

The Status of
Bodin's Milkvetch
(*Astragalus bodinii*)

in Newfoundland and Labrador



Photo: John E. Maunder

**THE SPECIES STATUS ADVISORY COMMITTEE
REPORT NO. 8**

February 20, 2008

ASSESSMENT

Assessment: Threatened	Current designation: None
Criteria met: D2. Area of occupancy < 20 km ² and number of locations < 5	
Reasons for designation: Qualifies as " <i>threatened</i> " under the SSAC/COSEWIC criteria D2 <ul style="list-style-type: none">• Only 1 known population in the province• Extremely restricted range, area of occupancy and extent of occurrence significantly < 1 km²• Small population roughly estimated at 2125-4250 mature individuals• Newfoundland is the only known locality in eastern North America, rescue effect highly unlikely	

The original version of this report was prepared by John E. Maunder on behalf of the Species Status Advisory Committee

STATUS REPORT

Astragalus bodinii E. Sheldon
Bodin's milkvetch; Fr: astragale de Bodin.

Synonyms:

Astragalus stragulus Fernald [TYPE: Cook's Point, Pistolet Bay, Newfoundland].
Astragalus yukonis M. E. Jones
Phaca stragulus (Fernald) Rydberg

Family: Fabaceae (Peas)

Life Form: Herbaceous, perennial forb.

Taxonomic Clarifications

M. L. Fernald (1926: 214-215) thought that the Newfoundland population of *A. bodinii* was distinct from the nearest outliers of the species' main population in western North America, 2700 km away. Barneby (1964: 373) appears to have concurred, writing: "It seems reasonable to interpret the Newfoundland plant as a relic race of *A. bodini*, in which a few variational tendencies extend beyond the norm encountered in the main range of the species. Possibly these exaggerated characters have become fixed through geographic isolation, in which case *A. stragulus* might deserve recognition as a poorly marked variety."

Distribution

Global:

North America: Canada [see more detail below]. United States: a few midwestern states, including Nebraska, Wyoming, Colorado, New Mexico, Utah; plus Alaska.

National:

Manitoba, Saskatchewan; Alberta, Northwest Territories, Yukon, Newfoundland and Labrador (Newfoundland only).

Provincial:

On the Island of Newfoundland, known from only one extremely restricted locality near Cook's Harbour (Fig. 1).

Annotated Range Map

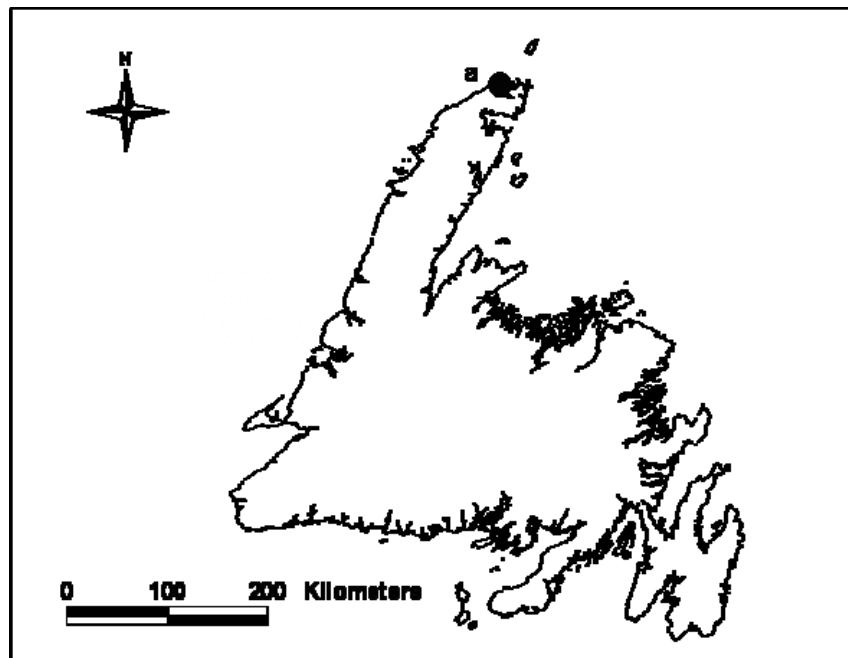


Figure 1. Known locality for *Astragalus bodinii* in Newfoundland: [a] Cook's Point.

Description

A small, freely branching, depressed, carpet-forming legume growing from a taproot; bearing relatively showy, pinkish-blue, typically pea-like flowers; very short, rounded pods, 5-8 seeded (Fernald 1950); and compact, pinnately-divided leaves.

Habitat

In western North America, *A. bodinii* is a relatively widespread plant of quite varied, mostly upland habitat, <300 to >3000 m.

By contrast, in Newfoundland, *A. bodinii* inhabits a very strictly-defined, highly-exposed, apparently unique, coastal habitat, located just above sea-level. More precisely, its "natural habitat" appears to be primarily restricted to a narrow, rather poorly-vegetated, discontinuous, coastal strip, running between the beach pea (*Lathyrus japonicus*) zone of the upper beach, and the dwarf willow (*Salix*) zone, fringing the lowest terraces of stunted coastal heath. A number of fringing or even

slightly outlying patches of *A. bodinii* can be found, scattered about, in even sparser habitat.

In recent years, areas of “disturbed habitat” have developed, adjacent to the “natural habitat” (but, usually, slightly further back from the beach). These areas are very largely the result of frequent ATV (ie. all-terrain vehicle) traffic along the shore fringe; and are comprised primarily of compacted and beaten-down trackways, and, as well, significantly de-vegetated eroded patches and larger “blow-outs”, within the shore heath.

The preferred rooting substrate of *A. bodinii* is coarse sand that appears to be rich in pulverized Blue Mussel (*Mytilus* sp.) and other shell material. The underlying substrate is limestone-dolostone of the Table Head Formation (deGrace 1974). The Cooks Point locality is exposed to heavy salt water spray during storms.

Overview of Biology

A calciphillic perennial. Probably also a halophile. Flowering was observed by John Maunder at Cook’s Point on July 1, 2005, and July 5, 2002. Fertile pods are produced. There have been insufficient late-season observations/collections to determine seed production. Pods had not yet opened by October 14, 2006 as observed by John Maunder.

Population Size and Area of Occupancy

The entire eastern population of *A. bodinii* appears to occur on a very narrow, discontinuous, 1.6 km strip of upper beach and fringing dwarf heath. There are six patches of significant dimension, plus a few much smaller, scattered, point localities.

The total area of occupancy is approximately 425 m². Percent coverage within this 425 m² area is between about 5% and 25%, with about 15% being the average.

The actual number of plants per square area is difficult to estimate without destructive excavation because the plants intertwine. However, a rough estimate of about 5-10 plants/m², at the average density of 15% coverage, is probably reasonable. Thus, the total population may be approximately 2125-4250 plants.

It should be noted that perhaps 50% of all plants occur on disturbed ground that is largely the product of ATV traffic (see “Threats and Limiting Factors” section below, for further discussion). Such plants are generally stunted, and seem to exhibit very poor reproductive potential.

Traditional and Local Ecological Knowledge

No published or other evidence has been found regarding the aboriginal use of *A. bodinii*. Arnason *et al.* (1981) do not mention the species in their study of eastern Canada ethnobotany.

Trends

Unknown.

Threats and Limiting Factors

The primary threat to the Cook's Point population is that it is very small, unique, and very near a town.

Potential threats include:

1. Relatively heavy ATV traffic along the edge of the grassy-sedgy heath just above the beach, which has, at once, produced: [a] linear trackways of compacted substrate, [b] low-vegetation habitat within formerly taller-vegetated areas, and [c] open, gravelly patches and blow-out areas in the heath. Nevertheless, the disturbances described have produced a significant amount of new *A. bodinii* habitat; albeit somewhat marginal.

Just how much the sub-populations inhabiting these disturbed habitats actually contribute to the survival of the taxon is unknown, however flowering and fruiting of the plants involved is rather minimal as observed by John Maunder.

2. General dumping of garbage and larger refuse, primarily glass, plastic, and ferrous metal, apparently occurs on a regular basis on the shore area. Some of the garbage ends up within the *A. bodinii* habitat. Flotsam and jetsam is a similar problem.
3. Turf harvesting may pose a random threat. There are a few small patches of ground, in the immediate vicinity of *A. bodinii* occurrences that have had irregular polygons of turf removed. The reasons for this turf removal are unclear, since the total amount of turf removed does not appear to have been great enough to have served any significant purpose. Nonetheless, should some future municipal, or other, project require a significant harvesting of turf

in the vicinity of the *A. bodinii* population, significant damage to *A. bodinii* habitat could be rather easily done.

4. Even though the economy of the adjacent Cook's Harbour area has long-relied, very heavily, upon gravel-pitting and the "scraping" of the limestone barrens in the region, this specific activity seems unlikely to threaten *A. bodinii* habitat, situated as it is, on shore terraces below the main inland plateau area that has been traditionally exploited. However, if there ever proves to be a demand for small quantities of the coarse, shelly beach sand that underlies the *A. bodinii* habitat - perhaps for concrete construction, or some similar purpose - considerable damage could be done, in a very short time, through surface scraping of the zone just above the beach.

Rank or Status

Global	
G-rank	G4
IUCN	not assessed
National	
N-rank	NNR (not ranked)
National General Status	4
COSEWIC	not assessed
Provincial	
Provincial General Status	2
Newfoundland S-rank	S1
Newfoundland General Status	2
Labrador S-rank	does not occur
Labrador General Status	does not occur
Adjacent Jurisdictions	
Nova Scotia S-Rank	does not occur
Nova Scotia General Status	does not occur
Prince Edward Island S-Rank	does not occur
Prince Edward Island General Status	does not occur
New Brunswick S-Rank	does not occur
New Brunswick General Status	does not occur
Quebec S-Rank	does not occur
Quebec General Status	does not occur

[Note: Where available, ranking data from the biodiversity databases of the individual Provinces has been used. Otherwise, General Status ranks are based upon the “General Status of Species in Canada (2005)”, and S-Ranks are based upon “NatureServe Explorer”. Where there is apparent discrepancy, NatureServe Explorer ranks are considered to be the least current.]

Existing Protection

None.

Special Significance

A western North American species, disjunct to Newfoundland. However, the Newfoundland population may, be a unique, distinct, endemic entity. This matter requires further study. Cook's Point is the TYPE Locality for *Astragalus stragulus*.

Sources of Information and List of References

- Anions, M. F. E., 1994. The flora of Gros Morne National Park. Resource description and analysis. Report, Gros Morne National Park, Rocky Harbour, Newfoundland, 143 p. + app.
- Arnason, T., R. J. Hebda, and T. Johns. 1981. Use of plants for food and medicine by native peoples of eastern Canada. *Canadian Journal of Botany* 59: 2189-2325.
- Barnaby, R. C. 1964. Atlas of North American *Astragalus*. Memoir of the New York Botanical Garden no 13. 1188 p.
- Bouchard, A., L. Brouillet, and S. G. Hay. 1993. The rare vascular plants of L'Anse-aux-Meadows National Historic Park. Park Services, Environment Canada. Unpublished report. 41 pp
- Bouchard, A., L. Brouillet, and S. Hay. 1996. Rare vascular plants in Gros Morne National Park, Newfoundland. Report of contract C2242-95-0005, Parks Canada, Hull.
- Bouchard, A., S. G. Hay, Y. Bergeron, and A. Leduc. 1991. The Vascular Flora of Gros Morne National Park, Newfoundland: A habitat classification approach based on floristic, biogeographical and life-form data. Pp. 123-157 *in* P. L. Nimis and T. J. Crovello (eds.), *Quantitative Approaches to Phytogeography*. Kluwer Academic Publishers, The Netherlands. 280 p.
- Bouchard, A., S. G. Hay, L. Brouillet, and M. Jean. 1992. The rare vascular plants of Port-au-Choix National Historic Park. Parks Service, Environment Canada, Ottawa. Unpublished report. 80 pp.
- Bouchard, A., S. G. Hay, L. Brouillet, M. Jean, and I. Saucier. 1991. The rare vascular plants of the Island of Newfoundland. *Syllogeus* No. 65. Canadian Museum of Nature, Ottawa. 191pp.
- Bouchard, A., S. Hay, L. Brouillet, and P. Turcotte. 1994. The rare vascular plants of the Big Level Plateau, Gros Morne National Park, Newfoundland. Contract K3129-91-136, Parks Service, Environment Canada, Ottawa. 54 pp.

- Bouchard, A., S. Hay, C. Gauvin, and Y. Bergeron. 1985. The rare vascular plants of Gros Morne National Park, Newfoundland, Canada. Parks Canada, Gros Morne National Park, Rocky Harbour, Newfoundland, contract GM83-20, 104 p. + app.
- Bouchard, A., S. Hay, C. Gauvin, and Y. Bergeron. 1986. Rare vascular plants of Gros Morne National Park, Newfoundland, Canada. *Rhodora*, 88 : 481-502.
- Brouillet, J., R. Charest, S. G. Hay, and A. Bouchard. 1997. Floristic analysis of the rare plants of Terra Nova National Park, Newfoundland. Contract #2242-96-0010 for Natural Resources Division, Parks Canada, Hull, Québec.
- Brouillet, L., S. Hay, P. Turcotte, and A. Bouchard. 1998. La flore vasculaire alpine du plateau Big Level, au parc national du Gros Morne, Terre-Neuve. *Géographie physique et Quaternaire* 52: 173-191.
- DeGrace, J. 1974. Limestone resources of Newfoundland and Labrador. Report 74-2. Department of Mines and Energy, Mineral Development Division. St. John's, Newfoundland. [web version available at: <http://www.nr.gov.nl.ca/mines&en/publications/geology/DeGrace.pdf> (Last accessed October 13, 2007)]
- Fernald, M. L. 1926. Two summers of botanizing in Newfoundland. III. Noteworthy plants collected in Newfoundland, 1924 and 1925. *Rhodora* 28: 145-155, 161-178, 181-204, 210-225, 234-241.
- Fernald, M. L. 1950. *Gray's Manual of Botany*. Eighth edition. American Book Company. Lxiv + 1632 pp.
- Hanel, C. 2004. Rare Plant Survey of the Squid Cove Area. Contract Report to the Department of Forest Resources and Agrifoods. Newfoundland and Labrador. Unpublished.
- Hanel, C. 2005. Doctor's Brook Rare Plant Survey. Contract Report to Western Newfoundland Model Forest. Unpublished.
- Hanel, C. 2005. Labrador Straits Botanical Initiative. Unpublished.
- Maunder, J. E. (ongoing) Genus *Astragalus*, in A Digital Flora of Newfoundland and Labrador Vascular Plants. [website] http://digitalnaturalhistory.com/genus_astragalus_index.htm (Last accessed October 13, 2007).

Newfoundland Rare Plant Project. [website]
<http://www.digitalnaturalhistory.com/naturalhistoryrareplant.htm> (Last accessed October 13, 2007).

Scoggan, H. J. 1957. Flora of Manitoba. National Museum of Canada. Bulletin 140. Biological Series 47. 619 pp.

Wild Species 2005: The General Status of Species in Canada. 2005. General Status Search Tool. [website]
<http://www.wildspecies.ca/wildspecies2005/search.cfm?lang=e&sec=9> (Last accessed October 13, 2007).

Collections Examined

Provincial Museum of Newfoundland and Labrador:
One collection.

TECHNICAL SUMMARY

Distribution and Population Information	Criteria Assessment
<i>Extent of occurrence (EO)(km²)</i>	0.0032 km ² [rough estimate]
<i>Area of occupancy (AO) (km²)</i>	0.000425 km ² [rough estimate]
<i>Number of extant locations</i>	1
<i>Specify trend in # locations, EO, AO (decline, stable, increasing, unknown)</i>	# of locations stable, trends in EO and AO unknown
<i>Habitat trend: specify declining, stable, increasing or unknown trend in area, extent or quality of habitat</i>	Unknown
<i>Generation time (average age of parents in the population) (indicate years, months, days, etc.)</i>	Unknown; perennial
<i>Number of mature individuals (capable of reproduction) in the Provincial population (or, specify a range of plausible values)</i>	2125-4250 [rough estimate]
<i>Total population trend: specify declining, stable, increasing or unknown trend in number of mature individuals or number of populations</i>	Unknown
<i>Are there extreme fluctuations (>1 order of magnitude) in number of mature individuals, number of locations, AO and/or EO?</i>	Unknown, but unlikely
<i>Is the total population severely fragmented (most individuals found within small and isolated populations)</i>	only one known Newfoundland locality
Rescue Effect (immigration from an outside source)	
<i>Does species exist elsewhere?</i>	yes; but more than 2700 km away; and possibly a different taxonomic entity
<i>Status of the outside population(s)? [adjacent Provinces only]</i>	not present
<i>Is immigration known or possible?</i>	Unknown
<i>Would immigrants be adapted to survive here?</i>	Unknown
<i>Is there sufficient habitat for immigrants here?</i>	Unknown

Appendix A. Population Information

Recently Verified Occurrences/Range Use (recorded within the last 25 years)

Verified occurrences consist of observations supported by the collection of a voucher specimen (i.e. a sample to be identified/confirmed by experts and deposited in a herbarium).

Cook's Point:

July 17, 1987. Cook's Harbour. Sandy gravelly upper beach of limestone headland. [Observers: A. Bouchard, S. Hay, L. Brouillet, I. Saucier. Collection: 87117. MT (Université de Montréal).]

July 5, 2002. Narrow, poorly-vegetated band between the *Lathyrus japonicus* zone of the upper beach, and the dwarf willow zone fringing the lowest terraces of barren coastal heath. More specifically, the preferred substrate seems consistently to comprise a coarse sand that is apparently very rich in pulverized Blue Mussel (ie. *Mytilus* sp.), and other shell material. [Observers: J. E. Maunder, Nathalie Djan-Chékar, Janelle Hancock. Collection: Maunder 18a/18b 05/07/02 (Provincial Museum of Newfoundland and Labrador, collection not yet accessioned); diagnostic photos taken (Maunder (ongoing) and present report).]

July 1, 2005. Same habitat as above. [Observer: J. E. Maunder. Collection: no collection, but diagnostic photos taken (Maunder (ongoing) and present report).]

October 14, 2006 Same habitat as above. [Observers: J. E. Maunder, Claudia Hanel. Collection: no collection, but diagnostic photos taken (Maunder (ongoing) and present report).]

Recent Search Effort (areas searched within the last 25 years with estimate of effort)

General rare plant surveys of the west and northeast coasts of the Island were conducted by members of the Newfoundland Rare Plant Project (*q.v.*), specifically during 1999 to 2001, when 1645 individual sites were surveyed and 7622 plant collections were made. Additional general rare plant surveys have been conducted within the Province by various National Parks personnel, and by J. E. Maunder of the Provincial Museum and H. Mann of Sir Wilfred Grenfell College (early 1970's to present), as well as by N. Djan-Chékar of the Provincial Museum (2002 to present). Significant additional general collecting has been conducted, on the south coast of the Island, by R. Etcheberry, of St.-Pierre et Miquelon (1986, 1987, 1989, 1990, 1992, and 1993).

Targeted rare plant surveys were conducted by personnel from the Université de Montréal, during the course of the preparation of the publication “The Rare Vascular Plants of the Island of Newfoundland” (Bouchard *et al.* 1991), in: 1984 and 1985 (Gros Morne National Park), 1986 (southwest coast, and the general Port au Port area), 1987 (Great Northern Peninsula), 1988 (Baie Verte Peninsula, Notre Dame Bay, and central and eastern Newfoundland), 1989 (Gros Morne National Park, and the south coast), and 1990 (west coast, and Great Northern Peninsula).

Geographically focused rare plant surveys were conducted by personnel from the Université de Montréal, during the course of the preparation of contracted rare plant reports for Port au Choix National Historic Park (Bouchard *et al.* 1993), L’Anse aux Meadows National Historic Park (Bouchard *et al.* 1993), Gros Morne National Park (Anions, 1994; Bouchard *et al.*, 1985, 1986, 1991, 1994, 1996; and Brouillet *et al.*, 1998), and Terra Nova National Park (Brouillet *et al.* 1997). Additional geographically focused rare plant surveys were conducted in the Squid Cove and Doctors Brook areas, and the Labrador Straits region by C. Hanel (2004, 2005a, 2005b).

Specific surveys for *Astragalus bodinii* have been conducted in the Cook’s Point area on at least 4 occasions (see above section, “Recently Verified Occurrences/Range Use”). More general surveys have also been conducted along many beach within the northern Strait of Belle.

Historical Verified Occurrences/Range Use (recorded prior to the last 25 years)

July 18, 1925. Sandy and turfey upper border of limestone beach. [Observers: M. L. Fernald, F. A. Gilbert. Collection: 28583. GH (Gray Herbarium), BM (British Museum), K (Kew), MT (Université de Montréal).]

August 13, 1925. Sandy, gravelly and turfey upper border beach. [Observers: M. L. Fernald, F. A. Gilbert, N. Hotchkiss. Collection: 28584 [TYPE] GH. (Gray Herbarium); [ISOTYPI] BM (British Museum), CAS (California Academy of Sciences), G (Geneva), K (Kew), NY (N.Y. Botanical Garden), P (Paris), US (Smithsonian); MT (Université de Montréal).]

Other Observations (unverified occurrences)

July 24, 1941. Cook's Harbour. Limestone barrens. [Observer: J. H. Penson. Collection: Yes, but no specific data presently available. Provincial Wildlife Division database.]

July 15, 1949. Cook's Harbour. [Observer: R. Tuomikoski. Collection: Yes, but no specific data presently available. Provincial Wildlife Division database.]

Potential Sites Unexplored

In all of eastern North America, *A. bodinii* is known only from Cook's Point, Newfoundland; this, despite over two centuries of comprehensive botanizing throughout both Canada and the United States. The apparent absence of *A. bodinii* in even such noteworthy eastern centres of disjunct occurrence as the Mingan Archipelago and Gaspé Peninsula of Quebec, and the Appalachian Region of northern New England, attests to its extreme rarity in the east. Considering further the significant concentration of botanical effort expanded in coastal limestone areas of both the Great Northern Peninsula in Newfoundland and the Straits of Belle Isle in southern Labrador since the late 1800's, and, as well, the very specific habitat preferences of *A. bodinii*, it seems that the Cook's Point occurrence may well be unique in the region.

Appendix B. Supplementary Detail

Taxonomic Clarifications

The tiny Newfoundland population of *Astragalus bodinii* [for discussion purposes, hereinafter named *A. stragulus*] is *disjunct* from the nearest outliers of the species' main population in western North America [for discussion purposes, hereinafter named *A. yukonis*], by about 2700 km.

M. L. Fernald (1926: 214-215) thought that the Newfoundland population was distinct.

Barnaby (1964: 373) summarized Fernald's "running account" of perceived differences between representatives of the two populations, as follows [items in square brackets were added for this report]:

Leaflets 7-13, relatively narrow, only exceptionally retuse [ie. notch-tipped], cinereous [ie. ash-coloured]; *peduncles* 5-10 cm. long; *racemes* elongating; *flower* small (banner 5 mm long); *pod* 2-3 seeded *A. yukonis*

Leaflets 9-19, [elliptic], retuse, glabrous [and bluish-green] above; *peduncles* 0.2-9 cm. long; *racemes* subcapitate [ie. compact, in loose "heads"]; *flower* larger (banner 8-10 mm long); *pod* 5-8 seeded *A. stragulus*

Barneby (1964: 373) wrote, further: "The contrasts brought out by Fernald have all proven fallible, but *A. stragulus* does seem to differ slightly in its usually shorter raceme-axis, mostly (2)5-22 mm rather than (5)10-90 mm long, and in its comparatively low and diffuse stems not known to exceed 1.5 dm. in length. It seems reasonable to interpret the Newfoundland plant as a relic race of *A. Bodini*, in which a few variational tendencies extend beyond the norm encountered in the main range of the species. Possibly these exaggerated characters have become fixed through geographic isolation, in which case *A. stragulus* might deserve recognition as a poorly marked variety."

Little more can be said on this matter unless or until a detailed molecular and morphological study of *A. bodinii* (*sensu lato*) is completed.

Description

A distinctly-miniature, freely branching, depressed, carpet-forming plant (Fig. B-2c and d). **Taproot** thick and woody, bearing a multi-topped, sometimes knotty root crown, at or just below soil-level. **Stems** usually many, slender or filiform, branching freely at the lower nodes, and even below ground; typically reddish-tinged (Fig. B-1d). **Branchlets** filiform, glabrous or sparsely strigose. **Stipules** 2-4 mm long. **Leaves** divergent; the 8-19 elliptic, retuse [ie. notch-tipped] leaflets 0.2-1 cm long, glabrous, or strigose beneath (Fig. B-2b), bluish-green. **Peduncles** filiform, 0.2-9 cm long. **Flowers** solitary or 2-10, in close subcapitate racemes, 1-4 cm long, divergent (Fig. B-1a, b and c). **Calyx tube** campanulate, 2.5-3 mm long, black-strigose; the slender teeth half as long. **Corolla** lilac, banner 8-12 mm long. **Legumes** sessile, erect, inflated, 1-locular, oblong-ovoid, apiculate, black-strigose, 6-8 mm long, 2.5-4 mm thick, 5-8 seeded (Fig. B-2a). (Adapted from Fernald's (1950: 909) description of *Astragalus stragulus*, and Barneby's (1964) comments regarding "*A. stragulus*", with additions.)



Photos: John E. Maunder

Figure B-1. Description: [a] flower (side view), [b] flower ($\frac{3}{4}$ view), [c] "subcapitate" inflorescence, [d] typically reddish-tinged flowering stem



Photos: John E. Maunder

Figure B-2. Description: [a] pod, [b] underside of leaf (note notched tip on third leaflet down on the left), [c] whole plants in habitat, [d] whole plants growing amongst plumboy (*Rubus arcticus*) to show the tiny stature of *Astragalus bodinii*.

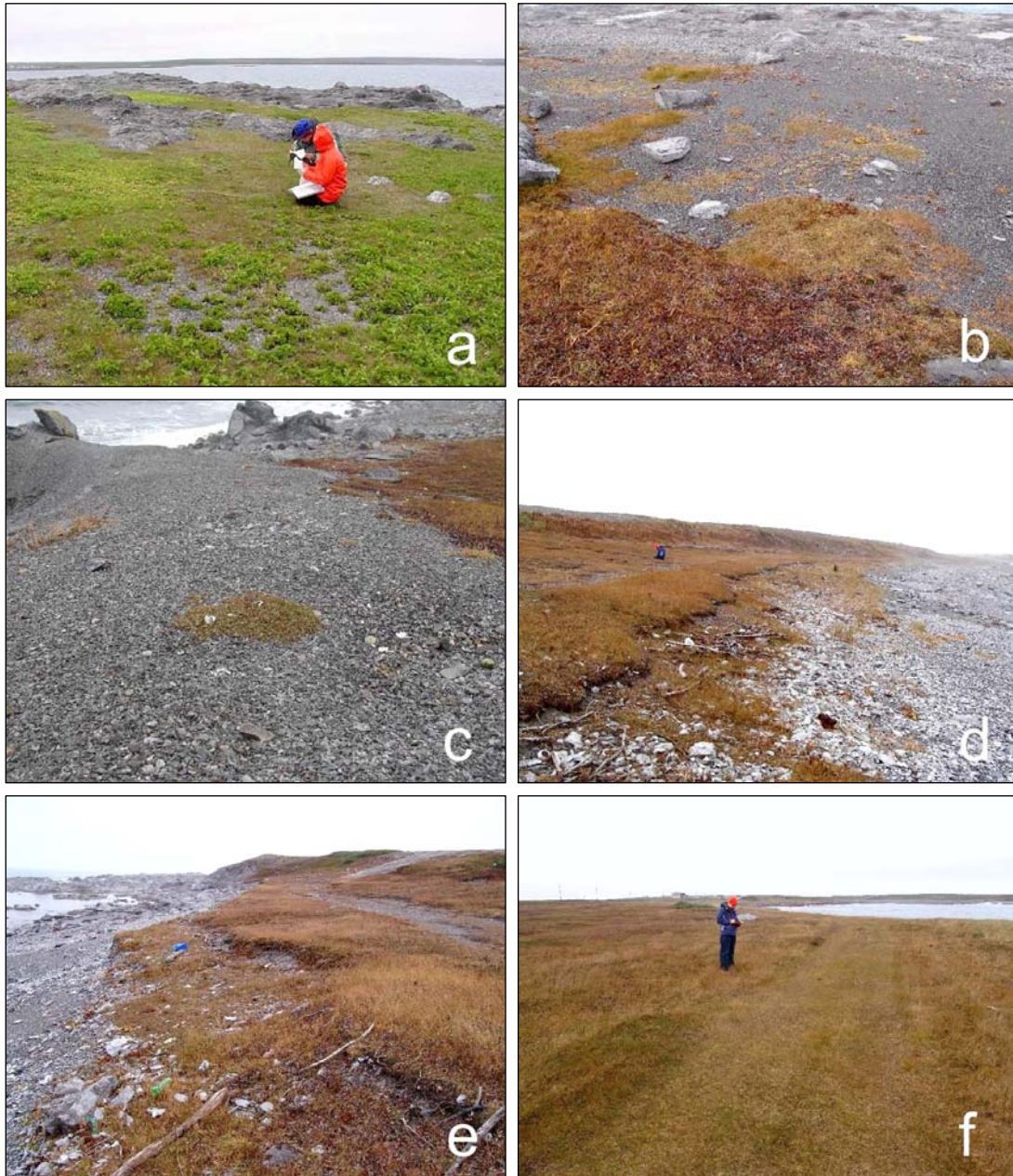
Habitat

1. In northwestern North America, *A. bodinii* inhabits “moist gravelly banks and beds or gravel bars of streams and rivers, sometimes in low sandy meadows, at the edge of aspen or birch thickets, occasionally ... on dunes” [in mountain valleys]; in the Yukon “becoming weedy and aggressive in disturbed soil along highway ditches and cleared woodland, recorded mostly from below 2000 feet” (Barneby 1964: 372).

In the western United States, *A. bodinii* is “locally frequent in moist meadows, mountain parks, on banks of mountain brooks, about willow thickets, and more rarely along wayside ditches and on alkaline bottomland, [in the Rocky Mountains] mostly between 6000 and 9800 feet ...” (Barneby 1964: 372).

In Manitoba, outlying *A. bodinii* is found on “lakeshores, below 1000 feet” (Barneby 1964: 372); or, more specifically, on a “cobble beach” [at Pipestone Lake], and on a “trail through woods” [at Cross Lake] (Scoggan 1957: 370).

2. In Newfoundland, *A. bodinii* inhabits a very strictly-defined, highly-exposed, apparently unique, coastal habitat, located just above sea-level (Fig. B-3). More precisely, its “natural habitat” appears to be primarily restricted to an absurdly narrow, rather poorly-vegetated, discontinuous, coastal strip, running between the beach pea (*Lathyrus japonicus*) zone of the upper beach, and the dwarf willow (*Salix*) zone, fringing the lowest terraces of stunted coastal heath. The preferred rooting substrate is a coarse sand that appears to be rich in pulverized Blue Mussel (*Mytilus* sp.), and other shell material. The underlying substrate is limestone-dolostone of the Table Head Formation (deGrace 1974). The Cooks Point locality is exposed to heavy salt water spray during storms. Nowhere else in North America does *A. bodinii* (*sensu lato*) grow anywhere near the sea, particularly on the upper beach.



Photos: John E. Maunder

Figure B-3. Habitat: [a] the “classic natural habitat” – dwarf willow on mid/upper left, *Astragalus bodinii* where people are kneeling, and beach pea closer to the beach on lower right, [b] patch of *A. bodinii*, below and to the right of centre, between dwarf willow heath and open beach gravels, [c] patch of milkvetch on open gravel ridge, [d] the “common condition” – a fairly continuous band of *A. bodinii* on upper gravels, just below the “hard edge” of the dwarf willow heath (plus a few patches along the ATV track near the person, [e] similar situation showing ATV track, [f] *A. bodinii* locality on ATV track in grassy-sedgy heath.

Threats and Limiting Factors



Photos: John E. Maunder

Figure B-4. General threats: [a] heavy ATV traffic in milkvetch habitat; and closeness to people in general (note the Wild Bight Cemetery fence on the right), [b] turf harvesting, [c] general flotsam and jetsam, and widespread garbage, [d] more garbage (rusted-out metal remains)

Collections Examined

Provincial Museum of Newfoundland and Labrador:

Maunder 18a/18b 05/07/02 (collection not yet accessioned)