

distinct in habit and floral structure as often to be treated as a separate genus. Some others of our native species of *Lysimachia* belong to § *Steironema*, a group of species which is often treated as a distinct genus. So far as we yet know *L. terrestris* has not crossed with members of this unique section.

Here is an alluring problem for some of the very modern students of evolution. Nature has already posed the problem. Field-study, reenforced by the newer techniques of the laboratory and the garden, should throw light upon it. Inability longer to use a microscope forces the writer to leave the question to others.

ADIANTUM CAPILLUS-VENERIS IN THE UNITED STATES

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As I pointed out in Gray, Man. ed. 8, 48 (1950), "Our plant has longer and more slender rhizomes than the typical European plant; the various geographic vars. are not yet worked out". At the time of writing I tried in vain to "wish" the problem upon the late C. A. Weatherby, who had so far dipped into the genus as to join Maxon in describing new species from Central and South America. Now, assembling data on the affinities of the flora of temperate eastern North America, it becomes important to have a more exact picture of the situation than seems to have prevailed.

Typical *Adiantum Capillus-Veneris* was described by Linnaeus, Sp. Pl. ii. 1096 (1753) with "*Habitat in Europa australi.*" The species is now considered to be semi-cosmopolitan in warm parts of the globe ("Europa occ. et austr. Africa. Asia temp.-Himalaya. Ceylon. Queensland, Polynesia. U. S. A. merid. et occ.—Columbia-A Amazonas. ? Ind. Occ."—*Christensen*). In general plants of such nearly world-wide range, within the tropical and warm-temperate latitudes, are not uniform; and, certainly, when in the western interior of the United States the species extends northward to ravines of the Black Hills, it is in an area with a relatively northern flora. It there occurs, however, at Cascade Spring, "along the banks of a stream of warm water which

issued from several very large springs.”¹ “In the southern foot-hills Fall River and Cascade Creek . . . rise in large warm springs.”²

A survey of much material of the European *Adiantum Capillus-Veneris* shows the rhizome to be relatively thick and short, the whole rhizome measuring 1.5–5.5 cm. long and being densely covered with dark brown to blackish lanceolate or more slender scales. Except from the specimens and plates it is difficult to form a good impression of the European rhizome, European students assuming that, of course, everyone knows such details. From Linnaeus, Willdenow, Swartz, Schkuhr (who evidently thought it too well-known to illustrate), Hooker, Hooker & Baker and many others we get no idea of the rhizome. Some, such as the caustically critical (of others) James Britten, *Eur. Ferns*, 44 (1881), after saying “It is hardly necessary to describe at very great length so well-known and popular a fern as this”, allows it “a slowly creeping caudex, which is black and scaly, about as thick as a quill”; and Rouy, *Fl. France*, xiv. 389 concurs, with “Rhizome rampant, densément paléacé”; Luerssen, *Farnpfl.* 81 (1889) does better: “Rhizom kriechend, spärlich verzweigt, . . . im Breitendurchmesser bis 4–5 mm. stark”.

In the wide-ranging North American plant, occurring from Cuba and Florida across the southern United States, south into Mexico and north into southwestern Virginia, Kentucky, Missouri, South Dakota, Utah and southern California, the very slender and (when fresh) rather pale rhizome or caudex is elongate and, when not broken, shows a length of 0.5–1.5 dm., with the scales paler and fewer than in the typical European plant. Small well shows a portion of a rhizome in his *Ferns Se. States*, 120 (1938), and his description, p. 118, correctly says: “Rootstock horizontal, slender, creeping, with light-brown chaff.” Whereas in the European plant the fronds only exceptionally reach a height of 6 dm., that is nearly the average with us. D. C. Eaton in Chapman, *Fl. So. U. S.* 591 (1860), discriminating between stipe and frond or lamina, said: “Fronds 1°–3° [*i. e.* 3–9.1 dm.] long”; and in his *Ferns N. Am.* i. 283 (1879) he said “one of Professor Harvey’s fine specimens has a frond

¹ C. E. Bessey in *Bot. Gaz.* xxvi. 211 (1898).

² Arthur C. Mackintosh, *A Botanical Survey of the Black Hills of South Dakota in Black Hills Engineer*, xix. 161 (1931).

seventeen inches [5.18 dm.] long." With the stipe of about equal length, that means a total length of more than 1 m. Typical *Adiantum Capillus-Veneris* does not reach nearly that length.

The pinnules, too, show rather notable differences. In the European plant those of the sterile fronds are lobulate and deeply incised and commonly dentate, those of the fertile fronds commonly rounded above, only shallowly notched and scarcely to not at all toothed. In the American plant the pinnules are deeply cleft and lobed on both sterile and fertile fronds and in both they are sharply dentate, especially around the summit. The latter difference is rarely noted by those who treat the European and the temperate North American plants as identical. It was, however, detected by George Schneider, Bk. of Choice Ferns, i. 256 (1892), when he wrote: On the sterile fronds the "pinnules . . . deeply lobed from the circumference in the direction of the center, and the lobes again bluntly crenated (dentated) . . . and the lobes in the American form are usually denticulated (toothed), and sometimes very sharply so . . . In fertile fronds [in Europe], the teeth either disappear or are seen only on the upper part of the sides of the lobes". George Schneider detected a real difference which, although shown in carefully prepared drawings (like D. C. Eaton's) had been overlooked by his predecessors.

With several tendencies or truly significant characters separating the more widely spread plant of the United States from the typical plant of Europe, I propose to call the former

ADIANTUM CAPILLUS-VENERIS L., var. **protrusum**, var. nov., a var. typica recedit caudice stramineo vel brunneo elongato 0.5–1.5 dm. longo, 2–4 mm. crasso, sparse vel laxe paleaceo, paleis brunneis; frondibus (stipitibus inclusis) plerumque 0.3–1 m. longis; pinnulis laminarum sterilium fertiliumque acute dentatis.—Damp calcareous cliffs and sheltered slopes, Cuba and Florida to Texas, Mexico and southern California, north to southwestern Virginia, Kentucky, Missouri, South Dakota and Utah.

The following are characteristic:

CUBA: San Blas, Prov. Santa Clara, *Hunnewell*, no. 11,454.

VIRGINIA: near New River, 1879, *Schrivver*.

GEORGIA: shaded lime-sink near Flint River, Dooly Co., *Harper*, no. 1064; lime-sink at Forest Falls, Decatur Co., *Harper*, no. 1193; shaded perpendicular cliffs, bank of Chattahoochee

River, Quitman Co., *Harper*, no. 1756; perpendicular rocky bank of Samochechobee Creek, Clay Co., October 29, 1902, *R. M. Harper*, no. 1791 (TYPE in Herb. Gray).

FLORIDA: rocks on Chipola River near Marianna, *A. H. Curtiss*, no. 6805; cliffs at Aspalaga, *Chapman*; Aspalaga Bluff, along Apalachicola River, Liberty Co., *Small, De Winkeler & Mosier*, no. 11,021; limestone rocks in seepage, along the Apalachicola River on Rock Bluffs, Aspalaga region, *Correll & Kurz*, no. 5674.

KENTUCKY: Burnside, Pulaski Co., *Jas. H. Ferriss*; waterfall near Bronston, Pulaski Co., *McFarland*, no. 66.

TENNESSEE: Lookout Mt., *A. H. Curtiss*, no. 3709.

ALABAMA: dripping rocks along Tennessee River northeast of Sheffield, Colbert Co., *Harper*, no. 3277.

MISSISSIPPI: Waynesboro, Wayne Co., *Pollard*, no. 1235.

MISSOURI: bluffs, Monteer, *Bush*, no. 1126; dripping rocks, Monteer, *Bush*, no. 5339; on dripping rocks, Branson, *Bush*, no. 5372.

ARKANSAS: limestone ledges, White River, Washington Co., Nov. 3, 1877, *F. L. Harvey*; dripping ledges, limestone bluffs of White River, near Calico Rock, Izard Co., April 27, 1929, *E. J. Palmer*, no. 35,570; on seepage, above Buffalo, Newton Co., *D. M. Moore*, no. 32,441.

(LOUISIANA: very doubtful; see explanation below.)

SOUTH DAKOTA: border of Cascade Creek, Aug. 25, *Bessey & Clements*; wet bank of brook, Cascade Spring, Fall River Co., *E. J. Palmer*, no. 37,464.

OKLAHOMA: on bank about a spring at head of canyon, 7 mi. ne. of Guthrie, Logan Co., *G. W. Stevens*, no. 3265.

TEXAS: S. Felipe de Austin, *Drummond*, no. 355; shaded limestone cliff, McKittrick Canyon, Culbertson Co., *Moore & Steyermark*, no. 3548; North Llano River, west of Roosevelt, Kimble Co., *Cory*, no. 6735.

UTAH: St. George, Washington Co., *Eggleston*, no. 14,764; seepage under ledges, $\frac{1}{4}$ mile east of Virgin, Washington Co., *Maguire*, no. 21,485; sandstone ledge near waterfall east of Auto Camp, Zion's Park, *Maguire*, no. 16,316.

ARIZONA: Lower Kanab Canyon, Colorado River, *Chas. D. Walcott*; under rocks, Ramsey Canyon, Huachuca Mts., *L. N. Gooding*, no. 731.

CALIFORNIA: on rocks, Canyon, about 1500 ft., Mt. Wilson, Los Angeles Co., *S. F. Blake*, no. 846; shaded calcareous seep, Palmer Canyon, alt. 2500 ft., San Gabriel Mts., Los Angeles Co., *L. C. Wheeler*, no. 248; Santa Barbara, Oct., 1880, *M. D. Stebbins*.

NEUVO LEON: saturated bank, Sierra Madre Oriental, alt. about 5000 ft., *C. H. & M. T. Mueller*, no. 706.

COAHUILA: Chojo Grande, 27 miles southeast of Saltillo, *Edw. Palmer*, no. 360; edge of upper canyon, Sierra de la Madera, Cañon del Agua, *C. H. Mueller*, no. 3249; cañon del Agua Grande, shade, on gypsum by water, *R. M. Stewart*, no. 3801.

TAMAULIPAS: vicinity of Victoria, alt. about 320 m., *Edw. Palmer*, no. 189; Ojo de la Agua Grande, Cerro Bamora, vicinity of El Milagro, *H. H. Bartlett*, no. 11,066.

SAN LUIS POTOSI: Rio Verde, *Edw. Palmer*, no. 35.

SONORA: Nacori, alt. 3750 ft., *C. V. Hartman*, no. 292; wet cliff, Cajón de la Higuera, near Moctezuma, *Stephen S. White*, no. 382.

In the citation of states Louisiana was left in doubt. In the Gray Herbarium there is only one specimen of *Adiantum Capillus-Veneris* from that state. This is a single fertile frond which is not of the American var. *protrusum*, but which closely matches the European plant with deeply cleft pinnules, which was described by Willdenow as *A. trifidum*, with which the Louisiana collection was identified. This sheet "EX HERB. C. H. DEMETRIO" bears in Demetrio's hand the statement: "Found only one plant among others collected by Rev. C. Niermann, Clinton, La. Collected by Rev. C. Niermann January 1893". In the Gray Herbarium there is also a portion of a manuscript (presumably sent to Gray) from the late John L. Riddell in which he specially emphasizes that "there being no limestone in the parts of Louisiana botanically explored, we have not yet met it in this state"; and in the *Catalogus Florae Ludovicianae*, AUCTORE. J. L. RIDDELL, M.D., CHEM. PROF. UNIV. LA. in New-Orl. Med. and Surg. Journ. viii. (May, 1852) Riddell listed for the state only *A. pedatum*. The Demetrio label says "only one plant". Most American collectors emphasize its local abundance on wet calcareous cliffs and shores. In view of the cultivation of various forms of the European plant it seems improbable that the "one plant" of the European variety was native in southeastern Louisiana.

In the Riddell manuscript above referred to that keen observer proposed our plant as a new but unpublished species. He sent a water-color drawing and 3 different pinnules but his efforts were unappreciated and opposite his description the late Sereno Watson wrote "*A. Capillus-Veneris*, L.!" Unfortunately the unpublished name given by Riddell cannot be taken up, especially since he had on the sheet one pinnule from the next variety

(apparently, judging from his note) from Texas. Two trivial names have been given within this variety. One was noted under *A. Capillus-Veneris* as follows: "The form **elongatum** Lemmon is an elongated form from Arizona".—Clute in Fern. Bull. xiv. 57 (1906). Just what was elongated was not explained. The other, *A. Capillus-Veneris*, forma *cristatum* Moxley in Am. Fern. Journ. ix. 27 (1919), is a very exceptional aberration "having the tips of the fronds more or less dichotomously forking and crested". Its name should not be taken up for the wide-ranging and crestless variety.

In *Adiantum Capillus-Veneris*, var. *protrusum* the fertile pinnules are obviously cleft or deeply lobed and with evident sharp dentation except where occupied by the sori. They are thin-membranaceous or almost filmy in texture and the larger ones range from 1–3 (av. 1.6) cm. broad. In the western interior of the United States and somewhat down the mountains of Mexico there is a smaller plant, with subcoriaceous or firm pinnules, "Rootstocks widely creeping, often 10–12 cm. long, covered with slender narrow pale brown scales; . . . leaflets 6–8 mm. wide, . . . mainly 3-lobed, the incisions narrow and very shallow", etc. This is *A. modestum* Underwood in Bull. Torr. Bot. Cl. xxviii. 46 (1901), "A plant related to *A. capillus-veneris* but differing from it in the smaller, less incised leaflets, their more rounded compact shape, in the fewer narrower sori, in the light-colored stalks to the leaflets, and in general habit.

"The European specimens of *A. capillus-veneris* are usually much more lacinate than the American, but in *A. modestum* the leaflets are barely trilobed with very shallow sinuses"—Underwood, *l. c.* In a large series of *A. modestum* the larger fruiting pinnules have a breadth of 5–14 (av. 8.5) mm., this about one-half the breadth in *A. Capillus-Veneris*, var. *protrusum*. Several American authors reduce it outright to the European plant, others maintain it as a species. To me the middle course, on account of numerous transitions, seems the proper treatment and I am calling it

A. CAPILLUS-VENERIS L., var. **modestum** (Underw.), stat. nov. *A. modestum* Underw. in Bull. Torr. Bot. Cl. xxviii. 46 (1901).—Colorado and Utah, south to northwestern Arkansas, Texas, New Mexico and Arizona and locally into Mexico.

The following collections well represent the plant:

COLORADO: Hot Springs, Ouray, August 4, 1894, *Jeanie I. W. Thacher*.

UTAH: St. George, alt. 2500 ft., April, 1888, *M. E. Jones*; West cliffs, crusted with alkali, St. George, *Goodding*, no. 793; wet rocks at 864 m., St. George, *Tidestrom*, no. 9250; along stream in canyon, Zion Park, Washington Co., *Maguire & Maguire*, no. 4711.

NEVADA: Las Vegas, *Goodding*, no. 2241.

ARKANSAS: wet rocks (Ordovician limestone), Sulphur Springs, Benton Co., *E. J. Palmer*, nos. 3788 and 19,060.

TEXAS: Buena Vista, about 4 mi. west of Alpine, Brewster Co., April 3, 1936, *Warnock*; wet beds of Nueces R., Pulliam, Zavalla Co., *E. J. Palmer*, no. 11,331.

NEW MEXICO: abundant on rocks and grassy points overhanging the water of North Spring River, Roswell, *F. S. Earle*, no. 261, TYPE and ISOTYPE in Herb. Gray; Piedra Pinta, 1852, without stated locality, *Chas. Wright*, no. 2123, PARATYPE, labelled *A. chilense* Kaulf.; wet places on limestone ledges, canyon east of road, foothills east of Cook's Peak, Luna Co., *McVaugh*, no. 8129; wet loam, alt. approx. 6600 ft., Kingston, Sierra Co., *O. B. Metcalf*, no. 1380.

ARIZONA: Bright Angel Trail, Grand Canyon of the Colorado, Cocomino Co., *Carl B. Wolf*, no. 3177; petrified springs, Littlefield, *Tidestrom*, no. 9238: on lime deposits below spring seepage, Monkey Spring, Jeffcott Ranch, nw. end of Canelo Hills, Santa Cruz Co., *W. S. Phillips*, no. 2873.

COAHUILA: Saltillo, common about shady springs and water-courses, *Edw. Palmer*, no. 71.¹

CHIHUAHUA: alt. about 1300 m., vicinity of Chihuahua, *Edw. Palmer*, no. 331.

DURANGO: San Ramón, *Palmer*, no. 77.

COLIMA: San Marcos, *M. E. Jones*, no. 497a.

As stated, many specimens are transitional between vars. *protrusum* and *modestum*, but the firmer texture and small and barely notched fertile pinnules and its restriction chiefly to the Cordilleran region of North America shows that var. *modestum* is truly a geographic variety, not a mere ecological state. On some Mexican sheets Weatherby suggested that this may be the *A. Schaffneri* Fournier in Bull. Soc. Bot. France, xxvii. 328 (? 1880). I have seen no material of the type-no. (*Schaffner*, no.

¹ Palmer noted that "in the market it is called 'Silantrillo', to be used to assist menstruation in females". Apparently the marketmen had an inkling that it is *Capillus-Veneris*.

64), but two other Schaffner nos. before me seem to be small plants of *A. Capillus-Veneris*, var. *protrusum*. Fournier's description was rather inconclusive:

L'Adiantum Schaffnerii a les pinnules de l'*A. Capillus Veneris*, mais les frondes courtes, à peine ramifiées et souvent même simplement pinnées, naissant très serrées sur un rhizome horizontal.

Several specimens were originally labeled as *A. emarginatum*, but the Pacific American plant which erroneously passed as *A. emarginatum* Hook. but which is now known as *A. Jordani* K. Müll. is quite different in its very strong veins, in its very long linear transverse (instead of short and lunate) indusia and in the larger flabellate-rotund pinnules.

In the Rocky Mountains, however, *A. Capillus-Veneris*, var. *modestum* has an exceptional form with large fertile pinnules as broad as in the more western *A. Jordani*. This is

Var. MODESTUM, forma **rimicola** (Slosson), stat. nov. *A. rimicola* Slosson in Bull. Torr. Bot. Cl. xli. 308, t. 7, fig. 1 (1914).—Larger fertile pinnules 1.5–2.4 cm. broad.—Little known but seemingly an extreme of var. *modestum*, with fertile pinnules as large as in var. *protrusum* and standing between these varieties.

SHRUBS OF MICHIGAN.—Under this self-explanatory title the Cranbrook Institute of Science has issued a very attractive and equally accurate volume,¹ the second edition, enlarged and brought to date. The work, most happily, coming from the hand of the late CECIL BILLINGTON, cannot fail to be authoritative, a most happy situation in these days of inaccurate and unsound books on trees, shrubs or other wild plants being rushed from the press. The descriptions are clear, the maps of ranges within the state of Michigan convincing and the line-drawings most helpful. Not only will all botanists of the Great Lakes area, professional or amateur, need the book. Everyone interested in the flora of the northeastern United States and southeastern Canada will want it.—M. L. F.

¹ CECIL BILLINGTON: *Shrubs of Michigan*, ed. 2, pp. vii + 339, 206 figs. Cranbrook Inst. Sci. Bloomfield Hills, Mich. \$4.50. 1949.

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