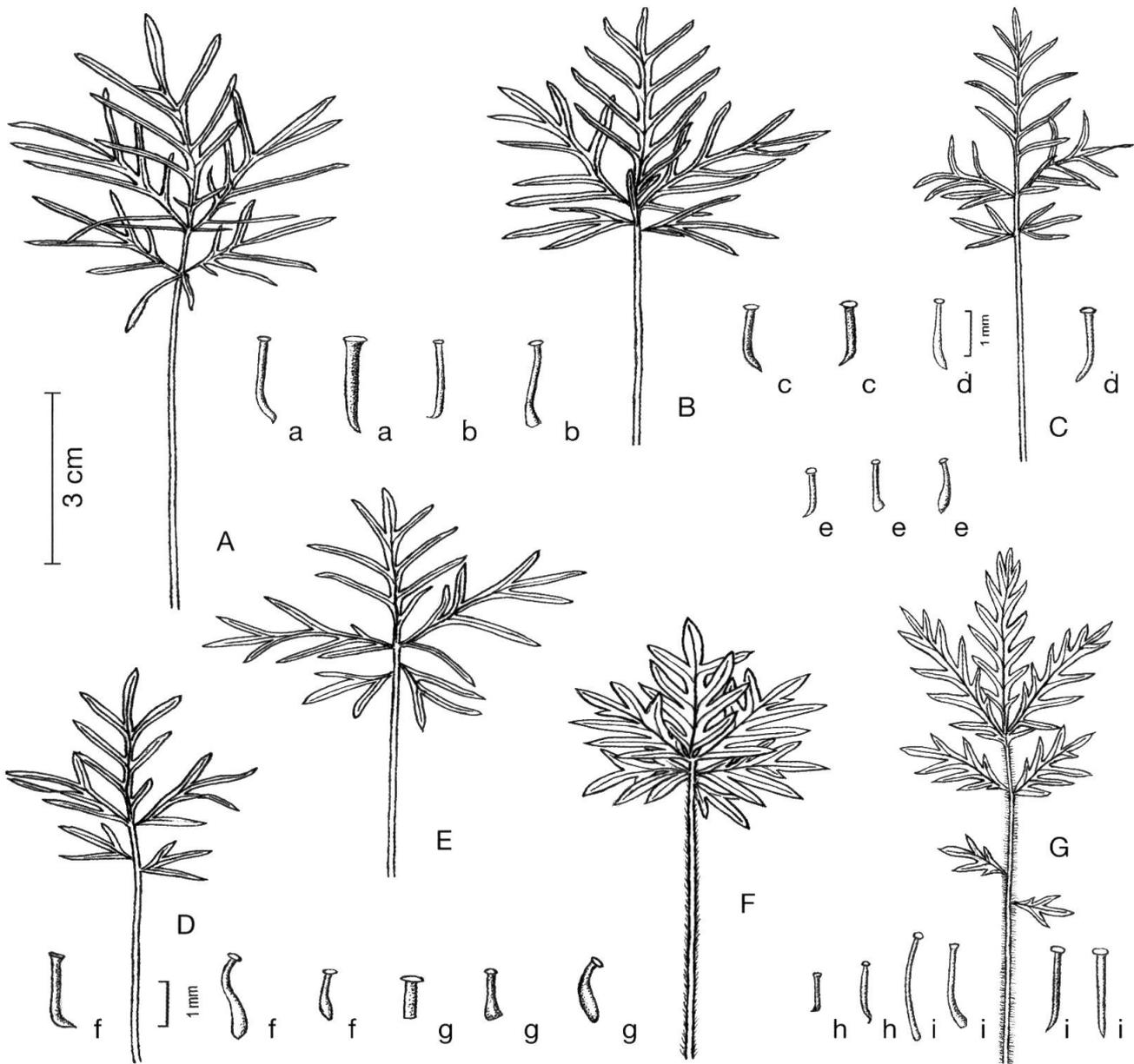


Fig. 4. – Basal leaves (A–G): **A.** *Potentilla multifida* L. from type (LINN 655.6); **B–C.** *P. hypoleuca* Turcz. (= *P. multifida*) from lectotype (1841 Turczaninow PR 378148); **D.** *P. multifida* from N Sweden (1915 Frödin); **E.** *P. multifida* from the Alps (s.d. Rotky s.n.); **F.** *P. arctica* Rouy from the locus classicus (1926 Montell PR 207153); **G.** *P. tergemina* Soják from type (1961 Soják) [A after a specimen in LINN; B–G after specimens in PR]. Styles (a–j): **a.** *P. crantzii* (Crantz) Beck ex Fritsch; **b.** *P. aurea* L.; **c.** *P. heptaphylla* L.; **d.** *P. incana* P. Gaertn., B. Mey. & Scherb.; **e.** *P. hyparctica* Malte; **f.** *P. thuringiaca* Bernh. ex Link; **g.** *P. longipes* Ledeb.; **h.** *P. stipularis* L.; **i.** *P. erecta* (L.) Raeusch.; **j.** *P. reptans* L. (Drawn by the author).

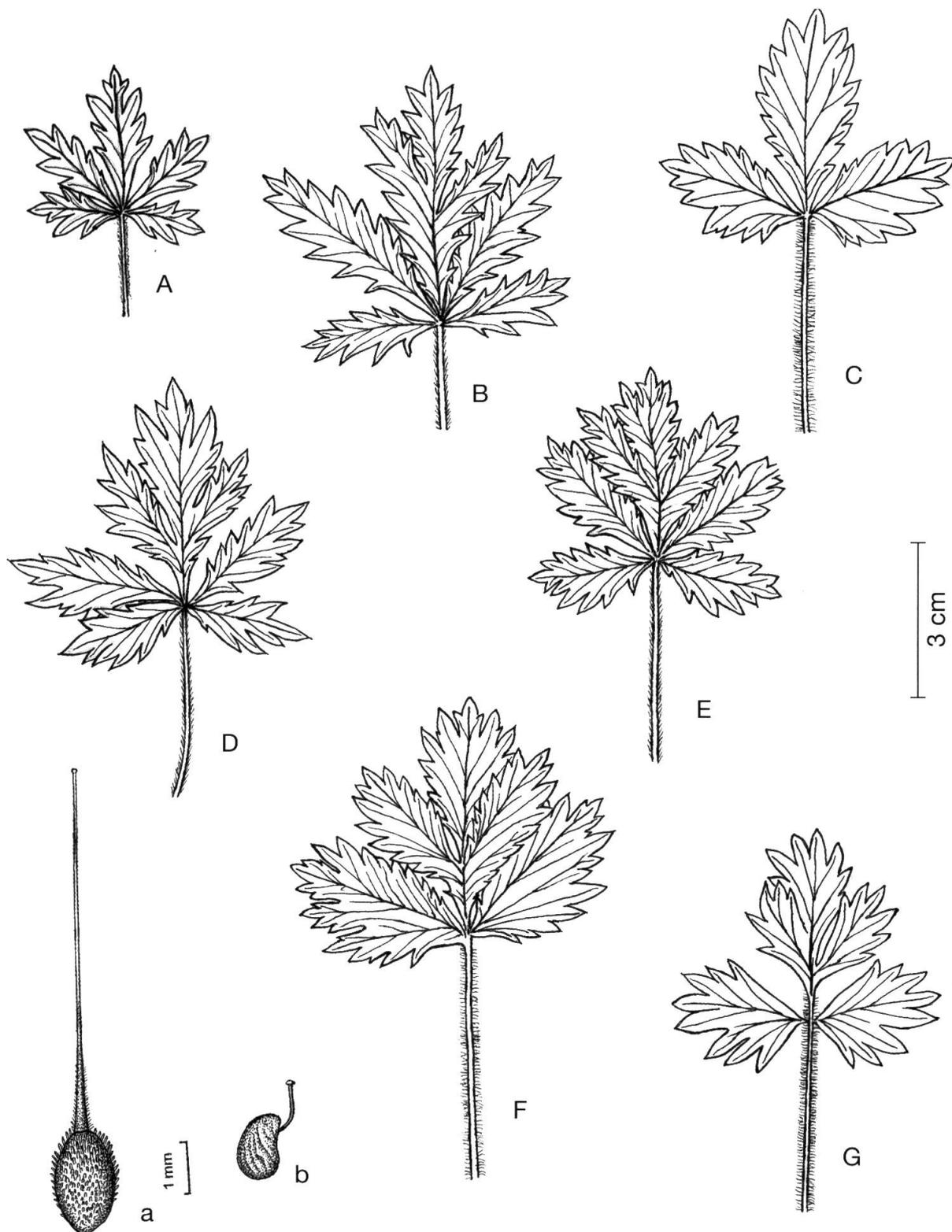


Fig. 5. – Lower cauline leaves: **A.** *Potentilla argentea* L. from Siberia [1961 Soják]; **B.** *P. argentea* x *P. norvegica* (= *P. intermedia*) from experimental crossing [1982 Soják]; **C.** *P. norvegica* L. from Siberia [1961 Soják]; **D-E.** *P. intermedia* L. from Sweden [1965 Hejny]; **F.** *P. ruthenica* Willd. (= *P. norvegica* f. *pinguis*) from type [Willdenow PR 378038]; **G.** *P. norvegica* f. *pinguis* Petunn. from Switzerland [Coaz 1153a] [all drawings after the specimens deposited in PR]. **a.** terminal style in *Coluria potentilloides* R. Br. (*Dryadeae*); **b.** *Potentilla crantzii* (Crantz) Beck ex Fritsch (*Potentilleae*). (Drawn by the author).

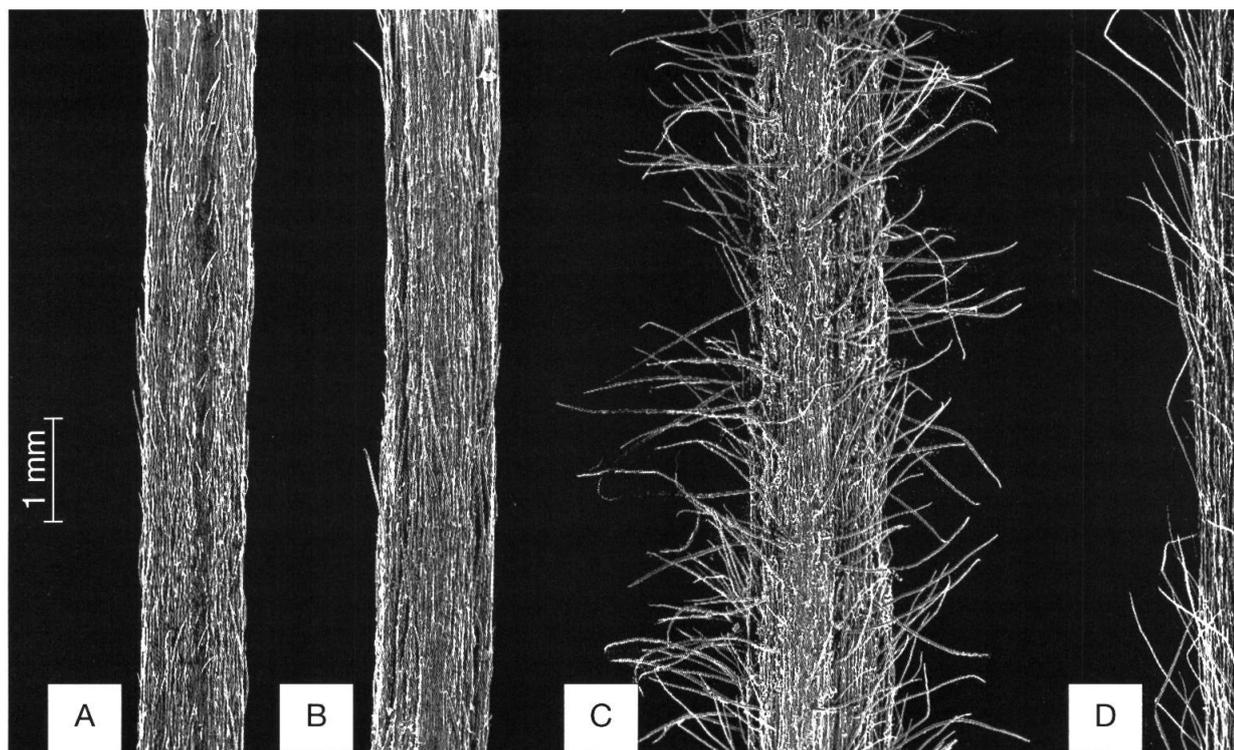


Fig. 6. – Indumentum of petioles of basal leaves: **A.** *Potentilla multifida* L. from the Alps [Rotky s.n.]; **B.** *P. hypoleuca* Turcz. (*P. multifida*) from lectotype [Turczaninow PR 378148]; **C.** *P. tergemina* Soják from holotype [Soják s.n.]; **D.** *P. arctica* Rouy from locus classicus [Montell PR 207153] [after specimens in PR].