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ARABIS DRUMMONDI AND ITS EASTERN RELATIVES.

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IN late July, 1902, Mr. Emile F. Williams and the writer found in open sandy woods and on the adjacent sand-dunes of "the commons," on the north shore of the Baie des Chaleurs, at New Carlisle, Quebec, an unfamiliar *Arabis* with pink flowers on divergent pedicels, spreading or loosely ascending pods, and basal leaves quite covered with stellate usually 3-forked hairs. A week later, on ledges and cliffs near the confluence of the Rivière du Loup and the St. Lawrence

another *Arabis* was found strongly resembling the New England plant with strict inflorescence which has been known as *Arabis confinis*, but with the pods much broader than in New England specimens. This strict plant of Rivière du Loup had the basal leaves, like those of the New England plant which it resembled, glabrous or with some simple stiff hairs usually attached at the middle (malpighiaceous hairs) but rarely 3-forked. The two plants were so very different that the result of the first comparison of them with the current manuals and with extensive herbarium material was a complete surprise, for, according to these sources of information, both plants were *Arabis confinis*, Watson (*A. brachycarpa*, Britton). Further study showed that both *Arabis confinis* and *A. brachycarpa* have been the source of much confusion.

When, in 1887, Dr. Watson described *Arabis confinis*, he included at least two plants, and his description which follows gives little clue to the special form he intended as typical of his species:

"*ARABIS (TURRITIS) CONFINIS*. Biennial, rarely somewhat glaucous; stems erect, one or several, usually simple, 1 to 3 feet high: lower leaves oblanceolate, usually dentate, finely stellate-pubescent or sometimes glabrous, the cauline oblong to linear-lanceolate, auriculate: flowers white or pinkish: pods more or less spreading or suberect, a line broad or less, straight or slightly curved, usually more or less attenuate above and beaked: seeds small, narrowly oblong, winged.—*A. laevigata*, Hook. Fl. Bor.-Am. 1. 43. *Turritis glabra*, and var. β , Torr. & Gray, Fl. 1. 78 and 666. *T. brachycarpa*, Torr. & Gray, l. c. 79. *T. stricta*, Torr. Fl. N. Y. 1. 53, not Grah.; Gray, Gen. Ill. 1. 144, t. 59. *A. Drummondii*, Gray, Manual, 69. From the lower St. Lawrence (Tadoussac, *Pickering*) along the Great Lakes to Lake Winnipeg (*Bourgeau*), and more rarely southward (Mt. Willard, *Faxon*; Dracut, Concord, and Brookline, Mass., *Dane*, *Deane*, *Faxon*; Thimble Islands, Conn., *A. L. Winton*; Cayuga Co., N. Y., *Dudley*; Elgin and Dixon, Ill., *Vasey*). It includes all the '*A. Drummondii*' of the Atlantic region."¹

As shown by the herbarium specimens as well as by studies of the plants in the field, the characters, "leaves . . . finely stellate-pubescent" and "pods more or less spreading," belong to one plant; while the characters, "leaves . . . sometimes glabrous" and "pods . . . suberect," are exhibited by a plant of quite different habit, habitat, and geographic range. Of the specimens cited by Dr. Watson, those from Tadousac, Lake Winnipeg, and Dixon, Illinois, belong to the

¹ Watson, Proc. Am. Acad. xxii. (1887) 466.

species with basal leaves stellate-pubescent and the pods spreading; while those from the other stations have the lower leaves glabrous or with some malpighiaceae hairs and the pods on erect pedicels.

As already stated, there is nothing in the descriptive text of Dr. Watson to show which plant he intended as *Arabis confinis*. Judging from the two differential features, the leaves and pods, the precedence given in the description to the characters, "leaves finely stellate-pubescent" and "pods more or less spreading," as well as the citation first of the Tadousac plant would indicate one species; while the citation of *Arabis laevigata*, Hook.¹ as the leading synonym points to the plant with smoother leaves and erect pods, though the remaining synonymy points partly to the former plant. Nor does the separation in the 6th edition of the Manual of var. *brachycarpa* (following *A. Drummondii*, var. *brachycarpa* of the 5th edition) merely on the length of the pod sufficiently clear the two plants; while the somewhat fuller definition of the plants in the Synoptical Flora still allows *A. confinis* with leaves either "finely stellate-pubescent or glabrate."

The only clue now obtainable as to Dr. Watson's conception of *Arabis confinis* is from the note following his description, where he says, "Of related species, *A. DRUMMONDII*, Graham [Gray], is confined to the western mountains, glaucous and glabrous, or usually pubescent below with appressed hairs attached by the middle, with broader straight erect blunt pods, and broadly elliptical winged seeds."² From this note the natural assumption might be that by *A. confinis* was meant the plant with stellate pubescence and spreading pods; but since most of the specimens cited are of the other plant it is more probable that Dr. Watson, following an artificial principle still too prevalent, was simply separating from the supposedly local Rocky Mountain species "all the '*A. Drummondii*' of the Atlantic region." At any rate, there is little reason to keep up for either of the eastern plants a name so indefinitely applied as *A. confinis*, especially since both the components of that compound species were already clearly defined.

¹"*A. laevigata*; erecta, glabra, glauca, foliis radicalibus obovatis petiolatis sinuato-dentatis, caulinis linearibus sessilibus integerrimis, siliquis erectis, seminibus marginatis"

Hab. About Lake Huron. *Dr. Todd*.—A foot high. *Pedicels* 3-4 lines long. *Siliquae* quite erect, 1½ to 2 inches long, linear, plane, tapering at the extremity into a very short style." Hook. Fl. Bor.-Am. i. 43 (1829).

² Watson, l. c.

In 1838 Torrey & Gray described as follows

Turritis brachycarpa: glabrous and glaucous; radical leaves spatulate, toothed; cauline ones linear-lanceolate, acute, sagittate and somewhat clasping; siliques short, rather broadly linear; pedicels of the flowers pendulous, of the fruit spreading or ascending.

Fort Gratiot, Michigan, and Shore of Lake Superior, *Dr. Pitcher*! — 2 Stem 1–2 feet high, simple or sparingly branched above. Radical leaves pubescent. Flowers rather large, pale purple; the pedicels mostly bent downward. Silique about an inch long and nearly a line wide, straight or somewhat curved, usually spreading at right angles to the stem. Seeds mostly abortive, in 2 distinct rows when young; the ripe and perfect ones nearly as broad as the cell, winged on the margin. — The whole plant is sometimes of a purple color. Nearly related to the preceding [*T. retrofracta*, Hook. *Arabis retrofracta*, Graham, probably *A. Holboellii*, Hornem.]; but distinguished by its short siliques.”¹

From the description alone it is tolerably clear that Torrey & Gray had a plant habitally resembling the Tadousac-Winnipeg component of *Arabis confinis*. This interpretation has been further strengthened by a tracing and by fragments of the original Pitcher material from Fort Gratiot kindly furnished the writer by Dr. John K. Small of the New York Botanical Garden. This material shows that not only in habit but in the closely stellate basal leaves is *Turritis brachycarpa* exactly the plant found by Mr. Williams and the writer at New Carlisle, and included by Dr. Watson under *A. confinis* from Tadousac, Lake Winnipeg, and Dixon, Illinois. This characteristic plant should be known, therefore, as *Arabis brachycarpa*, Britton, based upon *Turritis brachycarpa*, Torr. & Gray, the first clearly defined name for the plant with spreading pods and stellate-pubescent basal leaves.

The other component of *Arabis confinis*, the plant with erect pods and with the basal leaves glabrous or somewhat pubescent with centrally attached hairs, although separated by Dr. Watson from *A. Drummondii*, presents surprising similarities to that species. In fact, the very characters by which the “western” *A. Drummondii* was distinguished from the eastern plant are present in this second component of *A. confinis*.

A. Drummondii, Gray, was based upon *Turritis stricta*, Graham, “which is a true *Arabis*. — *A. Drummondii*.”² *Turritis stricta*, Graham, based upon material raised in the Royal Botanic Garden at

¹ Torr. & Gray, Fl. i. 79 (1838).

² Gray, Proc. Am. Acad. vi. 187 (1866).

Edinburgh from Rocky Mountain seed collected by Drummond, was a plant with "foliis omnibus glabris, subintegerrimis, radicalibus in petiolam attenuatis, caulinis amplexicaulibus, sagittatis; siliquis strictissimis, pedicello stricto, glabro, quadruplo longioribus," and further, with leaves "at the root attenuated into petioles as long as themselves, both the leaf and petiole being ciliated with minute reflected hairs."¹

A "rubbing" from the Drummond plant is in the Gray Herbarium and in the letter accompanying it Mr. Daniel Oliver wrote from Kew to Dr. Gray, under date of April 17, 1866: "I have been looking this afternoon at our specimens of *Turritis stricta* with a view to the settlement of the question put in yours of the 2nd inst. I enclose a 'rubbing' from the fruiting branch of Drummond's Rocky Mountain specimen. This plant agrees entirely with Bourgeau's plant sent out — apparently through mistake — under the name *T. patula*, Grah. (Rocky Mountains — Alpine region — 18 Augt., 1858), excepting that the petals of Drummond's plant are, in its present state, white, while in the Bourgeau plant they are tinged with purple."

The Drummond plant and the Bourgeau specimen identified by Mr. Oliver with it and labelled by Dr. Gray *Arabis Drummondii* are the narrow-podded plant (in the Drummond specimen pods 5.3–6 cm. long, 1.6–2.3 mm. broad; in the Bourgeau specimen 7 cm. long, 2 mm. broad) represented by many western plants (for example, Wolf & Rothrock's nos. 657, 658, 660 from Colorado; Baker, Earle and Tracy's no. 128 from Colorado; C. F. Baker's no. 48 — *Arabis oxyphylla*, Greene — from Colorado; Henderson's no. 2396 from Mt. Adams, Washington; and M. E. Jones's no. 1177 from Utah) and by most of the so-called *A. confinis* of the East. That the two plants are identical in habit, foliage, pods and seeds, and the occasional presence upon the basal leaves of malpighiaceae hairs, and only rarely of 3-rayed hairs like those of *A. brachycarpa*, is very apparent from examination of a large suite of specimens; and in view of these identities of characters and the lack of any apparent points of difference there seems no reason to separate from *A. Drummondii* the strict plant which in the East has passed as *A. confinis*.

The large plant with broad pods, found at Rivière du Loup and referred to in the introduction to these notes, differs from *Arabis*

¹ Graham, Edinb. New Phil. Jour. 1829, 350.

Drummondii only in its much wider pods (mostly 3 mm. wide). A plant quite like it in habit and with similarly broad pods is represented in the Gray Herbarium by several Rocky Mountain specimens, one of which, Hall & Harbour's no. 35, was apparently a source of some perplexity to Dr. Gray, who first referred to it as *Streptanthus angustifolius*¹ and later took it to be *Turritis brachycarpa* "a short-fruited form of *T. stricta*, Graham."² Other similar specimens from Colorado (as Patterson's of 1875) and from Washington (Henderson's no. 2397) have passed as true *A. Drummondii*, while a recent Colorado collection (Baker's no. 341) has been made the type of a proposed new species, *A. connexa*, Greene. As an extreme of *A. Drummondii* this plant seems very well marked, but with the same habit and pubescence, and with only the inconstant tendency to broader pods, it seems better treated as a variety of that widely distributed plant.

The three eastern plants which have been associated as *Arabis Drummondii* and the ill-defined *A. confinis* may be briefly distinguished, then, as follows.

* Basal leaves glabrous or with some simple centrally attached hairs: pods erect or strongly ascending.

A. DRUMMONDI, Gray. Biennial, usually slightly glaucous, glabrous throughout (except for the occasionally pubescent basal leaves), 2 to 9 dm. high: basal leaves oblanceolate, slender-petioled, entire or dentate; cauline erect or strongly ascending, oblong- to linear-lanceolate, entire, sagittate-clasping: flowers pink or whitish, 7 to 10 mm. long, on slender erect pedicels: pods erect (except in age), straight or slightly curved, normally flat, 3.5 to 10 cm. long, 1.3 to 2.3 mm. broad, bluntly pointed: seeds in 2 irregular rows, short-oblong to broadly elliptical, winged.—Proc. Am. Acad. vi. (1866) 187. *A. Drummondii* Gray, Man. ed. 5, 69, in part; Watson, Syn. Fl. i. pt. 1, 166, in part. *A. laevigata*, Hook. Fl. Bor.-Am. i. 43 (1829), not Poir. *A. confinis*, Watson, Proc. Am. Acad. xxii. (1887) 466; Wats. Syn. Fl. l. c. 163; in part; Watson & Coulter, in Gray, Man. ed. 6, 67, in part. *A. brachycarpa*, Britton, Mem. Torr. Cl. v. (1894) 174, Ill. Fl. ii. 150 and Man. 464; in part. *A. oxyphylla*, Greene, Pittonia, iv. (1900) 196. *Turritis stricta*, Graham, Edinb. New Phil. Jour. 1829, 350; Hook. l. c. 40; Torr. & Gray, Fl. i. 79; Torr. Fl. N. Y. i. 53; Gray, Gen. Ill. i. 144, t. 59; not *Arabis stricta*, Huds. *T. glabra*, β., Torr. & Gray, l. c. 78, 666. *Streptanthus angustifolius*, Nutt. in

¹ Gray, Proc. Acad. Phila. 1863, 57.

² Gray, Proc. Am. Acad. vi. 187.

Torr. & Gray, l. c. 76 (1838).—Rocky or ledgy banks, northern Maine to the Rocky mountains of British Columbia, south to Nova Scotia, eastern Massachusetts, Rhode Island, southern Connecticut, central and western New York, Ottawa Co., Ohio, Kane Co., Illinois, and along the mountains to Colorado, Utah, and Oregon, and California (?).

Var. **connexa**, n. comb. Stout: the pods 3 to 3.3 mm. broad.—*A. connexa*, Greene, Pittonia, iv. (1900) 197.—Mountains of Colorado and Washington, and at Rivière du Loup, Quebec. Passing gradually to the species.

** Basal leaves pubescent with mostly 3-forked stellate hairs: pods wide-spreading or loosely ascending.

A. BRACHYCARPA, Britton. Similar to *A. Drummondii*: radical leaves densely pubescent; cauline glabrous: flower-pedicels soon widely spreading or even pendulous: pods 1.7 to 9 cm. long, 1 to 2 mm. broad, mostly divergent, rarely even somewhat reflexed.—Mem. Torr. Cl. v. (1894) 174, Ill. Fl., l. c. and Man. l. c., in part. *A. Drummondii* and var. *brachycarpa*, Gray, Man. ed. 5, 69, in part. *A. confinis*, Watson, Proc. Am. Acad. xxii. (1887) 466, in part, and (including var. *brachycarpa*) Syn. Fl. l. c., in part; Watson & Coulter, l. c., in part. *A. divaricarpa*, A. Nelson, Bot. Gaz. xxx. (1900) 193. *Turritis brachycarpa*, Torr. & Gray, Fl. i. 79 (1838).—Sandy soil of open woods, banks and shores, more rarely on rocky banks, from Saguenay Co., Quebec, to Saskatchewan and Assiniboia, south to Restigouche Co., New Brunswick, Lake Memphremagog, Quebec, Lake Champlain, Vermont and New York, Jefferson Co., New York, the Great Lakes, Lee Co., Illinois, and along the mountains to Colorado.

GRAY HERBARIUM.

NOTES ON ALGAE,—VI.

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GRACILARIA CONFEROIDES (L.) Grev. It has been the practice for many years to assign all specimens of *Gracilaria* from the New England coast to *G. multipartita* (Clem.) J. Ag., the broader forms as the type, the slenderer as var. *angustissima* Harv. Just outside of our limits, politically, Farlow¹ doubtfully reports another species.

¹ Report of the U. S. Commissioner of Fishes and Fisheries for 1871 & 1872, p. 289, 1873.



Fernald, Merritt Lyndon. 1903. "ARABIS DRUMMONDI AND ITS EASTERN RELATIVES." *Rhodora* 5, 225–231.

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