lists may be due to this cause; in this case it is only because the "consignment" came ashore at a point itself barren that the detection and correction is so easy; if it had been at a place where deep water plants from just off shore were also coming in, it might be quite perplexing. It may seem like severity to put all deep water plants on the waiting list until some dredging expedition vouches for their eligibility, but it may be the only safe way.

North Eastham, Massachusetts.

THE AMERICAN VARIATIONS OF POTENTILLA PALUSTRIS.

M. L. Fernald and Bayard Long.

(Plate 106).

In 1908 attention was called by Dr. Theodor Wolf,[1] in his *Monographie der Gattung Potentilla,* to the fact that in North America *Potentilla palustris* is not a uniform species but that the little known var. *villosa* (Pers.) Lehm., a plant of rare occurrence in northern Europe and possibly Greenland, is also found on the continent of North America (Cartwright, Manitoba). In 1909 our knowledge of var. *villosa* was sufficient to justify the statement that it is found "Throughout the St. Lawrence system from n. N. S. and e. Que. to L. Superior and L. Winnipeg," [2] and in 1910 the plant was recorded as "the common form of the species in eastern Washington County, Maine." [3] In the study of this and other variants of *P. palustris* it has been necessary to look with some detail into the plant throughout its known range and into the very different treatments of its variations by authors, either as a *Potentilla* or as a separate genus, *Comarum.* As a result of these studies it seems to the writers that the plant in America falls into three well marked varieties with pronounced geographic ranges.

[1] Wolf. Mon. Pot. 76 (1908).
[2] Robinson & Fernald, Rhodora, xi. 48 (1909).
[3] Fernald & Wiegand, Rhodora, xii. 140 (1910).

As indicated by the *Species Plantarum* Linnaeus intended as his *Comarum palustre*[1] the common European plant. He gave no description but cited numerous previous works, *Flora Lapponica*, etc., the *Quinquefolium palustre rubrum* of Bauhin and the *Pentaphyllum palustre* of Cordus, and gave the habitat "*in* Europae *uliginosis*." Subsequent European students of the group, such as Lehmann and Wolf, have accepted as typical *Potentilla palustris* the common plant of Eurasia (fig. 1) and northern North America, with leaflets oblong-lanceolate, green and glabrous or merely puberulent above, glaucous and glabrous or merely puberulent beneath,[2] and have recognized a single notable variety, var. *villosa* (Pers.) Lehm., a plant figured by Plukenet and said to come from Sweden and Ireland.

In 1836, however, Rafinesque,[3] taking up the Linnean genus *Comarum* "(or Pancovia or Potentilla)" said: "I can increase it to 3 Species; all in my Autikon. Only one was known," and treated "*Comarum* (or Pancovia or Potentilla)" *palustre* as a strictly Old World plant, described "fol. pinnatis"; separated the "C. *palustre* of all the American botanists!" as "*Comarum* (Panc. Pot.) *digitatum*," "fol. . . . .digitatis"; and described as another new species "*Comarum* (Panc. Pot.) *angustifolium*," "fol. pinnatis, ... foliolis 5 cuneatis angustis" from "Oregon or N. W. Amer." In the *Autikon Botanikon*, in 1840, Rafinesque somewhat modified his treatment, coining the name *C. tomentosum* for Persoon's *C. palustre, β villosum;* altering the range of his *C. angustifolium* to read "Origon and Boreal America, Ohio: very peculiar, leaves narrow smooth, fl. small &c."; and publishing a new *C. angustifolium*, "*Var. parvifolium* Raf. folioles 5–7 small smooth cuneate or elliptic, petiols membranose, flowers very small, branches uniflore; Labrador, 3 to 10 inches high, folioles less than uncial."[4]

More recently, in the *North American Flora*, Rydberg[5] has stated that the typical form of the species, with "leaflets . . . .elliptic or oval," occurs in "Northern and subalpine Europe and Asia; also subarctic and arctic America, from Greenland and Labrador to Alaska," while

[1] L. Sp. Pl. 502 (1753).

[2] "Foliola. . .oblongo-lanceolata, acute-serrata, superiore facie laete-viridia, dorsa glaucescentia, venosa" — Lehm, Mon. Pot. 53 (1820); "foliola. . .oblongo-lanceolata acute et aequaliter serrata, supra viridia, subtus glauca, utrinque vel subtus tantum puberula" — Wolf, Mon. Pot. 75 (1908).

[3] Raf. Fl. Tell. pt. ii. 55, 56 (1836).

[4] Raf. Aut. Bot. 170 (1840).

[5] Rydb. N. A. Fl. xxii. 355 (1908).

"the more common American form (*C. angustifolium* Raf.)," with leaflets "linear-oblong," extends "south to New England, Minnesota, Wyoming, and California"; thus seeming to indicate that the common American plant has recognizably narrower leaflets than the European. In their study of this species, however, the writers have been unable to make out any definite difference in the shape of leaflets to separate from the European plant the common plant of southern British America and the Northern States, which extends southward at least to New Jersey, Pennsylvania, Ohio, Indiana, Illinois, Iowa, Wyoming and California. In the plant of Europe (fig. 1) the leaflets are, of course, variable in size and form, but they have in general an oblong-lanceolate to oblanceolate outline, and the various Eurasian specimens are readily matched by specimens from Canada and the northern United States. In the Eurasian plant the terminal leaflet of the primary leaves varies (in a rather small series of specimens examined) from 2–7 (average 4) cm. in length, though some of the European plates show that they may be longer. In a much larger American series the common plant has the terminal leaflet ranging in length from 2–10 (av. 5.2) cm. In the Eurasian plant the terminal leaflet ranges from 0.9–2.7 (av. 1.6) cm. wide, in the American from 0.7–3.8 (av. 1.8) cm. wide. Expressed as a proportion, the breadth of the terminal leaflet in the Eurasian plant is $\frac{3}{10}$–$\frac{1}{2}$ as great as the length; in the common American plant the terminal leaflet is $\frac{1}{6}$–$\frac{1}{2}$ as broad as long, but it should be noted that the plants with narrowest leaflets come for the most part from the West — Montana, Washington, Oregon, etc. and are undoubtedly the extreme which was separated by Rafinesque as *Comarum angustifolium* (fig. 2). Similar plants with the leaflets only $\frac{1}{8}$ as broad as long are found at scattered points eastward and the variant seems to be merely an extreme of the series rather than "the more common American form," for as already stated, the majority of American specimens seem to the writers quite inseparable from the Eurasian material.

The small-leaved plant of Labrador and Alaska (and the islands of northeastern Asia), however, which Rafinesque separated as *Comarum angustifolium*, var. *parvifolium* and which Rydberg identifies as the typical form of *Comarum palustre*, impresses us as sufficiently distinct for varietal recognition. The characters emphasized by Rafinesque, the small cuneate or elliptic leaflets and the few flowers ("branches uniflore"), seem to be reasonably constant in nearly all plants from

the coastal regions of Labrador and Alaska and the islands of Bering Sea (fig. 3), the elliptic to cuneate-obovate subtruncate or round-tipped leaflets being 1.3–4.5 (av. 2.75) cm. long and 0.9–2.5 (av. 1.5) cm. broad, ranging from $\frac{1}{2}$ –$\frac{2}{3}$ as broad as long.

The other noteworthy variety, *Potentilla palustris*, var. *villosa* has already been referred to. In this plant the petioles, stipules, peduncles, bractlets, etc. are densely glandular-villous and the leaflets are villous or very densely sericeous. The plant (fig. 4) was figured and described by Plukenet[1] in 1692 from Sweden and Ireland; was taken up by Linnaeus in his *Flora Lapponica* as an unnamed variety "rarius observatur & plane non differt a naturali planta";[2] was recognized without discussion by Persoon as *Comarum palustre, β villosum*;[3] and was later transferred by Lehmann[4] to *Potentilla.*

That *Potentilla palustris*, var. *villosa* is a rare plant in Europe is indicated by the citation of specimens by European monographers. Plukenet, upon whose figure and description the variety rests, said that the plant came from Sweden and Ireland;[5] but in his *Revisio Potentillarum* Lehmann omitted the Swedish citation and referred to the plant only "in Groenlandia et Hibernia";[6] while Wolf, in his monumental *Monographie der Gattung Potentilla*, states that it appears to be a subarctic plant which Lehmann knew only from Greenland and Ireland, though J. Lange says in his *Conspectus Florae groenlandicae* that he has not seen it from Greenland but from Iceland. Wolf goes on to say that in an old English herbarium he has seen the plant from "Canada, Distrikt Cartwrigt [Cartwright, Souris Co., Manitoba] (leg. W. Scott 1891)."[7] With the exception of the Cartwright record and the old but perhaps erroneous report from Greenland, there seems to have been no suggestion that the plant occurs in North America until the notes published in RHODORA in 1909 and 1910; but the range of the plant in North America, from the Magdalen Islands, Nova Scotia, and Maine to Minnesota and Manitoba, indicates that, with us at least, it belongs to the Canadian rather than the subarctic zone.

[1] Pluk. Phyt. t. ccxii. f. 2 (1692).
[2] L. Fl. Lapp. 172 (1737).
[3] Pers. Syn. ii. 58 (1807).
[4] Lehm. Stirp. Pug. ix. 44 (1851).
[5] "*Pentaphyllum palustre rubrum, crassis, & villosis foliis Suecicum, & Hibernicum. hujus exemplar ex Suevia sibi allatum. nobis dedit* Reverend D. Stonestreet, *quod etiam Ornatissimus Vir D. Gideon.* Bonavert *ex Hibernia (qua invenit) rediens, nobis amicissime communicavit.*"— Pluk. Phyt. t. ccxii. f. 2 (1692).
[6] Lehm. Revis. Pot. 74 (1856).
[7] Wolf, Mon. Pot. 76 (1908).

In his account of *Potentilla palustris*, var. *villosa*, Lehmann said "*β villosa*, minor";[1] but as Wolf points out Lehmann's diagnosis "ist ungenau und zweideutig" and the var. *villosa* instead of being called "minor" should be described "foliolis magnis."[2] That the leaflets are larger than in other variations of *P. palustris* is well shown by measurements of the 16 sheets of specimens examined. In these plants the leaflets are as shown in Plukenet's figure and as later described by Rafinesque (as *Comarum tomentosum*), presumably from Plukenet's drawing: "more robust....with broader leaves [leaflets] obl[ong-] ellipt[ic]";[3] and measurements of the terminal leaflets of this American series of var. *villosa* show them to vary from 3.3–9.4 (av. 5.6) cm. long and from 1.4–3.1 (av. 2.2) cm. broad, or from $\frac{1}{3}$ $\frac{3}{5}$ as broad as long, thus indicating that the leaflets are relatively considerably broader than in either the European or the American plants which are passing as typical *P. palustris*. In fact, so many of the specimens from eastern America have leaves of which Plukenet's figure might easily pass as a tracing that one is led to infer that Lehmann's lack of a clear understanding of the variety was indicated not merely by his description of it as "minor" but by his characterization of Plukenet's figure as "mala."[4] The occurrence of this variety, with glandular-villous peduncles and rather large elliptic-oblong villous leaflets, so generally in the comparatively temperate belt of southern Canada and the adjacent States together with Lehmann's vagueness in describing the plant and Lange's statement that he does not know of it in Greenland, indicate that the Greenland record (originating with Lehmann and apparently unverified by later students) may wisely be treated with doubt until more clearly vouched for.

Another variant of *Potentilla palustris*, somewhat conspicuous in its extreme development, is forma *subsericea* (Becker) Wolf,[5] originally proposed by Becker as a variety.[6] Our own experience accords with that recently described by Mr. S. F. Blake,[7] and it is probable that the form is an ecological state rather than a true geographic variety, for the sericeous foliage is most often found in exsiccated spots or as a late development in colonies which earlier in the season produced the ordinary green leaves. Since this form of *P. palustris* is sometimes

[1] Lehm, l. c.
[2] Wolf, l. c.
[3] Raf. Aut. Bot. 170 (1840).
[4] Lehm. Mon. Pot. 53 (1820).
[5] Wolf, Mon. Pot. 76 (1908).
[6] Becker, Deutsch. Bot. Monatschr. xv. 85 (1897).
[7] S. F. Blake, Rhodora, xv, 165 (1913).

mistaken for var. *villosa* it is probable that some of the unverified or doubtful records of the latter belong to forma *subsericea*.

Briefly summarized our interpretation of the American variations of *Potentilla palustris* follows.

POTENTILLA PALUSTRIS (L.) Scop. Figs. 1 and 2. Branches more or less minutely pilose or glandular above, 1–many-flowered: leaflets oblong-lanceolate to oblanceolate, acutish to obtuse, green and glabrous or merely puberulent above, glaucous and puberulent or sericeous beneath: the terminal leaflets of the primary leaves $\frac{1}{6}$–$\frac{1}{2}$ as broad as long, 2–10 (av. 4.6) cm. long, 0.7–3.8 (av. 1.7) cm. wide.— Fl. Carn. ed. 2, i. 359 (1772). *P. Comarum* Nestler, Mon. Pot. 36 (1816). *P. rubra* Hall. f. in Ser. Mus. Helv. i. 56 (1818). *P. digitata* and *angustifolia* Raf. Fl. Tell. ii. 55, 56 (1837). *Comarum palustre* L. Sp. Pl. 502 (1753). *C. digitatum* and *angustifolium*, Raf. l. c. 55, 56 (1837). *Argentina rubra* Lam. Fl. Fr. iii. 120 (1778). *Pancovia palustris*, *digitata*, and *angustifolia* Raf. l. c. 55, 56 (1837).— Cooler regions of Eurasia; in North America known from Labrador, Ungava, Keewatin, Yukon, and Alaska, southward to Newfoundland, Nova Scotia, southern New England, northern New Jersey, eastern and northern Pennsylvania, Ohio, northern Indiana, northern Illinois, northern Iowa, Wyoming and California.— Forma SUBSERICEA (Becker) Wolf, Mon. Pot. 76 (1908); S. F. Blake RHODORA XV. 165 (1913). Var. *subsericea* Becker, Deutsch. Bot. Monatsschr. XV. 85 (1897); Fernald & Wiegand, RHODORA, xii. 111, 140 (1910). Leaflets densely sericeous upon both surfaces. Apparently a form developed in exsiccated habitats or toward the end of the summer.

Var. **parvifolia** (Raf.) n. comb. Fig. 3. Similar, but smaller: branches 1–4-flowered: leaflets elliptic to cuneate-obovate, subtruncate or rounded at tip; the terminal $\frac{1}{2}$–$\frac{2}{3}$ as broad as long, 1.3–4.5 (av. 2.7) cm. long, 0.9–2.5 (av. 1.5) cm. broad.— *Comarum angustifolium*, var. *parvifolium* Raf. Aut. Bot. 170 (1840).— Labrador, Alaska, and islands of Bering Sea; examined from the following stations. LABRADOR: Ramah, *A. Stecker*, no. 323; Okkak, *Fratres Moravi;* Nain, *Lundberg;* Hopedale (large-leaved transitional plant), *Sornborger*, no. 131; Rigoulette, *Bowdoin College Expedition*, no. 270; Spear Harbor, *C. W. Townsend*, no. 44. ALASKA: Cape Nome, *F. E. Blaisdell;* Anvik, *J. W. Chapman*, no. 4; St. Paul Island, *J. M. Macoun*, no. 71; Dutch Harbor, Unalaska, *E. C. Van Dyke*, no. 93. COMMANDER ISLANDS: Bering Island, *Stejneger*, no. 27.

Var. VILLOSA (Pers.) Lehm. Fig. 4. Often coarser: branches few–many-flowered, with the petioles, peduncles, bractlets, etc. densely glandular-villous: leaflets villous or densely sericeous, oblong-elliptic to narrowly obovate, rounded at tip, $\frac{1}{3}$–$\frac{3}{5}$ as broad as long; the terminal 3.3–9.4 (av. 5.6) cm. long, 1.4–3.1 (av. 2.2) cm. broad.— Stirp. Pug. ix. 44 (1851) and Revis. Pot. 74 (1856); Walp. Ann. ii. 483 (1851–52); Wolf, Mon. Pot. 76 (1908); Robinson & Fernald,

RHODORA, xi. 48 (1909); Fernald & Wiegand, RHODORA, xii. 140 (1910). *Pentaphyllum palustre rubrum, crassis, & villosis foliis* Pluk. Phyt. t. ccxii. f. 2 (1692). *Comarum palustre, β. villosum* Pers. Syn. ii. 58 (1807); Rydb. Mem. Dept. Bot. Columbia Univ. ii. 163 (1898) and N. A. Fl. xxii. 355 (1908). *C. tomentosum* Raf. Aut. Bot. 170 (1840).—Reported but apparently rare or of doubtful status in Sweden, Ireland, Iceland and Greenland (see notes above), and Germany and Hungary (records questioned by Wolf, Mon. Pot. 76). In North America definitely known from the following stations. QUEBEC: Alright Island, Magdalen Islands, *Fernald, Long & St. John*, no. 7619. NOVA SCOTIA: near Pictou, *Howe & Lang*, no. 478. MAINE: Princeton, *Fernald & Wiegand* (*Fernald*, no. 1920); Moose Island, Passamaquoddy Bay, *Fernald & Wiegand* (*Fernald*, no. 1921); Marshfield, *Kate Furbish;* Merchants' Island, Hancock Co., *N. T. Kidder;* Readfield, *Kate Furbish.* NEW YORK: Wellesley Island, Jefferson Co. (transitional form), *Robinson & Maxon*, no. 9; Chatauqua Co., *M. S. Pettit.* MINNESOTA: Lake Kilpatrick, Cass Co., *C. A. Ballard;* Fort Snelling, *E. A. Mearns.* MANITOBA: Lake Winnipeg Valley, *Bourgeau;* Cartwright, *W. Scott* (acc. to Wolf). A specimen from Port Ludlow, Washington (*F. Binns*) strongly approaches var. *villosa* but is hardly typical.

EXPLANATION OF PLATE 106.

Fig. 1. Typical leaf of *Potentilla palustris*, after Svensk Botanik, t. 310. Fig. 2. Leaf of extreme form of *P. palustris* with narrow leaflets (*Comarum angustifolium* Raf.) from Ione, Washington (*Kreager*, no. 427). Fig. 3. Leaf of var. *parvifolia* from Dutch Harbor, Unalaska (*Van Dyke*, no. 93). Fig. 4. Leaf of var. *villosa* from Princeton, Maine (*Fernald*, no. 1920.)

FLORA OF THE SANDY RIVER VALLEY IN MAINE.

CLARENCE H. KNOWLTON.

THE Sandy River is a tributary of the Kennebec, in western Maine. It rises in the central part of Franklin County, with two main branches. One of these originates in a string of small ponds lying in Sandy River Plantation, and receives tributaries from Letter E and No. 6. The other branch rises in Redington, receiving many brooks from Mt. Saddleback in Madrid. The river is about fifty miles long, flowing southeast from its sources through Phillips, Avon, Strong and Farmington; then turning to the northeast it flows through New Sharon between Stark and Mercer, then through Stark into the Kennebec,