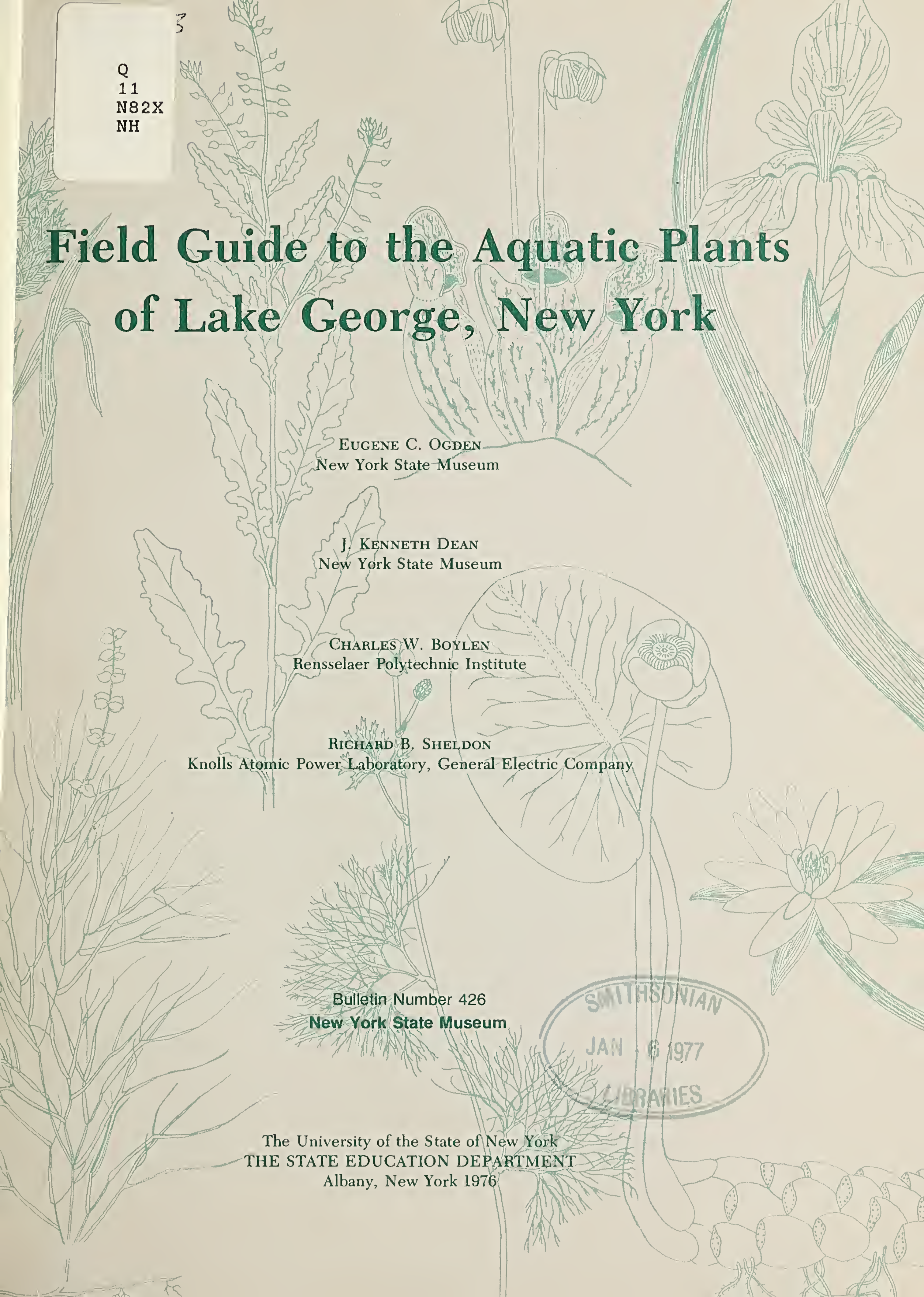

Field Guide to the Aquatic Plants of Lake George, New York

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INTRODUCTION

This bulletin is a guide to the aquatic flowering plants and ferns growing in Lake George, New York, and its adjacent marshes. It includes a checklist, keys and illustrations, to assist in the identification of the aquatic vascular plants most likely to be encountered. If no location is given, it is assumed the species is common and may be found in suitable habitats throughout. Specific habitats may not be inferred from most cited locations; for example, "Dunham Bay" includes open water and adjacent marshes.

Our data are from observations and herbarium records. Many of the herbarium collections do not indicate whether the plants were taken from the lake or from some nearby aquatic or non-aquatic habitat; if such species are known to grow in water, they are included. A few species are included for which we have no records from the lake but which have been collected in the Lake George drainage area. Trees and woody shrubs are not included; we do not consider them to be truly aquatic.

The keys are based on vegetative characters as much as possible. As such characters are often variable; many of the genera appear in more than one place in the key. If the characters in the generic key trace to but one species in a genus having more than one, the species is named.

For descriptions, notes on habitats, additional keys, and additional illustrations, see one or more of the following references:

Fassett, N. C. 1957. A manual of aquatic plants. University of Wisconsin Press.

Fernald, M. L. 1950. Gray's manual of botany. American Book Company.

Gleason, H. A. 1952. The new Britton and Brown illustrated flora of the northeastern United States and adjacent Canada. New York Botanical Garden.

House, H. D. 1924. Annotated list of the ferns and flowering plants of New York State. New York State Museum Bulletin No. 254.

Muenscher, W. C. 1944. Aquatic plants of the United States. Comstock Publishing Company.

Where the names used in one or more of these books differ from the ones used here, those synonyms are given in parentheses, unless the derivation is obvious, such as: *Isoetes echinospora* subsp. *braunii* vs. *I. braunii.*

Detailed underwater surveys were made for some common deep water species using scuba gear. The diver (Richard B. Sheldon) recorded the data underwater as to species encountered at various depths from one to several meters. See DEPTH DISTRIBUTION DATA.

Lake George is situated on the southeastern side of the Adirondack Mountains. It is famous for its spectacular scenery and its military significance during both the French and Indian Wars and the American Revolution. It has an overall length of 51 km and a mean width of 2.3 km. Maximum depths of almost 60 m have been recorded off Anthony's Nose and Phelp's Island. The lake is divided near the middle by a channel dotted with islands (The Narrows). The northern basin and perhaps the lake itself is largely spring fed. However, much surface runoff water does enter via streams in the lake's southern basin. The southern basin is also the location of most of the lake's marshland. The single outlet of the lake is at the extreme northern end at Ticonderoga, the water thus flowing north.

Lake George occupies a complex graben in Precambrian bedrock. The sheer slopes and the often linear shorelines are largely due to faulting along this graben. Much of the lake floor glacial or postglacial material is now covered or mixed with modern organic-rich sediments—a suitable substrate for aquatic vegetation. Because of the sheer sloped sides of much of the lake, the littoral zone is most confined to a narrow band around the periphery. Most submergent vegetation is found in 7 m of water or less although *Elodea* has been found as deep as 12 m and *Nitella* (a macrophytic alga) forms a zone throughout the lake between 12 and 15 m. Water transparency is exceptionally high for a freshwater lake, with secchi disc readings commonly 6 to 7 m throughout and values exceeding 13 m off Rogers Rock in the northern basin.

Water chemistry measurements over the last several years as routinely monitored by the Freshwater Institute at Smith Bay show variation within a relatively small range. The pH of the water column ranges between 6.8 and 7.8. Variation does not appear to be associated with either the southern or northern basins or time of year. Alkalinity measurements range from 16 to 24 mg $CaCO_3$/liter throughout Lake George. Interstitial water pH usually approaches neutrality regardless of sediment type, and alkalinity ranges from 20 to 30 mg $CaCO_3$/liter. Amounts of nitrogen and phosphorus in the interstitial sediment water are approximately ten times as high as they are in the water above.

KEY TO GENERA

1. Plants tiny (several may be attached together), floating on or near the water surface; without differentiation into stem and leaf
  2. Each plant with a single root; undersurface green . . . . *Lemna*
  2. Each plant with several roots; undersurface often purplish . . . . *Spirodela*
1. Plants with obvious stem and/or leaves
  3. Stems jointed; leaves whorled, reduced to scales . . . . *Equisetum*
  3. Stems not jointed
    4. Leaves basal or essentially so, may be reduced to bladeless sheaths (2nd 4, p. 6)
      5. Leaves compound
        6. Leaves palmate
          7. Leaflets three; reproduction by seeds
            8. Leaves not fleshy; leaflets lobed; flowers yellow . . . . *Ranunculus septentrionalis*
            8. Leaves fleshy; leaflets not lobed; flowers white or pink . . . . *Menyanthes*
          7. Leaflets more than three; fertile and sterile portions of leaf dissimilar; reproduction by spores . . . . *Osmunda regalis*
        6. Leaves pinnate
          9. Leaves with margin entire or essentially so but leaflets may be lobed; reproduction by spores (ferns)
            10. Leaflets 25 or less; sterile and fertile fronds dissimilar . . . . *Onoclea*
            10. Leaflets more than 25
              11. Sterile and fertile leaves dissimilar; sterile leaves with brown hairs at base of leaflets; fertile leaves cinnamon-brown, hairy . . . . *Osmunda cinnamomea*
              11. Sterile and fertile leaves similar, green, glabrous . . . . *Thelypteris*
          9. Leaves with margins of leaflets mostly serrate; reproduction by seeds; inflorescence an umbel
            12. Stems angled; leaves pinnately compound, upper ones once, lower twice; leaflets serrate; fruits with 1 oil tube between each pair of ribs . . . . *Sium*
            12. Stems terete; leaves twice or thrice compound, often some of them appearing palmate; leaflets serrate or entire; fruits with 1-3 oil tubes between each pair of ribs . . . . *Cicuta*
      5. Leaves simple
        13. Leaves sessile, with no distinction between blade and petiole (2nd 13, p. 5)
          14. Leaves less than twice as broad as thick (2nd 14, p. 4)
            15. Stems and/or leaves arising several from a common base or several from distinct points along a horizontal axis (2nd 15, p. 4)
              16. Leaves with closed sheaths, sometimes bladeless; inflorescence a spike or panicle of spikelets; flowers inconspicuous in the axils of scales; fruit an achene (sedges)
                17. Inflorescence a subterminal spike, a panicle of spikelets, or a close cluster of spikelets that appears to be lateral to the stem . . . . *Scirpus*
                17. Inflorescence a terminal spike or cluster of spikelets
                  18. Inflorescence with long white bristles; achenes lacking a tubercle . . . . *Eriophorum*
                  18. Inflorescence without obvious bristles; achenes with a terminal tubercle . . . . *Eleocharis*
              16. Leaf sheaths open or absent; inflorescence not a spike nor a cluster of spikelets
                19. Inflorescence many-flowered; flowers 2- or 3-merous
                  20. Roots with prominent cross striations; inflorescence a scape with a single head of tiny flowers . . . . *Eriocaulon*
                  20. Roots without prominent cross striations; inflorescence a raceme or panicle

21. Leaves broadly triangular in cross section . . . . *Sparganium*
21. Leaves terete or nearly so
22. Inflorescence a spikelike raceme, terminal on a long scape; each flower with 6 pistils . . . . *Triglochin*
22. Inflorescence a panicle, appearing lateral; each flower with 1 pistil . . . . *Juncus effusus*
19. Inflorescence few-flowered
23. Plants with rhizomes or stolons
24. Stolons greenish, arching above the soil; stems and leaves without striae; inflorescence single-flowered; flowers with showy yellow petals . . . . *Ranunculus reptans*
24. Rhizomes whitish; either stems or leaves with striae; inflorescence of several inconspicuous flowers
25. Stems filiform and leaflike, or uniform thickness, not flattened or cupped at base; stems usually with a delicate membranous, tubular, basal sheath; plants usually green or yellowish green; inflorescence (seldom produced on wholly submersed plants) a terminal spike . . . . *Eleocharis acicularis*
25. Leaves gradually tapered to tip, somewhat flattened at base, base of outer leaves cupped around inner leaves; sheathing lower portion of leaf with membranous margins, upper sheath truncate, abruptly tapered, or minutely auricled; plants often with a reddish cast; inflorescence (seldom produced on wholly submersed plants) a spacious cyme . . . . *Juncus pelocarpus*
23. Plants with no rhizomes or stolons
26. Roots with prominent cross striations . . . . *Eriocaulon*
26. Roots without prominent cross striations
27. Leaves round at apex, with two hollow tubes as seen in cross section; inflorescence a raceme of blue flowers . . . . *Lobelia dortmanna*
27. Leaves acute, with 4 or more hollow areas as seen in cross section
28. Leaves with enlarged bases, bearing sporangia and spores, with 4 hollow tubes as seen in cross section; inflorescence never produced . . . . *Isoetes*
28. Leaves never with sporangia, the hollow areas more than 4 as seen in cross section; inflorescence a raceme of tiny white flowers on a scape 2-10 cm long, seldom produced when plants are submersed . . . . *Subularia*
15. Stemlike peduncles arising singly from distinct points along a horizontal axis
29. Stems without bladders; leaves merely small blunt scales; flowers tiny, sessile, greenish . . . . *Myriophyllum tenellum*
29. Stems bearing tiny bladders; leaves tiny, straplike and rarely seen; flowers showy, about 10 mm long, violet, on short pedicels . . . . *Utricularia resupinata*
14. Leaves more than twice as broad as thick
30. Roots less than 1 mm in diam, with prominent cross striations; leaves awl-shaped, ±5 mm wide at base, tapering rapidly to a slender apex, loosely cellular, often translucent, forming a basal rosette; inflorescence a scape with a single head of tiny 2-merous flowers . . . *Eriocaulon*
30. Roots without prominent cross striations (except sometimes in *Sagittaria*)
31. Leaves stiff, not requiring water for support, less than 20 cm long
32. Leaves round at apex, with 2 hollow tubes as seen in cross section; inflorescence a raceme of blue flowers . . . . *Lobelia dortmanna*
32. Leaves acute at apex; inflorescence a raceme of white flowers or an umbel of spikelets
33. Stems terete; leaves thick with open sheathing base; inflorescence a raceme of white flowers . . . . *Sagittaria*
33. Stems triangular; leaves thin, with closed sheath; inflorescence an umbel of spikelets . . . . *Cyperus*
31. Leaves limp; requiring water for support, ribbonlike, more than 20 cm long
34. Leaves with midvein not evident, longitudinal and cross veins numerous giving the leaf a checkered appearance with squares or short rectangles (some plants of *Pontederia cordata* forma *taenia* may key to this point); male and female flowers in separate spherical heads, monoecious . . . . *Sparganium*

34. Leaves with an evident midvein, cross veins widely separated; flowers not in heads
35. Leaves with a dense middle area bordering the midrib and with translucent marginal areas that lack longitudinal veins; plants dioecious; flowers borne singly, female flowers on long coiled peduncles, male flowers sessile or on very short peduncles, both peduncles from a basal rosette . . . . *Vallisneria*
35. Leaves with translucent areas between the narrow midrib and the margins; inflorescence a raceme of showy white flowers . . . . *Sagittaria cuneata*
13. Leaves with distinct petiole and blade
36. Leaf blades stiff and erect, not requiring water for support
37. Leaf blades with 2 basal lobes, cordate or sagittate
38. Leaf blades with basal lobes acute
39. Leaves with 3 prominent veins from the juncture of the petiole and blade and with many lateral veins from the midvein to the margins; inflorescence a spadix in a green spathe; flowers with no petals . . . . *Peltandra*
39. Leaves with many veins from the juncture of the petiole and blade, with no veins from midvein to margins; inflorescence a raceme with pedicels in whorls of 3; flowers with showy white petals . . . . *Sagittaria*
38. Leaf blades with basal lobes rounded
40. Leaves round at apex, venation netted
41. Odor not skunky; leaf margins toothed; inflorescence of large pedicelled yellow flowers . . . . *Caltha*
41. Odor skunky; leaf margins entire; inflorescence of tiny sessile flowers on a spadix in a fleshy spathe . . . . *Symplocarpus*
40. Leaves acute at apex, margin entire, venation parallel; flowers not yellow
42. Plants up to 30 cm tall; leaf blades about as long as wide, apex with a sharp point; stems a horizontal rhizome only; inflorescence a spadix subtended by a large white spathe; fruits fleshy, red . . . . *Calla*
42. Plants up to 100 cm tall; leaf blades mostly much longer than wide, apex with a blunt point; stems a thick horizontal rhizome with vertical stems each bearing a single foliage leaf; inflorescence a spikelike panicle subtended by a small green spathe; flowers blue; fruits dry, brownish . . . . *Pontederia*
37. Leaf blades neither sagittate nor cordate
43. Leaf blades deeply lobed, nearly compound . . . . *Ranunculus septentrionalis*
43. Leaf blades not lobed
44. Leaf blades with hollow trumpet-shaped leaves . . . . *Sarracenia*
44. Leaf blades not trumpet-shaped
45. Leaves with long glandular hairs . . . . *Drosera*
45. Leaves glabrous
46. Plants creeping, rooting at the nodes; flowers yellow . . . . *Ranunculus reptans*
46. Plants erect; flowers white or blue
47. Petioles with central hollow cavity . . . . *Pontederia*
47. Petioles with spongy central area
48. Leaf blades mostly less than twice as long as wide, rounded at base, all flowers bisexual; fruits in a single whorl on the receptacle, forming a disk . . . . *Alisma*
48. Leaf blades mostly more than twice as long as broad, tapering to the petiole; most flowers unisexual, male above, female below; fruits attached all over the receptacle, forming a globose structure . . . . *Sagittaria*
36. Leaf blades floating on the water surface, requiring water for support
49. Floating leaf blades sagittate; submersed ribbon-shaped leaves may be present; inflorescence a raceme . . . . *Sagittaria cuneata*
49. Leaf blades cordate; inflorescence a single flower or flowers clustered to form an umbel
50. Leaf blades mostly less than 5 cm long, several principal veins equally strong, branching and recurving to unite with each other; some leaves appearing to be basal, others

from a slender, limp stem bearing a cluster of fleshy roots or flowers or both at the base of the petiole near the water surface .... *Nymphoides*

50. Leaf blades mostly more than 3 cm long, central vein more prominent than other veins, forking but not uniting; petioles and peduncles from a basal rhizome; flowers borne singly

51. Leaf blades about as long as wide, with more veins from the base of the midrib than from along the midrib, veins much forked; petioles and peduncles with 4 large hollow areas as seen in cross section; flowers white .... *Nymphaea*

51. Leaf blades with more veins from the midrib than from the base of midrib, veins little forked; petioles and peduncles with many small hollow areas; flowers yellow .... *Nuphar*

4. Leaves cauline or essentially so

52. Leaves linear

53. Leaves stiff, not requiring water for support

54. Leaves with parallel veins

55. Leaves with basal sheaths closed, or if open then with a ligule at the juncture of sheath and blade

56. Leaf sheaths several times as wide as the stem, basal sheaths overlapping, cauline leaves 1-3, not overlapping; inflorescence a terminal few-flowered raceme; each fruit composed of 3 follicles .... *Scheuchzeria*

56. Leaf sheaths scarcely wider than the stem; inflorescence a group of spikelets; fruit an achene or caryopsis

57. Leaf sheaths open (except *Glyceria*); stem internodes with hollow pith; leaves 2-ranked, with a ligule at the juncture of sheath and blade; fruit a caryopsis (grasses)

58. Inflorescence with spikelets closely aggregated to form a narrow spikelike panicle

59. Plants usually less than 70 cm tall; spikelets in a dense spikelike panicle; spikelets with sterile flowers or glumes attached above the fertile flower .... *Alopecurus*

59. Plants usually more than 60 cm tall; spikelets in a loose spikelike panicle; spikelets with sterile flowers or glumes attached below the fertile flower .... *Phalaris*

58. Inflorescence with spikelets widely spaced to form an open panicle

60. Plants without rhizome; staminate spikelets below and distinctly separated from the pistillate spikelets .... *Zizanea*

60. Plants with rhizomes (except *Puccinellia*); with no distinct separation of staminate and pistillate spikelets

61. Plants 2-4 m tall; spikelets with long silky hairs giving a silky appearance to the whole inflorescence .... *Phragmites*

61. Plants less than 2 m tall; spikelets without conspicuous hairs

62. Each spikelet with several florets

63. Leaf sheaths closed; rhizomes present; second glume with one distinct vein .... *Glyceria*

63. Leaf sheaths open; rhizomes absent; second glume with 3 veins . . . *Puccinellia*

62. Each spikelet with a single floret; leaf sheaths open

64. Leaf margins with fine sharp teeth; panicle pale green to whitish; spikelets 4-5 mm long; glumes absent; lemma pilose, ciliate on the keel but without long basal hairs .... *Leersia*

64. Leaf margins without sharp teeth; panicle often purplish; spikelets 3-3.5 mm long; glumes present; with copious long hairs around the base of the lemma .... *Calamagrostis*

57. Leaf sheaths closed; stem internodes with solid or spongy pith (except *Dulichium*); leaves 3-ranked, with no ligule; fruit an achene (sedges)

65. Spikelets with long, exserted, silky bristles subtending the achenes, giving the inflorescence a cottony appearance .... *Eriophorum*
65. Inflorescence without long exserted bristles
66. Inflorescence a terminal umbel of spikelets
67. Scales of spikelets 2-ranked .... *Cyperus*
67. Scales of spikelets spirally imbricated .... *Scirpus*

66. Inflorescence not an umbel
68. Stem internodes hollow; spikelets axillary on the stem .... *Dulichium*
68. Stem with solid or spongy pith
69. Florets unisexual; achenes enclosed in a sac (perigynium) .... *Carex*
69. Florets bisexual; achenes not in a sac
70. Achenes with a tubercle (persistent style base) at the apex; perianth bristles 8-14 .... *Rhynchospora*
70. Achenes without a tubercle; perianth bristles usually 1-6 .... *Scirpus*

55. Leaves without basal sheath, or if sheath present then with sheath open and without a ligule
71. Leaves less than 3 mm wide; flowers bisexual, radially symmetrical; fruit a capsule, less than 10 mm long .... *Juncus*
71. Leaves more than 5 mm wide; fruit an achene or, if a capsule, then more than 30 mm long
72. Leaves with a keeled midrib; flowers in pistillate and staminate globose heads .... *Sparganium*
72. Leaves without prominent midrib; inflorescence a spike or a single flower
73. Leaf sheaths abruptly narrowed to blade; inflorescence a spike; flowers tiny; fruits an achene .... *Typha*
73. Leaf sheath tapered to blade; flowers large and showy; fruit a capsule .... *Iris*

54. Leaves with netted veins
74. Leaves whorled; stems 4-angled; flowers 3- or 4-merous; fruits spherical and paired .... *Galium*
74. Leaves not whorled; stems terete or 3-angled; flowers 5-merous; fruits not spherical or paired
75. Stems 3-angled; flowers borne singly, bell-shaped .... *Campanula*
75. Stems terete or nearly so; flowers in heads
76. Inflorescence flat-topped; flowers yellow .... *Solidago*
76. Inflorescence not flat-topped; flowers not yellow .... *Aster*

53. Plants limp and flaccid, requiring water for support
77. Leaves opposite or whorled
78. Leaves whorled; flowers and fruits (both rarely seen) on long filamentous stalks .... *Elodea*
78. Leaves opposite; flowers and fruits sessile in the leaf axils
79. Lower submersed leaves linear, bidentate at apex, tapering to a sessile base; upper and floating leaves spatulate to ovate; fruits heart-shaped with 4 seeds .... *Callitriche*
79. Leaves all linear and submersed, apex acute, base broad and semiclasping or with sheathing stipules; fruits with 1 seed
80. Leaves 15-40 mm long, 0.5-1 mm wide at base above the lobes, tapering gradually to the apex; fruits borne singly in the leaf axils, terete and tapering to both ends .... *Najas*
80. Leaves 30-100 mm long, less than 0.5 mm wide, sides parallel; fruits with a long beak, often toothed on one side, 2-5 in an axil .... *Zannichellia*

77. Leaves alternate
81. Leaves to 150 cm long, with midvein not evident, longitudinal and cross veins numerous giving the leaf a checkered appearance with squares and short rectangles, stipules absent; flowers unisexual in globose heads .... *Sparganium*

81. Leaves less than 30 cm long, stipules present (may disappear with age); flowers bisexual, borne singly or in cylindrical or globose spikes
82. Leaves several times as wide as thick, with no definite midvein, stipules adnate to the leaf base; flowers (rarely seen) borne singly, 3-merous, pale yellow . . . . *Heteranthera*
82. Leaves with an evident midvein, except for those which are very narrow and scarcely wider than thick; stipules adnate or free; flowers borne in spikes, 4-merous, greenish or brownish . . . . *Potamogeton*

52. Leaves broad
83. Leaves opposite or whorled
84. Plants stiff, not requiring water for support
85. Stems terete or nearly so
86. Leaf margins entire
87. Leaves sessile
88. Leaves with transparent dots
89. Flowers yellow, without glands between the groups of stamens . . . . *Hypericum*
89. Flowers pinkish or greenish, with three orange glands alternating with the three groups of stamens . . . . *Triadenum*
88. Leaves without transparent dots (opaque dots may be present)
90. Plants 10-30 cm tall; stems soft; flowers bilaterally symmetrical . . . . *Gratiola*
90. Plants 40-120 cm tall; stems firm; flowers radially symmetrical
91. Larger leaves slightly cordate; inflorescence a spike; flowers reddish-purple, trimorphic . . . . *Lythrum*
91. Leaves never cordate; inflorescence a raceme; flowers yellow, not trimorphic . . . . *Lysimachia*
87. Leaves petioled
92. Plants delicate, erect or decumbent; leaves less than 4 cm long; flowers tiny, sessile in the leaf axils . . . . *Ludwigia*
92. Plants firm, erect; inflorescence large and showy
93. Plants with milky sap; inflorescence an umbel; flowers pink . . . . *Asclepias*
93. Plants without milky sap; inflorescence a raceme; flowers yellow . *Lysimachia terrestris*
86. Leaf margins serrate
94. Leaves connate or whorled . . . . *Eupatorium*
94. Leaves opposite, not connate
95. Plants decumbent; leaves linear lanceolate; inflorescence a raceme; flowers violet; fruits a notched capsule . . . . *Veronica*
95. Plants erect or essentially so; inflorescence not a raceme
96. Plants 10-30 cm tall; leaves obovate; flowers borne singly in the leaf axils, white tinged with purple; fruits a globose capsule . . . . *Gratiola*
96. Inflorescence a spike or a head
97. Inflorescence a terminal spike; flowers white . . . . *Chelone*
97. Inflorescence a head; flowers yellow . . . . *Bidens*

85. Stems 4- or 6-angled
98. Leaf margins entire; leaves opposite or in threes (some near inflorescence may be alternate); stems corky; flowers purple . . . . *Decodon*
98. Leaf margins with teeth; stems not corky
99. Leaves whorled, mostly in fours or sixes; flowers white . . . . *Galium*
99. Leaves opposite
100. Flowers borne singly or in loose racemes in the leaf axil
101. Plants 10-30 cm tall; leaves 1-3 cm long; flowers pale lavender, 7-10 mm long . . . . *Lindernia*
101. Plants 30-100 cm tall; leaves 3-10 cm long; flowers blue
102. Leaves sessile; flowers borne singly in the leaf axils on pedicels 2-4 cm long; fruits a capsule with many seeds . . . . *Mimulus*

102. Leaves with petioles 1-20 mm long; flowers in racemes or singly on pedicels less than a cm long; fruits forming 4 nutlets in each flower .... *Scutellaria*
100. Flowers borne in dense axillary clusters or terminal spikes
103. Plants fragrant; tubers absent; flowers bluish-pink; stamens 4 .... *Mentha*
103. Plants not fragrant; tubers sometimes present; flowers white; stamens 2 .... *Lycopus*
84. Plants flaccid, requiring water for support, or prostrate
104. Leaves simple
105. Leaves 4 mm or less wide, sessile, with 1 vein; flowers in the leaf axils .... *Elatine*
105. Leaves, at least some of them 5 mm or more wide, petioled
106. Upper leaves broad, forming a small rosette at the water surface, lower ones linear .... *Callitriche*
106. All leaves broad
107. Stems trailing; flowers in the leaf axils, 20-30 mm wide, yellow, 5-merous, on pedicels 10-25 mm long .... *Lysimachia nummularia*
107. Some stems upright from a horizontal rhizome; flowers small, 4-merous, sessile or nearly so
108. Flowers terminal on the branches .... *Chrysosplenium*
108. Flowers in the leaf axils .... *Ludwigia*
104. Leaves dissected
109. Leaves with bladders; flowers showy, bilaterally symmetrical .... *Utricularia*
109. Leaves without bladders; flowers radially symmetrical
110. Leaves pinnately divided .... *Myriophyllum*
110. Leaves forked
111. Plants without roots; all leaves submersed, lobes usually toothed on one side (plants lacking teeth might be confused with *Bidens*); flowers tiny, in the leaf axils .... *Ceratophyllum*
111. Plants rooted; with or without emersed leaves, lobes entire; flowers in a showy head with yellow rays .... *Bidens beckii*
83. Leaves alternate
112. Leaves peltate, floating plants usually with gelatinous coating .... *Brasenia*
112. Leaves not peltate
113. Floating leaves with inflated petioles; submersed leaves pinnately dissected .... *Trapa*
113. Leaves without inflated petioles
114. With a cluster of thick, tuberlike roots near the water surface at the juncture of the petiole and stem; leaves cordate .... *Nymphoides*
114. With no thick roots near the water surface
115. Plants flaccid, requiring water for support, or creeping mats
116. Leaves compound with broad leaflets; flowers about 2 cm wide, 5-merous; petals red-purple .... *Potentilla*
116. Leaves simple or compound with narrow leaflets or dissections
117. Leaves with parallel veins, with a stipule in the axil of the stem and leaf; inflorescence a spike; flowers small, greenish, 4-merous .... *Potamogeton*
117. Leaves with netted veins
118. Leaves palmately veined
119. Petioles as long or longer than the blades; inflorescence a tiny axillary umbel .... *Hydrocotyle*
119. Petioles much shorter than the blade; flowers solitary, on a long pedicel .... *Ranunculus*
118. Leaves pinnately veined
120. Leaf margins entire; with a tubular sheath (ocrea) at the base of each petiole; inflorescence a spike with rose-colored flowers .... *Polygonum*
120. Leaf margins shallowly to coarsely toothed; with no tubular sheath; inflorescence not a spike
121. Leaves less than 2 cm long, with a short petiole, shallowly toothed; flowers solitary, terminal, 4-merous .... *Chrysosplenium*

121. Leaves more than 2 cm long, sessile, coarsely toothed; flowers axillary, solitary or in clusters, 3-merous .... *Proserpinaca*

115. Plants stiff, not requiring water for support

122. Leaves compound

123. Leaves once compound; inflorescence 1- to several-flowered;

124. Leaflets 3, terminal one stalked; flowers yellow .... *Ranunculus septentrionalis*

124. Leaflets 5 or more; flowers not yellow

125. Petiole with broad base that encircles the stem; flowers 5-merous, red-purple .... *Potentilla*

125. Petiole without broad base; flowers 4-merous, white or pink .... *Cardamine*

123. Leaves twice or thrice compound; inflorescence an umbel; flowers white

126. Stems angled; leaves pinnately compound, upper ones once, lower twice; leaflets serrate; fruits with 1 oil tube between each pair of ribs .... *Sium*

126. Stems terete; leaves twice or thrice compound, often some of them appearing to be palmate; leaflets serrate or entire; fruits with 1-3 oil tubes between each pair of ribs . . *Cicuta*

122. Leaves simple, may be deeply lobed

127. With short cylindric stipules sheathing the stem at the nodes (ocreae), may be reduced to fibers in *Rumex*; flowers whitish, greenish, or rose

128. Flowers sessile, forming a spike .... *Polygonum*

128. Flowers on pedicels in whorls .... *Rumex*

127. Ocreae absent

129. Leaves cordate

130. Stems with one cauline leaf; leaves with parallel veins, margins smooth; inflorescence a showy spike of blue flowers .... *Pontederia*

130. Stems with more than one cauline leaf; leaves with netted veins; margins scalloped; flowers yellow or white

131. Leaves mostly more than 10 cm wide; flowers yellow .... *Caltha*

131. Leaves mostly less than 5 cm wide; flowers white .... *Hydrocotyle*

129. Leaves not cordate

132. Flowers in heads .... *Aster*

132. Flowers not in heads

133. Leaf margins entire, may be lobed

134. Leaves sessile, not lobed; flowers blue with yellow spot in center; fruits 4-lobed, becoming 4 nutlets .... *Myosotis*

134. Leaves petiolate, with or without lobes; flowers violet or purple; fruits a berry .... *Solanum*

133. Leaf margins toothed

135. Leaves lobed; flowers yellow; fruits a silique .... *Rorippa*

135. Leaves not lobed; flowers not yellow; fruits a follicle or capsule

136. Inflorescence a cyme, coiled when young, straightening as flowers open; flowers greenish; fruits a follicle .... *Penthorum*

136. Inflorescence a raceme of showy blue or scarlet flowers; fruits a capsule .... *Lobelia*

CHECKLIST

ISOETACEAE

ISOETES QUILLWORT

echinospora subsp. **braunii** *(I. muricata)* Fig. 2.

macrospora Fig. 1.

1. Megaspores spinulose, 0.3-0.6 mm in diam. *I. echinospora*
1. Megaspores reticulate, 0.5-0.8 mm in diam. *I. macrospora*

EQUISETACEAE

EQUISETUM HORSETAIL

fluviatile Fig. 3. Lake outlet; Red Rock Bay; Harris Bay

palustre Fig. 4. Harris Bay swamp

1. Central cavity of stem about 4/5 the diameter of the stem . . . . *E. fluviatile*
1. Central cavity about 1/6 the diameter of the stem . . . . *E. palustre*

OSMUNDACEAE

OSMUNDA

cinnamomea CINNAMON FERN Fig. 5. Big Burnt I.; Northwest Bay; Pilot Knob; Speaker Heck I.; Warner Bay; Harris Bay; Dunham Bay

regalis var. **spectabilis** ROYAL FERN Fig. 6.

1. Leaves once pinnate . . . . *O. cinnamomea*
1. Leaves twice pinnate . . . . *O. regalis*

POLYPODIACEAE

ONOCLEA

sensibilis SENSITIVE FERN Fig. 7.

THELYPTERIS

palustris var. **pubescens** *(Dryopteris thelypteris)* MARSH FERN Fig. 8.

TYPHACEAE

TYPHA CATTAIL

angustifolia NARROW-LEAVED CATTAIL Fig. 10. Lake outlet; N end of lake; Black Pt; Harris Bay; Dunham Bay

× **glauca** *(=T. angustifolia × latifolia)* Fig. 11. Lake outlet; Harris Bay; Dunham Bay

latifolia BROAD-LEAVED CATTAIL Fig. 9. Lake outlet; Cooper Pt; Northwest Bay; Warner Bay; Harris Bay; Dunham Bay

1. Stigmas lance-ovate; pistillate and staminate parts of spike usually contiguous; pollen grains in tetrads . . . . *T. latifolia*
1. Stigmas linear to lance-linear; pistillate and staminate parts of spike usually separated; pollen grains single
   2. Stigmas lance-linear; pistillate and staminate parts of spike contiguous or separated by an interval up to 4 cm (usually less than the diameter of the pistillate spike); leaves mostly 7-12 mm wide . . . . *T. × glauca*

Fig. 1. Isoetes echinospora; Fig. 2. I. macrospora; Fig. 3. Equisetum fluviatile; Fig. 4. E. palustre; Fig. 5. Osmunda cinnamomea; Fig. 6. O. regalis; Fig. 7. Onoclea sensibilis; Fig. 8. Thelypteris palustris.

Fig. 9. Typha latifolia; Fig. 10. T. angustifolia; Fig. 11. T. × glauca; Fig. 12. Sparganium eurycarpum; Fig. 13. S. americanum; Fig. 14. S. chlorocarpum; Fig. 15. S. angustifolium; Fig. 16. S. fluctuans; Fig. 17. S. minimum.

2. Stigmas linear; pistillate and staminate parts of spike separated by an interval of 0.5-12 cm (usually about twice the diameter of the pistillate spike); leaves mostly 4-8 mm wide .... *T. angustifolia*

SPARGANIACEAE

SPARGANIUM BUR REED

americanum Fig. 13. N end of lake; Northwest Bay; Shelving Rock; Bolton Ldg; Dunham Bay

angustifolium Fig. 15. Harris Bay. This species and/or S. *fluctuans* found sterile throughout and impossible to distinguish with certainty.

chlorocarpum Fig. 14. Northwest Bay; Warner Bay; Dunham Bay

eurycarpum Fig. 12.

fluctuans Fig. 16. Northwest Bay; Warner Bay. See note under S. *angustifolium.*

minimum Fig. 17. Dunham Bay

1. Stigmas 2; fruit 4-8 mm wide, usually with 2 seeds .... *S. eurycarpum*
1. Stigma 1; fruit 1-3 mm wide, with 1 seed
  2. Pistillate heads more than 12 mm in diameter; staminate heads 2 or more; beak of fruit about as long as ovary
    3. Plants erect with upper leaves emersed
      4. Pistillate heads axillary (from the axils of bracts); upper part of fruit usually dull .... *S. americanum*
      4. One or more of the pistillate heads supra-axillary (on the peduncle above the axil); upper part of fruit usually shiny .... *S. chlorocarpum*
    3. Plants flaccid with upper leaves floating and often very long
      5. Inflorescence branched; pistillate heads axillary; mature fruit dark with firm pericarp; beak strongly curved; sepals attached near base or middle of fruit stalk; leaves 3-10 mm wide, usually flattish on both sides .... *S. fluctuans*
      5. Inflorescence unbranched; one or more pistillate heads supra-axillary; mature fruit brownish or greenish with loose pericarp; beak straight or slightly curved; sepals attached near the summit of fruit stalk; leaves 2-5 mm wide, usually rounded on the back .... *S. angustifolium*
  2. Pistillate heads about 10 mm in diameter; staminate heads 1 (rarely 2); beak of fruit short .... *S. minimum*

POTAMOGETONACEAE

POTAMOGETON PONDWEED

alpinus var. **tenuifolius** Fig. 22. Northwest Bay stream; Shelving Rock; Warner Bay; Dunham Bay

amplifolius Fig. 19.

crispus Fig. 18. Hague; Gull Bay; Smith Bay; Lamb Shanty Bay; Tea I.; S end of lake

epihydrus var. **ramosus** (*P. e.* var. *nuttallii*) Fig. 31.

foliosus Fig. 32. Lake outlet; Dunham Bay

friesii Fig. 34. Shelving Rock; Warner Bay; Dunham Bay

gramineus Fig. 21.

illinoensis (*P. angustifolius, P. lucens*) Fig. 24. Lake outlet; N end of lake; bay N of Black Pt; Weeds Bay; Warner Bay

natans Fig. 20.

obtusifolius Fig. 36. Dunham Bay

pectinatus Fig. 28. Hearts Bay; Arcady Bay; Shelving Rock Bay; Dunham Bay
perfoliatus var. **bupleuroides** Fig. 23.
praelongus Fig. 26.
pusillus var. **tenuissimus** *(P. berchtoldii)* Fig. 33.
richardsonii Fig. 25. Weeds Bay; Warner Bay; Brayton
robbinsii Fig. 27.
spirillus *(P. dimorphus)* Fig. 30.
vaseyi Fig. 29. Bolton Ldg; Warner Bay; Dunham Bay
zosteriformis *(P. compressus)* Fig. 35.

1. Leaves all submersed, linear, auricled at base, margins finely denticulate; stipules adnate .... *P. robbinsii*
1. Leaves various but if linear then not auricled
  2. Stipules adnate to the base of the leaf for a distance of 10 mm or more; floating leaves absent .... *P. pectinatus*
  2. Stipules free or adnate for a distance of less than 10 mm
    3. Leaf margins serrate .... *P. crispus*
    3. Leaf margins entire
      4. Stem strongly flattened; leaves linear, veins 15-35 .... *P. zosteriformis*
      4. Stem terete or slightly flattened; leaves various but if linear then with less than 15 veins
        5. Submersed leaves linear, less than 10 mm wide, length more than 20 times the width
          6. Submersed leaves ribbonlike, flaccid, 2-10 mm wide, with a prominent parallel-sided median band of lacunae filling the broad space between the inner veins; fruits 2.5-4 mm long, embryo coil more than a complete revolution .... *P. epihydrus*
          6. Submersed leaves 0.1-4 mm wide, lacunae not forming a prominent parallel-sided band; fruits 0.8-3 mm long, embryo coil less than one revolution, or if more than fruits less than 2.5 mm long
            7. Floating leaf blades more than 20 mm wide, usually cordate; submersed leaves (usually absent at maturity) mostly from the main stem, firm, 0.8-2 mm wide; fruits 3.5-5 mm long, keels obscure, coat wrinkled .... *P. natans*
            7. Floating leaves less than 15 mm wide, not cordate, often absent; submersed leaves flaccid, usually from branches; fruits less than 4 mm long
              8. Floating leaves absent; submersed leaves 0.5-4 mm wide; fruits with embryo coil less than one revolution
                9. Stipules strongly fibrous, becoming whitish, especially on the winter buds .... *P. friesii*
                9. Stipules delicate, greenish or brownish
                  10. Leaves 2-4 mm wide, rounded at apex; fruits 3-4 mm long .... *P. obtusifolius*
                  10. Leaves 0.5-3 mm wide, acute to obtuse (if rounded, then with a sharp mucro); fruits 1.8-2.8 mm long
                    11. Fruits with dorsal keel thin, undulate or dentate; leaves acute, scarcely lacunate .... *P. foliosus*
                    11. Fruits with dorsal keel rounded; leaves acute or obtuse, usually with one or more rows of lacunae each side of the midrib .... *P. pusillus*
              8. Floating leaves usually present; submersed leaves 0.1-2 mm wide
                12. Submersed leaves 0.1-0.5 mm wide, tapering to a sharp pointed apex, stipules not adnate; peduncles from axils of floating leaves only; fruits with dorsal keel rounded and with embryo coil less than one revolution .... *P. vaseyi*
                12. Submersed leaves 0.5-2 mm wide, obtuse to rounded at apex; stipules slightly adnate to leaf base; peduncles from axils of floating and of submersed leaves; fruits with dorsal keel winged and with embryo coil more than one revolution .... *P. spirillus*
        5. Submersed leaves without parallel sides, 2-70 mm wide (sometimes narrowly linear in *P. gramineus)*, length less than 20 times the width

13. Submersed leaves petioled or sessile but not clasping; floating leaves often present
14. Submersed leaves sessile, apex obtuse; floating leaves delicate, blade tapering without sharp distinction into the petiole; fruit wall hard and smooth, tawny-olive .... *P. alpinus*
14. Submersed leaves sessile or petioled, apex obtuse or acute; floating leaves coriaceous, blade distinct from petiole; fruit wall spongy, greenish, brownish, or reddish
15. Submersed leaves, usually arcuate, with 19-37 veins; floating leaf blades mostly with more than 30 veins; fruits mostly more than 3.5 mm long .... *P. amplifolius*
15. Submersed leaves seldom arcuate, with 3-19 veins; floating leaf blades mostly with less than 30 veins; fruits mostly less than 3.5 mm long
16. Stem usually much branched; submersed leaves 2-15 mm wide, sessile, with 3-9 veins; floating leaf petioles mostly longer than the blades; fruiting spikes 10-25 mm long; fruits 1.7-2.8 mm long .... *P. gramineus*
16. Stem simple or once branched; submersed leaves 15-40 mm wide, sessile or petioled, with 9-17 veins; floating leaf petioles mostly shorter than the blades; fruiting spikes 25-60 mm long; fruits 2.5-3.5 mm long .... *P. illinoensis*
13. Leaves all submersed, cordate or rounded at base and clasping the stem
17. Leaves ovate-oblong, mostly 10-20 cm long, apex boatshaped, splitting when flattened; stipules persistent; stem often whitish; fruits more than 4 mm long .... *P. praelongus*
17. Leaves ovate or elongate ovate, 1-10 cm long, apex not boatshaped; stipules at maturity inconspicuous or disintegrated to fibers; stem greenish; fruits less than 3.5 mm long
18. Stipules coarse, disintegrating to persistent whitish fibers; peduncles clavate; fruits with a cavity in the endocarp loop .... *P. richardsonii*
18. Stipules delicate, disappearing with age; peduncles not clavate; fruits without a cavity in the endocarp loop .... *P. perfoliatus*

ZANNICHELLIACEAE

ZANNICHELLIA HORNED PONDWEED
palustris Fig. 37. Lake outlet; Gull Bay

NAJADACEAE

NAJAS NAIAD
flexilis Fig. 38.

SCHEUCHZERIACEAE

SCHEUCHZERIA
palustris subsp. **americana** Fig. 39. East Lake George marsh

JUNCAGINACEAE

TRIGLOCHIN ARROW GRASS
maritima var. **elata** Fig. 40. East Lake George marsh near Brayton

ALISMATACEAE

ALISMA WATER PLANTAIN
plantago-aquatica subsp. **subcordatum** *(A. p.-a.* var. *parviflorum)* Fig. 41. Lake outlet; Little Harbor Island; Bolton Ldg; Dunham Bay marsh

Fig. 18. Potamogeton crispus; Fig. 19. P. amplifolius; Fig. 20. P. natans; Fig. 21. P. gramineus; Fig. 22. P. alpinus; Fig. 23. P. perfoliatus; Fig. 24. P. illinoensis; Fig. 25. P. richardsonii; Fig. 26. P. praelongus.

Fig. 27. Potamogeton robbinsii; Fig. 28. P. pectinatus; Fig. 29. P. vaseyi; Fig. 30. P. spirillus; Fig. 31. P. epihydrus; Fig. 32. P. foliosus; Fig. 33. P. pusillus; Fig. 34. P. friesii; Fig. 35. P. zosteriformis; Fig. 36. P. obtusifolius.

Fig. 37. Zannichellia palustris; Fig. 38. Najas flexilis; Fig. 39. Scheuchzeria palustris; Fig. 40. Triglochin maritima; Fig. 41. Alisma plantago-aquatica; Fig. 42. Sagittaria latifolia; Fig. 43. S. rigida; Fig. 44. S. graminea; Fig. 45. S. cuneata; Fig. 46. Elodea canadensis; Fig. 47. Vallisneria americana.

SAGITTARIA ARROWHEAD

cuneata *(S. arifolia)* Fig. 45.

graminea Fig. 44. Sterile emersed plants similar to *S. rigida*.

latifolia Fig. 42.

rigida Fig. 43. See note under *S. graminea*.

1. Most leaves sagittate
  2. Pistillate flowers on definite pedicels
    3. Leaves stiff and erect; beak of achene horizontal .... *S. latifolia*
    3. Leaves usually flaccid, often of two kinds (submersed ribbonlike, floating sagittate) beak of achene nearly erect .... *S. cuneata*
  2. Pistillate flowers sessile or nearly so .... *S. rigida*
1. Most leaves not sagittate
  4. Pistillate flowers sessile or nearly so; peduncles strongly bent above the lowest flowers; achenes 3-4 mm long .... *S. rigida*
  4. Pistillate flowers on definite pedicles; peduncles straight or nearly so; achenes about 1 mm long .... *S. graminea*

HYDROCHARITACEAE

ELODEA ELODEA, WATERWEED

canadensis *(Anacharis c., Philotria c.)* Fig. 46.

VALLISNERIA DUCK CELERY, FRESH WATER EEL GRASS

americana *(V. spiralis)* Fig. 47.

GRAMINEAE

ALOPECURUS FOXTAIL

aequalis *(A. aristulatus)* Fig. 48. Warner Bay; Dunham Bay; Bloody Pond

CALAMAGROSTIS

canadensis BLUEPOINT GRASS Fig. 49. Warner Bay; Harris Bay; Dunham Bay

GLYCERIA MANNA GRASS

borealis *(Panicularia b.)* Fig. 50.

canadensis *(Panicularia c.)* Fig. 53. Bloody Pond

maxima subsp. **grandis** *(Panicularia g.)* Fig. 51.
Lake outlet; Sabbath Day Pt; Lake George village

striata *(G. nervata, Panicularia s., P. n.)* Fig. 52. Lake outlet; Harris Bay; Bloody Pond

1. Spikelets 10 mm or more long, cylindrical; panicle narrow and erect .... *G. borealis*
1. Spikelets 7 mm or less long, flattened, panicle spreading and nodding
  2. Spikelets 3-4 mm wide; veins of lemma inconspicuous .... *G. canadensis*
  2. Spikelets less than 3 mm wide; veins of lemma conspicuous
    3. Leaves 6-12 mm wide; spikelets 4-7 mm long; first glume 1-2 mm long; second glume 1.5-2.5 mm long .... *G. maxima*
    3. Leaves 2-5 (−8) mm wide; spikelets 3-4 mm long; first glume 0.6-1 mm long; second glume 0.8-1.3 mm long .... *G. striata*

LEERSIA

oryzoides *(Homalocenchrus o.)* CUT GRASS Fig. 55. Lake outlet; Black Pt Bay; Dunham Bay

PHALARIS

arundinacea REED CANARY GRASS Fig. 56. Bolton Ldg; Diamond Pt; Harris Bay; Dunham Bay

PHRAGMITES

australis *(P. communis, P. maximus, P. phragmites)* GIANT REED GRASS
Fig. 57. East Lake George marsh; Dunham Bay

Fig. 48. Alopecurus aequalis; Fig. 49. Calamagrostis canadensis; Fig. 50. Glyceria borealis; Fig. 51. G. maxima; Fig. 52. G. striata; Fig. 53. G. canadensis; Fig. 54. Puccinellia pallida; Fig. 55. Leersia oryzoides; Fig. 56. Phalaris arundinacea; Fig. 57. Phragmites australis; Fig. 58. Zizania aquatica; Fig. 59. Z. palustris.

PUCCINELLIA

pallida *(Glyceria p., Panicularia p.)* Fig. 54. Bolton Ldg; Harris Bay; Dunham Bay

ZIZANIA WILD RICE

aquatica *(Z. palustris)* Fig. 58. Harris Bay; Dunham Bay

palustris *(Z. aquatica, Z. a.* var. *angustifolia)* Fig. 59. Harris Bay; Dunham Bay

1. Pistillate lemmas thin, delicately ribbed, with scattered strigose hairs on the surface or glabrous .... *Z. aquatica*
1. Pistillate lemmas coarsely corrugated; with hairs only between the ribs .... *Z. palustris*

CYPERACEAE

CAREX SEDGE

alata Fig. 64. East Lake George marsh; Dunham Bay

bebbii Fig. 65. Pilot Knob; Harris Bay swamp; Dunham Bay

canescens Fig. 75. Northwest Bay; Warner Bay; Harris Bay; Dunham Bay

chordorrhiza Fig. 74. East Lake George marsh

comosa Fig. 78.

crinata Fig. 85. Smith Bay; Northwest Bay; Harris Bay swamp

cristatella Fig. 66. Lake outlet; N of Bolton; Pilot Knob; Warner Bay; Harris Bay; Dunham Bay

diandra Fig. 72. Warner Bay; Brayton; Harris Bay; Dunham Bay

exilis Fig. 60. East Lake George marsh; Harris Bay bog mat

flava Fig. 92. Brayton

gynandra *(C. crinata* var. *g.)* Fig. 84. Hague; Tongue Mt; Pilot Knob; Brayton; Harris Bay

howei Fig. 61. Brayton

hystericina Fig. 81.

interior Fig. 62. Harris Bay swamp; marsh S of Lake George village

intumescens Dunham Bay

intumescens var. **fernaldii** Fig. 90. Boon Bay; Basin Bay; Brayton; Harris Bay

lacustris Fig. 86. Northwest Bay; Dunham Bay

lanuginosa Fig. 88. Dunham Bay

lasiocarpa subsp. **americana** Fig. 89. Lake outlet; Dunham Bay

leptalea Fig. 77. Pilot Knob

limosa Fig. 83. Brayton; Dunham Bay

lupulina Fig. 91. Cotton Pt; Pilot Knob; Dunham Bay

lurida Fig. 80. Lake outlet; Dunham Bay

magellanica subsp. **irrigua** *(C. paupercula)* Fig. 82. swamp east of Harris Bay marsh

muricata var. angustata *(C. angustior)* Diamond Point; Harris Bay

muricata var. **cephalantha** Fig. 63.

normalis Fig. 67. Harris Bay; Lake George village

prairea Fig. 73. Abandoned road east of Harris Bay marsh

projecta Fig. 68. Pilot Knob

pseudocyperus Fig. 79. Northwest Bay; Dunham Bay

rostrata Fig. 93. Cotton Pt; Northwest Bay; Dunham Bay

scabrata Fig. 94. Hague

stipata Fig. 70.

stricta *(C. strictior)* Fig. 87. Typical form throughout. A form with drooping pistillate spikes found on Harris Bay bog mat. This may be **C. stricta** forma **xerocarpa.**

tenuiflora Fig. 76. East Lake George marsh

tribuloides Fig. 69. Pilot Knob

trisperma Fig. 76A. Hague; Huddle Bay; Harris Bay bog mat

trisperma var. **billingsii** Harris Bay bog mat

vulpinoidea Fig. 71. Pilot Knob

1. Staminate and pistillate flowers in the same spike; spikes more or less uniform in shape
  2. Stigmas three; staminate scales connate at base much like a miniature aroid spathe; spike solitary, terminal .... *C. leptalea*
  2. Stigmas two
    3. Culms arising from axils of preceding year's leaves on prostrate culms lying in Sphagnum moss .... *C. chordorrhiza*
    3. Culms arising from roots or rootstocks
      4. Spikelets one .... *C. exilis*
      4. Spikelets two or more
        5. Perigynia with thin winged margins, sometimes narrow but at least present on the lower part of the beak and the upper part of the body of the perigynia. (Species keying to this point belong to an extremely difficult taxonomic complex—the Ovales. Precise measurements are necessary since forms of one species often simulate another species to an exasperating degree. Other books should be consulted for more than field identification.)
          6. Perigynia more than 2.5 mm wide .... *C. alata*
          6. Perigynia less than 2 mm wide
            7. Perigynia with wing more prominent on upper half, narrowed or absent on lower half
              8. Spikelets crowded, overlapping in a dense, compact inflorescence
                9. Inflorescense 2.5-5 cm long; spikelets tapered at base; perigynia appressed-ascending .... *C. tribuloides*
                9. Inflorescence 1.5-3 cm long; spikelets rounded at base; perigynia appressed or spreading
                  10. Perigynia appressed, usually winged to the base though wing narrowed below; pistillate scales acute and sharp. (Hybrids between this species and the next have been postulated) .... *C. bebbii*
                  10. Perigynia spreading or recurved, wing usually absent toward the base; pistillate scales acute with a blunt or notched tip .... *C. cristatella*
              8. Spikelets remote, separated in a long, flexuous inflorescence .... *C. projecta*
            7. Perigynia winged from base to beak without conspicuous narrowing on lower half
              11. Inflorescence greenish; perigynia distinctly nerved on inner face .... *C. normalis*
              11. Inflorescence brownish; perigynia nerveless or at most slightly nerved at base of inner face .... *C. bebbii*
        5. Perigynia without winged margins (at most with a thin rib)
          12. Inflorescence simple (any branch with only one spikelet); spikelets 10 or less
            13. Achene nearly filling body of perigynium; perigynia elliptic, with rounded margins, surface greenish-white dotted under magnification, beak short
              14. Lowest spikelet subtended by a bract several times as long as the spikelet, spikelets 1-5 flowered, widely separated in a flexuous, filiform inflorescence .... *C. trisperma*
              14. Lowest spikelet subtended by a bract usually less than twice as long as the spikelet, spikelets 3-30 flowered in a straightish, firm inflorescence
                15. Inflorescence elongate; each spikelet with 10-30 perigynia .... *C. canescens*
                15. Inflorescence subglobose with 2-4 closely spaced silvery spikelets; each spikelet with 3-10 perigynia .... *C. tenuiflora*
            13. Achene filling only upper portion of perigynium (spongy below the achene); perigynia broadest toward the base, margins ribbed or sharp, surface not greenish-white dotted under magnification, beak prominent. (Species keying to this point belong to another difficult group—the Stellulatae. Confident identification may require additional reference books or minute comparisons with correctly identified specimens.)
            16. Pistillate scales bluntish, shorter than body of perigynium (excluding beak); beak about ¼ total length of perigynium

17. Leaves lax, delicate, less than 1 mm wide; perigynia with veins on inner surface ...... *C. howei*
17. Leaves stiff, ascending, 1.2-2 mm wide; perigynia without veins on inner surface .... *C. interior*
16. Pistillate scales acutish, as long or nearly as long as body of perigynium (excluding beak); beak about ⅓ total length of perigynium .... *C. muricata*
12. Inflorescence compound (branches, at least the lowest, with two or more spikelets); spikelets numerous
18. Perigynia 4 mm or more long; culms spongy, leaf sheaths strongly cross puckered ...... *C. stipata*
18. Perigynia 3 mm or less long; culms not spongy
19. Perigynia flat .... *C. vulpinoidea*
19. Perigynia plump
20. Sheaths copper-colored; inflorescence loose; perigynia appressed and concealed by their scales; perigynia flattish on ventral face .... *C. prairea*
20. Sheaths pale, not copper-colored; inflorescence compact; perigynia spreading, not concealed by their scales; perigynia convex on ventral face .... *C. diandra*
1. Staminate and pistillate flowers in different spikes or the staminate flowers in a strongly constricted terminal portion of a spike
21. Perigynia with beak 2-toothed, each tooth longer than wide
22. Perigynia 15 or less per spike; pistillate spikes globose or nearly so .... *C. intumescens*
22. Perigynia 15 or more per spike; pistillate spikes cylindric or short oblong
23. Perigynia densely pubescent
24. Leaves flat, 1.5-5 mm wide; stems sharply 3-angled .... *C. lanuginosa*
24. Leaves rolled, 2 mm or less wide; stems with 3 rounded angles .... *C. lasiocarpa*
23. Perigynia glabrous
25. Perigynia nearly all pointing downward
26. Pistillate spikes upright, sessile or with short peduncles .... *C. flava*
26. Pistillate spikes drooping on long slender peduncles
27. Teeth of mature perigynium 1.5-2 mm long, widely spreading .... *C. comosa*
27. Teeth of mature perigynium 0.5-1 mm long, parallel or slightly spreading .... *C. pseudocyperus*
25. Perigynia nearly all pointing upward (except sometimes the lowest)
28. Pistillate scales terminated with an awn
29. Staminate spikes 2 or more .... *C. lacustris*
29. Staminate spikes solitary
30. Perigynia with 8-10 veins .... *C. lurida*
30. Perigynia with 15-20 veins .... *C. hystericina*
28. Pistillate scales without an awn
31. Perigynia 4-8 mm long; staminate spikes 2 or more .... *C. rostrata*
31. Perigynia 12-15 mm long; staminate spike solitary .... *C. lupulina*
21. Perigynia with beak not 2-toothed, at most slightly notched at tip
32. Pistillate spikes drooping
33. Pistillate scales terminated with a long serrulate awn
34. Leaf sheaths smooth; pistillate scales notched at base of awn .... *C. crinata*
34. Leaf sheaths scabrous; pistillate scales tapered to base of awn .... *C. gynandra*
33. Pistillate scales without an awn
35. Roots glabrous; lower sheaths with threadlike brown fibers opposite the leaf blade .... *C. stricta*
35. Roots pubescent
36. Pistillate scales nearly as broad as the perigynium .... *C. limosa*
36. Pistillate scales conspicuously narrower than the perigynium .... *C. magellanica*
32. Pistillate spikes erect
37. Perigynia scabrous, beak prominent, obscurely toothed; plants forming extensive beds in wet woods .... *C. scabrata*
37. Perigynia granular-papillate or smooth, beak minute, not toothed; plants often forming large dense hummocks .... *C. stricta*

Fig. 60. Carex exilis; Fig. 61. C. howei; Fig. 62. C. interior; Fig. 63. C. muricata; Fig. 64. C. alata; Fig. 65. C. bebbii; Fig. 66. C. cristatella; Fig. 67. C. normalis; Fig. 68. C. projecta; Fig. 69. C. tribuloides.

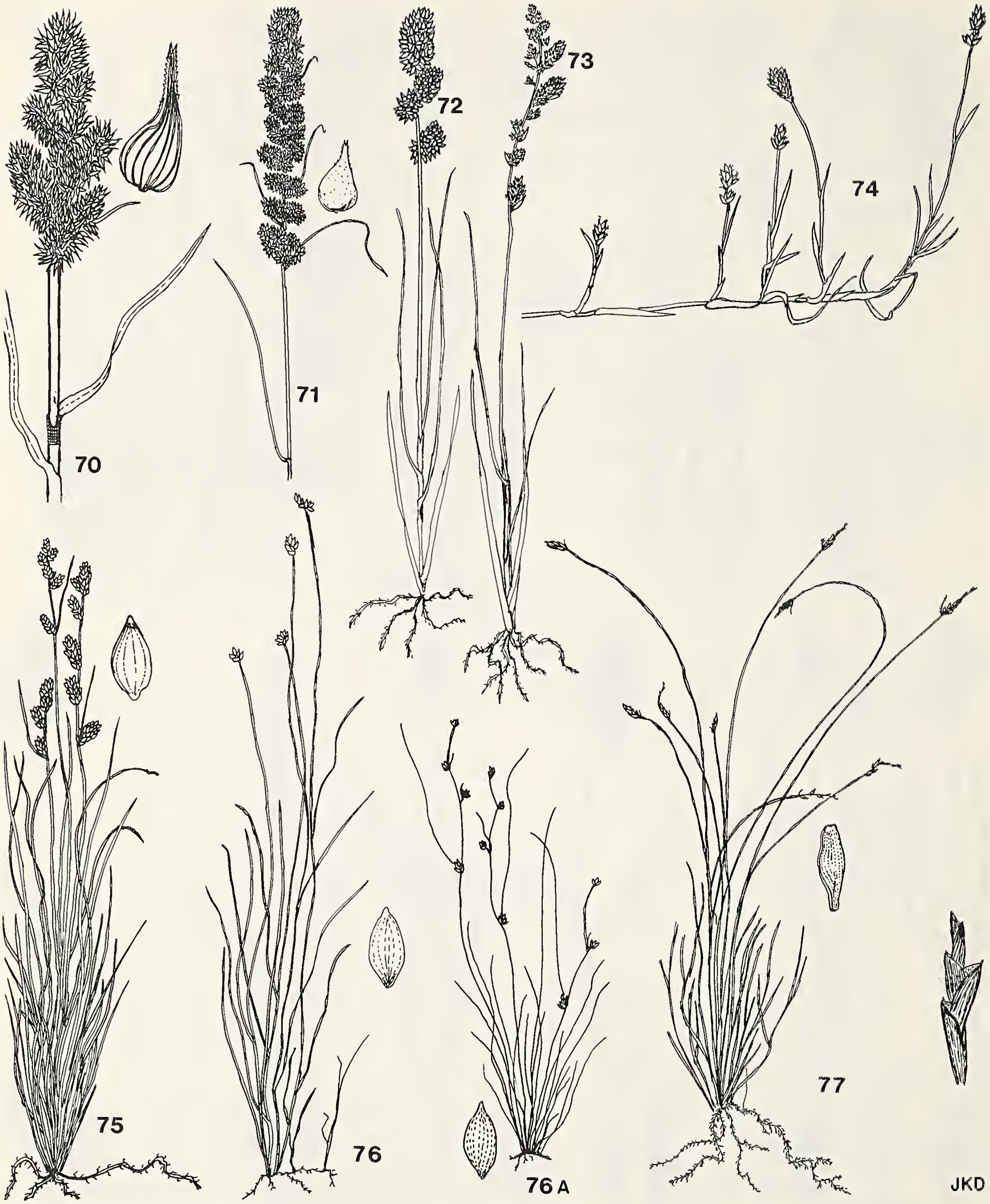


Fig. 70. Carex stipata; Fig. 71. C. vulpinoidea; Fig. 72. C. diandra; Fig. 73. C. prairea; Fig. 74. C. chordorrhiza; Fig. 75. C. canescens; Fig. 76. C. tenuiflora; Fig. 76A. C. trisperma; Fig. 77. C. leptalea.

Fig. 78. Carex comosa; Fig. 79. C. pseudocyperus; Fig. 80. C. lurida; Fig. 81. C. hystericina; Fig. 82. C. magellanica; Fig. 83. C. limosa; Fig. 84. C. gynandra; Fig. 85. C. crinata.

Fig. 86. Carex lacustris; Fig. 87. C. stricta; Fig. 88. C. lanuginosa; Fig. 89. C. lasiocarpa; Fig. 90. C. intumescens; Fig. 91. C. lupulina; Fig. 92. C. flava; Fig. 93. C. rostrata; Fig. 94. C. scabrata.

Fig. 95. Cyperus strigosus; Fig. 96. C. rivularis; Fig. 97. Eriophorum gracile; Fig. 98. E. vaginatum; Fig. 99. E. virginicum; Fig. 100. Dulichium arundinaceum; Fig. 101. Eleocharis acicularis; Fig. 102. E. smallii; Fig. 103. Rhynchospora alba.

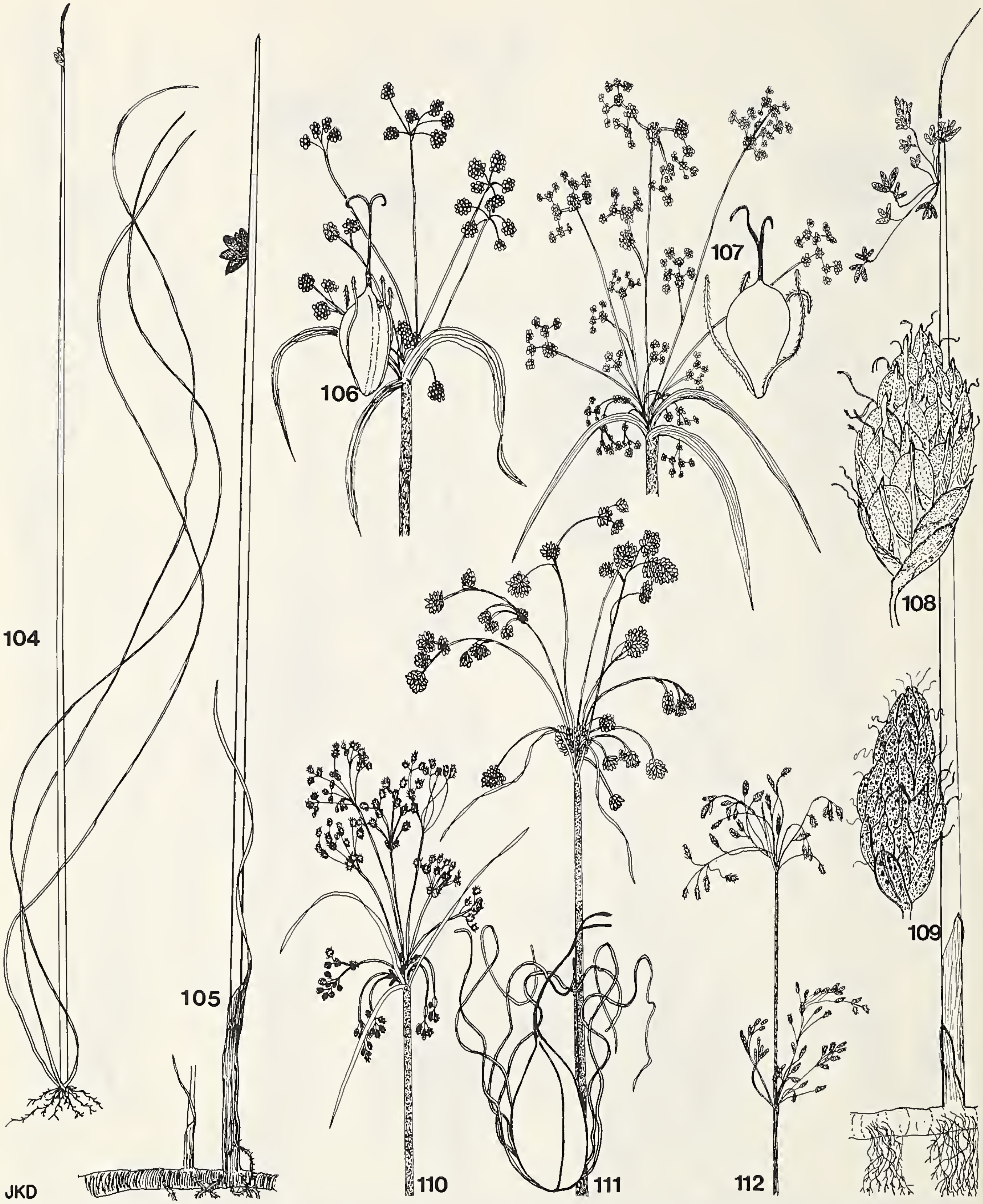


Fig. 104. Scirpus subterminalis; Fig. 105. S. pungens; Fig. 106. S. atrovirens; Fig. 107. S. rubrotinctus; Fig. 108. S. acutus; Fig. 109. S. validus; Fig. 110. S. pedicellatus; Fig. 111. S. cyperinus; Fig. 112. S. pendulus.

CYPERUS GALINGALE

aristatus *(C. inflexus)* Hague; Caldwell

diandrus Harris Bay

rivularis Fig. 96. Harris Bay; Caldwell

strigosus Fig. 95. Bolton Ldg

1. Spikelets pinnately placed .... *C. strigosus*
1. Spikelets radiating
   2. Scales with 7-13 veins .... *C. aristatus*
   2. Scales with 3-5 veins
      3. Pigmentation mostly at summit of scale .... *C. diandrus*
      3. Pigmentation mostly at base of scale .... *C. rivularis*

DULICHIUM

arundinaceum THREE-WAY SEDGE Fig. 100. Northwest Bay; East Lake George marsh; Warner Bay; Dunham Bay

ELEOCHARIS SPIKE RUSH

acicularis Fig. 101.

erythropoda *(E. calva)*

smallii *(E. palustris)* Fig. 102.

1. Styles 3-cleft; achene 3-angled .... *E. acicularis*
1. Styles 2-cleft; achene 2-angled
   2. Spikelets with blunt scales, with one empty basal scale .... *E. erythropoda*
   2. Spikelets with sharp pointed scales, with 2 or 3 empty basal scales .... *E. smallii*

ERIOPHORUM COTTON GRASS

alpinum *(Scirpus hudsonianus)* East Lake George marsh at Brayton

gracile Fig. 97. Harris Bay

vaginatum ssp. **spissum** *(E. callitrix)* Fig. 98. East Lake George marsh; Harris Bay bog mat

virginicum Fig. 99. South of Brayton; Harris Bay bog mat

1. Spikelets grouped into a single cluster
   2. Stem about 0.5 mm in diameter; foliaceous bract 1, ovate; each floret with 6 bristles .... *E. alpinum*
   2. Stem about 1 mm in diameter; foliaceous bract absent; each floret with many bristles .. *E. vaginatum*
1. Spikelets grouped into 2 or more clusters
   3. Leaves 1-2 mm wide, channeled; cluster of spikelets in a loose umbel; foliaceous bract 1, shorter than the umbel .... *E. gracile*
   3. Leaves 2-4 mm wide, flat; cluster of spikelets in a compact umbel; foliaceous bracts 2 or 3; exceeding the umbel .... *E. virginicum*

RHYNCHOSPORA BEAK RUSH

alba Fig. 103. Bolton Ldg; East Lake George

SCIRPUS BULRUSH, WOOLGRASS

acutus HARDSTEM BULRUSH Fig. 108. N end of Lake; Prison I.; Harris Bay

atrocinctus Cotton Pt; Brayton

atrovirens Fig. 106. Lake outlet; Pilot Knob; Harris Bay; Dunham Bay

cyperinus var. **pelius** Fig. 111. Lake outlet; Black Pt; Northwest Bay; Bolton Ldg; Harris Bay

pedicellatus Fig. 110. Cotton Pt. Brayton

pendulus *(S. lineatus)* Fig. 112. Brayton; Harris Bay

pungens *(S. americanus)* THREE-SQUARE Fig. 105. Hearts Bay; Harris Bay

rubrotinctus *(S. microcarpus)* Fig. 107. Pilot Knob; Million Dollar Beach marsh

subterminalis Fig. 104. Northwest Bay; Dunham Bay

validus SOFTSTEM BULRUSH Fig. 109. Lake outlet; Dunham Bay; pond at S end of Lake

1. Involucral leaves one
   2. Spikelets solitary on each stem; stems weak; often with tufts of hairlike leaves .... *S. subterminalis*
   2. Spikelets several; stems rigid
      3. Stems terete

4. Stems firm; scales of spikelet longer than achene; achenes 2.5-3 mm long . . . . *S. acutus*
4. Stems soft; scales about as long as achene; achenes about 2 mm long . . . . *S. validus*
3. Stems triangular . . . . *S. pugens*
1. Involucral leaves 2 or more
5. Stems solitary from a thick rootstock
6. Basal sheaths green; inflorescence once or twice branched; scales of spikelet mucronate; bristles barbed, about as long as achene or absent; achenes 3-angled . . . . *S. atrovirens*
6. Basal sheaths reddish; inflorescence repeatedly branched; scales acute or obtuse or mucronulate; bristles longer than achene, achenes 2-angled . . . . *S. rubrotinctus*
5. Stems in clumps; bristles without barbs
7. Mature bristles little longer than the scales . . . . *S. pendulus*
7. Mature bristles much longer than the scales giving the inflorescence a wooly appearance
8. Spikelets mostly sessile in glomerules of 3-15 . . . . *S. cyperinus*
8. Lateral spikelets mostly stalked
9. Involucels (bracts subtending each spikelet) blackish . . . . *S. atrocinctus*
9. Involucels red-brown or yellow-brown . . . . *S. pedicellatus*

ARACEAE

CALLA
palustris WATER ARUM, WILD CALLA Fig. 113.

PELTANDRA
virginica ARROW ARUM Fig. 114.

SYMPLOCARPUS
foetidus *(Spathyema f.)* SKUNK CABBAGE Fig. 115. Red Rock Bay; Brayton marsh; Dunham Bay

LEMNACEAE

LEMMA DUCKWEED
minor Fig. 119.
trisulca Fig. 121. Lake outlet; Red Rock Bay; Bolton Ldg; Pilot Knob; Warner Bay; Dunham Bay

1. Fronds 2-4 mm long, not stalked, free and floating on the surface . . . . *L. minor*
1. Fronds 6-12 mm long, stalked, mostly attached to the parent plant and sinking below the water surface . . . . *L. trisulca*

SPIRODELA
polyrhiza LARGE DUCKWEED Fig. 120.

ERIOCAULACEAE

ERIOCAULON
septangulare PIPEWORT Fig. 118.

PONTEDERIACEAE

HETERANTHERA
dubia *(Zosterella d.)* WATER STAR GRASS Fig. 117.

PONTEDERIA
cordata PICKERELWEED Fig. 116. *P. c.* forma *taenia* seen at Northwest Bay and Harris Bay

Fig. 113. Calla palustris; Fig. 114. Peltandra virginica; Fig. 115. Symplocarpus foetidus; Fig. 116. Pontederia cordata; Fig. 117. Heteranthera dubia; Fig. 118. Eriocaulon septangulare; Fig. 119. Lemna minor; Fig. 120. Spirodela polyrhiza; Fig. 121. Lemna trisulca.

Fig. 122. Juncus effusus; Fig. 123. J. canadensis; Fig. 124. J. brevicaudatus; Fig. 125. J. acuminatus; Fig. 126. J. marginatus; Fig. 127. J. articulatus; Fig. 128. J. pelocarpus; Fig. 129. J. nodosus; Fig. 130. Iris versicolor.

JUNCACEAE

JUNCUS RUSH

acuminatus *(J. paradoxus)* Fig. 125. Bolton Ldg; S end of Lake
articulatus Fig. 127. Caldwell
brevicaudatus Fig. 124. Sabbath Day Pt; Harris Bay; Lake George village
canadensis Fig. 123. Harris Bay; Dunham Bay
effusus var. **solutus** Fig. 122.
maginatus Fig. 126. Northwest Bay; Bolton; Brayton
nodosus Fig. 129. Bolton Ldg
pelocarpus Fig. 128.

1. Inflorescence appearing lateral . . . . . *J. effusus*
1. Inflorescence terminal
  2. Leaves nodose, having firm cross partitions at regular intervals
    3. Stamens 3
      4. Seeds with tails (whitish tubular extensions of the seed coat)
        5. Seeds, including tails, 1-1.8 mm long; tails ⅔ as long as the body of the seed; flowers 5-50 in each cluster; inflorescence (when well developed) quite broad; flower clusters usually subglobose . . . . . *J. canadensis*
        5. Seeds, including tails, about 1 mm long; tails about one half the body of the seed; flowers 3-7 in each cluster; inflorescence narrow and elongate; flower clusters hemispherical . . . . . *J. brevicaudatus*
      4. Seeds without tails . . . . . *J. acuminatus*
    3. Stamens 6
      6. Flowers borne singly or in pairs or partly replaced by bulblets . . . . . *J. pelocarpus*
      6. Flowers more than 3 in a cluster
        7. Clusters spherical, with 10-25 flowers . . . . . *J. nodosus*
        7. Clusters hemispherical, with 3-11 flowers . . . . . *J. articulatus*
  2. Leaves not nodose
    8. Flowers borne singly or in pairs or partly replaced by bulblets . . . . . *J. pelocarpus*
    8. Flowers in clusters . . . . . *J. marginatus*

IRIDACEAE

IRIS IRIS

pseudacorus YELLOW FLAG Turtle I.; Warner Bay; Dunham Bay
versicolor BLUE FLAG Fig. 130.

1. Flowers blue . . . . . *I. versicolor*
1. Flowers yellow . . . . . *I. pseudacorus*

POLYGONACEAE

POLYGONUM SMARTWEED

amphibium var. **emersum** *(P. coccinium, P. inundatum)* Fig. 132. Black Pt; Dunham Bay; S end of Lake
amphibium var. **stipulaceum** *(P. natans, P. fluitans, P. hartwrightii)* Hague; Big Burnt I.
hydropiper WATER PEPPER Fig. 134. Pilot Knob
pensylvanicum var. **laevigatum** Pilot Knob; Warner Bay
punctatum var. **confertiflorum** Fig. 133. Brayton; Dunham Bay; Million Dollar Beach

1. Plants annual, from a taproot
  2. Flowers with yellow to brownish punctations (glands)
    3. Achene surface dull; flowers with a pinkish tinge . . . . . *P. hydropiper*

3. Achene surface shiny; flowers without pink tinge .... *P. punctatum*

2. Flowers not punctate .... *P. pensylvanicum*

1. Plants perennial with rhizomes or stolons

4. Flowers greenish to cream with glandular dots .... *P. punctatum*

4. Flowers pink to carmine, without glands

5. Inflorescence 3 cm or less in length .... *P. amphibium* var. *stipulaceum*

5. Inflorescence 3 cm or more in length .... *P. amphibium* var. *emersum*

RUMEX

orbiculatus *(R. britannica)* WATER DOCK Fig. 131.
Northwest Bay; Pilot Knob; Harris Bay; Dunham Bay; swamp at Brayton

verticillatus SWAMP DOCK Black Pt; Sabbath Day Pt; south of abandoned road from Cleverdale to Brayton

1. Leaves often slightly reddish, margins crinkled or denticulate; peduncles about as long as mature sepals, with no obvious joint; mature sepals nearly orbicular, 5-8 mm long; achenes about ½ as long as sepals .... *R. orbiculatus*

1. Leaves not reddish, margins not crinkled nor denticulate; peduncles 3 to 4 times as long as mature sepals, with a swollen joint less than a mm from the base; mature sepals 3.5-5 mm long; triangular-ovate; achenes about ⅔ as long as sepals .... *R. verticillatus*

NYMPHAEACEAE

BRASENIA

schreberi WATER-SHIELD Fig. 137. Lake outlet; Northwest Bay;
Warner Bay; Harris Bay; Dunham Bay

NUPHAR YELLOW WATER LILY

luteum subsp. **macrophyllum** *(N. advena, Nymphozanthus a.)* Dunham Bay

luteum subsp. **pumilum** *(N. microphyllum, Ny. m.)* Echo Bay by Rogers Rock; Shelving Rock; Bolton Ldg; Cooper Pt; Dunham Bay

luteum subsp. **variegatum** *(Ny. v.)* Fig. 135.

NYMPHAEA WHITE WATER LILY

odorata (Castalia o.) Fig. 136.

CERATOPHYLLACEAE

CERATOPHYLLUM

demersum COONTAIL Fig. 139.

echinatum Fig. 140. Deep water of Warner Bay

1. Leaf lobes mostly toothed on only one side; fruits with no lateral spines, only 2 basal spines .... *C. demersum*

1. Leaf lobes entire or nearly so; fruits with many lateral spines .... *C. echinatum*

RANUNCULACEAE

CALTHA

palustris MARSH MARIGOLD Fig. 138. Pilot Knob; Dunham Bay

RANUNCULUS BUTTERCUP

flabellaris Fig. 142. Swamp near Brayton; Harris Bay swamp; Dunham Bay

longirostris *(R. circinatus)* Fig. 143.

reptans *(R. flammula)* Fig. 145.

septentrionalis Fig. 144. Marsh along shore, Pilot Knob

1. Leaves linear or linear-lanceolate, not lobed; flowers yellow .... *R. reptans*

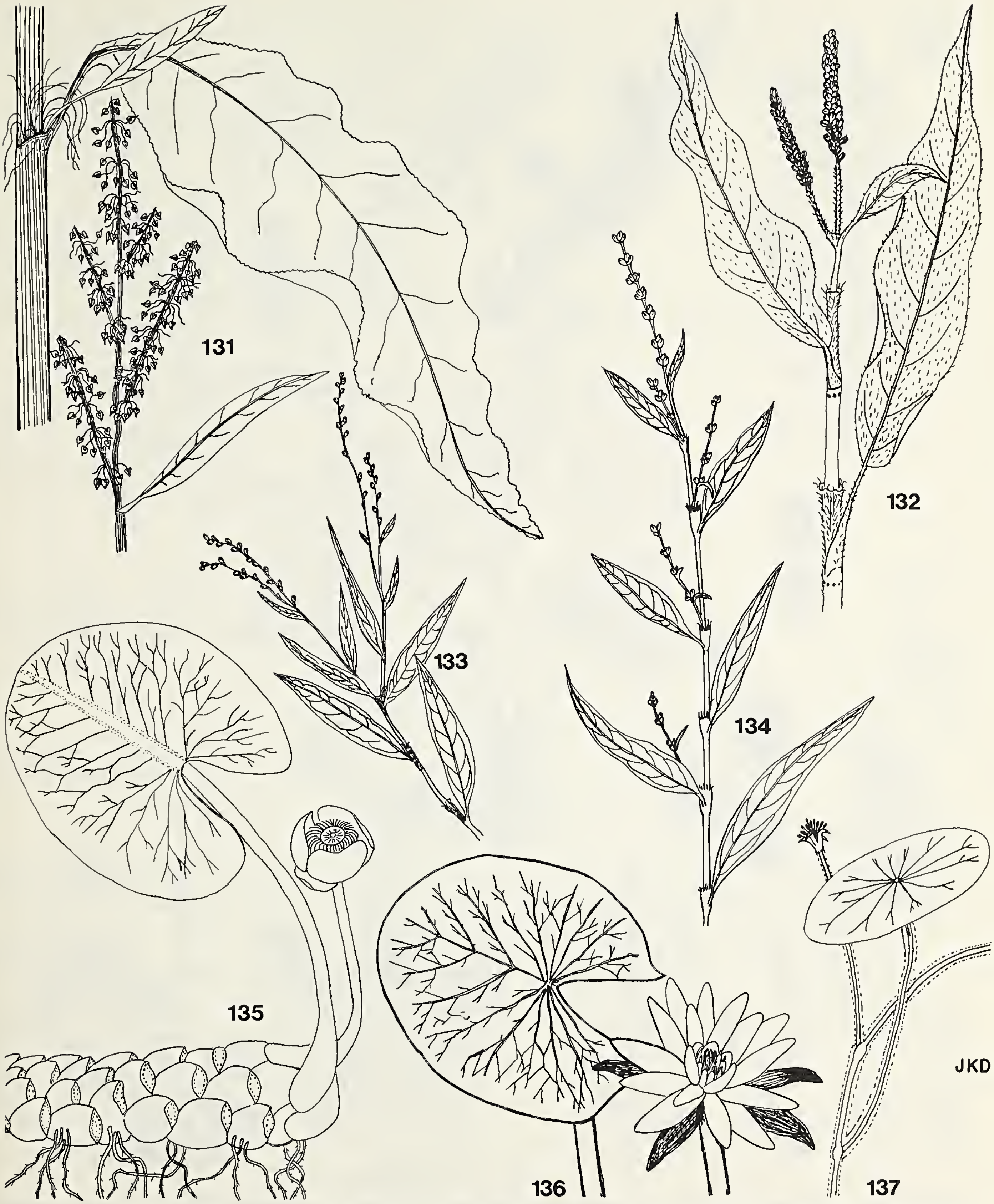


Fig. 131. Rumex orbiculatus; Fig. 132. Polygonum amphibium; Fig. 133. P. punctatum; Fig. 134. P. hydropiper; Fig. 135. Nuphar lutem; Fig. 136. Nymphaea odorata; Fig. 137. Brasenia schreberi.

Fig. 138. Caltha palustris; Fig. 139. Ceratophyllum demersum; Fig. 140. C. echinatum; Fig. 141. Rorippa palustris; Fig. 142. Ranunculus flabellaris; Fig. 143. R. longirostris; Fig. 144. R. septentrionalis; Fig. 145. R. reptans; Fig. 146. Sublaria aquatica; Fig. 147. Sarracenia purpurea; Fig. 148. Drosera rotundifolia.

1. Leaves broad, lobed or finely dissected
  2. Stems flaccid and requiring water for support; submersed leaves dissected 2 or 3 times into slender segments
    3. Flowers yellow; emersed leaves sometimes present .... *R. flabellaris*
    3. Flowers white; emersed leaves absent .... *R. longirostris*
  2. Stems stiff and erect; leaves lobed but all lobes broad .... *R. septentrionalis*

CRUCIFERAE

CARDAMINE BITTER CRESS
pensylvanica Log Bay I.
pratensis CUCKOO FLOWER Bolton Ldg
pratensis subsp. **palustris** Pilot Knob; Cotton Pt; Harris Bay
1. Cauline leaves with terminal leaflet usually wider than the other leaflets; petals white, 1.5-4 mm long .... *C. pensylvanica*
1. Cauline leaves with terminal leaflet usually as wide or narrower than the other leaflets; petals; petals white or pink, 10-15 mm long .... *C. pratensis*

RORIPPA
palustris *(R. islandica, Radicula p.)* YELLOW CRESS Fig. 141. Swamp near Brayton

SUBULARIA
aquatica subsp. **americana** AWLWORT Fig. 146.

SARRACENIACEAE

SARRACENIA
purpurea PITCHER PLANT Fig. 147. Silver Bay; bog mat southwest of Brayton; Harris Bay bog mat

DROSERACEAE

DROSERA SUNDEW
rotundifolia Fig. 148.

SAXIFRAGACEAE

CHRYSOSPLENIUM
americanum GOLDEN SAXIFRAGE Fig. 150. Swamp near Brayton; Dunham Bay; Shelving Rock

PENTHORUM
sedoides DITCH STONECROP Fig. 149. Bolton Ldg; Pilot Knob; Dunham Bay

ROSACEAE

POTENTILLA
palustris MARSH CINQUEFOIL Fig. 151.

CALLITRICHACEAE

CALLITRICHE WATER STARWORT
verna *(C. palustris)* Fig. 152. Lake outlet; Paradise Bay; Northwest Bay; Dunham Bay

Fig. 149. Penthorum sedoides; Fig. 150. Chrysosplenium americanum; Fig. 151. Potentilla palustris; Fig. 152. Callitriche verna; Fig. 153. Hypericum boreale; Fig. 154. H. punctatum; Fig. 155. Triadenum fraseri.

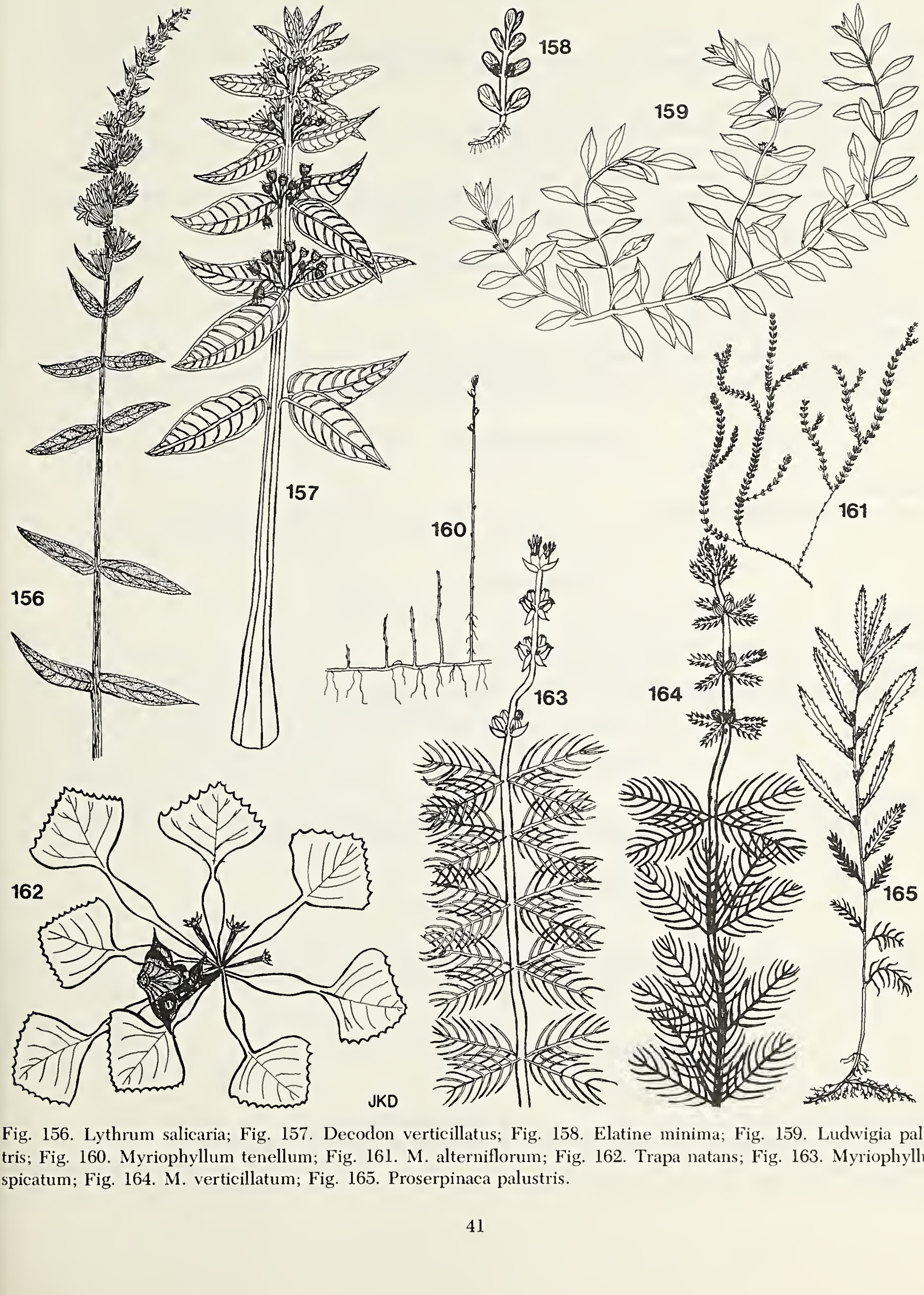


Fig. 156. Lythrum salicaria; Fig. 157. Decodon verticillatus; Fig. 158. Elatine minima; Fig. 159. Ludwigia palustris; Fig. 160. Myriophyllum tenellum; Fig. 161. M. alterniflorum; Fig. 162. Trapa natans; Fig. 163. Myriophyllum spicatum; Fig. 164. M. verticillatum; Fig. 165. Proserpinaca palustris.

HYPERICACEAE

HYPERICUM ST. JOHN'S-WORT

boreale Fig. 153. Northwest Bay; Kattskill Bay; Harris Bay; Dunham Bay
ellipticum Harris Bay
mutilum Hermit I.; Speaker Heck I.; Dunham Bay
punctatum Fig. 154. Pilot Knob; Brayton; Dunham Bay

1. Stems and often the flowers with black dots; fruit 3-celled .... *H. punctatum*
1. Stems and flowers without black dots; fruit 1-celled
   2. Leaves with veins originating at intervals along the midrib; stamens many .... *H. ellipticum*
   2. Leaves with veins originating at the base of the blade; stamens 12 or less
      3. Bracts of inflorescence resembling stem leaves .... *H. boreale*
      3. Bracts of inflorescence much smaller than stem leaves .... *H. mutilum*

TRIADENUM MARSH ST. JOHN'S-WORT

fraseri (*Hypericum virginicum* var. *f.*) Fig. 155.
virginicum (*Hypericum v.*) Dunham Bay

1. Sepals ovate-lanceolate, acute, 5-7 mm long; style 2-3 mm long .... *T. fraseri*
1. Sepals oblong or elliptic, obtuse, 2.5-5 mm long; style 0.5-1.3 mm long .... *T. virginicum*

ELATINACEAE

ELATINE

minima WATERWORT Fig. 158.

LYTHRACEAE

DECODON

verticillatus var. **laevigatus** WATER WILLOW Fig. 157.

LYTHRUM

salicaria PURPLE LOOSESTRIFE Fig. 156. Warner Bay; Harris Bay

ONAGRACEAE

LUDWIGIA

palustris var. **americana** WATER PURSLANE Fig. 159. Northwest Bay; Pilot Knob

HYDROCARYACEAE

TRAPA

natans WATER CHESTNUT Fig. 162. Dunham Bay (a few specimens seen and destroyed by State personnel; none found during past few years)

HALORAGACEAE

MYRIOPHYLLUM WATER MILFOIL

alterniflorum Fig. 161.
spicatum subsp. **exalbescens** Fig. 163. Lake outlet; Warner Bay; Harris Bay; Dunham Bay
tenellum Fig. 160.
verticillatum Fig. 164. Lake outlet; Dunham Bay

1. Leaves not dissected, scales minute or absent .... *M. tenellum*
1. Leaves pinnately dissected
  2. Submersed leaves 3-10(-12) mm long; flowers alternate .... *M. alterniflorum*
  2. Submersed leaves 10-50 mm long; flowers whorled
    3. Bracts shorter than the flowers and fruits; not lobed; stems often whitish on drying .... *M. spicatum*
    3. Bracts mostly longer than the flowers, deeply lobed; stems remaining greenish or brownish .... *M. verticillatum*

PROSERPINACA

palustris var. **creba** MERMAID WEED Fig. 165. Brayton

UMBELLIFERAE

CICUTA WATER HEMLOCK

bulbifera Fig. 166.

maculata Fig. 167; Turtle I.; Big Burnt I.; Log Bay I.; Pilot Knob; Harris Bay; Dunham Bay

1. Leaflets linear, 1-5 mm wide; leaves usually with bulblets in the axils .... *C. bulbifera*
1. Leaflets lanceolate to ovate-oblong, 5-20 mm wide; leaves without bulblets .... *C. maculata*

HYDROCOTYLE

americana WATER PENNYWORT Fig. 169. Northwest Bay; Shelving Rock; Pilot Knob; Dunham Bay

SIUM

suave WATER PARSNIP Fig. 168. Lake outlet; N end of Lake; Red Rock Bay; Northwest Bay; Uncas I.; Warner Bay; Harris Bay

PRIMULACEAE

LYSIMACHIA

nummularia MONEYWORT Fig. 170. Smith Bay; Paradise Bay; Big Burnt I.

terrestris SWAMP CANDLE Fig. 172. Little Harbor I.; Oval I.; Log Bay I.; Pilot Knob; Speaker Heck I.; Lake George village; Harris Bay

thyrsiflora *(Naumburgia t.)* TUFTED LOOSESTRIFE Fig. 173. Lake outlet; Sabbath Day Pt.; Northwest Bay; Bolton Ldg; Brayton

1. Stems creeping; flowers solitary in the axils .... *L. nummularia*
1. Stems erect; flowers in racemes
  2. Racemes terminal; petioles without fringe of hairs .... *L. terrestris*
  2. Racemes axillary; petioles with fringe of hairs .... *L. thyrsiflora*

GENTIANACEAE

MENYANTHES

trifoliata var. **minor** BUCKBEAN Fig. 171. Northwest Bay swamp; Harris Bay swamp; Dunham Bay marsh

NYMPHOIDES

cordatum *(Trachysperma lacunosa)* FLOATING-HEART Fig. 176. Harris Bay (reported by House in 1941, no voucher)

ASCLEPIADACEAE

ASCLEPIAS

incarnata SWAMP MILKWEED Fig. 174.

Fig. 166. Cicuta bulbifera; Fig. 167. C. maculata; Fig. 168. Sium suave; Fig. 169. Hydrocotyle americana; Fig. 170. Lysimachia nummularia; Fig. 171. Menyanthes trifoliata; Fig. 172. Lysimachia terrestris; Fig. 173. L. thyrsiflora; Fig. 174. Asclepias incarnata; Fig. 175. Myosotis scorpioides; Fig. 176. Nymphoides cordatum.

Fig. 177. Lycopus uniflorus; Fig. 178. Mentha arvensis; Fig. 179. Mimulus ringens; Fig. 180. Scutellaria galericulata; Fig. 181. S. lateriflora; Fig. 182. Solanum dulcamara; Fig. 183. Chelone glabra; Fig. 184. Gratiola neglecta; Fig. 185. Lindernia dubia; Fig. 186. Veronica scutellata.

BORAGINACEAE

MYOSOTIS

scorpioides FORGET-ME-NOT, SCORPION GRASS Fig. 175.

LABIATAE

LYCOPUS

americanus WATER HOREHOUND Northwest Bay; Bass I.; Uncas I.; Hermit I.; Clark I.; Little Harbor I.; Perch I.; Pilot Knob; Speaker Heck I.

uniflorus BUGLEWEED Fig. 177. Northwest Bay; Bass I.; Gull Rock I.; Hermit I.; Crow I.; Sarah I.; Speaker Heck I.; Brayton; Harris Bay; Dunham Bay

virginicus bugleweed Perch I.; Log Bay I.; Dunham Bay

1. Leaves usually lobed; sepals with rigid spine at apex .... *L. americanus*
1. Leaves with coarse teeth but not lobed; sepals with apical spines
   2. Plants with tubers; fruits clusters 4-9 mm wide .... *L. uniflorus*
   2. Plants without tubers; fruit clusters 8-15 mm wide .... *L. virginicus*

MENTHA MINT

arvensis var. **canadensis** Fig. 178.

SCUTELLARIA SCULLCAP

galericulata var. **pubescens** *(S. epilobiifolia)* Fig. 180. Hague; Turtle I.; Speaker Heck I.; Harris Bay; Dunham Bay

lateriflora Fig. 181. Big Burnt I.; Uncas I.; Gull Rock I.; Sarah I.; Hermit I.; Pilot Knob; Harris Bay

1. Petioles 1-4 mm long; flowers borne singly in the leaf axils .... *S. galericulata*
1. Petioles 5-20 mm long; flowers in racemes in the axils .... *S. lateriflora*

SOLANACEAE

SOLANUM

dulcamara BITTERSWEET NIGHTSHADE Fig. 182.

SCROPHULARIACEAE

CHELONE

glabra TURTLEHEAD Fig. 183. Northwest Bay; Montcalm Pt.; Brayton; Dunham Bay

GRATIOLA

neglecta *(G. virginiana)* HEDGE HYSSOP Fig. 184. Green Island; Bolton Ldg; Harris Bay

LINDERNIA

dubia subsp. major *(Ilysanthes d.)* FALSE PIMPERNEL Fig. 185. Harris Bay

MIMULUS

ringens MONKEY FLOWER Fig. 179. Dunham Bay

VERONICA

scutellata MARSH SPEEDWELL Fig. 186. Uncas I.; Speaker Heck I.; Brayton; Dunham Bay; Bloody Pond

LENTIBULARIACEAE

UTRICULARIA BLADDERWORT

intermedia Fig. 189. Northwest Bay; Bolton Ldg; Harris Bay; Dunham Bay

Fig. 187. Utricularia resupinata; Fig. 188. U. minor; Fig. 189. U. intermedia; Fig. 190. U. vulgaris; Fig. 191. Campanula aparinoides; Fig. 192. Galium palustre; Fig. 193. G. trifidum; Fig. 194. Lobelia cardinalis; Fig. 195. L. dortmanna.

Fig. 196. Aster puniceus; Fig. 197. A. lateriflorus; Fig. 198. Solidago graminifolia; Fig. 199. Eupatorium maculatum; Fig. 200. E. perfoliatum; Fig. 201. Bidens frondosa; Fig. 202. B. beckii.

minor Fig. 188. Lake outlet; Harris Bay; Dunham Bay
resupinata Fig. 187.
vulgaris subsp. **americana** *(U. macrorhiza)* Fig. 190.

1. Stems erect from a rooted base; bladders absent or poorly developed .... *U. resupinata*
1. Stems floating in the water, sometimes rooted; bladders commonly found in finely dissected leaves
   2. Stems 0.5 or more mm thick; leaf segments terete, without a midrib; plants free floating .... *U. vulgaris*
   2. Stems less than 0.5 mm thick; leaf segments flattened, with a midrib; plants creeping on the bottom in shallow water
      3. Bladders on stem separate from leaves; margins of terminal leaf segments minutely spiny; corolla spur nearly as long as lower lip .... *U. intermedia*
      3. Bladders on leaves; margins of leaf segments entire; corolla spur short .... *U. minor*

RUBIACEAE

GALIUM BEDSTRAW
palustre Fig. 192. Lake outlet; Perch I.; Pilot Knob; Speaker Heck I.; Lake George village
trifidum subsp. **tinctorium** Fig. 193. Northwest Bay; Bolton Ldg; Bloody Pond

1. Flowers in much-branched clusters .... *G. palustre*
1. Flowers mostly in groups of three .... *G. trifidum*

CAMPANULACEAE

CAMPANULA MARSH BELLFLOWER
aparinoides Fig. 191. Northwest Bay; Harris Bay; Dunham Bay

LOBELIA
cardinalis CARDINAL FLOWER Fig. 194. Gull Bay; Pilot Knob; Brayton
dortmanna WATER LOBELIA Fig. 195. Juniper I.; Cooks Bay; Forest Bay; Hague; Smith Bay; Bluff Head; Bolton Ldg; Huddle Bay; Dome I.; Phelps I.; Gem I.
siphilitica BLUE LOBELIA Marsh near shore; Bolton Ldg

1. Leaves in a basal rosette, fleshy .... *L. dortmanna*
1. Leaves on the stem, flat
   2. Flowers red .... *L. cardinalis*
   2. Flowers blue .... *S. siphilitica*

COMPOSITAE

ASTER ASTER
junciformis *(A. junceus)* Dunham Bay
lateriflorus CALICO ASTER Fig. 197. Northwest Bay; Little Harbor I.; Uncas I.; Oahu I.; Crow I.; Sarah I.; Bolton Ldg; Dunham Bay
puniceus PURPLE-STEM ASTER Fig. 196. Pilot Knob; Brayton
simplex *(A. paniculatus)* Bolton Ldg; Brayton; Harris Bay

1. Stem leaves clasping .... *A. puniceus*
1. Stem leaves not clasping
   2. Bracts of the involucre nearly equal in length; leaves more than 15 times as long as wide .... *A. junciformis*
   2. Bracts unequal in length; leaves seldom more than 12 times as long as wide
      3. Leaves pubescent beneath, at least along the midrib; lobes of the disk corollas ½ to ¾ as long as the tube; flower heads mostly on one side of the branch .... *A. lateriflorus*

3. Leaves glabrous; lobes of the disk corollas 1/5 to 1/2 as long as the tube; flower heads on all sides of the branch .... *A. simplex*

BIDENS BEGGAR TICKS, BUR MARIGOLD

beckii *(Megalodonta b.)* WATER MARIGOLD Fig. 202.

comosa *(B. tripartita)* Northwest Bay; Brayton; Harris Bay

frondosa Fig. 201. Northwest Bay; Mohican I.; Pilot Knob; Brayton; Harris Bay; Dunham Bay

vulgata Bolton Ldg

1. Aquatic plants with filiform-dissected submersed leaves; achenes terete .... *B. beckii*
1. Subaquatic plants without filiform-dissected leaves; achenes flattened or quadrangular
   2. Leaves simple, unlobed to 3-lobed, terminal lobe without an evident stalk .... *B. comosa*
   2. Leaves compound, terminal leaflet with an evident petiolelike stalk
      3. Disk flowers orange; outer elongated bracts 5-10, sparingly ciliate .... *B. frondosa*
      3. Disk flowers yellow; outer bracts 10-20, copiously hispid .... *B. vulgata*

EUPATORIUM

fistulosum *(E. maculatum,* in part*)* JOE-PYE-WEED Bolton Ldg; Pilot Knob

maculatum *(E. bruneri)* JOE-PYE-WEED Fig. 199. Bolton Ldg; Brayton

perfoliatum BONESET Fig. 200. Pilot Knob; Dunham Bay

1. Leaves opposite, connate-perfoliate; flowers whitish .... *E. perfoliatum*
1. Leaves whorled; flowers purplish
   2. Inflorescence flat-topped; stem not glaucous; florets 8-20 .... *E. maculatum*
   2. Inflorescence convex; stem glaucous .... *E. fistulosum*

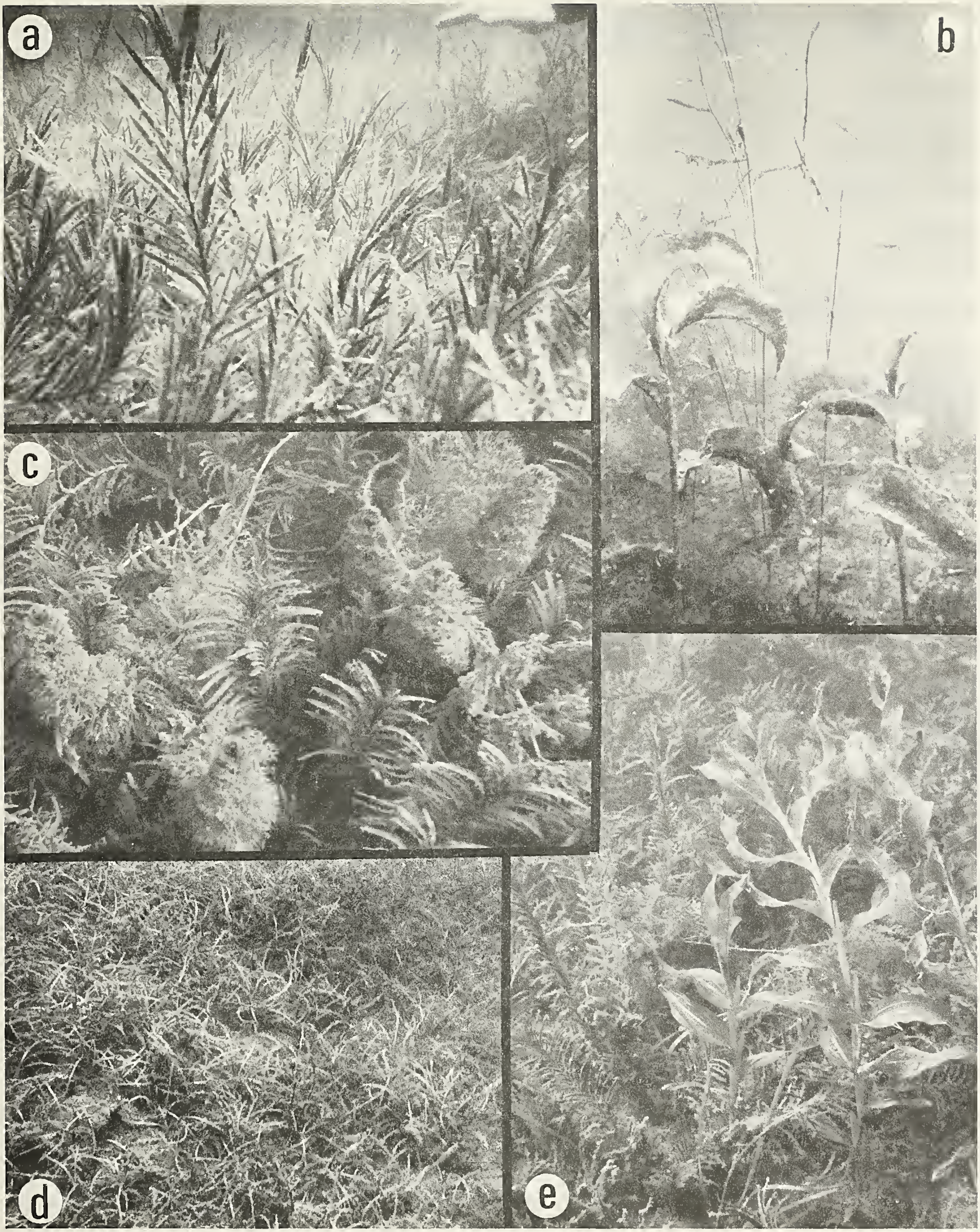
SOLIDAGO

graminifolia FLAT-TOPPED GOLDENROD Fig. 198. Big Burnt I.; Crow I.; Pilot Knob; Brayton; S end of Lake

DEPTH DISTRIBUTION DATA

Detailed underwater surveys were made to record the occurrence of species growing at water depths ranging from 1 to 12 meters. Underwater observations were made during the summers of 1973 and 1974 at 44 different sites in the lake. The location of these sites are shown on the map on page 2. The occurrence of species is given in tabular form starting at the most northerly site and moving south. The depths routinely observed were 1, 2, 3, 5, 7, and 9 meters. In this presentation, only presence or absence of a given species is scored; no information is given as to its abundance. Thirty-one species were observed most frequently in the lake and their presence is recorded in the following tables. This does not represent the total number of species growing in water at greater depths than 1 meter. Submergent macrophytes sighted infrequently are not listed in the survey. Presence of a species is scored for each depth listed above. If the notation is hyphenated (for example: 1-3), the plant was present inclusively between those depths (at 1, 2, and 3 meters). If the notation is given with a comma or "and" (for example: 1,3 or 1 & 3), the plant was observed at those depths only and not at a depth inbetween (absent at 2 meters). Species growing at depths less than 1 meter and emergent were not scored in the survey. These include species of the following genera: *Nuphar*, *Nymphaea*, *Sagittaria*, *Scirpus*, *Sparganium*, and *Typha*.

The procedure for surveying was as follows: all underwater observations were made by R. B. Sheldon using self-contained breathing apparatus. Routinely observations started at the 1-meter depth and a transect approximately 5 meters wide was traversed to the 12-meter depth. Observations were made directly underwater. Species of uncertain taxonomic position were taken from the water for closer examination. It is important to note that a thorough underwater survey was not possible at each site. Each survey as described above took between 20 to 30 minutes to complete. Any omission from the list, therefore, does not necessarily mean the plant was not present at a given site.



Growth habits of common submergent macrophytes found in Lake George.

a: *Potamogeton robbinsii* (7m); b: *P. amplifolius* and *P. gramineus* (3m); c: *Bidens beckii* and *P. robbinsii* (5m); d: *Isoetes macrospora* (9m); e: *P. praelongus* and *P. robbinsii* (5m).

	East of Howes Ldg	Between Black Pt & Spencer Pt	Hearts Bay	Weeds Bay	West of Juniper Island	Cooks Bay	North of Anthony's Nose
Bidens beckii	2	1-3	1&5		2	3	
Elatine minima	1						
Elodea canadensis	2	1-2	5&7		2&7	1&5	9
Eriocaulon septangulare	1	1	1-3	2	2	2	2
Heteranthera dubia	2	1					
Isoetes							
echinospora		1		3	2	1&3	2
macrospora			5	5-7	5-7	5-7	3-5
Juncus pelocarpus	1-2	1	1-3	2			3
Lobelia dortmanna					2	2	
Myriophyllum							
alterniflorum			1		2	2-3	3-5
tenellum	1	1	1-2	2	2	1-2	1-2
Najas flexilis	1-2	1-3	1-7	1-7	2-3	2-5	1-5
Potamogeton							
alpinus							
amplifolius	1-2	1-3	1-5	2	3	3-5	
crispus							
epihydrus							
gramineus	1-2	1-3	1-3	1-5	2-3	1-5	1-5
illinoensis		2-3		3&7			
pectinatus			3				
perfoliatus	1-2	1-3	1-5	2-5	3	5	
praelongus			3	3-5			
pusillus	2	2-3	1-5	1-3	3	2-3	1-3
robbinsii	1-2	1-3	1-5	2-7	5-7	2&5	5
spirillus							
zosteriformis		2-3					
Ranunculus longirostris	2	1-2	1				
Sagittaria graminea	1-2	1-2	2				
Subularia aquatica							
Utricularia resupinata	1		1-3	2	2		1-2
Vallisneria americana	1-2	1-3	1-7	1-7	3	2	1-3

	Forest Bay	Blairs Bay	Hague	Gull Bay	Smith Bay	Arcady Bay	Lamb Shanty Bay
Bidens beckii		3-5	3-5		2-7	3	
Elatine minima		1		1		1	
Elodea canadensis	5	1&5	1&5	1&3	1-9	7-9	
Eriocaulon septangulare		1	1	1	1	1	1
Heteranthera dubia				1-2	1-3		
Isoetes							
echinospora	5	2		2&5	1-2		1-3
macrospora	7	7-8	5-7	5-6	7	3-7	5-7
Juncus pelocarpus			2			1	2
Lobelia dortmanna	2						2
Myriophyllum							
alterniflorum	5	3-5	5	1	1-2		3
tenellum	3	1		1-2	1-2	1-3	1
Najas flexilis	2-7	1-7	2-7	1-3,7	1-7	2-7	1-9
Potamogeton							
alpinus							
amplifolius	5-6	2-5	3-7	3	1-6	3-5	
crispus				1	1		3
epihydrus							
gramineus	3-5	1-5	1-5	1-3	1-3	1-5	1-3
illinoensis							
pectinatus						1-2	
perfoliatus	5	2-5	1-5	1-2	2-5	3-5	2-5
praelongus		5		5	3-5	5	
pusillus	5-7	2-7	3	1-2	1-7	3-5	1-9
robbinsii	7-9	2-7	3-7	1-7	2-8	3-7	3-9
spirillus				1			3-5
zosteriformis					5		
Ranunculus longirostris				1			
Sagittaria graminea				1	1-2		
Subularia aquatica				1	2	2	
Utricularia resupinata	1-3	2	2	1		1-2	1
Vallisneria americana	2&7	2-5	1-6	1-5	1-6	3-5	2-5

	Silver Bay	Bluff Head	Sabbath Day Point	Huletts Ldg	Davis Bay	Kitchal Bay	Mother Bunch Islands
Bidens beckii				3-5		3	
Elatine minima		1			1		1
Elodea canadensis	1&7	1-5		3-6		7	5-7&12
Eriocaulon septangulare		1		2	1	1	1
Heteranthera dubia	1	2		2-3		3	
Isoetes							
echinospora	1-3		1-2	6	1&3	2-5	
macrospora	5-9		7	4-7	5-6	5-7	1-7
Juncus pelocarpus	3						
Lobelia dortmanna							
Myriophyllum							
alterniflorum				1-3	1-3		3
tenellum	1	1-3			1	1	1
Najas flexilis	1-9	2-7	1-7	2-9	1-7	1-7	2-3&8
Potamogeton							
alpinus							
amplifolius	2&5			2-5		2-5	3
crispus							
epihydrus							
gramineus	1-7	1-3	1-7	2-7	1-5	1-3	1-3
illinoensis							
pectinatus							
perfoliatus	1,5-7	2	5	2-6	2	3-5	3
praelongus			5	2-3&7		3-5	
pusillus	5-7	2-3&7	1&5-7	2-6	2-5	1-7	2-7
robbinsii	5-7	3-7	5-7	2-7		2-7	
spirillus							
zosteriformis							
Ranunculus longirostris	1	2		3			
Sagittaris graminea	3						
Subularia aquatica						1	
Utricularia resupinata	1-2		2			1	
Vallisneria americana	2&5-7	1-3	3	2-6		1-3	

	Black Mountain Point	French Point	Red Rock Bay	The Narrows	North end Northwest Bay	Walker Point	West side Tongue Mt.
Bidens beckii	1		5	5	3-5		
Elatine minima	1			1-2		1	1
Elodea canadensis		2	5&9	7&10		1&7	5-7
Eriocaulon septangulare	1	1-2	1	1-2	1	1	1
Heteranthera dubia		2	2-3	2-3	3		2
Isoetes							
echinospora	3	2&5	1&3	1&3-5	1-5	3-5	1-3
macrospora	5-8	3-7	3-7	1-7	3-7	5-7	5-7
Juncus pelocarpus				1-3			
Lobelia dortmanna							
Myriophyllum							
alterniflorum			3	3			
tenellum			1	3	2	1-2	1
Najas flexilis	2-5	2-5&9	1-7	1-7	2&5	1-5	1-5&9
Potamogeton							
alpinus							
amplifolius		3	3	3-5	2-3		3
crispus							
epihydrus							
gramineus	1-3	2-5	1-2	1-5	2-5	1-5	1-2&5
illinoensis							
pectinatus							
perfoliatus	3-5		2-5	2-5	2		1&3
praelognus		5	5	5	2		3
pusillus	2-7	5&9	2-5	1-7	2-7	1-5	2-3&7
robbinsii	5-7	5-7&10	1-9	2-7	3-9	7-9	2-9
spirillus							
zosteriformis					3		
Ranunculus longirostris	1	2			3		
Sagittaria graminea		1		1	1		
Subularia aquatica	1					1-2	1
Utricularia resupinata			1			1-2	2-3
Vallisneria americana	2-5	2-5	1-5	2-5	2-5	1	2-5

	Montcalm Point	Green Island	Shelving Rock Bay	Huddle Bay	Dome Island	Phelps Island	Point Comfort Bay
Bidens beckii	2	3-5		2-3			1-3
Elatine minima	1	1-2			1-2		1
Elodea canadensis	3-7	2-7	7-9	1-3	1-2		1-8
Eriocaulon septangulare	1-2	2	1		1-2		1
Heteranthera dubia	2-3	2-3			1-5		1-3
Isoetes							
echinospora	3-7		1	3	1-2	1-3	
macrospora	5-7	5-7		7-8	7	5-8	3-8
Juncus pelocarpus	1-2						
Lobelia dortmanna				1	1	1-2	
Myriophyllum							
alterniflorum	1-3				1-2	2	1
tenellum	3	2-3			1-2		
Najas flexilis	1-3	1&3-5	1-2&5	1&3-5	1-7	2-5	2-5
Potamogeton							
alpinus							
amplifolius	2-5			2-5			3-5
crispus							
epihydrus							
gramineus	1-3	2-3	1-3	1-5	1-5	2-5	1-3
illinoensis							
pectinatus			1				
perfoliatus	2&5	3-5	2-5	1-5	2-5	4-5	1-3
praelongus			5	5			3-5
pusillus	1-7	1-5	5	1-7	1-5	4-5	1-3
robbinsii	2-5	5-7	3-9	1-7	5-7		1-3
spirillus							
zosteriformis			3-5	1-5			
Ranunculus longirostris		3		1-2&5			1-3
Sagittaria graminea		1-3	1	1-2			1
Subularia aquatica	1						1-2
Utricularia resupinata	2-3						1
Vallisneria americana	2-5	2-5	2	1-5	1-7		1-5

	Boon Bay	Sandy Bay	Warner Bay & Cove	Harris Bay	Dunham Bay	Orcutt Bay
Bidens beckii	1-3	5	1-3	3		
Elatine minima	1		1			
Elodea canadensis	1-3&9	5	1-5	1,3-5	1-5	1
Eriocaulon septangulare	1		1			1
Heteranthera dubia	1-3	5		1-2	1	
Isoetes						
echniospora			3			
macrospora		5	3&5	3		
Juncus pelocarpus						
Lobelia dortmanna						
Myriophyllum						
alterniflorum						
tenellum	2					
Najas flexilis	1-5	2-5	1-3	1-2	1&5	1
Potamogeton						
alpinus			1			
amplifolius	2-3	3-5	2-5	2-5	2-3	
crispus						
epihydrus				1		
gramineus	1-2	2-3	1-3	1-3	1	1-3
illinoensis			5			
pectinatus					1	
perfoliatus	1-3	2-5	1-3	1-3	1&5	1
praelongus		5-6	2-5	2-6	2-5	
pusillus	1-7	3-5	1-7	1,3-5	5	1&3
robbinsii	1-5	2-6	1-7	1-7	3-5	
spirillus	1					
zosteriformis			2-3		1&5	3
Ranunculus longirostris	1		2	3		
Sagittaria graminea			1-3	1-3	1	1
Subularia aquatica	1					
Utricularia resupinata	1	1			1	2-3
Vallisneria americana	1-5	2-6	1-5	1-5	1-5	1-2

	Diamond Island	Tea Island	Lake George Village
Bidens beckii		3	3
Elatine minima		1-2	
Elodea canadensis	1&5-10	2-7	3-10
Eriocaulon septangulare		1	
Heteranthera dubia	2-3	2	3
Isoetes			
echinospora		2	
macrospora	5	2-7	5-6
Juncus pelocarpus			
Lobelia dortmanna			
Myriophyllum			
alterniflorum	2-3		
tenellum		1	
Najas flexilis	1-5	2-5	3
Potamogeton			
alpinus			
amplifolius		5	
crispus		2	
epihydrus			
gramineus	1-5	2-3	
illinoensis			
pectinatus			
perfoliatus	1-3	2-3	
praelongus		3-6	
pusillus	1-5	2-7	3
robbinsii		2-7	3-7
spirillus			
zosteriformis		2-3	
Ranunculus longirostris		2-3	3
Sagittaria graminea		2	3
Subularia aquatica			
Utricularia resupinata		1	
Vallisneria americana	2	2-5	3

GLOSSARY

achene: a small, dry fruit with a single seed that is free from the fruit wall. The fruit wall does not open naturally to release the seed.
acute: pointed or forming less than a right angle.
adnate: unlike parts united or fused together. See **connate.**
alternate: any arrangement of parts that are not opposite or whorled.
anther: that portion of the stamen in which the pollen grains are formed.
apex: the tip or extreme end.
arcuate: curved or arched.
aroid: pertaining to a member of the arum family (Araceae).
auricle: an earlike lobe or appendage.
awl-shaped: gradually tapering from the base to a slender point.
awn: a long stout or stiff bristle.
axil: the upper angle between an organ and its axis such as a leaf attached to a stem.
basifixed: attached by the base or lower end.
berry: a fruit which, except for the seeds, is completely fleshy.
bilaterally symmetrical: with two vertical planes of symmetry.
bisexual: having both sexes in the same flower.
bladder: an inflated structure.
blade: the expanded portion of a leaf as distinct from the petiole.
bract: a small leaf, usually subtending a part of an inflorescence.
bristle: a stiff hair.
calyx: the outer part of a flower, composed of sepals.
capsule: a dry fruit formed from two or more carpels, which open at maturity exposing the seeds.
carpel: a single modified seedbearing leaf that alone or fused to others forms a fruit.
caryopsis: similar to an achene but with the seed coat fused to the fruit wall. Found only in the grasses.
cauline: pertaining to the stem.
centimeter: ten millimeters or two-fifths of an inch.
ciliate: with marginal hairs or bristles.
clavate: gradually enlarged upward. Shaped like a club.
compound: formed of a number of similar parts, as a leaf made up of two or more leaflets or a fruit of two or more carpels.
connate: similar parts united or fused together. See **adnate.**
cordate: heart-shaped.
coriaceous: leathery.
corolla: the petals of a flower.
culm: the stem of a grass or a sedge.
cyme: a somewhat flat-topped cluster of flowers in which the central flowers open slightly in advance of the outer ones.
decumbent: reclining but with tip usually ascending.
decurrent: extending down the stem from the point of attachment.
dehiscent: process of opening which releases pollen or seeds.
dentate: with teeth projecting at right angles, such as on a leaf margin.
denticulate: finely dentate.
dioecious: having male and female sex organs on separate individuals, such as pollen produced by one plant, seeds by another.
disk: an enlargement of the tip of the peduncle bearing the tiny flowers in the family Compositae.
dissected: divided into narrow segments.
dorsal: the back or outer side.
embryo: the rudimentary plant within a seed.
emersed: extending above the water surface.
endocarp loop: the tissue that projects as a fold into the center of the fruit of *Potamogeton.*

entire: with an unbroken or even margin, without teeth or other indentations, such as the smooth margin of a leaf.
fertile: productive. Capable of producing seeds, pollen, or spores.
filamentous: like a thread.
filiform: threadlike. Long and slender.
flaccid: limp.
floret: a tiny flower. Usually used to indicate a flower in a cluster of flowers.
foliaceous: having leaves.
follicle: a dry fruit of one carpel that splits on one side.
frond: the leaf of a fern. Sometimes used to describe the plant body in the Lemnaceae.
fruit: a mature ovary with enclosed seeds; sometimes including other adherent parts.
glabrous: without hairs, bristles, or scales.
glandular: having secreting organs or glistening bodies.
glaucous: covered with a powdery bloom, which is easily rubbed off.
glomerule: a small compact, more or less rounded cluster.
glume: one of a pair of empty scalelike bracts at the base of a grass spikelet.
head: a dense inflorescence of sessile or subsessile flowers on a short or broadened axis.
hispid: having stiff, bristly hairs.
indehiscent: not opening. See **dehiscent.**
inflorescence: a flower cluster.
internode: portion of a stem between nodes.
interstitial: referring to the space between particles.
involucel: a secondary involucre that subtends a part of an inflorescence.
involucre: a whorl of bracts subtending an inflorescence.
keel: a prominent ridge.
lacuna: a large intercellular cavity.
lanceolate: lance-shaped, much longer than wide, widest below the middle and tapering to the apex.
leaflet: one of the divisions of a compound leaf.
lemma: a bract that usually encloses a flower in the spikelet of grasses.
lenticular: lens-shaped, biconvex with two edges.
ligule: a strap-shaped corolla bract of some flowers in the family Compositae. A membranaceous appendage at the juncture of the blade and sheath of grasses and similar plants.
linear: narrow with parallel sides.
littoral: along the shore.
lobe: a partial division of a plant organ, such as a deeply cut part of a leaf, petal, etc.
megaspore: a female spore, usually the larger when both male and female spores are produced.
membranous: thin, flexible and more or less translucent.
-merous: a suffix which taken with a numerical prefix indicates the number of each of the floral parts.
midrib: the middle vein of a leaf or other structure.
millimeter: one-tenth of a centimeter or one twenty-fifth of an inch.
monoecious: having pollen and seeds in separate flowers, but on the same plant.
mucronate: a short, sharp point at the tip of a rounded apex.
node: position on the stem where a leaf, a bud, or a branch is attached.
nodose: knotty, knobby, or having prominent nodes.
nutlet: a small nut. Often used to include any small, thick-shelled, seedlike fruit.
obovate: inverted ovate, egg-shaped with the attachment at the smaller end.
obtuse: blunt, usually forming more than a right angle.
ocrea: a stipular sheath surrounding the stem.
opposite: two parts at a node on opposing sides of a node.
ovary: the basal portion of a pistil containing one or more seeds.
ovate: egg-shaped with the attachment at the larger end.
palmate: with parts diverging from a common base, as fingers of a hand.

panicle: an elongate inflorescence with compound branching.
papillate: bearing minute pimplelike protuberances.
pedicel: the stalk of a single flower or fruit. The ultimate branch of a peduncle.
peduncle: the stalk, including branches, of an inflorescence.
peltate: attached by the lower surface, not by the margin.
perfoliate: descriptive of a leaf having the stem apparently passing through it because of a joining or overlapping of the basal lobes.
perianth: the calyx and corolla collectively or either one when only one is present.
perigynium: a modified leaflike structure that surrounds the ovary, such as the inflated sac in Carex.
perigynous: borne around the ovary, rather than below or above.
petal: one of the parts of the corolla or inner leaflike parts of a flower.
petiole: the stalk of a leaf.
pilose: with rather sparse, soft hairs.
pinnate: having the parts arranged in two rows along the common axis.
pistil: the female reproductive part of a flower.
pith: the central, soft tissue of a stem.
plano-convex: flat on one side and convex on the other.
raceme: an inflorescence having an elongate axis bearing single flowers on pedicels.
rachis: the central axis of an inflorescence or compound leaf.
radically symmetrical: having more than two planes of symmetry.
rank: a vertical row. Leaves that are 2-ranked are in two vertical rows; 3-ranked in three vertical rows.
receptacle: the floral axis to which the flower parts are attached.
rhizome: a modified, underground stem. Distinguished from a root by having buds or scalelike leaves.
rootstock: the basal thickened portion of a stem where the roots are attached.
rosette: a basal cluster of leaves produced on a very short stem.
sac: shaped like a bag or pouch.
sagittate: shaped like an arrowhead. Similar to cordate but with pointed basal lobes.
scabrous: rough to the touch because of tiny, stiff hairs or other projections.
scale: thin membranous structure, such as a chafflike bract or a flattened hair.
scape: a peduncle arising at ground level from a very short stem.
scuba: self-contained underwater breathing apparatus.
sepal: one of the parts of the calyx.
serrate: with fine, sharp teeth that are inclined toward the tip.
sessile: without a stalk, as with some leaves and flowers.
sheath: a tubelike part surrounding another part, such as the lower part of a grass or sedge leaf that is wrapped around the stem.
silique: a dry fruit that splits open leaving a thin partition. Found in the Cruciferae.
spadix: a spike of flowers on a fleshy axis.
spathe: a single large bract subtending an inflorescence, which is usually a spadix.
spike: an elongated, unbranched inflorescence of sessile flowers.
spikelet: a tiny spike, usually used for portions of the inflorescence of the grasses and sedges.
spinulose: minutely spiny.
sporangium: a structure containing spores.
spore: single reproductive body of plants that does not produce seeds.
stamen: the pollen-bearing organ of the flower.
staminate: having male but not female reproductive organs.
sterile: without sexual reproductive parts.
stigma: the part of a pistil on which pollen adheres and germinates.
stipule: a pair of appendages that may be present at the point of attachment of a leaf to a stem.
stolon: a modified above-ground horizontal or arched stem that produces new plants at the nodes.
striae: narrow lines, streaks, grooves, or channels.

strigose: covered with straight appressed hairs.
style: the stalklike part of some pistils connecting the stigma and the ovary.
supra-axillary: attached above the axil.
terete: circular in cross section.
tetrad: a group of four.
trigonous: three-angled.
trimorphic: having three forms. Having three kinds of flowers which differ in the relative length and placement of stamens and stigmas.
tuber: a modified portion of a rhizome, being thick and fleshy.
tubercle: a small swollen structure.
umbel: an inflorescence having peduncles of nearly equal length and attached at a common point. It is usually flat-topped and may be simple or compound.
undulate: wavy.
unisexual: of one sex only; staminate or pistillate.
vein: a bundle of externally visible transporting tissue in a leaf or other organ.
venation: the pattern of veins in an organ.
ventral: the under or inner side.
versatile: attached by the middle and free to swing as with some anthers.
whorl: a group of three or more parts at a node.
winter bud: shortened and hardened tips of branches with crowded leaf blades, which serve to survive the winter and germinate the next season.

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PREFACE

The Mohawk people, like many other Native American tribal groups, have placed a high priority on the retention of the Mohawk language by their children. This is evidenced by the extensive language programs in operation in the schools that Mohawk children attend, both in Canada and in the United States.

Kanien'kéha' Okara'shón:'a (Mohawk stories) is a welcome addition to the limited resources available to the Mohawk language teachers at this time. The authors are to be commended for the effort put into recording this portion of a rich cultural heritage. This pioneer work in writing the Mohawk language will benefit many of our people for years to come.

Philip H. Tarbell
Specialist in Indian Culture

OH NAHO:TEN' KAHIA:TON'

KARAHSTANION'
Konwatsi'tsaién:ni

INTRODUCTION

The legends, histories, anecdotes, omens, and poetry collected here were written down by Mohawk teachers from Caughnawaga and Oka for their children. Most of the legends have been around for a long time, handed down from one generation to the next. Like any oral literature, they have been recounted so many times that they are no longer remembered as the property of a single person but have come to be part of the cultural heritage of all Mohawk people.

A characteristic of most oral literature is its variety. Each legend has many versions, and the ones collected here are no exceptions. Any good storyteller is bound to make small changes with every performance, embellishing here, only alluding to an event or detail there. The versions presented here are not considered any more definitive or authentic than any other. The observant reader will notice that even within this volume, the same tale appears in two versions.

Because this book is intended primarily for young people, many of whom are just learning the language, two kinds of translations have been included in the second section. Directly under each Mohawk line, are word by word translations. Their purpose is to provide the reader with a glimpse of some of the imagery present in the Mohawk. Word by word translations can never be perfect, however, because no single word in one language embodies the same connotations, ambiguities, presuppositions, and level of abstraction as one word in another. Sometimes a concrete term in English has been chosen for a word used abstractly in Mohawk, in order to reveal the imagery of the Mohawk. Number on nouns and tense on verbs need not always be specified in good Mohawk, yet it is not possible to separate number from nouns and tense from verbs in English, so arbitrary choices must be made, and different people have made different choices.

The word-by-word translations can sometimes capture some of the imagery, but they can never convey the richness of the Mohawk style. In order to approximate an English stylistic equivalent, the teachers have retold the tales in English. This appears at the bottom of each page. Since these are retellings, and not translations, some details vary slightly from the Mohawk version to the English. As all of the teachers have remarked, a certain amount of color and wit must be lost in the retelling.

This observation should serve only to spur on younger readers to devote even more energy to their study of Mohawk so that they, too, may appreciate fully the original versions.

Wariá:nen Io'nikonhrí:io

Marianne Williams
Editor

ONKWEHSHON:'A SEWATAHONHSATAT

Onkwehshón:'a

Ietshiiatahónhsatat oh nahó:ten'

ionkhihsothokon'kénha' rón:ton'.

Onkwehshón:'a

Shé:kon ionkwahronkátie'

ionkhihsothokon'kénha' raotiwén:na'.

Onkwehshón:'a

Ionkhihsothokon'kénha' rón:ton',

"Thó nonkwá ionsásewe'

tsi nisewaweiennó:ten tánon'

tsi nitesewehtáhkwen."

Onkwehshón:'a

Ionkhihsothokon'kénha' rón:ton',

"Thó nionsásewe' tsi nonkwá:ti ne orihwaká:ion."

Onkwehshón:'a

Ionkhihsothokon'kénha' rón:ton',

"Sásewatst ne sewawén:na'."

Onkwehshón:'a

Ionkhihsothokon'kénha' rón:ton',

"Ietshiiatahónhsatat ne kontíriio'

tsi nahó:ten' rón:ton'."

Onkwehshón:'a

Ionkhihsothokon'kénha' rón:ton',

"Ietshiiatahónhsatat ne otsi'ten'shón:'a

tsi nahó:ten' rón:ton'."

Onkwehshón:'a

Ionkhihsothokon'kénha' rón:ton'.

"Ietshiiatahónhsatat ne otsi'nonwahshón:'a

tsi nahó:ten' rón:ton'."

Onkwe'shón:'a

Ionkhihsothokon'kénha' rón:ton',

"Ietshiiatahónhsatat ne ononhkwa'shón:'a

tsi nahó:ten' rón:ton'."

Onkwehshón:'a

Ionkhihsothokon'kénha' rón:ton',

"Ietshiiatahónhsatat tsi karhahrónnion'

tsi nahó:ten' rón:ton'."

Onkwehshón:'a

Ionkhihsothokon'kénha' rón:ton',

"Ietshiiatahónhsatat tsi kanientarahrónnion'

tsi nahó:ten' rón:ton'."

Onkwehshón:'a

Ionkhihsothokon'kénha' rón:ton',

"Ietshiietahónhsatat ne ratiweraráhstha'

tsi nahó:ten' rón:ton'."

Onkwehshón:'a

Ionkhihsothokon'kénha' rón:ton',

"Sewatahónhsatat ne tiohkehnéhkha' karáhkwa'

tsi nahó:ten' wá:ton'."

Onkwehshón:'a

Ionkhihsothokon'kénha' rón:ton',
"Sewatahónhsatat ne ahsonthénhkha' karáhkwa'
tsi nahó:ten' wá:ton'."

Onkwehshón:'a

Ionkhihsothokon'kénha' rón:ton',
"Sewatahónhsatat ne otsistohshón:'a
tsi nahó:ten' rón:ton'."

Onkwehshón:'a

Ionkhihsothokon'kénha' rón:ton',
"Ietshiiatahónhsatat ne ietshihsothó:kon'
tsi nahó:ten' rón:ton'."

Onkwehshón:'a

Ionkhihsothokon'kénha' rón:ton',
"Ietshiiatahónhsatat ne ionkhi'nisténha ohwén:tsa
tsi nahó:ten' ión:ton'."

Onkwehshón:'a sewatahónhsatat

Tekaronhió:ken

THARONHIAWA:KON

Tharonhiawá:kon, né kén:ton' ráhawe' tsi karonhiá:te' ronónha' raotiní:io ne ononkwehón:we. Shako'nikón:rare' tánon' shakoia'tanonstá:ton. Karonhiá:ke nithawé:non otsható:kon, watshatará:ken, e' thó wahoké:tohte'.

Wahshakona'tón:hahse' tánon' tahshakó:ion', ne ononkwehón:we nattokháhtshera, nahontó:rate', nahontátenonte', tánon' tsi nahatí:iere' nahatikwatá:ko' ne raonatsherónnia'. Wahshakona'tón:hahse' ononhkwa'shón:'a, tánon' ohtehra'shón:'a, nahotítsen'te'. Wahshako'satsténhseron' tánon' rotirihwakwaríhsion tsi rón:ne's. Tahshakó:ion' ne ó:nenhste', wahshakona'tón:hahse' ka' nón nahatitshén:ri' ne onatsakén:ra, o'niónkseri, osahé:ta', tánon' onon'ónsera.

Rao'nikón:ra' thatenniéhtha' tsi ní tsi ronatétshens thó ní tsi rotitokenhsehátie' tsi neniawénhseron'. Khwató:ken na'tekónteron tsi ronwá:kens enhshakorihónnien' nahó:ten' ioiánere's ahonnón:ni'. Kwáh skenén:'a tahshakowihátie' kaia'torehtatsherí:io. Ronaterí:iohkwe' ó:nen ronwatishennionhátie', thontaiawénhstsi', kén' nahatí:iere', Tharonhiawá:kon wahoké:tohte'. Wahén:ron',

"Tóhsa' tesewa'nikonhrhá:ren."

Akte' nonsakaié:ra'te' tsi ronaterí:io wahontkwé:ni'.

Tharonhiawá:kon, wahshako'nikonhráta' ne Tekanawí:ta, tánon' Aié:wate' nahianitiohkón:ni' ne Kaianere'kó:wa. Kí:ken Tekanawí:ta, tánon' Aié:wate', kwáh í:ken tsi nihsennowanén:ne', Huron thohténtion ne Tekanawí:ta, ok ne Aié:wate', kanien'kehró:non'. E:so' wahianonhton-nión:ko' tsi nahní:iere' nahianitiohkón:ni'. E:so' iohserá:ke wahotiió'ten' tsi wahianitiohkwahserón:ni', Tharonhiawá:kon é:so' wahshako'nikón:ron' tsi nahonní:iere' ne tóhsa' taonteríhsi' ne Kaianere'kó:wa né:ne tsi nén:we' enkatátie'. Wahní:ron' tsi nikarí:wes enkahwatsiratátie' tánon' entkarahkwinekénhseke', óhente' entkanióhseke' tánon' ohné:kanos kón:ne's é' thó nikarí:wes enkatátie' ne Kaianere'kó:wa.

Aié:wate', wahakwé:ni' wahona'tón:hahse' ne Atotárho, ononta'kehró:non' nahaia'tó:ten, né:ne aonhá:'a thronkwe'táksen, wahohró:ri' tóka' enháhsere' ne Kaianere'kó:wa tsi tenkaté:ni' tsi rónnhe', e' thó ki na'á:wen'ne'. Wahaié:na' ne Kaianere'kó:wa wa'thatté:ni', iah teshronkwe'táksen, wahotinenhrá:ko' ne ononta'kehrón:non' tsi ní tsi tehotté:nion ne Roiá:ner Atotárho, akwé:kon wahonní:ron',

"Teionkwatonhwentsó:ni aiakwáhsere' ne Kaianere'kó:wa."

Aié:wate' akwé nontá:rehte' ne wísk nihononhwentsá:ke, Kanien'kehá:ka', Oneniothá:ka', Ononta'kehá:ka', Kaio'konhá:ka', tánon' Shotinontowane'há:ka', wahshakohró:ri' tsi niioiánere' ne akwé skáthne aontahontihéntho' tánon' akwé skén:nen'ahón:ton' ne onkwehón:we. Kwáh ionehrákwa' tsi niioiánere' tsi ní tsi wahnikwatá:ko' notióhkwa' iáh ne té:ken ne iosnó:re' aonnitiohkwaríhsi' nok né:ne tsi nén:we'. Akwé wahatirihwanón:wehne' nahatíhsere' ne Kaianere'kó:wa. Wisk-niwáhsen nihá:ti Rotiiá:ner, wahontkennísa' katsénhakon. Wísk na'thatínerenke' ne kaién:kwire', ne kén:ton' tsi ó:nen wísk nihononhwentsá:ke ia'thóntieste'. Enhati'shátsten'ne' skáthne enthontihéntho' skén:nen' enhón:ton'. Kaié:riiawén:re' tewen'niáwe' tánon' wísk-niwáhsen shiiohseró:ten nihonanitiohkón:ni. Oh na'kénhkha' ne Tuscaroras ronatiá:tare'. Iá:ia'k nihononhwentsá:ke wahón:ton'. Enska ne tsóhsera ronnitiohkwaró:rokskwe' ne wísk-niwáhsen nihá:ti Rotiiá:ner, katsénhakon enhontkennísa' nek ratihá:wi ne raoneriáhsakon ne skén:nen' tánon' ne karihwí:io nek enhonnonhtonnión:ko' ne akwé ahoti-iáneren'ne' ne raononkwe'ta'shón:'a. Wahatiweien-téhta'ne' tahoti'nikonhraién:ta'ne', iáh ní ó:nen tha'teshontatetshá:nis. On:wa' wenhniserá:te tewehiá:ras né:ne Iá:ia'k Nihononhwentsá:ke, tsi ronónha ronanitsoh-kwí:son ne Kaianere'kó:wa.

Kahnawá:ke iá:ken' nohná:ken Tharonhiawá:kon shonwá:ken, ákta' ne Tiohtiá:ke. Tho ní tsi shohténtion tsi ní tsi thawé:non otsható:kon tsi karonhiá:ke nionsá:re'.

Warisó:se Kaieríthon

SHA'TEWAHSIRÍ:HEN

Ó:nen ki ní:'i nakká:ra'

Wahón:nise' iá:ken'ki rón:kwe, ro'níha skáthne ní:teron'. O:nen ki rón:kwe wahó:niake' tánon' ne ró:ne' iakotahkontá:ni' tsi thó rén:teron' ne rokstén:ha.

Sok ki rón:kwe iahotó:ri' ne roién:'a iahoia'ténhawe' ne rohsótha tánon' karhá:kon iahóhtka'we'. Kí rón:kwe áhsire' tahó:ion' ne roién:'a tahohsirawén:'eke' ne rohsótha nó:nen ienhóhtka'we' karhá:kon.

O:nen iá:ken'ki raksá:'a iahoia'ténhawe' ne rohsótha. Tsi ó:nen iahá:newe' ne karhá:kon, sok ki raksá:'a ahsén:nen wa'throhwíha' ne áhsire'. Tho ki' tahóhtka'we' ne rokstén:ha tánon' tontahahtén:ti' shahá:wi' ne sha'tewahsirí:hen.

Kí rón:kwe wahori'wanón:tonhse' ne roién:'a oh nontié:ren tsi sha'tewahsirí:hen shahá:wi'. Ki raksá:'a wahohró:ri' ne ro'níha, "Ki sha'tewahsirí:hen sekhá:wi', enkatatién:hahse'. Nó:nen í:se' ensakstén:ha'ne' ne én:katste' tenkoniahsirawén:'eke' nó:nen karhá:kon ienkoniáhtka'we'."

O:nen iá:ken' ki rón:kwe wahanonhtonnión:ko' tsi nahá:iere', sok wahohró:ri' ne roién:'a aonsahonónksa' ne rohsótha.

Kí:ken oká:ra' ne né:'e kén:ton ne tóhsa' aionkhiiatahkón:tahse' ne onkwe'taká:ion's. Tá:we' ne ohnísera, í:'i káti' ó:ni entionkwaién:ta'ne'.

Konwatién:se'

RAWE:RAS RO:NE'

Karhá:kon thati'terón:tahkwe' iá:ken' kí:ken kahwá:tsire'. Tóhka' nihotiwí:raien'. Kháre' ó:nen kí:ken wahonwatinatahré:nahse' kaná:takon thatinákere' rontatenonhkwe' wahontshenon:ni' ki:ken ne shakoti-ien'okón:'a tsi ó:nen wahonatero'seraién:ta'ne'.

O:nen ki' iá:ken' karhá:kon niahatitakhenóntie' wahonhiákha' sewahió:wane', thontaiawénhstsi' taie'nahkwáweron' tsi na'okén:nore'. Tewanine'kara'wánions tánon' teio'tónhahre' iowé:ren tánon' wa'tkawerata:se' khé kí' é' thó okwiró:kon wahontáhsehte' ki:ken na'tewatenón:ianihte' tánon' iá:ken' é' thó niiohsnó:re' ontóhetste' tánon' ontoríshen'. Tontakarahkwíneke'ne'. Sanwenhniserí:iohste' nek tsi akwé:kon kí ioná:nawen.

E' thó kí:ken ne ratiksa'okón:'a wahontahraketsko' kwáh iá:ken' énhsehre' sha'tekarhí:hen wa'tiekháhsi tsi na'tonsaiohswáthe'ne' tánon' ahsén:nen nón:we tsi tekeniiáhse tekeniksá:'a wa'onatshatárhahse'. O:nen wa'thiáttoke' tsi iakón:kwe tsi iakote'wháhsate' kí:ken wa'tkenikahrá:ra'ne'. O:nen kwáh ohtekén:'en wa'kenika'én:ion' tsi iakón:kwe kí:ken kwáh tsi iotérhate' ní:iete'. Isi' ne ká:ti ia'teieká:nere'. E' thó iá:ken' niiehnén:ies tsi niiokwí:res kahon'tsistóskon iakótston tó:k niiako'khá:res tánon' teiakoteweiáhere' tó:k niiotsiwiién:tes tsi iakononhwaró:ron tánon' ionterahkwawerhóhstha' iéhawe' tsenekwá:ti ne ká:ti. Tsik niió:re' ia'tkenikahraién:ta'ne' e' thó niiohsnó:re' ka'k thónhte niahá:'en ne iakón:kwe.

Tsi ó:nen ne tekeniksá:'a ionsákenewe' tánon' satiathró:ri' nahó:ten' wa'tiatkáhtho', wahshakohró:ri' ne' neksá:'a ronwa'níha,

"Iotahkwáhswa' tsi iáh teietshiwennará:'on ase'kén rawé:ras ónhte thí:ken ró:ne' wa'etshí:ken' káti' nón:wa' aietshiiatera'swá:wi'."

Konwatsi'tsaién:ni

AKON:WARA'

Shiiakwaksa'okón:'a akón:wara' she's róntstha' ne rotikstén:ha nahotewiraserón:ni'. Tsi ní:iot tsi ionkhihró:ri iah ónhka' ne wén:ton teiotón:'on aiakothró:ri' ne oh nihaia'tó:ten ase'kén akwé:kon ronenhé:ion tsi niiá:kon ne ronwá:ken. E' thó tsi na'teiotenonhianíhton nihakonwaró:ten tiótkon' ahsatakónhson' tehotstikahwenhátie's ratonkwe'tí:saks rotateweienentá:'on ahshakoié:na' ne iakaonkwe'táksen tó:ka' iáh teiontate'nikón:rare'.

Konwatsi'tsaién:ni

AKON:WARA'

E:so'iohserá:ke ó:nen tsi náhe' ne kahwá:tsire' skáthne ie'terón:tonhkwe' sahsótha sa'nisténha ia'níha tánon' ratiksa'okón:'a. Kí:ken iatathróna' wá:nehre' ahniiá:ken'ne' ahiatkenhnisa'ánha'. Wahshakotiri'wanón:tonhse' ne akokstén:ha aiontennón:na' tsi nikarí:wes enhotiiakén:'en.

Wa'í:ron' nakokstén:ha, "Ió, nek ki' tsi shehró:ri tha'tehontó:tat ase'kén é:so' tsi tewakwishenhé:ion."

Tsi niiosnó:re' tsi iahniiá:ken'ne' óksa'k tahontáhsawen' ne kanonhsakwé:kon wa'thonrahtáthon'. Ne rotihsótha tia'teká:konte' ión:ton', "Tha'tesewató:tat," nek ki' tsi iáh ónhka' teiakotahonhsatá:ton. Kháre' ó:nen wahonwatihró:ri', "Tóka' iáh tha'tensewatótáthe' átste ienkwaia'tón:ti' tánon' akón:wara' ientshisewaia'ténhawe'."

Iáh tha'tehonatotá:ton ratitakhenóntie's thihshakotié:ron ne akokstén:ha wahshakotina'kón:ni'. Wa'onte'nién:ten' ahonwatiié:na' ne ratikowá:nens nek ki' tsi sótsi' tehotí:ka. Nakwáh ken' nithrá:'a rate'niéntha' ahshakona'ké:ren' ne ronátia'ke. Tsi rotohetstonhátie' tahonwaié:na'. Tsi kanhohká:ronte' átste iahonwá:reke' wa'í:ron', "Kóh akón:wara' kí:ken raksá:'a," tánon' saiehnhóhaienhte'.

Kénk nikarí:wes sahonwenhnónksa' ne raksá:'a iáh teshonwaia'tatshénrion. Iah nonwén:ton teshonwá:ken ne raksá:'a.

Rake'níha rakkaratón:ni
Niioronhiá:'a

KAIENTEREHSTAHKHWA'

1. Tóka' ensathón:te'ne' ónhka'k taieken'to'ókhon' tánon' iáh ónhka' té:ien's né kén:ton' tsi ónhka'k eniaíheie'.

2. Tóka' ensatatshatárhahse' ónhka'k thó í:ien' tánon' iáh ónhka' té:ien's, né ni' né:'e kén:ton' tsi ónhka'k eniaíheie'.

3. Tóka' ehtá:ke iorhá:tare' ne ó:nenhste' né kén:ton' tsi iáh é:so' thakanié:ien'.

4. Tóka' sótsi' ehtá:ke otsi'nahkontahkwá:ne ronatshi'-nahkón:ni né ni' né:'e kén:ton' tsi iáh é:so' thakanié:ien'.

5. Tóka' ohwhará:ne í:ions tsi kahón:tsi rohá:te' né kén:ton' tsi eniohseresónhake'.

6. Tóka' okariahtá:ne énhtsken' kanónhskon akohserá:ke né kén:ton' tsi sénha' enwathó:rate'.

7. Tóka' tensahonhtá:kahre' né kén:ton' tsi thé:nen' enhserihwá:ronke'.

8. Tóka' tsi'tén:'a onahstonhkwá:ke teniaón:ko' né kén:ton' tsi iáh tekarihwí:io nahó:ten' enhserihwá:ronke'.

9. Tóka' ensahsi'tarónhkhwen' né kén:ton' tsi ká'k iénhse' tókani' tenhsenonniahkwá:na';

10. Tóka' ensakahrani'kerón:ko' tsi sehsenekwá:ti nekwá né kén:ton' tsi ensa'nikonhráksen' tókani' ensaná:khwen'.

11. Tóka' ensakahrani'kerón:ko' tsi sehseweientehtáhkwen nekwá né kén:ton' tsi karihwí:io nahó:ten' enhserihwá:-ronke'.

12. Toka' ensahsiaronhkhwen' tsi sehsenekwá:ti nekwá né kén:ton' tsi ónhka'k enhsenéntsha'.

13. Tóka' ensahsiarónhkhwen' tsi sehseweientehtáhkwen nekwá né kén:ton' tsi ensahwistaién:ta'ne'.

14. Tóka' ná:kon karahkwákta' iostsísto' né kén:ton' tsi rón:kwe enhrénheie'.

15. Tóka' é:neken karahkwákta' iostsísto' né kén:ton' tsi tsakothonwí:sen eniaíheie'.

16. Tóka' ia'tesa'kharaké:tote' né kén:ton' tsi enhsaten'niotá:na'.

17. Tóka' atókwa ensá:sen'se' né kén:ton' tsi ónhka'k éntien'.

18. Tóka' ieksohare'táhkhwa' onia'tá:'a ensá:sen'se'

né kén:ton tsi ónhka'k iáh teiakokwéniens eniesanatahré:nahse'.

19. Tóka' iáh thasa'nikonhrón:ni' ahsani'tskwahra'tsherakarhátho' né kén:ton' tsi ónhka'k rohné:ka enthatáweia'te'.

20. Tóka' ó:niare' ensatetshá:ten' karihwaka'ténhtshera kén:ton'.

21. Tóka' entéhsia'ke' sanónhkwis nó:nen oráhkwase' sénha' iohsnó:re' ensewatehiá:ron'.

22. Tóka' tenhsatianakarhátho' né kén:ton' tsi ohkwá:ri tentsátera'ne'.

23. Tóka' sótsi' é:so' ensaiéshon' iáh tekarihwáhstha' né kén:ton' tsi tenhsashéntho'.

24. Tóka' owirá:'a oshon'kará:ke rotahónhsate' né kén:ton' tsi ó:ia' ensehsewirahní:non'.

25. Tóka' tóhka' niionkwé:take eniaíheie' né kén:ton' tsi Shonkwaia'tíson thotén:niote'.

Tok ní:kon

Wathahí:ne' tánon' Konwatién:se'

TIAWERON:KO KANEHON OKA:RA'

Ne ká:ti' kí:ken oká:ra' wahón:nise' rón:kwe wahaientakóha'. Skáthne tettiatera'né:ken akohsá:tens. Tetiate'serehtahnhontérha' wahshakoia'taniión:ten'.

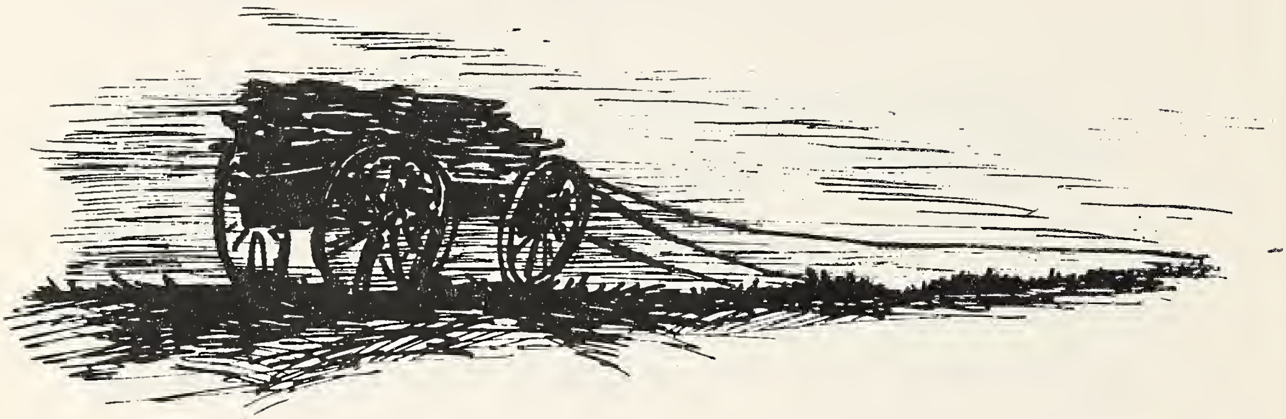
O:nen ká:ti' wahahtén:ti' wahaientakóha' tánon' né:ne akohsá:tens aonatahkwénnia' tiawerón:ko aotinéhon ionniá:ton.

Tsi iahá:rawe' karhá:kon tontáhsawen' wa'okén:nore'. Iaháhsa' ki tsi raientákwas tánon' akwé:kon ka'seréhtakon waháta', sok tontahahtén:ti'. Tsi tahshakotó:ri' ne akohsá:tens, tetsá:ron tatiatihéntho' iáh ki' tetiohténtion ne tetiate'serehtahnhontérha'. Aonahkwénnia' wa'tewatirón:ten' khe tka'seréhtaien' karhá:kon.

Ionsá:rawe' tsi thonónhsote' tánon' wahshakohkwenniahrá:ko' ne akohsá:tens tánon' aten'enhrá:ke wahrotárhoke' ne aonahkwénnia'.

Tsi niwahsón:tes onstáthen' ne tiawerón:ko aonéhon sok tontáhsawen' ontó:roke'.

Orhon'ké:ne wahá:ie' iahatke'tó:ten' tsi tekatsiserá:ton' wahonehrá:ko' tsi nahó:ten' wahatkáhtho'. Thó aten'enhrákta' ka'seréhtaien' ne tetiate'sereh-



tahnhontérha' tetkaientáhere', ne roientákwen.

Wahón:nise' shihatiká:ratons ne thotí:ien'skwe'.

Takaronhió:ken

IEHWISTA'EKSTHA'

Ne kī:ken aoká:ra' tsi iohwistén:ton teieiahson'thá:ke ononhsatokenhtī:ke. Wahón:nise' o'seronni'ón:we ronontī:io wahshakorharátsten' Kahnawa'kehró:non' tsi enhshakó:ion' iehwista'ékstha'. E' thó kí'na'á:wen'ne', tahaténniehte' kahonweia'kowáhne tahonnéta', Kahnawá:ke taiawenonhátie'.

Ne' thó nón shontakahá:wi o'seronni'ón:we tánon' tiohro'shaka'ón:we ronateriióhne'. Iah té:io ne iehwista'ékstha' né tsi wa'konwaié:na' ne kahonweia'kó:wa, iahatīhawe' wastohronón:ke, takarhárho', wahonnetáhko' tsi nahó:ten' wá:tahkwe' ne kahón:wakon. Akwé wahontenhnī:non', é' thó wa'karátie' ne iehwista'ékstha'. Tsi nón tkaná:taien' ne Deerfield thatinákere' wahatihnī:non'.

Khára' ó:nen wahotinónhton'ke' naón:we'ne raotihwīsta'. Wahatirihwī:sake' ka' nieiawé:non. Wahatirihwatshén:ri' tsi wa'konwaié:na' ne kahonweia'kó:wa tánon' tsi wastohronón:ke tiorhárhon Deerfield tkonwá:iats, tsi nón tioia'totarhé:'on.

Wahontenenhrón:ni' Kahnawa'kehró:non', tékeni tewen'niá:we' nihá:ti, ratsihénhstatsi tánon' o'serón:ni' wahonhtén:ti'; wahonnehsákha' ne iehwista'ékstha'.

Karī:wes wa'thontstikáwha' tsi niió:re' iahón:newe' ne Deerfield. Akohsere'kehkó:wa 1704 shiiohseró:ten.

Teiotenonhianíhton tsi ní tsi wahonterí:io'. E:so' wahoníheie'. Wahontkwé:ni' ne onkwehón:we, wahshakotiié:na' ótia'ke ne wahshakoti'shén:ni'. Ne' tho nón shontakahá:wi tóka' sótsi' é:so' rá:ti enhonníheie' ne onkwehón:we, tenhsakotiia'taiestáhsi' né:ne kwáh rotiia'tahní:rions tánon kén' nithotiién:ha' rotisken'rakéhte' entehshakotiia'ténhawe', tánon' thó ní tsi enhsakonehiá:ron' tsi ní ne shakotiien'okón:'a, kháre' ó:nen enhóniake' onkwehón:we. E' thó ni tsi ótia'ke rotihsennaientá:'on ne tiohrén:sa, ken'tá:here', arísmen, tánon' o'seronni'kéha kahsenna'shón:'a; ne kí:ken raotihsenna'shón:'a ne shakotiié:na Kahnawá:ke shakotiiá:the'.

Wahatihwistaniiohtá:ko' ononhsatokenhtí:ke kahnia'sá:ke,karontá:ke wahatihwánerenke'. Wahonnenhsá:ren' é' thó ní tsi tontahonhtén:ti'. Kwáh í:ken tsi rotiháhes tsi niió:re' enshón:newe'. Iohseratshá:ni é:so' wahatiiésha' tsi niioháhes, iohaháksen tsi rón:ne' tánon' wa'tkanien'kwataséhon'. Ne é:so' wahatiiésha' shotár, tsi thotikwi'tsháhere' niió:re' iehatihsinén:serons. Wahshakoti'nósha' ne onkwehón:we ne tsi tehonathwén:karonte' ok é:neken thihón:ne'. Wahonská:neke' ronónha ó:ni' ahotiién:take' ne kahwén:kare', tsi niió:re' tsi tehotihwishenhé:ion tsi rotiniotkawenhátie' ok ne onkwehón:we iah thé tewe'ne' tahotihwishenhé:ion.

Tonsahatitharónnion', ia'thotirihwaién:ta'se' tsi enkonwaia'táta' ne iehwista'ékstha'. Wahén:ron' ne roiá:ner,

"Kén:'en kaniatarákta' entewaia'táta', kenkwité:ne tentitewakóha'."

E' thó ki na'á:wen'ne'. Wahatiia'táta'.

Ia'káhewe' ne kenkwité:ne sahontenenhrón:ni' e' thó nionsahón:ne' kaniatarákta' ne Champlain, sahonnetáhko' ne iehwista'ékstha'. Ronatshennonihátie' tsi sahatíhewe'. Kháre' ó:nen iahatihwistaniión:ten' ononhsatokenhtí:ke kahnia'sá:ke. E:so' iohserá:ke wáhontste'.

Ohiarí:ha shiwennhni'tó:ten wísk-iawén:re' shískare' tiohtoniawén:re' tewen'niáwe' tánon' iá:ia'k-niwáhsen tióhton shiiohseró:ten kahwistasé'tsi sahati-hwistannión:ten'. On:wa' wenhniserá:te' ononhsatokenhtí:ke kanónhskon oshon'kará:ke tká:ien' ne Deerfield aohwístha'. Ne tsakawehiahrakwén:nis tsi niiawén:'en ne iehwista-'ékstha' aoká:ra'.

Warisó:se Kaieríthon

SENHA' TEHOTI:KA TSI NI:IOT NE AKON:WARA'

O:nen ki' kwáh ken' niiohserá:ke tsi náhe' kí:ken é' thó niiawén:'on. E' thó shikahá:wi' kontatewenní:io shé's ne katshé:nen' ne kahnawá:ke. Isi' nónhskwati she's niió:re' niekonnéhtha' ne teionnhónhskwaron. Awenhniserakwé:kon enkontihón:take' ná:kon ne kwá:ti. Sok she's tentkonhtén:ti' nó:nen ienkáhewe' akonwatinon'tatáhko' orhon'ké:ne tánon' ne ni' no'karahsnéha.

O:nen kí:ken shiwenhniserá:te' iáh tha'tetiawé:non kí:ken ne teionnhónhskwaron. Iahonwanató:ri' ne tehniksá:'a iatate'kén:'a aonsakonwaia'tisákha'. Iahniráthen' karíhstá:ke. Ia'thiatkathónnionhwe'. Tóka' akonwá:ken' ne raotitshé:nen' ka' ok nón:we aontaiora'kárhon'. Kháre' ó:nen ki' ionsahiátsnenhte' ísi' ne ká:ti' ákte'k nón:we ieshonatkén:se'. Kháre' ó:nen tó:ke niió:re' ná:kon ne ká:ti ia'thiatstikáhwha'. Iáh ki' tekonwá:ken ne raotitshé:nen'.

O:nen tontaió:karahwe' tahiatáhsawen' tonthiate-rihstíta' tehotisterihenhátie' ase'kén ronaterién:tare' akón:wara' í:re's nó:nen entiokaráhwe'. Kí:ken ne thakowá:nen rattó:kas rotatshatará:nis ok thé:nen' okwirokónhson' nek tsi iáh wé:ne' tehaón:ni ase'kén tóhsa' ahoterónhkwen' ne rokén:'a. Kháre' ó:nen wahiastó:ron'. Sok ó:ni' ne onstoró:'en ne kí:ken karhakónhs'on tetiotshatarátie's. Kháre' ó:nen wa'thiarahtáte' ó:nen ki' sénha' ákta' nonwéhte' ne notshá:ta'.

O:nen kí:ken ne thakowá:nen tahohterón:ne'. Wahanonhtónnionhwe' tsi tóka' ó:nen ki' ne akón:wara' shakoienáhsere'. E' thó ki' kí:ken ronahstoróntie' tsi nontaio'kara'onhátie'. E' thó ki' ne akón:wara' sénha' aktóntie' nontahawenonhtonhátie'. Kháre' ó:nen thó:ha ahshakonhonterá:ne'. O:nen thó:ha shahia'nikonhró:ten' wahát toke' ne thakowá:nen ken'k nïió:re' ne karhá:kon tkaháhserote' tontahonerahóntsha' ne ro'kén:'a tánon' wa'thní:ten' tsi niiohsnó:re' iahianontátsnenhte'. Iakén:'ak iahninhohó:kate' rotikstén:ha iatathróna' tsi thní:teron, raotinónhskon ia'thnihra'kwénhtara'ne'. Wahonatewerá:ienhte' ne akón:wara' kwah iakén:'ak tonsa-hshakowíhskwahte'. Seréka' ahshakoié:nenwake'. Wahshakotihró:ri' ne iatathróna',

"Tsatera'swí:io kí:ken teseniiá:se, tsi iáh tetshiseniié:nen ne akón:wara', ase'kén iáh hónhka' ne wén:ton tetsako'niakén:'en tsi niiá:kon shakonhonterá:'on tsi niiohserá:kon ahsontakónhson sha'tehotstika-hwenhátie's."

Konwatsi'tsaién:ni

RONENHE:ION IAH TEHONTA:TI'

Wahón:nise' iá:ken' kaná:takon rati'terón:tahkwe' kaié:ri nihá:ti ronón:kwe, tehontero'seríiohne'. Kháre' ó:nen kí wa'thonterihotárhoke', iáhken ónhka' ahohteron'níhake'. Shaiá:ta kí ne rahtahkón:ni' wahaterá:ieste' tsi iáh thé:nen' tehatshá:nis. O:nen ki' ne ronátia'ke ne rontén:ro' wahón:nehre' enhonwate-'niéntenhste' oronhwí:io ken.

Sók kí shaiá:ta thahrón:ni tsi wahrenhé:ie'. Shaiá:ta né:ne rahenheion'tahserón:nis wahshakaón:nien' ne karón:to. Kwáh ki' tahatiié:rite' tsi wahonwaia'tá:-ren' tánon' akwé:kon wahatiweienén:ta'ne' tsi niiote-rihwíson'.

O:nen kí tsi taió:karahwe akwé:kon ki' ne rontén:ro' wahatinonha'á:na'. Wahonterihwahserón:ni' ne kí ne rahtahkón:nis ne e' tenhárhenhte' enhatenón:na'. Waharihwanón:wen' ne kí. Niá:rehkwe' ki' sahakóha' raoio'ténhsera.

Tóhsa' ki' ahonónhtonke' tsi niwahsón:tes. O:nen ki' kwáh ken' shikahá:wi' tsi niwahsón:tes kí:ken rahtahkón:ni' renná:kahre' raonhá:'ak rone'kón:re', roió'te' áhta shakwatákwas.

Thontaiawénhstsi' kí:ken ne raia'táhere' tahatá:ti' wahén:ron',

"Hé tha'tesató:tat, thí:ken iáh teioterihwíson' nahsenná:kahre' nó:nen senónhnha'."

Ne rahtahkón:nis wahén:ron',

"I:se' tha'tesató:tat, ase'kén iáh tehontá:tis ne ronenhé:ion."

Sok ionsahatasónteren' sahoió'ten'. O:nen kwáh ken' niskahá:wi' á:re' ki ne raia'táhere' tahén:ron',

"Hé, iáhken tesá:ien' ahserihwakwénnienhste' ne iakawenhé:ion. Tha'tesató:tat."

Ne rahtahkón:ni wahén:ron',

"Hé, énskak ó:nen enskonhró:ri', serihó:kten. O:nen ní:se' senhé:ion."

Sok ionsahatasónteren', sahrenná:kahre' tánon' sahane'kón:reke'. Sok á:re' ki' ne raia'táhere' tontahohén:rehte',

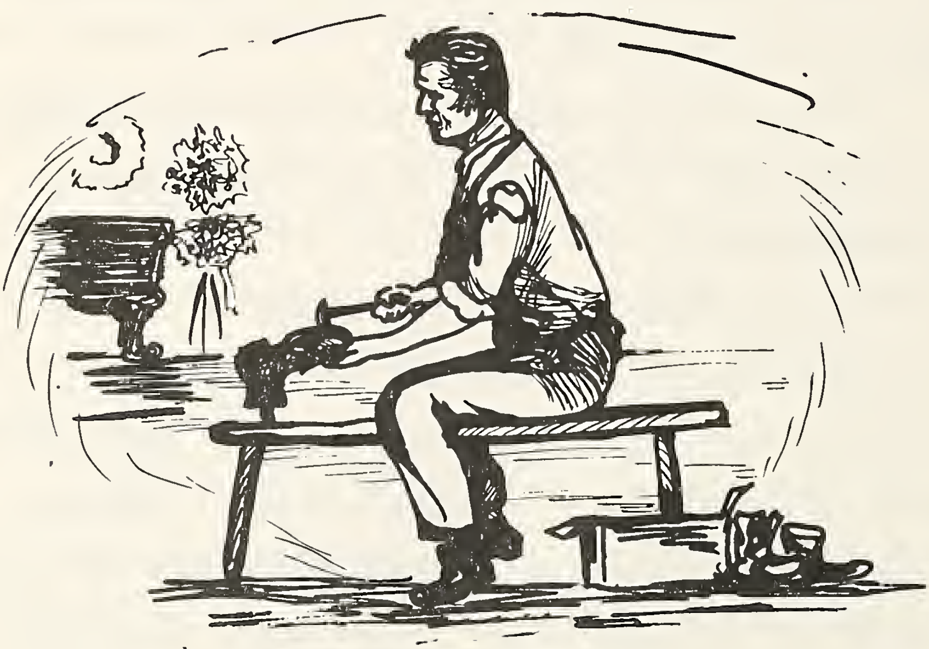
"Serihó:kten thí:ken, tha'tesató:tat ó:nenk."

O:nen ki' ne rahtakón:nis tahoná:khwe'. Tontahatá'stsi' tánon' karonto'tsherákta' nia'thá:ta'ne' tánon' ia'thosó:kwe'ke' ne raia'táhere'. Tonsahat-karhaté:ni', ionsahátien' tánon' sahoió'ten' skén:ne' tsi niió:re' wa'awén:te'ne'. Iah nénska tha'tetho-wennaketó:ton' ne rawenhé:ion.

Tsi ó:nen tontahón:ne' ne rontén:ro'

aonsahonwá:iehte' ne raoniheión:ta' tánon'
aonsahshakokaratón:hahse' oh na'á:wen' tsi niwahsón:tes
iah tehotikwénion aonsahonwawiéhton'. Iah
tha'tiesehshakowennará:ni ne rawenhé:ion rontén:ro'

Konwatsi'tsaién:ni



ERHAR'O:KON

Wahón:nise' iá:ken' né:ne wa'tewatenón:ianihte' érhar wa'kontinákeren'ne' ne kaná:takon. Tánon' she's iá:ken' teionaterien'takária, ahsontakwekónhshon' iotihní:hen. O:nen iá:ken' ne ranatakwe'ní:io' wahariho:-wanahte' tsi entá:'on ok nenkaié:ren' kí:ken érhar sótsi' wa'onatiohkowánha'ne'. Wahontkennísa' ne ronón:kwe, tánon wahatirihwínion'te' tsi akwé:kon ki' entá:'on enkonwanahshéhton'.

O:nen kí:ken rokstén:ha í:non karhá:kon thanákere', iaharihwá:ronke' tsi nihontierá:ne'. Kwah iá:ken' óksa'k tahahtén:ti', tahshakohroriá:na' tsi iah tetkaié:ri' tsi nihontierá:ne'.

Wahshakohró:ri', wahén:ron', "Enkwahró:ri' tsi ionkhiia'takéhnhas thí:ken érhar. Sewaterién:tare' kí:ken kaniataratátie' tsi ohniare'kó:wa kontí:teron', tánon' ne teionatonhwentió:ni ne aontakontiráthen' kén:'en kaná:takon akóntien'. Ne ká:ti' thí:ken ahsontakwé:kon sewathón:te' érhar iotihní:hen. Skonwa-na'te'kwáhtha' ne ohniare'kó:wa, tóhsa' atiá:kta' naontakón:ne'."

Tsi ó:nen wahar ihó:kten' ne rokstén:ha, iah ónhka' thé:nen' tetiaká:wen tánon' skennen'áhson:'a sahonhtén:ti'. Iáh ne wén:ton ónhka' tha'teskonwana'nikónhare' ne érhar.

Ne aorí:wa', shé:kon nón:wa' tho niionkwanahskwaká:te' érhar ne kaná:takon.

A:nen Kaia'titáhkhe'

KASPÉ

Né:ne wahón:nise' shé:kon askwakaión:ne sha'teionskwí:ia'ks nón:kwe ó:nen iá:ken' kí:ken tontahonahtentionhátie' ken' nithotiién:sa skaniatará:ti na'tontahón:ne'.

O:nen iá:ken' tahón:newe' tsi iotón:niate' ó:nen wahónttoke' ó:ia' ohná:ken' tahón:ne'. Sok ná:'a shaiá:ta wahén:ron',

"Há'o kén:tho tewatáhset, eniethiia'tetshahníhten' thí:ken ohná:ken' tahón:ne'."

Thó kí nahatí:iere'.

Wahón:nise' iá:ken' thó nón:we nishonókwen ronkwehkénha', Kaspé ronwá:iatskwe'. Thó kí' tsi karíhstote' thonwaia'táten'.

O:nen kí' ne thó shiwahsontá:te' thó wahonteneró:-kwaien' wahonterhá:rate' ahón:newe' ne ronátia'ke tahón:ne'. Kháre' ó:nen ki' khé' ákta' rotihtharonnóntie' ne kí:ken ohná:ken' tahón:ne'.

O:nen kí' thók nitió:re', ó:nen enwá:ton' enhsheién:tere'ne'. O:nen shaiá:ta ne rotahséhton wa'thohén:rehte', wahén:ron',

"Tóhsa' ia'satkáhtho Kaspé tsi thaiá:ta."

Sok iá:ken' ki ronnón:kwe tahontihéntho' wahon-té:ko'.

O:nen ki nen' né:'e ne kí:ken ratineró:kwaien' wahónttoke' tsi niió:re' tsi ronateronhienhtén:ni, kí:ken ne ronnón:kwe ronate'kwenhátie'. Sok ne ne:n né:'e tahontihéntho' wahonté:ko'. Ne's ká:ti' ionsahiatkáhtho'. Shé:kon ká:ti' ohná:ken' tá:re' ne Kaspé tahshakóhsere'.

Né:'e ká:ti' ne' né:'e tho ní:iot tsi wahshakotianerónhkwen' ne Kaspé ne thó shikahá:wi'.

Né:'e ki nen' né:'e ne wahón:nise' ne shé:kon shihatikaraweientehténion'ne khe'nihokón:'a séns thó ní:iot tsi ratiká:ratonhskwe'.

Né:'e ki nen' né:'e ne akwiratékha' ronwá:iatskwe' ne kí:ken rakkaratón:ni.

Akwirá:'es

O'TONHKWA'

Tóka' iá:ia'k-iawén:re' sha'tewakohseriiá:kon teiontiatieronnión:ni istén:'a tánon' í:'i shonsaiontiahtetionhátienne' énska shiwahsontá:te'. O:nen ki' kwáh·kén' shitio'kará:'on tánon' teiothahá:kton tsi nón:we niiákene'. Ok tieió:ken' she's tsi tionkwanónhsote' nó:nen kanenna'ké:ne tánon' akwé:kon ionerahtén:'en. Kwáh she's ki' ken'k nón:we thí tkahnhohká:ronte'.

Ionkenikaratóntie' ki' ná:'a, kháre' ó:nen ki istén:'a ia'ontkáhtho' tsi tionkwanónhsote' tánon' wa'í:ron',

"Oh nekén' kwah nón:wa' nithatiérha' thí:ken ia'níha?"

O:nen ó:ni' ní:'i ia'katkáhtho'. Ken' niken'tónhkwa' se'kén tsi tkahnhohká:ronte' skennen'ahsón:'a tsi teiohkwatasehátie'. Kwáh né:ne ónhka'k shi ok nahó:ten' tieken'eniónnions. Iáh ki' thé:nen' teiontianonhtonniónhon', ase'kén tho roió'te'kwe' thetén:re' ne rake'níha. Tsi ó:nen ionsaiákenewe' wahonwari'wanón:tonhse' oh nihatiérhahkwe' ne átste. Wahén:ron' ne' tsi iáh ne énska tiehoiakén:'en. Wa'akonekhé:ren', nek tsi iáh ki' thé:nen' teiaká:wen.

Tsi wa'órhen'ne' wa'akorihó:ta'se' tsi thononhwáktani'ne ronwa'níha, sok óksa'k wa'onhtén:ti'. Tho wá:'enhte' tsi thonónhsote'. Sótsi wa'ako'nísko', ok ná:'a shithawenhé:ion shiahá'onwe'. Saiakehiá:ra'ne' oh nahó:ten' iontiatkáhthon, tánon' ó:nen ó:ni' wa'ako'nikonhriaién:ta'ne' tsi wa'akohshónnion'se' thí thó shiwahsontá:te'.

A:nen Kaia'titáhkhe'

IAKOTINENIOIA'KS

O:nen ki' ní:'i nakká:ra'. Wahón:nise' skahwatsí:ra onkwehón:we ronné'skwe', tiótkon ronatonnháhere'. Kí:ken ne ronwa'níha ratoratsheraweiénhen iáh nowén:ton tehontonhkária'ks ne raohwá:tsire'. Kí:ken ne shakoti'nisténha ieweienní:io iakokhonniáhtskon tánon' tiótkon ionhkwennión:ni raonawenhshón:'a kanéhon tánon' óhwhare' ióntstha', ne ó:ni iakonniá:tha' ne raonahsire'shón:'a.

Kaié:ri nihotiwí:raien'. Tseiá:ta ne ísi' nón niiako'nikonhratshá:ni, Katsi'tsaró:roks iontátiats. Ne kwáh iakaon'éskwani kaniatarákta' aióntien', tiótkon nia'tè:kon ionnonhtonniónkwas ne karihwí:io's naontá:we' nakohwatsí:rakon.

Ia'a kó:ta'we' se'kén nón:wa'. Akoserénhtakon iakothón:te' rotíhthare'. Ia'eiéhtahkwe'. Taionnitskó:ten', kén' na'é:iere' ken' rón:ne' iakotinenióia'ks, kén'k nihón:na's iatathróna' tánon' áhsen nihotiwí:raien'. Kwáh se'kén kí:ken owirá:'a kahronhserá:ke roia'tanentá:kon. Katsi'tsaró:roks o'nisténha iotká:te' ronwatikaratón:nis ne ronwatiien'okón:'a ne iakotinenióia'ks. "Tóhsa' ietshitshá:ni'k, ietshithárhas tóhsa' teietsheia'teriahtíkhon enietshiaterá:shon'." Ne kati' wa'akehiá:ra'ne' tsi nahó:ten' iaká:wen o'nisténha. Iáh ki' tetiakoton'nékon'.

Iahonwatihthárhahse' wa'í:ron', "Ká:ts kén sewátien tánon' sewatoríshen. Sewatonhkáia'ks kén? Kana'tarokhón:we tánon' sewahió;wane' wátien'. Kóh ísewak," tánon' wahonwatihné:kanonte'.
Wa'í:ron', "Ka' nón nisewén:teron'?"

Wahní:ron' ne iatathróna', "A'é:ren onontohará:ke." Wahshakotihón:karon' aienatá:ra' tsi nón thatí:teron'. Wa'onthón:tate'. Sahón:ne' tsi sahonhtén:ti', iahón:newe' tsi tkentstén:rote'. Kí:ken iakoneniói a'ks rahsnonhsá:ke wahonitskerón:ti' tánon' kentstenhrá:ke waharánie'. Thontaiawénhstsi kén' ní:wa' tsi wa'tewateronwén:tate'. Ionsahontáweia'te' raotinónhskon ne raohwá:tsire'.

Wa'í:ron', "Iáh tháonton' iakatáweia'te' sótsi' kén' niwá:'a tsi iontaweia'táhkhwa'."

"Tó:ske' wáhi'," wahén:ron' ne iakoneniõia'ks. "Sonke'nikónhrhen tsi skowá:nen ní:se'." Akohén:ton wa'thá:ta'ne' tánon' rahsnonhsá:ke wahonitskerón:ti', ienontsí:ne wahaié:na'. Thontaiawénhstsi' wa'ónhstho'ne' tsi niió:re' tho ok nitsá:ka' tsi ni' ne ronátia'ke. O:nen ón:ton' ia'ontáweia'te'.

Kí:ken raotinónhskon ken'k ní:wa' atekhwá:ra, ani'tskwá:ra, kanakta'shón:'a kaké:ron', tánon' karîhstote'. E' thó kana'tsáhere' karihsta:ke onón:tara'. Wa'ontathón:karon' Katsi'tsaró:roks tahón:tonte'. Wa'enontararónnion' ne iakón:kwe iakorákwen, iakorákwen, tánon' iáh tetewaterákwas nonón:tara'. Iotena'tsâtkon'.

O:nen ia'káhewe' ne Katsi'tsaró:roks naonsa-ionhtén:ti', e' thó ionsaiontó:roke' tsi teionitstenhra-kháhsion. Khé' thó roia'ten'tón:ne ne rón:kwe kén' nihrá:'a, sahonitskerón:ti' rahsnonhsá:ke tánon' ienontsí:ne iahaié:na'. Thontaiawénhstsi saiontehiá:ron' tsi nitiá:kahskwe'. Wahén:ron' ne iakoneniõia'ks, "Enhskerharátsten' tsi iáh ónhka' thahsehró:ri' tsi wahskwá:ken', tánon' tsi wahskwátho' tsi nón iakwén:teron'." E:so' shé:kon saienatá:ra' tsi niwakénnhes.

Kanenna'kè:ne' òn:we', ia'kàhewe' ne Katsi'tsa-rò:roks tànon' akohwà:tsire' iaonsahonhtèn:ti' tsi nòn thatoratstàhkhwa' ronwa'nìha. Saienatà:ra' shè:kon nohna'kènhkha' tonsahonwatinonhwehrà:ton' nakoterò:sera'.

Kì:ken iakotineniòia'ks wahatkàhtho' tsi tiakorìhwaiè:ri'. Wahèn:ron', "Ne tsi seksa'tí:io tànon' iáh tesathrò:ri tsi wahskwà:ken', ne kati' enkòn:ion' àhsen niwaskanektsherà:ke."

Ne kì:ken tiotierènhton wa'erà:ko',"Kaskà:neks ne iotena'tsàtkon' ne onòn:tara', nè:ne akhwà:tsire' tóhsa' nowén:ton aiakwatonhkária'ke', tánon' ónhkha' iakotohetstonhátie' aiakhinontará:nonte'. Tekenìhaton, kaská:neks ne o'nikón:ra' ne tóhsa' nowén:ton ónhka' akhe'nikonhráksa'te' ne akarihón:ni' tsi nahó:ten' tkewennìneken's. Ahsénhaton, kaská:neks akwé:kon nón:kwe enkhé:ken' ne tiók nahó:ten' akatkáhtho' ne ioiánere' tóhsa' akherihwa'tshénnia'se'."

Wahén:ron' ne iakotineniòia'ks, "Akwé ioiánere' nahó:ten' wahserá:ko', tsi nén:we' enhsónnheke' enhsatonnhá:rake', tánon' ensatera'swiióhake'."

Warisó:se Kaierìthon

TSI TETKAHNHOHONTION

Wahón:nise' iá:ken', atsá:kta' ákta' tkanonhsó:tahkwe' é' thó rati'terón:tahkwe' iatathróna' tánon' ne ronwatiio'okón:'a tánon' akokstén:ha.

O:nen iá:ken' kí:ken sewahsón:ta iahniiá:ken'ne' ne iatathróna', wahiaterennaiénha'. Akokstén:ha wa'ontenón:na'. O:nen ki' kwáh kén' shikahá:wi' tahontáhsawen' ne ratiksa'okón:'a wa'thonterien'taká-riahte'. Ronatsharokwáhton ki' ná:'a tánon' ieshonaterí:io, ronatswá:ton tánon' ratitakhenóntie's. Kháre' ó:nen wa'akononniá:ni' nakokstén:ha. Wa'aí:ron',

"Tha'tesewató:tat. Tóka' iáhten akón:wara' ientsisewaia'ténhawe'."

Iáh ki' thé:nen' tehonatahonhsatá:ton. Kháre' ó:nen thontaiawénhstsi' tahonwaniá:ra' ne shaiá:ta ratákhe' ieia'tákta' shihotohetstonhátie'. Sok wa'tiakonhohón:ti' tha'akón:ni' iahonwaia'tón:ti' átste'. Nek tsi tsók nahó:ten' awenhsá:takon tahoié:na' tánon' iahoia'ténhawe'. Iáh ne wén:ton teshonwaia'tatshénrion ne raksá:'a.

Konwatsi'tsaién:ni

KANA'TAROKHON:WE

Nia'té:kon ne ó:nenhste' tsi nî tsi iakoia'takéhnhen nokwehón:we, iakoia'tahnî:rats tsi niióhseres. Kî:ken oká:ra' ne tsi niieiérhahkwe' aksótha nó:nen enienenhstó-hare' tánon' eniethe'serón:ni' ohén:ton' tsi niió:re' kana'tarokhón:we eniena'tarîsa'. Khwató:ken tsi nî tsi roné:ka's nón:wa' tahonatehiaróntie'.

Kenkwité'stsi aksótha eniaé:ron', ó:nen ieióhe ahati'tarakarhátho'. Akwé tenhon'kenhrakwátho'. Ó:nen ienietáhko' kahnenhshón:'a káksakon eniakéta' tánon' entionkhî:ion' raktsî:'a khe'kén:'a tánon' î:'i, enionkhihró:ri', "Kaié:ri tókani' wîsk nikanénhstake iensewá:senhte' áhsen niwahsî:take na'tekónteron'."

E' thó ki' na'kwá:iere', wakwahahoktanîhon', raksótha tánon' aksótha ohná:ken' tá:ne' tahoti'rhoronhátie' tsi niió:re' eniakwâhsa'. Tsahiá:kshera sok ná:'a eniotke:tohte' kén' nikanerahté:son's tenkonta'kenhrótka'-we'. E:so' tenkonwatîhsnie'ne' kháre' ó:nen enkon-tehiá:ron' kwáh skenén:'a tsi enwatenenhstísa'.

Nó:nen kanenna'ké:ne én:wawe' enhén:ron' raksótha, ó:nen iehióhe naienenhstaienthó:ko'. Akwé tsi tkanenhstaiénthon ieniákwe' tánon' ieniakwahróhtenhte', e' thó ne ó:nen eniakwanoróhthsi'. Iáh akwé thaiakwanoróhthsi' kwáh nek tsi niió:re' iotenénhstate'. O:nen ki' nén' né:'e enwá:ton' aksótha tánon' raksótha enhniratskentón:ni', a'é:ren nikaronhkwáhses tóka' tékeni-iawén:re' tókani' wísk-iawén:re' nikanonhkwen:take enhnihá:ren' naonstáthen'. Nó:nen akwé iostáthen nó:nenhste'sók nón:wa' entsakwanenhstarón:ko'.

O:nen enwá:ton' enienenhstohare'. Ken' niieiérha' tsi ienenhstóhares, enion'kenhrontá:ko' karístakon o'kén:ra né:ne ioté:ken wáhta'. Eniena'tsá:ren' karistá:ke ne ohné:kanos tánon' wa'kenhrontákwen. Nó:nen tentiohnekón:ti ienienenhstáweron teniohnekón:ti' tsi niió:re' nó:nenhste' enkontia'tawi'tahsión:ko'. Thó ne' ó:nen eniehrá:ko' karistá:ke. Tsi kahionwatátie' ieniéhawe' e' thó ienienenhstóhare'. Raksótha rona'tsakahrón:ton e thó ienionweron' sok awén:ke ieniá:kohwe' kwáh skenén:'a teniehkarhateníhon' ia'otiiakenhátie' ne kahnekáksen. Wakon'éskwani séns akheiateró:roke' tekka:nere' iorihwanerá:kwa tsi niió:re' tsi ontenenhstóhare' kwáh otsí:nekwar neniá:wen'ne'. Akwé ne konnón:kwe séns kahiónwakon iekontinenhstóhares. Ne thó nón shontakahá:wi iáh ónhka' teiakoiéntahkwe' ohné:kanos ne kanónhskon.

Nó:nen wa'enenhstoharéhsi' sok nón:wa' entsestátha'te' nó:nen kwáh tokén:'en enwastáthen' tsi ní ne óhstien', ó:nen enwá:ton' naiethe'serón:ni'.

Raksótha shahahní:non' ne kathe'serón:nis tiotáhsawe' iakwaksa'okón:'a onkwaio'ténhsera ón:ton' naiakwate'serón:ni'. Kí:ken kathe'serón:nis ká:tens oshón:kare' é' thó iora'nentá:kon tánon' iokahkwén:tonte', ieniakwanenstáweron' sók teniakwatenníha'te' teniakwakarhaté:ni' ne' okahkwén:ta', ná:kon tkaksó:ron é' thó ieiohná:ote' othé:sera' tsi niió:re' eniakwáhsa'.

O:nen kathe'serìson' ó:nen enwá:ton' eniena'tarón:ni'. Kén' niieiérha'. Othé:sera', onekwénhtara' nikasahe'tó:ten', tánon' ostón:ha tiohió:tsis, káksakon eniakéta', teiohnekóntie's entiónweron', sok tenionwénrie' tsi niió:re' tenkontatié:na'. Ohnekanó:sne ia'tennionni-hsnónhsohwe'. Eniontokwatsherótsenhte' iehsnonhsá:ke enié:ren' tenietakwénhtenhste' tánon' teniehwe'nón:ni', tetiohnekóntie's ieniakéta'. Nó:nen enwatá:kerahwe', né kén:ton' tsi ó:nen wa'ká:ri'. Ie'wahrakeri'táhstha' tókani oskenón:ton enié:rihte' ne teniakwatatiéhsten' ne kana'tarokhón:we tánon' kén:ie entionkwá:ti' iawékon'. Ne sha'kanenhsta iakwátstha' nó:nen eniakwatkátston' onénhsto.

Iáh thé:nen' tekaiésha's nó:nen kanenhstaienthókwen. Kì:ken onó:ra' kaiarowá:nen ronnéta'skwe', ratiksa'okón:'a thó rón:ratskwe', tánon' séns ratiratsken'tón:nis kéntskare' ionrahsi'tokewáhtha'. Kaia'tón:ni ó:ni' rononniá:thahkwe'. Shé:kon nón:wa' skehiá:ra's akwé tsi niiakwahwatsí:ra' kató:ken nahó:ten' ionkwa-io'tensherá:ien'. Ion'wé:sen' she's ne' skáthne tsi ionkwaió'te'.

Warisó:se Kaieríthon

AHTHEN:NO

Wahón:nise's iá:ken' tahonhthénnokskwe' tewa'á:raton. Thihonaterien'tatshénrion' tsi ronahthenno'tsherón:ni. Né sé's iá:ken' thi tsikónhses kéntson enkonwaié:na' tánon' enkonwania'tó:'ase'. Ohén:ton' tsi niió:re' tenhatí:rihte' ka' nionhsákta' nón:we nenhatikwé:taren' kwáh se's iá:ken' né:ne aiohnatirónhthake' kwáh se's iá:ken' ó:ni' ostón:ha teiothwe'nón:ni ne éh nón:we. Né ki' iá:ken' enhatikwé:taren'. Ne énhontste' ne enhonhthenno'tsherón:nia'te'. Tho niió:re' ó:nen onia'tará:'a tenhatihwawén:'eke'. Thók se's iá:ken' ní:iot tsi ká:ien' ne wahón:nise' ne ahonten'nikonhró-ria'te'. Né se's ki' iá:ken' róntstha' ne wahón:nise' tsi tehonhthenno'óksthahkwe'.

Oróte' Karihwénhawe'

WAHSHAKOIA'TAKEHNHA' RAOHWA:TSIRE'

Ne' thó nón shontakahá:wi' shé:kon í:non sha'teionnonhsháteron' wahotiténhta'ne' ne onkwehón:we ase'kén ne' thó shiiohserá:te' iáh é:so' teiokennó:ron sok ná:'a ki iáhten' tehotihetiióhse' nahonnonnhéhkwen ase'kén akwé:kon ieiénthohskwe'.

E'tho nón shontakahá:wi' akokstén:ha akaonhá:'a ié:teron' iakothón:te' ónhka'k tiehnhonhtíshon. Ia'ont-ke'tó:ten' e' thó raksá:'a íthrate'. Wahonwanhohtón-kwahse' aontahatáweia'te' wa'í:ron',

"Takí:tenr na'teiawenhniseranón:iani tánon' saiakenhátie', serihsión:ko ne sawenhshón:'a tánon' tstátha't."

Tahén:ron' ne raksá:'a, "Iah tháon:ton' ase'kén tewakseríhens iaonsá:kewe', istén:'a ionkehn-ha'onhátie'. Ahsathón:tate' ken aonsétene' ase'kén ratikwé:kon thotinonhwáktani' ne onkwanónhskon. Teiako'nikónhrhare' ne istén:'a ase'kén iah ó:nen tetsonkwatennatsherá:ien' iáh ó:ni' tetsonkwanonhkwatshe-ráien' tánon' é:so' tsi iakononhwáktani' ne istén:'a. Wa'í:ron' tóka' ostón:ha aesanonhkwatsheraién:take' tánon' aesakhwaién:take' ahshé:ni' aiontshennón:ni'."

Wa'í:ron' ne akokstén:ha,

"A:ke oh nén'tiere' ne iá:kewe', na'teiohahahnón:-niani enkatonrió:kten' tsi na'teionien'kwatá:se'."

Tahén:ron' ne raksá:'a, "I:'i enkonia'thahónnien'." Thó ne wa'ontatkwatá:ko' tánon' sahonwáhsere' ne raksá:'a. Wa'akonehrá:ko' tsi niwatié:sen' tsi ní tsi í:ien' wa'ónttoke' tsi akwáh né:ne tekaniehtohtárhon tsi nón:we ní:ien'.

Iahá:newe' tsi nón thotinónhsote' ne raksá:'a, ia'ehnhohtíshon. Ro'nisténha taiehnhohtón:ko' wa'í:ron',

"A:ke tasatáweia't! Niwenhniseráksen saiakenhátie'."

Taiaí:ron' ne akokstén:ha, "Ehtién:'a kwí' ietsehnhá:'on ahakihnónksha'."

Wa'í:ron' ne ro'nisténha, "Iáh ónhka' tiekhehnhá:'on ase'kén akwé:kon é:so' tsi ionkwanonhwáktani'. Ahsen nón:ta' tsi náhe' wahshakwaia'táta' ne Ohserá:se'."

Wa'í:ron' ne akokstén:ha, "Oh kati' na'á:wen' tsi né:'e rakihnonksónhne'?"

Rake'níha rakkaratón:ni

Niioronhiá:'a

SE'NIKON:RARAK

Tóhka' niiohserá:ke tsi náhe' éh nikiawén:'en kí:ken kkaratón:ne'.

Ake'nisténha ó:nen kwáh kén' náhe' ionkkaratón:ni. Kanátthen ne tsi kaná:taien' ia'teiakohahahiia'konhákie'. Tha'kaké:rok iá:ken' ísi' na'ohááhati iakothón:te' ónhka'k khe thontahohén:rehte',

"Se'nikón:rarak wats ensákwahte' thí ká:sere ."

Tánon' iá:ken' tontahohahahiia'konhákie'. Tsi wa'thiátera'ne' ne ake'nisténha wa'é:ron',

"Iáh ki' ne ónhte' thé thaesewatkarón:ni."

O:nen iá:ken' kwáh kén' niió:re' sá:re' tontahohén:rehte' iá:ken' tánon' wahén:ron',

"Ká:sere ki' wáhe' enkarihwén:ta'ne'."

Oróte' Karihwénhawe'

ATERO:SERA'

Ne iá:ken' kí:ken tehnón:kwe, shiá:ta Ahkwesahshró:non' tánon' shaiá:ta Kahnawa'kehró:non' nes ne ronatén:rọ' nek tsi teiotenonhianíhton tsi na'tehiatate-rihwanonhwéhne'. Tiótkon ok nahó:ten' tiorihón:ni tehonatkénnion.

Tetsá:ron rotinahskwaién:tahkwe' érhar, tánon' tiótkon she's ó:ni'né:'e tehotirihwatí:ronte', ónhka' raotshé:nen' sénha'ra'shátste'. Kháre' ó:nen wahiaterí:io' ne raotitshé:nen' érhar. Sok wa'thní:ien', kwáh wahnihwistá:ren'. Ó:nen ki enkató:ken'ne' ónhka' raotshé:nen' sénha' ra'shátste'.

Kwáh iá:ken' nek ne na'tewaniwharó:ko' tsi wa'-thiatátienhte' ki érhar. Kwáh iáh thé:nen' tetió:ken' ka' niká:ien' rotkwenionhátie'. Kháre' ki' ó:nen ia'tonson'kenhraién:ta'ne'. Kwáh iá:ken' nek ne otáhshon' o'kenhrá:ke skaké:ron'. Óksa'k ki' ã:re' ne ronatén:ro' tonsahiatkén:ni' ka' niká:ien' sénha' í:ions tiotatén:ron.

A:nen Kia'titáhkhe'

RABAHBOT

Tóhka' niiohserá:ke tsi náhe' sha'té:kon nikón:ti rabahbót wahentsiahní:non' ki rake'níha. Atsiá:kta' iahshakó'teron' tsi nón:we iáh akwáh tekiohnó:tes.

Tsiahiá:kshera tó:wa' entóhetste' kí:ken rakenonhá:'a eh tahahrárho'. Ronehrakó:'on iá:ken' kí:ken tsi nikanahskwí:io's ki kéntsion. Tánon' ki' ne sénha' ieshonehrakó:'on tsi kwáh akwé:kon skáthne tsi nón:we nikontí:teron'. Ok ó:ni' iá:ken' ná:'a iahohrión:ti' akwé:kon wahshakoié:na' ki rabahbót. Sha'té:kon nikón:ti wahó:nawe'. Kwáh iá:ken' khé saháhkete' kí:ken rakenonhá:'a sahentsiahsheronniá:na'.

Ionsá:rawe' ki' óksa'k wahentsiahsherón:ni' tánon' wahentsiakerí:tahwe'. Tsi nahotsiaríhse' ki' kí:ken wahén:ron', "To ionkiatén:ro' rinontsianontén:ra."

Otsta' iá:ken' ne' tsi nontahatshennón:ni' kí:ken rake'níha. O:nen iá:ken' tó:ske' tsi rotikhwáten' wahori'wanón:tonhse' ne ronatén:ro', "Ka'," wahén:ron' "nón:we nontahsitsiénhawe'?"

"Kí:ken rakenonhá:'a wahén:ron, "Satsiá:kta' orhon'kéhstsi' takhráho'. Tsi ki' nón:we thí:ken iah wí' sótsi' teiohnó:tes. Tho iahonkwahrión:ti' wa'kahrióhkawi'ne'. Thó," wahén:ron' "ní:iot tsi kontí:teron' tó:wa' shí:ken hónhka'k eh konwatí'teron' rotenahskwarákwen."

Wa'thohén:rehte' iá:ken' kí:ken rake'níha tánon' wahoiéshon'. "I:'i, wahén:ron', "thí:ken akitshenen'-ó:kon. Tsiahiá:kshera tsi náhe' thó tekhé'teron'. I:'i wakatenahskwarákwen."

Oróte' Karihwénhawe'

RAKSOTHA RAOKA:RA'

Wahón:nise', Ahkwesáhsne iá:ken', éh nitiawén:'en kí:ken nahó:ten' kkaratón:ne'. Akohserá:ke éh niiawén:'en.

Arok shiiotohétston ne "Seaway" kawehnó:ton' she's thi ná:kon nekwá, kén' nikawehnohkwá:sa's. Raksótha raowenhkénha' énska kén' nikawehnóhkwa'. Kanonhsó:tahkwe' iá:ken', tekaronta'serónnion', tánon' thó she's nón:we na'tehatí:ta'skwe' ne tehonatstekawhenhátie'. Sewatié:ren tóhka' nón:ta', sewatié:ren nek ne sewahsón:ta enhonnón:wete'.

Iatathróna' iahá:newe' o'karahsnéha', iatonhkariá:khe' tánon' tehotihwihshenhé:ion. Oksa'k ne rón:kwe wahatsenhón:ni', tánon' ne iakón:kwe taiontáhsawen' wa'ekhón:ni'.

O:nen ki' shishonahtá:'on, wá:rehre' ne rón:kwe óksa'k ki' ná:'a ne' ienharáthen', enhotá:wha'. Ok ne iakón:kwe, khé:ken ne' tonsaiakohtárho' niá:re'. Kwáh ki' thí:ken kén' nikarí:wes ó:nen tiok nahó:ten'k wa'akothón:te'ne'. Wa'akorihwaióha' oh nekén' kwah nahó:ten', sok ia'eiá:ken'ne', ia'tiontkahthonnióhwe'. Iáh ki' thé:nen' teiakotkáhthon . Tontaiontáweia'te' Sok á:re' saiakothón:te'ne', kwáh né:ne tiok na'ka-ia'tó:ten' shitaiotská:honke'. O:nen se'kén wa'ako-'nikonhraién:ta'ne' tsi kanonhsohará:ke nontaiawenonhátie'.

Skennen'ahsón:'a tsi ia'ieráthen', thó iá:ken' ki "ráhskahn" tho'wahrá:kon ne ron'kénha'. Kwáh iá:ken' khe na'tontaieiá:ten'ne' tsi nikanekó:tes tsi niió:re' tsi wa'akoteronhiénhten', sok wa'tionráhtate' wa'onté:ko'. Owisa'kéhson' nia'etákhe', shakóhsere' ne "ráhskahn." Kwáh ki', iá:ken', ó:nen thóha ahshakohóntera'ne ó:nen wa'ónhsá:kaienhte'. Kaná:takon niió:re' iahonathón:te'ne', sok tontahshakonaterahtá:na'.

Saháhkete' ki' ne "ráhskahn", kwah iá:ken' nek ne wahén:ron' "Wesani'taní:tenre' tsi iáh tekonié:na."

A:nen Kaia'titáhkhe'

OTHE:SERA

Kī:ken kkaratón:ne' rakenonhá:'a rakkaratón:ni tsi na'thokerón:nion'se'. Tsi niwakénnhes kī:ken tho nihoia'tawén:'en.

"Orhon'kéhstsi'," wahén:ron', "wa'katkétsko' ia'kiá:ken'ne' wá:kehre' enkhehnekanontén:ra' kī:ken ohén:ton' tewaktsi'tsaiénthon. Kwáh," wahén:ron', "ó:nen iewakhnekonkiéhsere' wa'káttoke' tsi ok na'kaia'tó:ten' í:waks kí:ken tsi waktsi'tsaienthóhseron. Oksa'k ó:ni' wa'káttoke' tsi tsiki'nhontstókhi' wahonwahehtaká:ri'." Kwáh iá:ken' skanó:ronks ahontekhwī:sa' kī:ken rotsi'tsiaiénthon.

Isi' na'ohahá:ti rén:teron' ronatén:ro' wahohró:ri', "Thí:ken ohnenna'tá:ke ronathe'serónkie's ne tho sá:ti."

Tho ki' iá:ken' nahá:iere'. Orhon'ké:ne iá:ken' ionsahatke'tó:ten' kwáh iá:ken' ronatenekó:tote' kī:ken tsiki'nhontstókhi'. Nek iá:ken' kí:ken rakenonhá:'a ne shotakiehsón:ton só:tsi' iá:ken' wa'thonwaren'ké:ni'.

Oróte' Karihwénhawe'

RONTONHWENTSI:SAKS

Kí:ken oká:ra' né:ne tóske' kwáh é' thó niiawén:'en. Raksótha ne kwáh é' thó nihoia'tawén:'en. 1893 shiohseró:ten wahonwahtíhnha'ne' ne Hudson Bay Company, raksótha tánon' áhsen nihotate'kén:shen' nahón:ne' tehniiáhse nirihstí:sere's, nahshakotihahónnien' tánon' ahshakotihsnién:ne' nahatirihstí:sere' kí:ken onhwéntsase' Othoré:ke nón:we niiawén:'en. Raksótha Rówí Sohé:rase' ronwáiatskwe' tánon' Sakó, Wíshe, tánon' Kanenrahtí:ron ronwatíiatskwe' ne rontate'ken'okón:'a.

Kenkwitéhstsi'wahonhtén:ti' wahontonhwentsisákha', tióhton niwenhní:take karhakonhkó:wa rón:ne's, oná:ke tánon' érhar iotikarenionhátie' ne raonawenshón:'a. O:nen sha'tontahonahtentionhátie' nia'te:kon tsi nahotiia'tawénhseron', Great Slave Lake konwá:iats, tsi nón seréka' tahonatenonhianihtén:ni'.

O:nen akohserá:ke ón:we'ioweiennatshá:ni tsi na'tkanien'kwatasehon' iáh thietsó:ken', wahontia'táhton'. O:nen ni'wahoná:karahwe', wahontenaktón:ni'. Tsi wa'óhrenne' akwé raona'tóhsera' óniehte' tioterhó:ron, soronhké:ne ón:ton' tahatiiá:ken'ne' tánon' ne raotitshé:nen' érhar wa'kontia'táhton'. Raonatenná:tshera' ó:nen ehtá:ke ní:we' kháre' ó:nen iahóntshahte'. Tóhka'

nón:ta óniehte khók rononnhehkwen. Skenén:'a ó:nen sénha' tsi rón:ne', rontonhkáia'ks, ratiwístos, tánon' tehotihwishenhé:ion. O:nen ni tó:ske' tsi tehoti'nikonhrahrí:'on.

Ia'thotirihwaién:ta'se' tsi enhati'wahstará:ko' ónhka' tsi rónnhe' enhatattká'we', enhón:neke' tsi rónnhe' ne tóhsa' ahonníheie', oh naiá:wen'ne' ronátia'ke ahonnónnheke'. Né:ne kwáh ken' niehrá:'a tsi nihontate'kén:'a Sakó, waha'wastará:ko' ne kén' nika'wastésha. Kwáh í:ken tsi roti'nikonhráksens tánon' tehoti'nikonhrahrí:'on, tsi wahoná:karahwe'. Tehniiáhse iatate'kén:'a ia'thotirihwaién:ta'se' énska shé:kon enshiate'nién:ten' nahiatorátha' oskenón:ton. Tsi í:ne' tahonahsí:tia'ke' wahkwari'tará:ken raia'tá:ke, wa'thá:ta'ne' kí:ken ohkwá:ri tekeniawén:re' niwahsí:take nihahnén:ies, wa'thatskára'we', kwáh né:ne o'tónhkwa' ne rahsá:kon. Tóhka' nia'káienhte' nahonwarón:tate' tsi niió:re' iahrénheie'. Oksa'k sahiathroriá:na' tsi wa'konwário' óhkwa:ri. Ronatshennonnihátie' tsi wahoti'waraién:ta'ne'. Iah ó:nen ne Sakó thahrénheie'.

Sakonwaia'tisákha' ne ohkwá:ri sakonwaia'taióha', sok ná:'a akwé tioteniehtó:ron wahonnó'kwate' iáh tehotitshénrion ase'kén tioia'tataríhen ne ohkwá:ri wa'kahwistaná:wen' ne óniehte' kaia'tó:kon. Tewenhniserá:ke ronnókwats ó:nen shihon'nikonhróktha' ó:nen sakonwahiatatshén:ri' ne ohkwá:ri. Wa'konwaiénsehre' sok wahati'wararíhte'. Tewenhniserá:ke ohnekákeri khok wahatihnekí:ra' thó ne ó:nen wahati'wá:rake', akwé wahotinonhwákten' sótsi' io'wahráresen' tánon' sótsi' karí:wes tsi náhe' tethonatská:honhkwe'. Kanenrahtí:ron rahiakwirá:ke wakanennió:kwanoste'. Iah téshre's, ó:nen ni wahón:newe' ne shakotiia'tí:saks nahonwatiia'takéhnha'.

Ionsahonwatiia'ténhawe' tsi nón thonatenatíson' ne Hudson Bay Company. Kaié:ri nihá:ti iosnó:re' sahón:newe' tsi nón ienakerénion' nón:kwe. Raksótha Rowi Shohé:rase', ro'kén:'a Sakó, tánon' ne tehniiáhse niristí:sere's, sok ne Wíshe, tánon' Kanenrahtí:ron, khe íthne's sótsi' rotinonhwáktani'. Wa'thonwatíhsnie' ne kwáh skenén:'a sahiata'karí:tate'. Kanenrahtí:ron, seréka tsi rónnhe' ia'taioné:non' tetsá:ron wahonwahsí:nia'ke'.

E:so' wahatiiésha'tsi ronahtentión:ne', tiótkon ki iahatirihwaié:rite' tsi nahó:ten' ronathonkaiá:kon. Kí:ken ne tionathonwí:sen'rotiniákhon onónha' ó:ni' wa'kontiiésha'. Ronaterihwasherón:ni né:ne Hudson Bay Company tsi rotiniákhon enkonwatikária'kse' tsi nikarí:wes othoré:ke iehón:nes. Kí:ken ne Hudson Bay Company ó:nen kwáh kén' náhe' iáh thé:nen tehshonwati-wennahrónkha' wahonte'nikonhrí:sa' tsi iáh tha'onsakonwati-kária'kse' ne rotiniákhon, wahonní:ron' iáh ó:nen tha'onshakwakária'kse' "ase'kén iá:kwehre' thonenhé:ion." Taioti'nikón:renhne' tsi na'teiotenonhianíhton nahó:ten' wa'konwatihró:ri'. Oh nenkontiie:re'. O:nen wa'onatiá'kse' tsi kontihwistatáhkwas, akwé nieiotiwiraién:ton taiakotíhsnie'ne'. Aksótha áhsen niiakowiraién:tahkwe' istén:'a shiiewirá:'a. Kon'tátie' iakoió'te' tánon' to:k nitio'kará:'on otsinéhtara iakoió'te' ská:ti ne ionhsi'tá:ke teiontatkarén:ron owirá:'a. Tsi nahó:ten' eniéhsa' kaio'ténhshera' teniontá:ton', atenná:tshera' tánon' ne karístakon nahó:ten' aionté:kate' nahotiia'tatarí:hen, iakén:'ak tsi ronnónnhe'.

Ontsharó:ko' tsi ó:nen sá:newe' ne iatate'kén:'a, akwé ne rontátenonhkwe' tánon' ronatenra'shón:'a ronatshennón:ni ronatonnháhere' tsi sá:newe' ne iatonhwentsí:saks.

Warisó:se Kaieríthon

TSITHA

Ne iá:ken' kí:ken ranekénhteron ionsahatáweia'te' tsi thonónhsote' wahori'wanón:tonhse' ne ro'níha aón:ton' ken ne aho'seréhtani'. "I:kehre' akaterohrókha' kí:ken teióia'aks."

Wahén:ron' iá:ken' ne ro'níha, "Wá:s nek ki' ná:'a ne enhsaten'nikón:raren'. Tóhsa'," wahén:ron', "nón:wa' enhse'niakenhtánion'."

Sahén:ron' iá:ken' kí:ken ranekénhteron' "Enkaten'nikón:raren'se'."

Orhon'ké:ne iá:ken' saharihwá:ronke' ne ro'níha ákte'k nón:we iehshohonwí:sere's tánon' ákte'k ó:ni' nón:we ronwá:kens tethoke'tóhton. Ohstón:ha iá:ken' ó:ni' tsi ní:iot nahorihwáksha'se' ne ro'níha. Thók shé' ní:iot tsi ronaterihwahsherón:ni tsi thók nón:we ienhakwátho' kí:ken teioia'a'áksne. Iáh ó:ni' óksa'k thé tehá:wen ki ro'níha. Tóhkara' nón:ta' ontóhetste'.

Ronwaia'tanontaktónhne o'karahsnéha shonsá:rawe' ne roién:'a sahori'wanón:tonhse' ne ro'níha enhathón:-tate' ken shé:kon ne aonsaho'seréhtani'.

Tho ki' niió:re' ó:nen wahori'wanón:tonhse' ne roién:'a tó:ske' ken ki oh nahó:ten' rarihwahrónkha'.

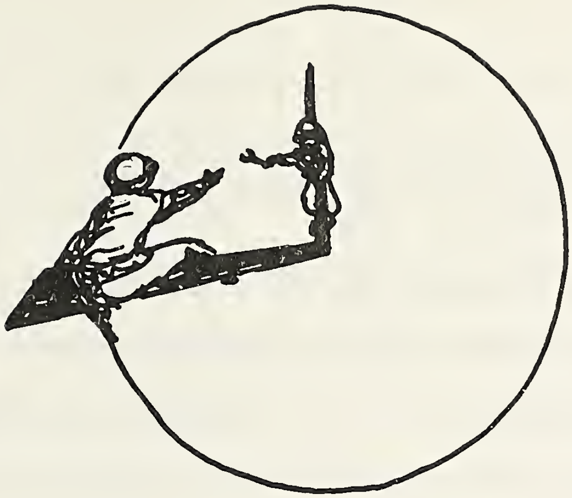
Wahén:ron' iá:ken' ki roién:'a, "Tó:ka'."

Sahén:ron' ne ro'níha, "Wa'kerihwá:ronke' thí tóhka' niwahsontá:te' tsi náhe' kon'serehtanihén:ne' tsi sa'niaken'én:ne',akté:shon iá:ken' nón:we nonkwehshón:'a iesá:ken's tetisake'tóhton'."

Wahén:ron' iá:ken' kí:ken roién:'a ónhka' ne' ne rá:ton. Ranonhtonniónkwas iá:ken' kí:ken ro'níha tho niió:re' ó:nen iahén:ron', "Tsítha wahakhró:ri'."

Ia'tehononhsonhtiia'konhátie' iá:ken' ki roién:'a **kwáh** ó:nen ranhotón:ne wahén:ron', "Ronó:wen kí'."

Oróte' Karihwénhawe'



KA:R NAHSONTHEN

Ká'tsi ok nón:we kí:ken kanón:no karíhstatsi thotiió'tehkwe' tóhka' nihá:ti kahnawakehró:non' tánon' shaiá:ta ne ahkwesahshró:non' ostón:ha tethoná:kara's. Shaiá:ta ó:ni' iá:ken' ne rahón:tsi skáthne thonatoróhon ronkwé:tase'.

Ne ki' kí:ken ahkwesahshró:non' thé:nen' ki' ná:'a iahori'wanón:tonhse' aontahó:ion' ne rahón:tsi. Sok iá:ken' wahén:ron' tó:k na'tehawennakará:ni,

"Niá:wen ki' ahsónthen."

Khe' ki' niiohsnó:re' wa'tharihwaserá:ko' ne rahón:tsi,

"Iáh tekarí:wa', ákta' ki'k ní:se' ne ká:r nahsónthen nihsia'tó:ten."

Konwatsi'tsaién:ni

TSIK A TSIK, TSIK A TSIK

Tsi niióhseres, iá:ken', kí:ken iatathróna' wahiatonhkária'ke', tánon' wahiatienhtó:kten' ó:ni'. Wahatateweiennén:ta'ne' ne rón:kwe ahatorátha', tánon' wahshakohró:ri' ne ró:ne' tóhsa' aionté:ka'te' tsik énshrawe'.

Iáh teiakotahonhsatá:ton, kaní:io'k iahaiá:ken'ne' sok wa'etsenhón:ni' tánon' sótsi' ákta' niahá:'en' tsi iotékha' wa'onnihsnonhsótshi'. Wa'tiakohén:rehte' ki' ná:'a tánon' wa'ako'tsí:reke' ne iehsnonhsá:ke. Tsi niió:re' tsi iontonhkária'ks, wa'akawé:ka'we' sekén ne iehsnonhsá:ke tánon' wá:'eke', wá:'eke' ó:ni' ne ienentshá:ke, tánon' ne ieia'tá:ke, tánon' ne iehsiná:ke, akwé:kon ne ionhsi'tá:ke. Kwáh iá:ken' wa'ako'tsirékhon' ne ionhiakwirá:ke.

O:nen ki' iá:ken' kwáh iah thé:nen' tetsako'wá:rare', tánon' shé:kon niiontonhkária'ks. Sok ia'eiá:ken'ne' wahonwaia'tisákha' ne ró:ne'. Ne sekén ne ó:ia' nikawennó:ten tsi wa'onhtén:ti'. Tsi ní:iot ne wa'ohstien'tá:kahre', "tsik a tsik, tsik a tsik, tsik a tsik."

Wa'tharáhtate' iá:ken'ne' raotshé:nen' érhar wahohroriá:na' tsi na'akoiá:tawen' ne ró:ne'. Tánon' ó:nen ó:ni' iahothón:te'ne' "tsik a tsik, tsik a tsik,

tsik a tsik," taiohstien'takaré:re', sok iá:ken' wahaté:ko'.

Iahá:rawe' kí:ken tekana'tkarokenhkó:wa tánon' khé ieiotiá:kton. O:nen kí:ken wá:rehre' oh nenhá:iere' ne tahiá:ia'ke'. O:nen ó:ni' wahatkáhtho' ken' nikanónhsa' tkanónhsote'. Tho niahá:re' tánon' iahahnhonhtíshon'.

Tahahnhotón:ko' rokstén:ha' ken'k nihahnén:ies. Wahori'wanón:tonhse' ne rón:kwe ahoié:nawa'se' tahiá:ia'ke'.

Wahén:ron' ne rokstén:ha, "Thi kawenní:io', entá:'on ki' niáhkwe' enhsahiákha' tánon' enhsanitsatorátha' tánon' kén:'en nentéhshawe'."

Tho ki' nahá:iere' ne rón:kwe. Wa'thosteríhen' ki' ná:'a, ó:nen she'á:re' sahothón:te'ne', "tsik a tsik, tsik a tsik, tsik a tsik," taiohstien'takaré:re'. Tahó:ion' ne káhi, tánon' ne kéntson, sok ne rokstén:ha wa'tatia'karatirón:ten' tánon' wahatatia'tahní:rate', sok raia'tá:ke wahahtén:ti' ne rón:kwe wa'thaiá:ia'ke'. Iahá:rawe' ki' ne ísi' nekwá ne rón:kwe, ok ná:'a ne rokstén:ha sahatatáhsthohte', tánon' kanónhskon nionsá:re'.

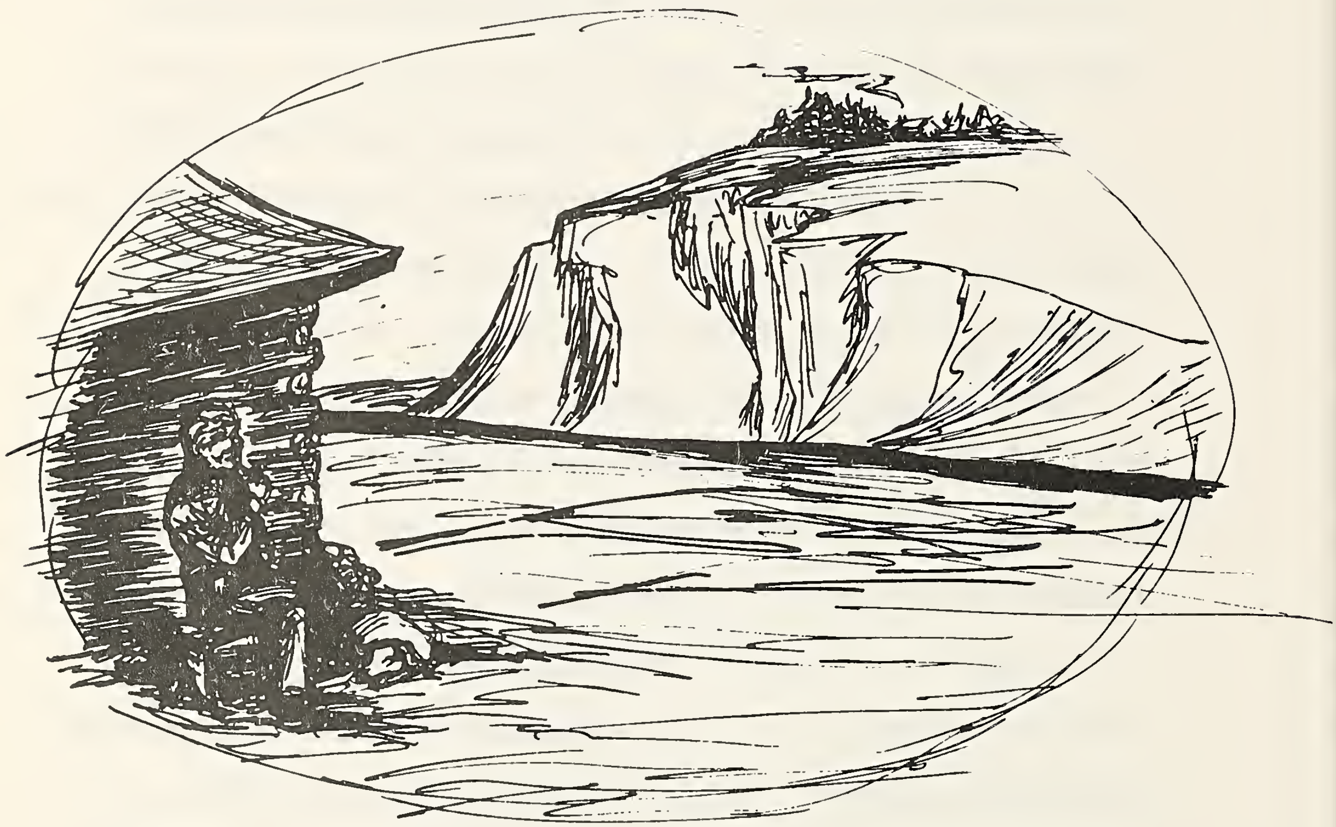
Ken'k nikarí:wes kanónhskon iéshre's, sok wahothón:te'ne', "tsik a tsik a tsik a tsik." Aktóntie' nontaiawenonhátie'. Kháre' ó:nen kwáh átste tho taiorá:kahre'. Iahahnhotón:ko'. Thó í:tsete' kí:ken iakón:kwe iah thé:nen' teiako'wá:rare'.

Wa'í:ron', "Taki'terónhna' ísi' nekwá."

Wahén:ron' ne rokstén:ha, "Thí kawenní:io', entá:'on ki' niáhkwe' enhsahiákha' tánon' enhsanitsatorátha' tánon' kén:'en nentéhshawe'."

Iah teiakothontá:ton, wa'í:ron', "Iah tewakenáktote', kwáh óksa'k taki'terónhna'."

Sok ki' ne rokstén:ha wa'thatia'karatirón:ten' tánon' raia'tá:ke wa'onhtén:ti' ne iakón:kwe, nek tsi iah tieiá:ko ne ísi' nekwá, sótsi' wahatatia'tahnhétskwahte', wa'ekháhen', tánon' ia'eiá:ten'ne'. Iáh ne wén:ton ónhka' teskonwawennahrón:ken.



Shatatáhsthohte' ne rokstén:ha tánon' kanónhskon nionsá:re'

A:nen Kaia'titáhkhe'

IAH TEHOTEWEN:NARA

Iekaratónhkhwa' tsi kí:ken kén' nithoión:ha onkwehón:we raon'eskwaníhahkwe' iotahsontatíhen shé:kon ahoiakenhatié:seke' tsi ní:kon ienhaiá:ken'ne' eniaí:ron' ne ro'nisténha,

"Tóhsa' sasa'nikónhrhen ohén:ton' ne ahsónthen tontasahtén:ti' ase'kén nó:nen enwatóhetste' ne' tho nitsohwistá:'e nek ne iáh tekon'tkonhserí:io teskón:ne's."

Tia'tewahsón:take ne kén' nithoión:ha enharhá:ratste' tsi iosnó:re' énshrawe' nek ki' tsi tiótkon sho'nikónhrhens iahatkáhtho' to nitsohwistá:'e nó:nen ne rontenro'shón:'a tánon' raotihwá:tsire' enthontáhsawen' kakarí:io's tahontatkaratón:hahse' iotká:te iotkarátteron's.

Kí:ken wahsontá:te iahatkáhtho' karahkwaka'ión:tha'. Tontahani'tsónhkwahkwe' ionsahaiakenhstahkwe' ase'ken ó:nen tékeni tetsohwistá:'e. Iohsontáskats ashon'thénhka' ioráhkote' iáh othé:non tehohteron'ní:sere'. Onhka'k wahshakó:ken' taiakawenonhátie' tsi niahawenonhátie'. Tsi ó:nen ákta' wá:'onwe' tsakothonwí:sen' wa'í:ron,

"Kwé, iohsontáskats wáhi'. Ka' wáhse'?"

"Sonkwahtentionhátie'," tahén:ron'.

"Niiohsontáskats, ánio ostón:ha tiahtén:ti," wa'kén:ron'.

"A:ke, iáh tháon:ton', ase'kén sók ná:'a ohná:ken' í:ke' tsi ronkwahtentionhátie'," tahén:ron'.

Takén:ron' ne tsothonwí:sen', "Enskon'terónhna'."

Skáthne í:ne' tsi ó:nen iahá:newe' ate'én:rakon wa'kén:ron',

"Anio tsi iakennekeraientáhkhwa' ietiátien' tánon' entenitká:raton'. Iáhse' thaiesaná:khwahse' ase'kén ó:nense' tsí:sa."

Iahiatáweia'te', kanekótote' ontkáhtho', wa'kén:ron',

"Anio ietenireáthen a' káts í:se' íshent," nek ki' tsi ne ranekénhteron' wahén:ron',

"I:se' íshent," sók ki tontáhsawen' akaráthen'. Sha'tekanekotí:hen sháhe' ó:nen teka'nhiá:ronhwe' iahaié:na' wahathon'kwáweron' ó:nen wahatkáhtho' tsi iáh tha'te-wahsí:tonte' teiotshinarén:tonte', tsi niió:re' tsi wahoteronhiénhten' takaiakén:seron' ne raoká:ra' tánon' tehohenrehtá:ne' raotinónhskon nionsahatákhe'. Iowen-natshá:ni wá:ton,

"Wesatera'swí:iohste' tsi iáhten í:se' tesahén:ton, ase'kén tóka' aesahén:ton' iaonsakonia'ténha' tsi nén:we'."

Shé:kon na'tehohenréhtha' wahonwaié:na' ne ro'nisténha tánon' wa'í:ron',

"E:so' ó:nen konhró:ri tsi iáh tekontkonhserí:io tiótkon ionatahsetonhátie's nahsonthenhnéhshon'."

Rake'níha rakkarató:ni.

Niioronhiá:'a

TEHOSTERIHENHSERE'

Kiótkon iá:ken' kí:ken rón:kwe énhtsken' ro'thahitáhkhe'. Sawátis ronwá:iats. Kiótkon ó:ni' io'shátste' tsi rostorónkie'. Tsi nón:we ién:re' ó:nenk iá:ken' tsi enhathahíta'. Iáh she's iá:ken' tha'tahatate'nikonhá:ren' ne ahréhsake' kén ne hónhka'k kén ahonwaia'títa'.

Tha'kakié:ro'k ki' iá:ken' hónhka'k tahohonwí:sere'. Wa'thá:ta'ne' wá:rehre' enhoia'títa'. Wa'thanhohón:ti' iá:ken' ne Sawátis. Iáh ki' tehawé:ren ratíta.

Wahén:ron' iá:ken' kí:ken tsi niká:ien' roia'tita'áhne, "Ka' wáhse'?"

Wahén:ron iá:ken' ne Sawátis, "Tekahson'kahró:rens."

"Enkonia'títa' káti' kén?"

Sahén:ron' iá:ken' ne Sawátis, "Iáhten, tewaksterihénhsere'." Ok ná' iá:ken' ó:ni' sahanhóhaienhte'.

Oróte' Karihwénhawe'

IAH TESHATA:TI'

O:nen kwáh kén' náhe' kiotáhsawen ki onkwehón:we tonhténkie's. Okia'ke ákte'k nón:we iehshotiio'tákie's. Ronekiohkowá:nen ó:ni' ákte'k nón:we iehonwanatenniéhtha' ne ahonterihwaienstá:na' ókia'ke iá:ken' kí:ken onkwehón:we enshón:newe' ne onkwehonwé:ke kwáh shé's iá:ken' iáh thé:nen' teshonhrónkha' ne onkwehonwehnéha'. Kwáh iá:ken' ó:ni' ókia'ke tohkára'k niiohserá:ke, tó:wa' ó:ni' tohkára'k niwenhní:take ronahténkion nék sé's ne shatikwáthos tsi nón:we nihatí:teron'. Tenshontátken' iá:ken' ne ronatenro'shón:'a ne onkwehonwé:ke kwáh shé's iá:ken' iáh tha'taontahontá:ti' ne onkwehonwehneha'. Kwáh shé's iá:ken' ó:ni' ókia'ke thihonnéhtha'.

Shiá:ta iá:ken' kí:ken okwehón:we iahonwaia'ténhawe' tsi iakenheion'taientáhkhwa'. Wahonwahnia'sakwé:taren' iá:ken' ohén:ton tsi niió:re' tontahonwáhtka'we'. Tontahonwen'terónhna' ne onkwehonwe:ke. Tonsahontátken' ne ronatenro'shón:'a. Tsi iahonwawén:nara'ne' nia'té:kon wahonrai'wanontennión:hahse' tho nió:re' iá:ken' ó:nen iahónttoke', kwáh iá:ken' ne' kí:ken ronatén:ro' iáh teshatá:ti'.

Oróte' Karihwénhawe'

IEHATIIEN:TERE'SKWE'

Ne khók ki' ní:'i wakká:raien' rake'níha tsi oh nahó:ten' rakaratónhkhwahkwe' kén' shiiakwaksá:'a né:ne rotikstohokon'kénha' né:ne iehatiién:tere'skwe' tsi niiawénhshere' rontónhahkwe' tá:we' nenhnísera' ensewatkáhtho' kí:ken kaniataratátie' enkontohétstake' katsi'noniowá:nen's né:ne iah nonwén:ton tesewatkáhthon ok ó:ni' ne karonhia'kéhshon' enkontítie' sekén ne katsi'noniowá:nen's é:so'nón:kwe eniakório'.

On:wa' ki' wenhniserá:te' kerihwaién:tere's oh nahó:ten' ratí:ton'. Ne kí:ken ken nón:we nikaná:taien' tenwatté:ni' iah kahnawá:ke thenskénhake'. Iáh ó:ni' onkwehonwehnéha' thanhshako'nikonhrotákwen iáh ó:ni' hónhka' thaonsaiontatíhseke' nonkwawén:na' enionkwatewennáhton'se' ok ó:ni' nonkwaianerénhshera' tenwatté:ni'. O:nen ki' tiotáhsawen tsi teiotenionhátie'. Ne sewatkwénie's ne ratihnara'kenhnéha'.

I:'i wakhiá:ton. Rówi Shehé:rese' rake'nihkénha' ne rakkaratonhkhwahkwe'.

A:nen Karonhiahên:te' Sky
(Oróte' Karihwénhawe')

KAHNAWA:KE AOKA:RA'

Tóka' iá:ia'k-iawén:re' tewen'niáwe' tánon' iá:ia'k-niwáhsen tsá:ta shiiohserá:te', tohkára' nikahwatsí:rake onkwehón:we wahontená:taien' ákta' kenhtá:ke tsi kaniataratátie'. Tóka' iá:ia'k-iawén:re' tewen'niáwe' tánon' tsá:ta-niwáhsen shiiohserá:te' wa'thoná:tahkwe' kén:'en, kahnawá:ke wahóntien'.

Tóka' iá:ia'k máir tsi nikaná:tes tánon' kaié:ri máir na'tekanataká:ron. Tóka' wísk-niwáhsen tewen'niáwe' niiá:kon ié:teron'. Skaniatará:ti othoré:ke neká:ti, kenhtá:ke ná:kon neká:ti, St. Isidore tánon' St. Constant éntie neká:ti shahré:'on é:neken neká:ti. Akta' ne kahnawá:ke ne tiohtiá:ke. Tewáhsen wísk mínit nikarí:wes iá:ionwe' aiakohonwí:sere'. Tiohtiá:ke ne kwáh tkanatowá:ne ne koráhne nekwá.

Ken' nikanatá:'a ne kahnawá:ke. Thó:ha akwé:kon ne kahwá:tsire' rotinónhsote'. Otia'ke ne raotinónhsa' ó:nen tiotí:ion ne tsi otstén:ra' wátston tho ní:iot tsi ronón:nihskwe' norihwaká:ion. Otia'ke ó:nen énska tewen'niáwe' tánon' wisk-niwáhsen niiohserá:ke tsi náhe' tkáhson'. Teionáktane' ne raotinónhsa' ne ronón:ni' ó:nen tsi ki' ní:iot ne ronátia'ke tsi rotinonhsó:ten ne koráhne neká. Tsi iakenheion'taientáhkhwa' ne kwáh tkanonhsowá:nen.

Tsi tenhsatstekáhwha' tsi kanatakwe'niió:ke ne kí:ken enhsatkáhtho': tsi iontenhninón:tha', tsi ionterihstahninón:tha', iáh tha'tekaiahsonthá:ke ionterennaientáhkhwa', tsi ratitsenhaientáhkhwa', tsi ratirihtón:ke, tsi ron'swáhtha', tsi teiontska'hónhkhwa', tsi ionteiennahninón:tha', karonhianónnha' ionterihwaiensáhkhwa'.

Tsi tiotierénhton enhsatkáhtho' kana'tsheraktátie', tsi iakenheion'taientáhkhwa', tsi shakotitsén:tha', Katerí ne konwá:iats ne ionterihwaienstáhkhwa', tekaiahsonthá:ke ionterennaientáhkhwa', tsi ienohare'táhkhwa' tehatatié:nas Billy Two-Rivers raó:wen, tánon' tsi iehiatonhseratahkwáhtha'. Nia'tekanónhsake kanonhsó:ten.

Tiótkon teiotiweiennhará:'on ne kawennanó:ron' tsi ionterihwaiensáhkhwa' né:ne ken' nihonná:sa' ratiksa'okón:'a ronteweiénstha'. Katerí tsi ionterihwaienstáhkhwa' ne ne' ne tiotierénhton tsi niió:re' ne ahsénhaton tánon' karonhianónnha' kaieríhaton tsi niió:re' iahiá:khaton ronteweiénstha'. Akwé:kon ronteweiénstha' ahontá:ti' tánon' ahonterennó:ten', tiorhén:sha', o'seronni'kéha' tánon' onkwehonwehnéha'. Kaié:ri tewen'niáwe' nihá:ti iehonterihwaiénstha' sharhé:'on. Tsá:ta nikahiá:ton' tsi niió:re' énska-iawén:re' thonwatirihonnién:ni. Otia'ke onkwehonwehnéha' roteweiénstha' akté:shon' ó:ni' nón:we nithotiión:sa iehonterihwaiénstha'. Otia'ke ó:ni' "Manitou College" iehón:ne's

Tiótkon nia'té:kon ronaterihwahtentiá:ton ne ratinákere' ne ratiksa'okón:'a raoterihwá:ke. Tóhka' niiohserá:ke tsi náhe' rotinonhsíson ne ratisa'okón:'a raotitióhkwa' raoná:wen. Tóhka' na'teionáktane' ionáktote' tsi nón:we ne ahatihson'karaké:tate' tánon' tahatitsi'nehtará:ron. Ratiwennahnotáhkhwa' ió:ien' tánon' ó:ni' ió:ien' tsi nón:we niiontia'tahkariohstáhkhwa' kanonhsowá:nen ne eh nón:we nia'té:kon ó:ni' né:'e nón:wa' ioterihwahtentiá:ton'. E' tho tehonhthénno'ks. Akte' nithonéhtha' nahonte'nikonhró:ri'.

Tóhka' niiotióhkwake rotinén:raien' ne iako-tehiá:ron' : Legion, Knights of Columbus, Moose, tánon' Marine Club. Ionkhihsothokón:'a o:ni' roti-nén:raien'. New Horizon Club konwá:iats.

Ronatiohkowá:nen ne kahwá:tsire' né:ne kanón:no iehati'terón:ton tethatinatá:re's ne kahnawá:ke ne akenhnhá:ke. E:so' rón:ti ne ratiiénthos ne áhsen, né:ne ienakarótha', onenhste'ón:we tánon' onon'onsera'-shón:'a.

Rono'éskwani' ahontawénha' kana'tsherá:kon tánon' ratiksa'okón:'a tsi iontawenstáhkhwa' rontawénhe's. Tsi iakenheion'taientáhkhwa' isi' na'oháhati tho nón:we nihontawenstáhkhwa' tánon' tehonthénno'ks. Roti'nikonhró:ris ne rotinonhwaktanión:ni. Kén'k ó:ni' niió:re' ne ronten'nikonhró:ris ne ratiksa'okón:'a ronteweiénstha' ne ahatiká:we' í:non akté:shon' nón:we enthón:ne' ne kwáh tenhontátien'te' tsi tenhonré:ron'.

Otia'ke ronon'éskwani' tewa'á:raton tánon' golf tahonhthénno'ke'.

Né:ne kwah aonhá:'a roti'nikonhroriá:tha' nó:nen enhatinenhríneken'ne' tánon' tenhonatatá:se' ne ron'swáhtha'. Teiakhirénhsarons ne onkonkwe'tahshón:'a ne ron'swáhtha'. Tsi nihá:ti akwé:kon rontatsnié:nons.

Ionkwe'éskwani' tsi niiátion kahnawá:ke iakwanákere'.

Kawennanó:ron'

Tho ní:kon

ONKWEHSHON:'A SEWATAHONHSATAT
People Listen, All

Onkwehshón:'a
people

Ietshiiatahónhsatat oh nahó:ten'
listen to all of them what

ionkhihsothokon'kénha' rón:ton'.
our grandparents of old they are saying

Onkwehshón:'a
people

Shé:kon ionkwahronkhátie'
still we hear constantly

ionkhihsothokon'kénha' ra'otiwén:na'.
our grandparents of old their voice

Onkwehshón:'a
people

Ionkhihsothokon'kénha' rón:ton',
our grandparents of old they are saying

"Thó nonkwá ionsásewe'
that way go back there

tsi nisewaweiennó:ten tánon'
to your culture and

tsi nitesewehtáhkwen."
to your belief

Onkwehshǿn:'a
people

Ionkhihsothokon'kénha'   rǿn:ton',
our grandparents of old   they are saying

"Thǿ   nionsásewe'   tsi   nonkwá:ti   ne
there   all of you return   to   way of   the

orihwaká:ion."
way is old

Onkwehshǿn:'a
people

Ionkhihsothokon'kénha'   rǿn:ton',
our grandparents of old   they are saying

"Sásewatst   ne   sewawén:na'."
use them again   those   your words

Onkwehshǿn:'a
people

Ionkhihsothokon'kénha'   rǿn:ton',
our grandparents of old   they are saying

"Ietshiiatahǿnhsatat   ne   kontíriio'
listen to all of them   the   animals

tsi   nahǿ:ten'   rǿn:ton',"
to   what   they are saying

Onkwehshón:'a
people

Ionkhihsothokon'kénha' rón:ton',
our grandparents of old they are saying

"Ietshiiatahónhsatat ne otsi'ten'shón:'a
listen to all of them the various birds

tsi nahó:ten' rón:ton'."
to what they are saying.

Onkwehshón:'a
people

Ionkhihsothokon'kénha' rón:ton',
our grandparents of old they are saying

"Ietshiiatahónhsatat ne otsi'nonwahshón:'a
listen to all of them the various insects

tsi nahó:ten' rón:ton'."
to what they are saying

Onkwe'shón:'a
people

Ionkhihsothokon'kénha' rón:ton',
our grandparents of old they are saying

"Ietshiiatahónhsatat ne ononhkwa'shón:'a
listen to all of them the various medicines

tsi nahó:ten' rón:ton'."
to what they are saying

Onkwehshón:'a
people

Ionkhihsothokon'kénha' rón:ton',
our grandparents of old they are saying

"Ietshiiatahónhsatat tsi karhahrónnion'
listen to all of them the forests

tsi nahó:ten' rón:ton'."
to what they are saying

Onkwehshón:'a
people

Ionkhihsothokon'kénha' rón:ton',
our grandparents of old they are saying

"Ietshiiatahónhsatat tsi kanientarahrónnion'
listen to all of them the rivers

tsi nahó:ten' rón:ton'."
to what they are saying

Onkwehshón:'a
people

Ionkhihsothokon'kénha' rón:ton',
our grandparents of old they are saying

"Ietshiietahónhsatat ne ratiwerarâhstha'
listen to all of them the they draw the winds

tsi	nahó:ten'	rón:ton'."
to	what	they are saying

Onkwehshón:'a
people

Ionkhihsothokon'kénha'	rón:ton',
our grandparents of old	they are saying

"Sewatahónhsatat	ne	tiohkehnéhkha'	karáhkwa'
listen, all	the	light of day	sun

tsi	nahó:ten'	wá:ton'."
to	what	it is saying

Onkwehshón:'a
people

Ionkhihsothokon'kénha'	rón:ton',
our grandparents of old	they are saying

"Sewatahónhsatat	ne	ahsonthénhkha'	karáhkwa'
listen, all	the	dark of day	moon

tsi	nahó:ten'	wá:ton'."
to	what	it is saying

Onkwehshón:'a
people

Ionkhihsothokon'kénha'	rón:ton',
our grandparents of old	they are saying

"Sewatahónhsatat ne otsistohshón:'a
listen, all of you the various stars

tsi nahó:ten' rón:ton'."
to what they are saying

Onkwehshón:'a
people

Ionkhihsothokon'kénha' rón:ton',
our grandparents of old they are saying

"Ietshiiatahónhsatat ne ietshihsothó:kon'
listen to all of them the your grandparents

tsi nahó:ten' rón:ton'."
to what they are saying

Onkwehshón:'a
people

Ionkhihsothokon'kénha' rón:ton',
our grandparents of old they are saying

"Ietshiiatahónhsatat ne ionkhi'nisténha ohwén:tsa'
listen to her, all the our mother earth

tsi nahó:ten' ión:ton'."
to what she is saying

Onkwehshón:'a sewatahónhsatat
People, listen, all

Tekaronhió:ken
Frank Jacobs Jr.

PEOPLE LISTEN

People

Listen to what our ancestors are saying.

People

We are still, constantly hearing our ancestors' voices.

People

Our ancestors are saying, return to your culture and belief.

People

Our ancestors are saying, return to the old ways.

People

Our ancestors are saying, return to your native language.

People

Our ancestors are saying, listen to what the animals are saying.

People

Our ancestors are saying, listen to what the birds are saying.

People

Our ancestors are saying, listen to what the insects are saying.

People

Our ancestors are saying, listen to what the medicines are saying.

People

Our ancestors are saying, listen to what the forests are saying.

People

Our ancestors are saying, listen to what the rivers are saying.

People

Our ancestors are saying, listen to what the wind
makers are saying

People

Our ancestors are saying, listen to what the sun
is saying.

People

Our ancestors are saying, listen to what the moon
is saying.

People

Our ancestors are saying, listen to what the stars
are saying.

People

Our ancestors are saying, listen to what our elders
are saying.

People

Our ancestors are saying, listen to what our Mother
Earth is saying.

People Listen.

Tekaronhió:ken
Frank Jacobs, Jr.

THARONHIAWA:KON

Tharonhiawá:kon, ne kén:ton', ráhawe'
Tharonhiawa:kon that means his holding

tsi karonhiá:te' ronónha' raotiní:io ne
at in the heavens their their creator the

rononkwehón:we. Shako'nikón:rare' tánon'
real people he puts his mind on them and

shakoia'tanonstá:ton. Karonhiá:ke nithawé:non
he protects them in heavens he came from

otsható:kon, watshatará:ken, e' thó wahoké:tohte'.
in clouds white clouds there he appeared

Wahshakona'tón:hahse' tánon' tahshakó:ion'
he showed them and he gave them

ne rononkwehón:we nattokháhtshera, nahontó:rate',
the real people wisdom for them to hunt

nahontátenonte', tánon' tsi nahatí:iere'
to feed themselves and how they are to do

nahatikwatá:ko' ne raonatsherónnia'.
how they would sew the their clothing

Tharonhiawá:kon means holder of the heavens. He was the great God of the Indians who presided over them and their hunting grounds. He came down from Heaven in a white cloud to help the Indian.

He showed and gave the Indian the skills to hunt, nourish and clothe himself. The Indians were sustained

Wahshakona'tón:hahse'	ononhkwa'shón:'a,	tánon'
he showed them	various medicines	and

ohtehra'shón:'a,	nahotítsenhte'.	Wahshakohsatsténhseron'
various roots	to heal their ills	he gave them strength

tánon'	rotirihwakwaríhsion	tsi	rón:ne's.
and	they are honest	while	they are here

Tahshakó:ion'	ne	ó:nenhste'	wahshakona'tón:hahse'
he gave them	the	corn	he showed them

ka'	nón	nahatitshén:ri'	ne	onatsakén:ra,
what	place	they would find	the	rice

o'niónkseri,	osahé:ta',	tánon'	onon'ónsera'
onions	beans	and	squash

Rao'nikón:ra'	thatenniéhtha'	tsi	ní	tsi
his mind	he sent down	in	the	way

ronatétshens	thó	ní	tsi	rotitokenhsehátie'
they dream	there	is	how	they learn

tsi	neniawénhsheron.	Khwató:ken	na'tekónteron'
what	would happen	every now and then	from time to time

by the bounty of the earth, river, and forest. Tharonhiawa:kon showed them the herbs and roots that would heal their sickness and wounds. He gave them the corn, wild rice, onions, and squash.

He gave strength and integrity. Tharonhiawá:kon declared his will to them in dreams; in like manner he disclosed future events. It was he who guided the

tsi	ronwá:kens	enhshakorihónnien'	nahó:ten'
as	they see him	he will teach them	what

ioiánere's	ahonnón:ni'.	Kwáh	skenén:'a
it is good	for them to make	just	slowly

tahshakowihátie'	kaia'torehtatsherí:io.	Ronaterí:iohkwe'
he is giving them	good judgment	they were fighting

ó:nen	ronwatishennionhátie',	thontaiawénhstsi'	kén'
now	they were losing	suddenly	just

nahatí:iere',	Tharonhiawá:kon	wahoké:tohte'.
they noticed	Tharonhiawa:kon	he appeared

Wahén:ron',
he said

"Tóhsa'	tesewa'nikonhrhá:ren."
do not	put your mind on it

Akte'	nonsakaié:ra'te'	tsi	ronaterí:io,
other	the battle turned	at	their fighting

wahontkwé:ni'.
they won

Indians in their early wanderings. He visited them from time to time in person to protect them from their enemies and to instruct them in useful arts. He instilled in them good judgment. He appeared in one of their battles when it looked like they were going to be defeated. Tharonhiawá:kon assured them all would be well, and the battle turned and they were victorious.

Tharonhiawá:kon,	wahshako'nikonhráta'	ne
Tharonhiawa:kon,	he put into their minds	the

Tekanawí:ta,	tánon'	Aié:wate'	nahianitiohkón:ni'
Tekanawi:ta	and	Hiawatha	for they two to organise

ne	Kaianere'kó:wa.	Kí:ken	Tekanawí:ta,	tánon'
the	great good (League of the Iroquois)	this	Tekanawi:ta	and

Aié:wate',	kwáh	í:ken	tsi	nihsennowanén:ne',
Hiawatha	very	much	they	their names were great

Huron	thohténtion	ne	Tekanawí:ta,	ok	ne
Huron	he came from	the	Tekanawi:ta	the	other

Aié:wate',	kanien'kehró:non'.	E:so'	wahianonhtonnión:ko'
Hiawatha	he was Mohawk	much	they meditated

tsi	nahní:iere'	nahianitiohkón:ni'.	E:so'	iohserá:ke
what	they two could do	for they two to organise	many	years

wahotiió'ten'	tsi	wahianitiohkwahserón:ni',
they worked	to	for they two to put together the group

Tharonhiawá:kon inspired Tekanawí:ta, who was the founder of the League of Peace. Hiawatha was his spokesman. He was a chief of high rank among the Onondaga's. For years Tekanawí:ta meditated, and with inspiration from Tharonhiawá:kon, had elaborated in his mind the plan of a vast Confederation which would

Tharonhiawá:kon	é:so'	wahshako'nikón:ron'	tsi
Tharonhiawá:kon	much	he gave them mind	what

nahonní:iere'	ne	tóhsa'	aonteríhsi'	ne
what they should do	so	as not	to ever undo	the

Kaianere'kó:wa	né:ne	tsi	nén:we'	enkatátie'.
League of Peace	it was	to be	forever	standing

Wahní:ron',	tsi	nikarí:wes	enkahwatsiratátie'
they said	that	the length of time	generations are coming

tánon'	entkarahkwinekénhseke',	óhente'	entkah-
and	sun will come up	grass	it will

nióhseke'	tánon'	ohné:kanos	kón:ne's	é' thó
grow	and	water	it flows	that there

nikarí:wes	enkatátie'	ne	Kaianere'kó:wa.
length of time	it will stand	the	League of Peace

Aié:wate',	wahakwé:ni'	wahona'tón:hahse'
Hiawatha	he was able	he could show them

ne	Atotárho,	ononta'kehró:non'	nahaia'tó:ten,
the	Atotarho	from the place on the hill	he is that type person

ensure universal peace. The system which he devised was not to be for a short time but a lasting one. He said that this confederacy would last from generation unto generation, as long as the sun shines, the grass grows, and the waters run.

Tekanawí:ta sent Hiawatha to the wicked Chief

né:ne aonhá:'a thronkwe'táksen, wahohró:ri'
this very much a bad person he told him

tóka' enháhsere' ne Kaianere'kó:wa tsi
if he will follow the League of Peace it

tenkaté:ni' tsi rónnhe', é' thó ki na'á:wen'ne'.
it will change as his life that there is what happened

Wahaié:na' ne Kaianere'kó:wa wa'thatté:ni'. Iáh
he took it the League of Peace he was changed not

teshronkwe'táksen, wahotinenhrá:ko' ne
was he a bad person they were surprised the

ononta'kehrón:non' tsi ní tsi tehotté:nion
people from the hill as so that he had changed

ne Roiá:ner Atotárho, akwé:kon wahonní:ron',
the chief Atotarho all they said

"Teionkwatonhwentsó:ni aiakwáhsere' ne
we want it for us to follow the

Kaianere'kó:wa."
League of Peace

Aié:wate' akwé nontá:rehte' ne wísk
Hiawatha all over he went the five

Atotarho of the Onondagas, to show him that this plan for peace would change his whole life for the better. When the Onondagas saw this change in their Chief, they all wanted to follow the new plan.

Hiawatha then went to each of the other four

nihononhwentsá:ke,	Kanien'kehá:ka',	Oneniothá:ka',
their nations	Mohawks	Oneidas

Ononta'kehá:ka'	Kaio'konhá:ka',	tánon'
hill residents	Cayugas	and

Shotinontowane'há:ka',	wahshakohró:ri'	tsi
nation of the big hill	he told them	that

niioiánere'	ne	akwé	skáthne	aontahontihéntho'
how good	the	all	together	for them to pull

tánon'	akwé	skén:nen'	ahón:ton'	ne	onkwehón:we.
and	all	peaceful	they would become	the	real people

Kwáh	ionehrákwa	tsi	niioiánere'	tsi	ní	tsi
what	amazing	it	it is good	the	way	

wahnikwatá:ko'	notióhkwa',	iáh	ne	té:ken	ne
they two organised	the League	not	it	was not	the

iohsnó:re'	aonnitiohkwaríhsi'	nok	né:ne tsi
it is fast	for them to disband the League	but	the one is

nén:we'.	Akwé	wahatirihwanón:we'ne'	nahatíhsere'
forever	all	they agreed	they would follow

tribes to tell them of this new way of living together in peace. Finally the Mohawks, the Senecas, the Onondagas, the Oneidas, and the Cayugas, all said they would become part of the peace plan. Fifty chiefs gathered

ne Kaianere'kó:wa.	Wísk-niwáhsen	nihá:ti	Rotiiá:ner,
the League of Peace	fif-ty	of them	chiefs

wahontkennísa'	katsénhakon.	Wísk	na'thatí:nerenke'
they had a meeting	around the Council Fire	five	they bound

ne kaién:kwire',	ne	kén:ton'	tsi	ó:nen	wísk
the arrows	which	it means	that	now	five

nihononhwentsá:ke	ia'thóntieste',	enhati'shátsten'ne'
tribes	they were joined	they will become strong

skáthne	enthontihéntho'	skén:nen'	enhón:ton'.
together	they will pull	peaceful	they will become

Kaié:ri-iawén:re'	tewen'niáwe'	tánon'	wísk-
four-teen	hundred	and	fif-

niwáhsen	shiiohseró:ten	nihonanitiohkón:ni.	Oh
ty	at the year	when they formed the League	

na'kénhkha'	ne	Tuscaroras	ronatiá:tare'.	Iá:ia'k
later	the	Tuscaroras	they joined	six

around the Council Fire. Tekanawí:ta said,

"We shall now combine our power into one great power which is the confederacy; we shall therefore symbolise the union of these powers by each nation contributing one arrow each, to be tied up together in a bundle with deer's sinews, which are strong. When they are tied together, no one can bend or break them and the confederacy shall endure."

Five arrows were then bound together to show that the five Iroquois tribes were now joined into a peaceful League of Five Nations. The League of Five Nations was believed to be formed in the year 1450. Later, when the

nihononhwentsá:ke	wahón:ton'.	Enska	ne	tsóhsera
nations	they became	once	the	one year

ronnitiohkwaró:rokskwe'	ne	wísk-niwáhsen	nihá:ti
they used to meet together	the	fifty	of them

Rotiiá:ner,	katsénhakon	enhontkennísa'	nek
chiefs	around the Council Fire	they will make plans	that

ratihá:wi'	ne	raoneriáhsakon	ne	skén:nen'
they bring	the	in their hearts	the	peace

tánon'	ne	karihwí:io	nek	enhonnonhtonnión:ko'
and	the	good will	only	good thoughts

ne	akwé	ahotiiáneren'ne'	ne	raononkwe'ta'shón:'a.
the	all	it would go well for them	the	their own people

Wahatiweientéhta'ne'	tahoti'nikonhraién:ta'ne',
they all learned	to lay their minds out

iáh	ní	ó:nen	tha'tehshontatetshá:nis.
not	longer	now	would they fear each other

Tuscaroras came into the League, it became the League of Six Nations. Once each year the fifty chiefs met around a great Council Fire. The chiefs who came to this meeting were supposed to have hearts full of peace and good will, patience, love, and honour, and to cultivate friendship. They were to think of what would be good for all the Iroquois, not for just the people of their own tribe. They learned to understand one another and they were no longer afraid of each other.

On:wa'	wenhniserá:te'	tewehiá:ra's	né:ne	Iá:ia'k
these	days	we remember	that the	Six

Nihononhwentsá:ke,	tsi	ronónha'	ronanitsohkwí:son
Nations	it is	they	they organised

ne	Kaianere'kó:wa.
the	League of Peace

Kahnawá:ke	iá:ken'	nohná:ken'	Tharonhiawá:kon
at the rapids	they say	was the last time	Tharonhiawa:kon

shonwá:ken,	ákta'	ne	Tiohtiá:ke.	Thó	ní	tsi
they had seen him again	near	the	Montreal	there	is	as

shohténtion	tsí	ní	tsi	thawé:non	otsható:kon
he left again	as	is	as	he had come	in a cloud

tsi	karonhiá:ke	nionsá:re'.
to	in heaven	he went back.

That is how the League of Six Nations began.

Today, the Iroquois are remembered because of the League of Six Nations. Tharonhiawá:kon was last seen at Caughnawaga, near Montreal. He left the same way he had come, in a white cloud.

This story was told to me by my grandfather and his friends.

Warisó:se Kaieríthon
Josephine Horne

SHA'TEWAHSIRÍ:HEN
Half a Blanket

O:nen ki ní:'i nakká:ra'
Now this mine my story

Wahón:nise' iá:ken' ki rón:kwe, ro'níha
Long ago it is said this man his father

skáthne ní:teron'. O:nen ki rón:kwe
together they lived. Now this man

wahó:niake' tánon' ne ró:ne' iakotahkontá:ni' tsi
he married and the his wife she got tired that

thó rén:teron' ne rokstén:ha.
there he lived the he is old.

Sok ki rón:kwe iahotó:ri' ne roién:'a
Then this man out he sent the his son

iahoia'ténhawe' ne rohsótha tánon' karhá:kon
to take him out the he is old and woods in

iahóhtka'we'. Ki rón:kwe áhsire' tahó:ion'
let him go This man blanket he gave him

ne roién:'a tahohsirawén:'eke' ne rohsótha
the his son to wrap him the he is old

This is my story. A long time ago, this man lived with his father. The man married and brought his wife home. His wife got tired of the old man living with them.

So the man sent his son to take the old man into the woods and leave him there. But before they left, the

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nó:nen  ienhóhtka'we'   karhá:kon.
the when there will he  woods in
         him let go

      O:nen   iá:ken'   ki   raksá:'a   iahoia'ténhawe'
      Now    it is said this  boy      there he him took

ne   rohsótha.    Tsi   ó:nen   iahá:newe'   ne
the  his grand-   And   when    there they   the
      father                     arrived

karhá:kon,   sok   ki   raksá:'a   ahsén:nen
woods in    then  this    boy      half

wa'throhwíha'   ne   áhsire'.   Tho   ki'  tahóhtka'we'
he it split     the  blanket   There just  he him left

ne   rokstén:ha   tánon'  tontahahtén:ti',   shahá:wi'
the  he is old     and    back he came       he carrying back

ne   sha'tewahsirí:hen.
the  half blanket

      Ki   rón:kwe   wahori'wanón:tonhse'   ne   roién:'a
     This   man      he him asked          the   his son

oh   nontié:ren   tsi   sha'tewahsirí:hen   shahá:wi'.
what  reason     that   half blanket       he carries back

Ki   raksá:'a   wahohró:ri'   ne   ro'níha,   "Kí
This  boy       he him told  the  his father,  This
```

man gave his son a blanket to wrap the old man with.

So the boy took the old man into the woods. Before leaving for home, the boy took the blanket and tore it in half and took one half home with him.

On returning home, he was asked by his father why he had brought back half a blanket. The boy said, "I am

sha'tewahsirí:hen   sekhá:wi', enkatatién:hahse'.
half blanket   back I carry   will I it save

Nó:nen   í:se'   ensakstén:ha'ne'   ne   én:katste'
When   yourself you will be old   this   will I use

tenkoniahsirawén:'eke'   nó:nen   karhá:kon
I will wrap you up   when   woods in

ienkoniáhtka'we'."
there will I leave you.

O:nen   iá:ken'   ki   rón:kwe   wahanonhtonnión:ko'
Then   it is said   this   man   he it thought over

tsi   nahá:iere',   sok   wahohró:ri'   ne   roién:'a
what   he did   then   he him told   the   his son

aonsahonónksa'   ne   rohsótha.
to back he him go get   the   his grandfather

Kí:ken   oká:ra'   ne   né:'e   kén:ton'   ne   tóhsa'
This   story   the   it is   it means   this   do not

aionkhiiatahkón:tahse'   ne   onkwe'taká:ion's.   Tá:we'
let them in our way be   the   people are old   It is coming

ne ohnísera',   í:'i   ká:ti'   ó:ni'   entionkwaién:ta'ne'.
the   day   ourselves   then   also   will we become old.

saving it. When you get old, I will use this half of the blanket to wrap you in when I leave you in the woods."

The man thought over what he had just done. So he told the boy to go back into the woods and get his grandfather.

There is a moral to this story. We should treat the old people kindly, for we too, someday, shall get old.

Konwatiên:se'
Carolee Jacobs, told to her by her mother

RAWE:RAS RO:NE'

The Thunderer's Wife

Karhá:kon thati'terón:tahkwe' iá:ken'
in forest they used to live they say

kí:ken kahwá:tsire'. Tóhka' nihotiwí:raien'.
this family a few they have children

Kháre' ó:nen kí:ken wahonwatinatahré:nahse'
finally now this they were visited

kaná:takon thatinákere' rontátenonhkwe'.
downtown they lived they were relatives

Wahontshenón:ni' kí:ken ne shakotiien'okón:'a
they were happy this the their children

tsi ó:nen wahonatero'seraién:ta'ne'.
that now they had friends.

O:nen ki' iá:ken' karhá:kon niahatitakhenóntie'
now just they say in forest they started to run into

wahonhiákha' sewahió:wane', thontaiawénhstsi'
they went to pick fruit large fruit all of a sudden

In the forest stood a house where lived a couple who had several children. They seldom saw any strangers. One day, they had visitors, relatives who lived in town, who brought with them a girl. The children were so happy to have a new friend to play with and they skipped through the woods and soon were happily picking apples.

taie'nahkwáweron' tsi na'okén:nore'
it poured down buckets so much it rained

Tewanine'kara'wánions tánon' teio'tónhahre'
lightning was striking and it was noisy

iowé:ren tánon' wa'tkawerată:se' khé ki'
it thundered and winds came right just

é' thó okwiró:kon wahontáhsehte' kí:ken
there under trees they hid this

na'tewatenón:ianihte' tánon' iá:ken' é' thó
it got so terrible and they say there

niiohsnó:re' ontóhetste' tánon' ontoríshen'.
as it is fast it passed and it stopped

Tontakarahkwíneke'ne' sanwenhniserí:iohste' nek tsi
the sun came back out the day got nice again but

akwé:kon kí ioná:nawen. E' thó kí:ken ne
all this it is wet there this the

ratiksa'okón:'a wahontahrakétsko' kwáh iá:ken'
children they lifted their heads till they say

Suddenly, with a clap of thunder, rain poured down in buckets forcing them to take shelter under the nearest tree. It was a terrible storm, lightning flashing in all directions, winds blowing every which way, and the noise of the thunder frightening. Just as suddenly, the storm ended. The sun shone brightly upon the glistening wetness all around. Most of the children

énhsehre'	sha'tekarhí:hen	wa'tiekhánhsi'	tsi
you will think	half the forest	they separated	as

na'tonsaiohswáthe'ne'	tánon'	ahsén:nen	nón:we	tsi
it got bright again	and	half	where	that

tekeniiáhse	tekeniksá:'a	wa'onatshatárhahse'.
two of them	two girls	they saw a shadow.

O:nen	wa'thiáttoke'	tsi	iakón:kwe	tsi
now	they noticed	that	a lady	that

iakote'wháhsate'	kí:ken	wa'tkenikahrá:ra'ne'.
edge of her skirt	this	their eyes fell upon

O:nen	kwáh	ohtekén:'en	wa'kenika'én:ion'	tsi
now	just	completely	they examined	that

iakón:kwe	kí:ken	kwáh	tsi	iotérhate'	ní:iete'.
lady	this	just	at	the edge of the forest	she stood

Isi'	ne ká:ti	ia'teieká:nere'.	E'	thó	iá:ken'
there	other side	she was looking		there	they say

niiehnén:ies	tsi	niiokwí:res	kahon'tsistóskon
she was tall	as	the length of trees	all in black

ran for home but for the two girls who had remained under a tree. As they lazed there, a dark shadow fell upon them and then moved on. They looked to see what it might have been, and as they gazed at the shadow, they realised that they were looking at the bottom edge of a lady's skirt. Their eyes moved up and it was a lady! A lady as tall as the trees, all dressed

iakótston tó:k niiako'khá:res tánon' teiakoteweiáhere'
she used so very long skirt and she wore a cape

tó:k niiotsiwiién:tes tsi iakononhwaró:ron
very long pointed so she wore a hat

tánon' ionterahkwawerhóhstha' íehawe' tsenekwá:ti
and umbrella she carried on her left

ne ká:ti. Tsik niió:re' ia'tkenikahraién:ta'ne'
side by as it is far their eyes could see

e' thó niiohsnó:re' ka'k thónhte niahá:'en
there as it is fast somewhere she went

ne iakón:kwe.
the lady

Tsi ó:nen ne tekeniksá:'a ionsákenewe'
at when the two girls they got back

tánon' satiathró:ri' nahó:ten' wa'tiatkáhtho',
and they told what they saw

wahshakohró:ri' ne' neksá:'a ronwa'níha,
he told them the girl her father

in black. She had her back to them, and she seemed to be watching the receding storm clouds. She wore a long cape, a hat with a long point at the top, and on her left arm hung a folded umbrella. In the instant that they fully comprehended what it was that they saw, she disappeared.

Later, when they had told what had happened, the girl's father told them,

"Iotahkwáhswa'	tsi	iáh	teietshiwennará:'on
it is too bad	that	not	did you address a word to her

ase'kén	rawé:ras	ónhte	thí:ken	ró:ne'
because	he thunders	perhaps	that	his wife

wa'etshí:ken'	káti'	nón:wa'	aietshiiatera'swá:wi'."
you saw her	perhaps	maybe	she might have given you good luck

"It's too bad that you didn't speak to the lady of the storm; she is said to be the wife of the Thunderer and gives good luck to anyone who speaks with her."

Konwatsi'tsaién:ni

Rita Phillips

AKON:WARA'

O Face

Shiiakwaksa'okón:'a	akón:wara'	shé's
when we were children	O Face	then

róntstha'	ne	rotikstén:ha	nahontewirahserón:ni'.
they use	the	they are old	to straighten the children

Tsi -	ní:iot	tsi	ionkhihró:ri	iáh	ónhka'
as	so it is	as	we are told	not	anyone

ne	wén:ton	teiotón:'on	aiakothró:ri'	ne
the	ever	it happens	for them to tell	the

oh	nihaia'tó:ten	aśe'kén	akwé:kon	ronenhé:ion
what	kind of body he had	because	all	they have died

tsi	niiá:kon	ne	ronwá:ken.	E' thó	tsi
that	everyone	the	they have seen him	there	that

na'teiotenonhianíhton	nihakonwaró:ten	tiótkon
so horrible it is	as his face is	always

ahsatakónhson'	tehotstikahwenhátie's	ratonkwe'tí:saks
in shadows	he travels along	he hunts people

When we were children, the older people would frighten us with the terrible name of O Face who travelled in the dark at night, always ready to catch the wicked or unwary person.

rotateweienentá:'on	ahshakoié:na'	ne
he is ready always	to catch someone	that

iakaonkwe'táksen	tó:ka'	iáh	teiontate'nikón:rare'.
person is bad	or	not	his mind is on it

His face, it is said, is so horrible that no one ever survived after seeing him face to face.

Konwatsi'tsaien:ni

Rita Phillips

AKON:WARA'
The Ugly Face

E:so'	iohserá:ke	ó:nen	tsi	náhe'	ne
many	years	now	that	ago	the

kahwá:tsire'	skáthne	ie'terón:tonhkwe'	sahsótha
family	together	they used to live	your grandmother

sa'nistén:ha	ia'níha	tánon'	ratiksa'okón:'a.
your mother	your father	and	children

Kí:ken	iatathróna'	wá:nehre'	ahniiá:ken'ne'
this	they are married	they wanted	they would go out

ahiatkenhnisa'ánha'.	Wahshakotiri'wanón:tonhse'
they would go to a meeting	they asked her

ne	akokstén:ha	aiontennón:na'	tsi	nikarí:wes
the	she is old	would she watch	as	the length of the matter

enhotiiakén:'en.	Wa'í:ron'	nakokstén:ha,	"Ió
they will be out	she said	she is old	OK

nek ki' tsi	shehró:ri	tha'tehontó:tat	ase'kén
but	tell them	they keep quiet	because

Many years ago when families lived together, that is, grandparents, mother, father, and children, this mother and father wanted to go out to a meeting. They asked the grandmother to take care of the children while they were gone. The grandmother said, "OK, but tell the children to be quiet as I am very tired."

é:so'	tsi	tewakwishenhé:ion."
much	so	I am tired

Tsi	niiohsnó:re'	tsi	iahniiá:ken'ne'	óksa'k
as	it is fast	as	they went out	right away

tahontáhsawen'	ne	kanonhsakwé:kon	wa'thonrahtáthon'.
they started	the	all over the house	they were running

Ne	rotihsótha	tia'teká:konte'	ión:ton',
the	their grandmother	very often	she said

"Tha'tesewató:tat,"	nek ki' tsi	iáh	ónhka'
all of you be quiet	but	not	anyone

teiakotahonhsatá:ton.	Kháre'	ó:nen	wahonwatihró:ri',
they did not listen	finally	now	she told them

"Tóka'	iáh	tha'tensewatotáthe'	átste	ienkwaia'tón:ti'
if	not	will you keep quiet	outside	I shall throw your bodies

tánon'	akón:wara'	ientshisewaia'ténhawe'."
and	ugly face	he shall take you

Iáh	tha'tehonatotá:ton	ratitakhenóntie's
not	did they quiet	they running around

As soon as the parents left, the children started running around the house. The grandmother kept telling them to be quiet but nobody listened. Finally, she told them, "If you don't stop I shall throw you out the door and let Ugly Face take you."

The children kept right on making a lot of noise

thihshakotiié:ron' ne akokstén:ha. Wahshakotina'kón:ni'
they tease her the she is old they made her angry

wa'onte'nién:ten' ahonwatiié:na' ne ratikowá:nens
she tried she would catch them the they are bigger

nek ki' tsi sótsi' tehotí:ka. Akwáh ken'
but too they run fast the very small

nithrá:'a rate'niéntha' ahshakona'ké:ren' ne
he is small he is trying he would do like them the

ronátia'ke. Tsi rotohetstonhátie' tahonwaié:na'.
others as he is passing she grabbed him

Tsi kanhohká:ronte' átste iahonwá:reke' wa'í:ron',
to the door opens outside she pushed him out she said

"Kóh akón:wara' kí:ken raksá:'a," tánon'
here ugly face this boy and

saiehnhóhaienhte'.
she slammed the door

and running, teasing the old lady. They made her very angry. She tried to catch the older children, but they were too swift for her. The youngest was trying to do as the rest of them, and as the child was passing, she grabbed him and, going to the door, pushed him out, saying, "Here, Ugly Face, take this child," then she slammed the door.

Kén'k	nikarí:wes	sahonwenhnónksa'	ne
a bit	matter is long so	she went back to get him	the

raksá:'a	iáh	teshonwaia'tatshénrion.	Iáh
boy	not	could she find him	not

nonwén:ton	teshonwá:ken	ne	raksá:'a.
ever	did they see him again	the	boy.

A while later she went back out for the child but she could not find him. The child was never seen again.

Rake'níha rakkaratón:ni
my father he told me

Niioronhiá:'a

This story was told to me
by my late father,
Louis T. Curotte

Mae Montour

KAIENTEREHSTAHKHWA'

Omens

1.	Tóka'	ensathón:te'ne'	ónhka'k	taieken'to'ókhon'
	if	you will hear	someone	one is knocking

tánon'	iáh	ónhka'	té:ien's	né	kén:ton'	tsi
and	not	anyone	there is	that	it means	that

ónhka'k	eniaíheie'.
someone	one will die.

If you hear someone knocking, and no one is there, that means that someone will die.

2.	Tóka'	ensatatshatárhahse'	ónhka'k	thó	í:ien'
	if	will you shadow see	someone	there	one goes

tánon'	iáh	ónhka'	té:ien's,	né	ni'	né:'e
and	not	anyone	there one goes	the	also	that

kén:ton'	tsi	ónhka'k	eniaíheie'.
it means	that	someone	one will die

If you see someone's shadow, and no one is there, that also means that someone will die.

3.	Tóka'	ehtá:ke	iorhá:tare'	ne	ó:nenhste'	né
	if	low	stalk	the	corn	that

kén:ton'	tsi	iáh	é:so'	thakanié:ien'.
it means	that	not	much	would snow fall

If the cornstalk is low, that means that there will not be much snow.

4.	Tóka'	sótsi'	ehtá:ke	otsi'nahkontahkwá:ne
	if	too	low	creature in a hive

ronatshi'nahkón:ni	né	ni'	né:'e	kén:ton'	tsi
they their nest make	that	also	that	it means	that

iáh	é:so'	thakanié:ien'.
not	much	would snow fall

If the bee's nest is too low, that also means that there will not be much snow.

5.	Tóka'	ohwhará:ne	í:ions	tsi	kahón:tsi
	if	fur on it	it is long	that	it is black

rohá:te'	né	kén:ton'	tsi	eniohseresónhake'.
his stripe	that	it means	that	winter will be long

If the caterpillar has a long, black stripe, that means that it will be a long winter.

6.	Tóka'	okariahtá:ne	énhtsken'	kanónhskon
	if	it bites its fill	will you him see	house in

akohserá:ke	né	kén:ton'	tsi	sénha'	enwathó:rate'.
winter in	that	it means	that	more	will it get cold

If you see a mosquito in the house in the winter, that means that it will get cold.

7. Tóka' tensahonhtá:kahre' né kén:ton' tsi
if will your ears ring that it means that

thé:nen' enhserihwá:ronke'.
something will you news hear.

If you hear a ringing in your ears, that means that you will hear some news.

8. Tóka' tsi'tén:'a onahstonhkwá:ke teniaón:ko'
if bird window on will it hit

né kén:ton' tsi iáh tekarihwí:io nahó:ten'
that it means that not good news what

enhserihwá:ronke'.
will you hear

If a bird hits your window, that means that you will hear bad news.

9. Tóka' ensahsi'tarónhkhwen' né kén:ton' tsi
if will your feet itch that it means that

ká'k iénhse' tókani' tenhsenonniahkwá:na'
some where there will you go or will you dancing go

If your feet itch, that means that you will go somewhere or you will go dancing.

10. Tóka' ensakahrani'kerón:ko' tsi sehsenekwá:ti
if will your eye twitch at beyond your side

nekwá   né   kén:ton'   tsi   ensa'nikonhráksen'   tókani'
side   that   it means   that   will your mind   or
be bad

ensaná:khwen'.
will you get
angry

If your eye twitches on the left side, that means that you will be sad or angry.

11. Tóka'   ensakahrani'kerón:ko'   tsi   sehseweienteh-
if   will your eye twitch   at   your right

táhkwen   nekwá   né   kén:ton'   tsi   karihwí:io
side   that   it means   that   good news

nahó:ten'   enhserihwá:ronke'.
what   will you hear.

If your right eye twitches, that means that you will hear good news.

12. Tóka'   ensahsiarónhkhwen'   tsi   sehsenekwá:ti
if   will your palm itch   at   beyond your side

nekwá   né   kén:ton'   tsi   ónhka'k   enhsenéntsha'.
side   that   it means   that   someone   will you arm hold

If your left palm itches, that means that you will shake someone's hand.

13. Tóka'   ensahsiarónhkhwen'   tsi   sehseweientehtáhkwen
if   will your palm itch   at   your right

nekwá né kén:ton' tsi ensahwistaién:ta'ne'.
side that it means that will you money get

If your right palm itches, that means that you will get money.

14. Tǫ́ka' é:neken karahkwákta' iostsísto' né
if up moon near star that

kén:ton' tsi tsakothonwí:sen' eniaíheie'.
it means that woman will she die

If a star is over and near the moon, that means that a woman will die.

15. Tóka' ná:kon karahkwákta' iostsísto' né
if under moon near star that

kén:ton' tsi rón:kwe enhrénheie'.
it means that man will he die.

If a star is under and near the moon, that means that a man will die.

16. Tóka' ia'tesa'kharaké:tote' né kén:ton' tsi
if your slip is peeking that it means that

enhsaten'niotá:na'
you will go to a wedding

If your slip is showing, that means that you will go to a wedding.

17. Tóka' atókwa ensá:sen'se' né kén:ton' tsi
if spoon will you drop that it means that

ónhka'k   éntien'.
someone   will one come

If you drop a spoon, that means that someone will come.

18. Tóka'   ieksohare'táhkhwa'   onia'tará:'a   ensá:-
if   one to dish wash uses it   rag   will you

sen'se'   né   kén:ton'   tsi   ónhka'k   iáh
drop   that   it means   that   someone   not

teiakokwéniens   eniesanatahré:nahse'.
is one tidy   will one to visit you come

If you drop a dishrag, that means that an untidy person will visit you.

19. Tóka'   iáh   thasa'nikonhrón:ni'   ahsani'tskwa-
if   not   would your mind make   would you seat

hra'tsherakarhátho'   né   kén:ton'   tsi   ónhka'k
setter tip over   that   it means   that   someone

rohné:ka   enthatáweia'te'.
he liquid   will he enter

If through no fault of your own, you tip over a chair, that means that a drunk man will enter your house.

20. Tóka'   ó:niare'   ensatetshá:ten'   karihwaka'tén-
if   snake   you will dream   scandalous

htshera   kén:ton'.
matter   it means.

If you dream of a snake, that means scandal.

21. Tóka' entéhsia'ke' sanónhkwis nó:nen
if will you cut your hair when

oráhkwase' sénha' iohsnó:re' ensewatehiá:ron'.
moon new more it is fast will it grow back.

If you cut your hair during the new moon, it will grow back much faster.

22. Tóka' tenhsatianakarhátho' né kén:ton' tsi
if will you put the shoe that it means that
on the wrong foot

ohkwá:ri tentsátera'ne'.
bear will you two meet

If you put the wrong shoe on the wrong foot, that means that you will meet a bear.

23. Tóka' sótsi' é:so' ensaiéshon' iáh
if too much will you laugh not

tekarihwáhstha' né kén:ton' tsi tenhsahséntho'
does it reason that it means that will you cry
use

If you laugh for nothing, that means that you will cry.

24. Tóka' owirá:'a oshon'kará:ke rotahónhsate'
if baby floor on he listens

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né   kén:ton'  tsi   ó:ia'    ensehsewirahní:non'.
that it means  that another  will you baby buy
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If a baby listens on the floor, that means that you will have another baby.

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25.  Tóka'  tóhka'  niionkwé:take     eniaíheie'
      if   several  of people         will they die
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né   kén:ton'  tsi   Shonkwaia'tíson   thotén:niote'.
that it means  that  he our bodies     he is having
                        finished       a wedding
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If quite a few people die that means that our Creator is having a wedding.

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Wathahí:ne'   tanon' Konwatién:se'
  Mary         and    Carolee
Nicholas               Jacobs
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TIAWERON:KO KANEHON OKA:RA'
The Eel Skin Story

Ne	ká:ti'	kí:ken	oká:ra'	wahón:nise'
the	that	this	story	long ago

rón:kwe	wahaientakóha'.	Skáthne	tettiatera'né:ken
man	he went to get wood	together	they two side by side each other

akohsá:tens.	Tetiate'serehtahnhontérha'	wahshako-
one is astride	it links it drags	he them

ia'taniión:ten'.
bodies hitched

O:nen	ká:ti'	wahahtén:ti'	wahaientakóha'
now	then	he went away	he went to get wood

tánon'	né:ne	akohsá:tens	aonatahkwénnia'
and	that	one is astride	harness

tiawerón:ko	aotinéhon	ionniá:ton.
eel	their skin	it is made of

Tsi	iahá:rawe'	karhá:kon	tontáhsawen'
as	he arrived	at forest	it started

Long ago a man went to get wood in the forest. He hitched two horses together side by side on an adjustable wagon.

Now then he went into the forest to get wood. The horses' harness was made out of eel skin. As he arrived at the forest, it started to rain. He

wa'okén:nore'.   Iaháhsa'   ki   tsi   raientákwas
it rained   he finished this then he cuts wood

tánon'   akwé:kon   ka'seréhtakon   waháta',
 and   all   in it drags   he put in

sok tontahahtén:ti'. Tsi   tahshakotó:ri'   ne
then he started to   as   he started them the
     return home   going

akohsá:tens,   tetsá:ron   tatiatihéntho'   iáh   ki'
one straddles both of   they pulled   not   even
                them

tetiohténtion   ne   tetiate'serehtahnhontérha'.
did it move   the it drags it adjusts
 forward

Aonahkwénnia' wa'tewatirón:ten' khe   tka'seréhtaien'
their   it started   just   it drags it
harness   remained

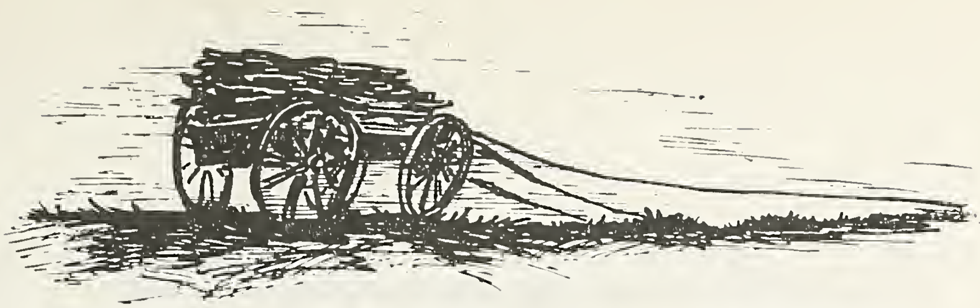
karhá:kon.
in forest

Ionsá:rawe'   tsi   thonónhsote'   tánon'
he arrived   at   his house   and
                    stands there

wahshakohkwenniahrá:ko'   ne   akohsá:tens   tánon'
he removed their harness the one straddles and

finished cutting the wood, and loaded it on to the wagon, then he started for home. He got the horses to go, but the wagon did not move. Their harness started to stretch. The wagon remained in the forest.

As he arrived at his home he removed the harness from the horses and hung it on the fence.



aten'enhrá:ke wahrotárhoke' ne aonakwénnia'
on the fence he strapped it the their harness

Tsi niwahsón:tes onstáthen' ne
as long night it dried the

tiawerón:ko aonéhon sok tontáhsawen' ontó:roke'.
eel skin then it started it shrank

Orhon'ké:ne wahá:ie' iahatke'tó:ten' tsi
in morning he woke up he looked out of at

tekatsiserá:ton' wahonehrá:ko' tsi nahó:ten'
window he was surprised at what

wahatkáhtho'. Tho aten'enhrákta' ka'seréhtaien'
he saw there near the fence it drags it lay

ne tetiate'serehtahnhontérha' tetkaientáhere', ne
the it drags it adjusts full of wood the

roientákwen.
he cut wood

During the night the eel skin dried and started to shrink. He woke up in the morning and looked out of the window and to his surprise he saw the wagon parked next to the fence full of wood that he cut.

Wahón:nise' shihatiká:ratons ne thotí:ien'skwe'.
long ago as they used to tell the they were older

Tekaronhió:ken

Frank Jacobs, Jr.

IEHWISTA'EKSTHA'
The Bell

Ne	kí:ken	aoká:ra'	tsi	iohwistén:ton'
is	this	story	of	metal hanging

teieiahson'thá:ke	ononhsatokenhtí:ke.	Wahón:nise'
one signs the cross	in the holy house	long ago

o'seronni'ón:we	ronontí:io	wahshakorharátsten'
real axe makers	their king	he promised them

Kahnawa'kehró:non'	tsi	enhshakó:ion'	iehwista-
people of rapids	that	he will give them	one strikes

'ékstha'.	E'	thó	kí'	na'á:wen'ne',	tahaténniehte'.
metal with it	that	there	just	it happened	he sent it

Kahonweia'kowáhne	tahonnéta',	Kahnawá:ke	taiawenon-
in a large boat	they put	at rapids	it was

hátie'.
coming

Ne'	thó	nón	shontakahá:wi'	o'seronni'ón:we
it	there	place	as it carries	people of France

This is the story of the church bell in the St. Francis Xavier Catholic Church in the village of Caughnawaga, Province of Quebec, near Montreal. The King of France promised the Mohawk Indians he would give them a bell for their church. He fulfilled his promise, and a bell was put on a ship for Caughnawaga.

tánon'	tiohro'shaka'ón:we	ronateriióhne'.	Iáh
and	English people	they were fighting	not

té:io	ne	iehwista'ékstha'	né tsi
arrive	the	one strikes metal with it	because

wa'konwaié:na'	ne	kahonweia'kó:wa,	iahatíhawe'
they caught it	the	large boat	they took it

wastohronón:ke	takarhárho'	wahonnetáhko'	tsi
(Bostonian place) United States	it docked	they took out	

nahó:ten'	wá:tahkwe'	ne	kahón:wakon.	Akwé
whatever	it was on	the	in the boat	all

wahontenhní:non'	é'	thó	wa'karátie'	ne
they sold	that	there	along with	the

iehwista'ékstha'.	Tsi	nón	tkaná:taien'	ne
one strikes metal with it	at	where	town lies	the

Deerfield	thatinákere'	wahatihní:non'.
Deerfield	they live there	they bought it

Kháre'	ó:nen	wahotinónhton'ke'	naón:we'	ne
until	now	they became impatient	for it to arrive	

At that time the French and English were fighting one of their wars. The bell never reached its destination The ship was captured and docked in Salem, Massachusetts, and the cargo was sold, including the bell. The town of Deerfield purchased the bell.

In the meantime, the Mohawks were waiting for their

raotihwísta',	wahatirihwí:sake'	ka'	nieiawe:non.
their metal	they sought the reason	where	it had gone

Wahatirihwatshén:ri'	tsi	wa'konwaié:na'	ne
they found the reason	that	they caught it	the

kahonweia'kó:wa	tánon'	tsi	wastohronón:ke
large boat	and	that	United States

tiorhárhon	Deerfield	tkonwá:iats,	tsi	nón
it was docked	Deerfield	they call it	at	the place

tioia'totarhé:'on.
it was caught

Wahontenenhrón:ni'	Kahnawa'kehró:non'	tékeni
they formed a group	rapids people	two

tewen'niáwe'	nihá:ti,	ratsihénhstatsi	tánon'
hundred	of them	priest	and

o'serón:ni'	shotár	wahonhtén:ti',	wahonnesákha'
axe makers	soldier	they went away	they went to look for

ne	iehwista'ékstha'.
the	one strikes metal with it

bell. They inquired about it and found that the ship had been captured and the bell had been sold in Deerfield.

The Mohawk Indians got together a war party of 200 braves along with some French soldiers and a priest, and together they left for Deerfield to find the bell.

Karí:wes	wa'thontstikáwha'	tsi	niió:re'
length of time	they wandered	to	so it is far

iahón:newe'	ne	Deerfield.	Akohsera'kehkó:wa
they arrived		Deerfield	middle of winter

1704	shiiohseró:ten.	Teiotenonhianíhton	tsi	ní
	was the year	it was frightful	as	the

tsi	wahonterí:io'.	E:so'	wahonníheie'.	Wahontkwé:ni'
as	they fought	many	they died	they won

ne	onkwehón:we.	Wahshakotiié:na'	ótia'ke	ne
the	real people	they held them	some	the

wahshakoti'shén:ni'.	Ne'	thó	nón shontakahá:wi'
they defeated them	in	there	place as it carries

tóka'	sótsi'	é:so'	rá:ti	enhonníheie'	ne
if	too	many	of them	they will die	the

onkwehón:we,	tenhshakotiia'taiestáhsi'	né:ne	kwáh
real people	they will look over people	which	truly

rotiia'tahní:rons	tánon'	kén'	nithotiién:ha
they are strong	and	small	they are aged (males)

rotisken'rakéhte'	entehshakotiia'ténhawe'	tánon'
boys	they will bring them	and

It was in the winter of 1704 that they arrived in Deerfield. A fierce battle took place, the town was taken, and many lives were lost. The Mohawks captured some prisoners. In those days, if they lost too many warriors, they would pick out the strongest young males, capture them, and bring them to their

thó ní tsi enhshakonehiá:ron' tsi ní ne
there that as they will raise them as that the

shakotiien'okón:'a, kháre' ó:nen enhóniake'
their children until now he will marry

onkwehón:we. E' thó ní tsi ótia'ke
real person that there that as some

rotihsennaientá:'on ne tiohrén:sha' ken'tá:here',
they got their names the English Scottish

arísmen, tánon' o'seronni'kéha kahsenna'shón:'a
Irish and way of axe makers names

ne kí:ken raotihsenna'shón:'a ne shakotiié:na
is this their names the they caught them

Kahnawá:ke shakotiiá:the.
to rapids they brought them.

Wahatihwistaniiontá:ko' ononhsatokenhtí:ke
they took the metal off at the holy house

kahnia'sá:ke, karontá:ke wahatihwánerenke'.
on its neck on log they tied it

Wahonnenhsá:ren' é' thó ní tsi tontahonhtén:ti'.
they carried there the as they returned
over their shoulders

village to raise like their own sons. Eventually they would marry into the tribe. This is how and why some of the Indians have English, Scottish, Irish, and French names. The names came from the young boys who were captured in the wars.

The bell was taken from the church steeple and fastened to a beam with a crossbar at both ends, so that

Kwáh	í:ken	tsi	rotiháhes	tsi	niió:re'
truly	it is	that	their road was long	to	as it is far

enshón:newe'.	Iohseratshá:ni	é:so'	wahatiiésha'
they will return	fierce winter	much	they suffered

tsi	niioh….áhes,	iohaháksen	tsi	rón:ne'	tánon'
at	as the road is long	bad roads	as	they walked	and

wa'tkanien'kwataséhon'.	Ne	é:so'	wahatiiésha'
it snowed	the	much	their hardship

shotár,	tsi	thotikwi'tsháhere'	niió:re'
soldier	to	their knees	that far

iehatihsinénhserons,	wahshakoti'nósha'	ne
their legs were falling in	they were jealous	the

onkwehón:we	ne	tsi	tehonathwén:karonte'	ok
real people	because		they had snowshoes	on

é:neken	thihón:ne'.	Wahonská:neke'	ronónha	ó:ni'
top	they were walking	they were longing	themselves	also

the men could carry it. They left Deerfield and started the long trek homeward. The winter was cruel, and there were many hardships, one of them the rough terrain. The snowstorms were hard to endure, especially for the French soldiers, who suffered a great deal from the toil of wading through the deep snow. They envied the Indians who were wearing snowshoes and who seemed to be floating on top of the snow. They did not show signs of fatigue

ahotiién:take'   ne   kahwén:kare',   tsi   niió:re'
they should   the   snowshoes   because
have them

tsi   tehotihwishenhé:ion   tsi   rotiniotkawenhátie'
as   they were tired   that   they were laboring
                                     through the snow

ok   ne   onkwehón:we   iáh   thé   tewé:ne
but   the   real people   not   at all   did it show

tahotihwishenhé:ion.
they would be tired.

Tonsahatitharónnion',   ia'thotirihwaién:ta'se'
they discussed   they decided

tsi   enkonwaia'táta'   ne   iehwista'ékstha'.
that   they will bury   the   one strikes metal with it

Wahén:ron'   ne   roiá:ner,
he   the   he is chief

"Kén:'en   kaniataráktaʼ   entewaia'táta';
here   near the lake   will be bury it

kenkwité:ne   tentitewakóha'."
in spring   will we come get it

E'   thó   kí   na'á:wen'ne',   wahatiia'táta'.
that there this it happened   they buried it.

as did the French soldiers.

The party decided to bury the bell on Lake Champlain and come back for it in the Spring. When Spring came,

Ia'káhewe'	ne	kenkwité:ne	sahontenenhrón:ni'
there it arrived	the	spring	they grouped back together

é'	thó	nionsahón:ne'	kaniatarákta'	ne	Champlain
that	there	they retraced their steps	near the lake		Champlain

sahonnetáhko'	ne	iehwista'ékstha'.	Ronatshennonihátie'
they took it out	the	one strikes metal with it	they were happy

tsi	sahatíhewe'.	Kháre'	ó:nen	iahatihwistaniión:ten'
that	they brought it back	time	now	they hung the metal

ononhsatokenhtí:ke.	E:so'	iohserá:ke	wáhontste'.
in the holy house	many	years	they used it

Ohiarí:ha	shiwennhni'tó:ten	wísk-iawén:re'
June	in the month of	fif teen

shískare'	tiohton-iawén:re'	tewen'niáwe'	tánon'
the date	nine teen	hundred	and

iá:ia'k-niwáhsen	tióhton	shiiohseró:ten
six ty	nine	in the year of

kahwistasé'tsi	sahatihwistaniión:ten'.	On:wa'
new bell	they hung the metal	Now

they grouped together again and went back to Lake Champlain where the bell was buried and triumphantly brought it home. In due time it was installed in the church steeple. The bell served the village for many years.

A new bell was installed on June 15, 1969.

wenhniserá:te'	ononhsatokenhtí:ke	kanónhskon
days	in the holy house	inside the house

oshon'kará:ke	tká:ien'	ne	Deerfield	aohwístha'.
on the floor	there it lies	the	Deerfield	bell

Né	tsakawehiahrakwén:nis	tsi	niiawén:'en	ne
it	reminds us again	what	happened	to

iehwista'ékstha'	aokâ:ra'
one hits metal with it (bell)	her story

Today you will find the old Deerfield bell resting on the floor inside the church to remind people of this history.

This story was told to me by my grandmother.

Warisó:se Kaierĩthon

Josephine Horne

SENHA' TEHOTI:KA TSI NI:IOT NE AKON:WARA'

Faster than O Face

O:nen	kí'	kwáh	kén'	niiohserá:ke	tsi
now	just	some	few	years	

náhe'	kí:ken	é' thó	niiawén:'on.	E' thó
ago	this	there	it happened thus	there

shikahá:wi'	kontatewenní:io	shé's	ne	katshé:nen'
as it carries	their word was good	then	the	animals

ne	kahnawá:ke.	Isi'	nónhskwati	she's	niió:re'
the	at rapids	there	beyond the bridge	used to be	as it is far

niekonnéhtha'	ne	teionnhónhskwaron.	Awenhnisera-
they would wander	the	cows	all day

kwé:kon	enkontihón:take'	ná:kon	ne	kwá:ti.	Sok
long	they would eat grass	under	the	side	then

shé's	tentkonhtén:ti'	nó:nen	ienkáhewe'	akonwati-
used to be	they would come back	at the time	it would carry	for one to take

This happened some years ago when domestic animals were still free to roam in Caughnawaga. The cows used to pasture way on the other side of the bridge, on the east side, returning home twice each day to be milked,

non'tatáhko'	orhon'ké:ne	tánon'	ne	ní'	no'karahsnéha.
milk out of them	morning in	and	the		in the evening

O:nen	kí:ken	shiwenhniserá:te'	iáh
now	this	as this day	not

tha'tetiawé:non	kí:ken	ne	teionnhónhskwaron.
had she come back	this	the	cow

Iahonwanató:ri'	ne	tehniksá:'a	iatate'kén:'a
they sent them out	the	two boys	they are brothers

aonsakonwaia'tisákha'.	Iahnirá́then'	karistá:ke,
for them to go look for her (body)	they two climbed up	on the iron

ia'thiatkathónnionhwe'.	Tóka'	akonwá:ken'	ne
they looked around	maybe	she might be seen	the

raotitshé:nen'	ka' ok nón:we	aontaiora'kárhon'
their animal	somewhere	she might be lagging

Khá́re'	ó:nen	kí'	ionsahiatsnenhte'	ísi'
finally	now	just	they two went back down	over there

ne ká:ti	ákte'k	nón:we	ieshonatkén:se'.
the side	every	place	they looked

morning and evening.

One day, this cow did not return home, so the family sent out their two sons to search for her. The boys went up on the railroad tracks and looked in every direction, but she was nowhere in sight. They climbed

Kháre' ó:nen tó:k niió:re' ná:kon ne ká:ti
finally now so as it is far under the side

ia'thiatstikáhwha'. Iáh ki' tekonwá:ken ne
they traveled not just did they see her the

raotitshé:nen'.
their animal

O:nen tontaió:karahwe' tahiatáhsawen'
now it got dark again they started

tontahiateristíta' tehotisterihenhátie' ase'kén
they traveled on the iron they were hurrying because

ronaterién:tare' akón:wara' í:re's nó:nen
they knew O Face he goes at the time

entió:karahwe' Kí:ken ne thakowá:nen rattó:kas
it will get dark this the he is large he notices

rotatshatará:nis ok thé:nen' okwirokónhson'
shadows appear around him something among the trees

nék tsi iáh wé:ne' tehaón:ni ase'kén tóhsa'
but that not showing he made on because not

down the other side of the tracks and hiked a great distance but she was nowhere to be found.

Darkness came upon them and they started for home following the railroad tracks back. They started to walk faster as darkness was descending upon them. They knew they had to be home before night was completely upon them

ahohterónhkwen'	ne	rokén:'a.	Kháre'	ó:nen
to frighten him	the	his small brother	finally	now

wahiastó:ron'.	Sók ó:ni'	ne onstó:ren'	ne	kí:ken
they two walked fast	then also	it began to walk fast	the	this

karhakónhson	tetiotshatarátie's.	Kháre'	ó:nen
in the forest	shadowing	finally	now

wa'thiaráhtate'	ó:nen	ki'	sénha'	ákta'	nonwéhte'
they two ran	now	just	more	near	it moved

ne	notshá:ta'.
the	shadow

O:nen	kí:ken	ne	thakowá:nen	tahohterón:ne'.
now	this	the	he is larger	he began to get scared as he came

Wahanonhtónnionhwe'	tsi	tóka'	ó:nen	ki'	ne
he thought	that	maybe	now	just	the

akón:wara'	shakoienáhsere'.	E' thó	ki'	kí:ken
O Face	he is going to catch them	there	just	this

for they knew that O Face lurked in the dark of night, ready to pounce on any youth who wandered about.

In the gloom, the older boy sensed a darker, gloomier shadow flitting among the trees in the distance. He did not let on to his little brother the fear that was growing within him. As the gloom grew more dense, he sensed the darker shadow of O Face flitting in among the trees and coming closer and closer. He urged his

ronahstoróntie'	tsi	nontaio'kara'onhátie'.	E' thó
they were walking fast	as	it was getting dark	there

kí'	ne	akón:wara'	sénha'	aktóntie'	nontahawe-
just	the	O Face	more	near abouts	he came

nonhtonhátie'.	Kháre'	ó:nen	thó:ha	ahshakonhóntera'ne'.
along	finally	now	almost	would he catch up to them

O:nen	thó:ha	shahia'nikonhró:kten'	waháttoke'
now	almost	they came to the end of their minds	he noticed

ne	thakowá:nen	ken'k	niió:re'	ne	karhá:kon
the	his is large	a bit	so is it far	the	in the woods

tkaháhserote'	tontahonerahóntsha'	ne	ro'kén:'a
there a house stands	he just grabbed him by the wings	the	his small brother

tánon'	wa'thní:ten'	tsi	niiohsnó:re'	iahianontátsnenhte'.
and	they flew	as	so it is fast	they went down the hill

Iakén:'ak	iahninhohó:ka'te'	rotikstén:ha	iatathróna'
just barely	they two reached the door	they are old	they are married

little brother to hurry and finally they were almost on the road home. The darkness swirled around and so did the shadow of O Face, closer and closer. The boys saw a small light glowing in the window of a house where lived an old couple. They broke into a run, with the dark figure of O Face starting to take swipes at them. With a last desperate burst of speed, they plunged right through the door of the cabin,

tsi	thní:teron',	raotinónhskon	ia'thnihra'kwénhtara'ne'.
there	they two live	in their house	they fell down on their stomachs

Wahonatewerá:ienhte'	ne	akón:wara'	kwáh
a wind hit them	the	O Face	just

iakén:'ak	tonsahshakowíhskwahte'.	Seréka'
barely	did he miss them	almost

ahshakoié:nenwake'.	Wahshakotihró:ri'	ne	iatathróna'
would he catch them	they told them	the	they are married

"Tsatera'swí:io	kí:ken	teseniiáhse,	tsi
your luck is good	this	you two	that

iáh	tetshiseniié:nen	ne	akón:wara',	ase'kén
not	has he caught you two	the	O Face	because

iáh	ónhka'	ne	wén:ton	tetsako'niakén:'en
not	anyone	the	ever	have they escaped

tsi	niiá:kon	shakonhonterá:'on	tsi	niiohserá:kon
as	many people	he has caught up to them	as	many years

falling to the floor before the startled eyes of the old man and the old woman. The terrible roaring, dark form of O Face took one last angry swipe at the door and all was quiet.

After the boys told their story, they were told how fortunate they were to escape, as in all

ahsontakónhson	sha'tehotstikahwenhátie's."
in the darkness	as he is travelling along

the years that O Face had been known to travel in the darknesses of earth, no one, but no one, had ever gotten away once O Face had gotten hold of them.

Konwatsi'tsaién:ni

Rita Phillips

RONENHE:ION IAH TEHONTA:TI

The Dead Do Not Talk

Wahón:nise'	iá:ken'	kaná:takon	rati'terón:-
long ago	they say	in town	they lived

tahkwe'	kaié:ri	nihá:ti	ronón:kwe,	tehontero'seri-
then	four	of them	men	they used to be

ióhne'.	Kháre'	ó:nen	ki	wa'thonterihotárhoke',
good friends	and	then	this	they had an argument

iáhken	ónhka'	ahohteron'nîhake'.	Shaiá:ta	ki	ne
not	who	he would be afraid	one man	this	the

rahtahkón:ni'	wahatená:ieste'	tsi	iáh	thé:nen'
he makes shoes	he bragged	that	not	anything

tehatshá:nis.	O:nen	ki'	ne	ronátia'ke	ne
he fears	now	just	the	others	the

rontén:ro'	wahón:nehre'	enhonwate'niéntenhste'
they are friends	they thought	they will test him

Long ago, it has been told, in this town lived four men who were very good friends. One day they got to arguing as to who among them was the bravest. The shoemaker boasted that he, of all, was not, and never would be afraid of anything seen or unseen. The other three decided among themselves to give him a test.

oronhwí:io ken.
matter is if
good

Sók kí shaiá:ta thahrón:ni tsi wahrenhé:ie'.
then this one man he made as as he died

Shaiá:ta né:ne rahenheion'tahserón:nis wahshakaón:nien'
one man who he is an undertaker he made them

ne karón:to. Kwáh ki' tahatiié:rite' tsi
the casket so even they did it as
properly

wahonwaia'tá:ren' tánon' akwé:kon wahatiweienén:ta'ne'
they laid his and all they prepared
body out

tsi niioterihwíson'.
as the matter should be

O:nen ki tsi taió:karahwe' akwé:kon ki'
now this as it got dark all of

ne rontén:ro' wahatinonha'á:na'. Wahonterihwah-
the they are they went to the they made a
friends wake

serón:ni' ne ki ne rahtahkón:nis ne é'
pact that this the he makes shoes that there

A few days later, the shoemaker was notified that one of his best friends was dead. One of the men, a funeral director, had made all the arrangements. The three remaining friends met at the wake and decided that one of them must remain with the dead man all night to

tenharhenhte'	enhatenón:na'.	Waharihwa'nón:wen'ne'
he will spend the night	he will watch	he agreed

ki'.	Niá:rehkwe'	ki'	sahakóha'	raoio'ténhsera',
just	before	though	he went back to get	his work

tóhsa'	ki'	ahonónhtonke'	tsi	niwahsón:tes.
not	just	he would find the time long	as	the length of the night

O:nen	ki'	kwáh	kén'	shikahá:wi'	tsi
now	just	just	a bit	as it carries	that

niwahsón:tes	kí:ken	rahtahkón:ni'	renná:kahre'
as the night is long	this	he makes shoes	he whistles

raonhá:'ak	rone'kón:re',	roió'te'	áhta
he alone	he hammers	he works	shoes

shakwatákwas.
he repairs

Thontaiawénhstsi'	kí:ken	ne	raia'táhere'
all of a sudden	this	the	his body is laid out

watch. So, the shoemaker readily agreed to be the one, but first he returned to his shop to get a few things to work on during the night so that he would not find it so long.

When the shoemaker was alone with his "dead" friend, he set to work repairing the shoes he had brought, whistling as he hammered away.

tahatá:ti' wahén:ron',
he spoke he said

"Hé, tha'tesató:tat, thí:ken iáh teiote-
Hey, you keep quiet that not is the

rihwíson' nahsenná:kahre' nó:nen senónhnha'."
proper way for you to whistle when you are watching

Ne rahtahkón:nis wahén:ron',
the he makes shoes he said

"I:se' tha'tesató:tat, ase'kén iáh
you you keep quiet as not

tehontá:tis ne ronenhé:ion."
do they talk the they are dead

Sok ionsahatasónteren' sahoió'ten'. O:nen
then he continued he worked again now

kwáh kén' niskahá:wi' á:re' kí ne raia'táhere'
just a bit it carries again again this the his body is laid out

tahén:ron',
he spoke

Suddenly, a voice from the casket said,
"Have you no respect for the dead? Be quiet!"
The shoemaker replied,
"You keep quiet, the dead do not talk!" and he kept on hammering and whistling. After some time, the voice from the casket said again,
"Quiet, you, have you no respect for the dead?"

"Hé,	iáhken	tesá:ien'	ahserihwakwénnienhste'
Hey!	not	do you have	you should respect

ne	iakawenhé:ion.	Tha'tesató:tat."
the	they are dead	Keep quiet

Ne	rahtahkón:ni'	wahén:ron',
the	he makes shoes	he said

"Hé,	énskak	ó:nen	enskonhró ri',	serihó:kten.
hey!	once	now	I will tell you again	shut up

O:nen	ní:se'	senhé:ion."
now	you	you are dead

Sók	ionsahatasónteren',	sahrenná:kahre'	tánon'
then	he continued	he whistled again	and

sahane'kón:reke'.	Sók	á:re'	ki'	ne	raia'táhere'
he hammered some more	then	again	just	the	his body is laid out

tontahohén:rehte',
he hollered again,

"Serihó:kten	thí:ken.	Tha'tesató:tat	ó:nenk."
shut up	that	you keep quiet	right now

The shoemaker was getting a bit riled up by this time and said, impatiently,

"Hey you, I'm telling you for the last time, you keep quiet. You're the one that is dead."

Then for a while it was quiet again and the shoemaker returned to his hammering and whistling. Again the voice issued from the casket, this time much louder and demanding,

"Keep quiet. You have no respect for the dead.

O:nen	ki'	ne	rahtahkón:nis	tahoná:khwe'.
now	just	the	he makes shoes	he got mad

Tontahatá'stsi'	tánon'	karonto'tsherákta'
he stood up suddenly	and	near the casket

nia'thá:ta'ne'	tánon'	ia'thohsó:kwe'ke	'ne
he stood	and	he hit him on the head	the

raia'táhere'.	Tonsahatkarhaté:ni',	ionsahátien'
his body is laid out	he turned around	he re-sat

tánon'	sahoió'ten	skén:nen'	tsi	niió:re'
and	he worked again	in peace	as	so it is far

wa'awén:te'ne'.	Iáh	nénska	tha'tethowennaketó:ton'
daylight came	not	once	did a word come out from him

ne	rawenhé:ion.
the	he is dead

O:nen	tontahón:ne'	ne	rontén:ro'
when	they came back	the	they are friends

Only a very stupid and crude man would do what you are doing in the presence of the dead!"

At this, the shoemaker angrily jumped up from his bench, bounded to the casket, and with his hammer, bopped the man in the casket on the head. After that, the shoemaker whistled and hammered in peace and quiet until the break of day. Not even one word issued from the dead man from then on.

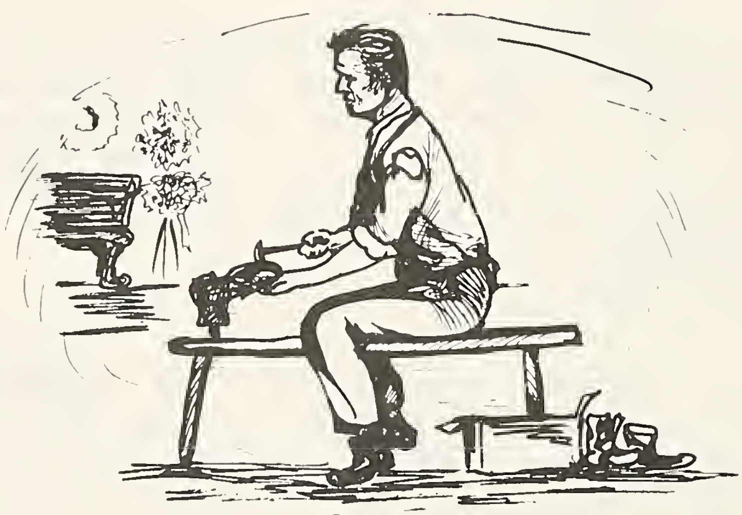
When his friends returned next morning, expecting

aonsahonwá:iehte' ne raoniheión:ta' tánon'
to wake him up the dead body and

aonsahshakokaratón:hahse' oh na'á:wen' tsi
for him to tell them what it happened as
stories

niwahsón:tes iah tehotikwénion aonsahonwawiéhton'.
as night is not were they able to wake him up
long

Iáh tha'tiesehshakowennará:ni ne rawenhé:ion rontén:ro'.
not a word did he speak the he is dead they are
to them friends



to be regaled by the story the "dead" man might tell.
He lay still and never said a word.

Konwatsi'tsaién:ni

Rita Phillips

ERHAR'O:KON
The Dogs

Wahón:nise'	iá:ken'	né:ne	wa'tewatenón:ianihte'
Long ago	it is said	that	it exaggerated itself

érhar	wa'kontinákeren'ne'	ne	kaná:takon.	Tánon'
dog	they started to live	the	village in	And

she's	iá:ken'	teionaterien'takária,	ahsontakwekónhshon'
then	it is said	they were noisy	all night, here, there

iotihní:hen.	O:nen	iá:ken'	ne	ranatakwe'ní:io'
they bark	Now	it is said	the	he is main town chief

waharihó:wanahte'	tsi	entá:'on	ok	nenkaié:ren'
he word made large	that	it must be	something	will be done

kí:ken	érhar	sótsi'	wa'onatiohkowánha'ne'.
this	dog	too	the groups became large

Wahontkennísa'	ne	ronón:kwe,	tánon'	wahati-
they met	the	men	and	they

rihwínion'te'	tsi	akwé:kon	ki'	entá:'on
word brought	that	all	just	it must be

A long time ago, there were a great many dogs in our small village. There were almost as many dogs as there were people. Everyone was getting very tired and impatient with them, because they were barking all night and getting into all kinds of mischief.

The chief called a big town meeting and the people decided that something had to be done. The people agreed, and the chief announced that all the dogs of the village

enkonwanahshéhton'.
they will be killed

O:nen kí:ken rokstén:ha í:non karhá:kon
Now this he is old far woods in

thanákere', iaharihwá:ronke' tsi nihontierá:ne'.
there he lives he word heard that what they are going to do

Kwáh iá:ken' óksa'k tahahtén:ti', tahshako-
Just it is said quickly there he walked there he them

hroriá:na' tsi iáh tetkaié:ri' tsi nihontierá:ne'.
to tell came that not is it right that which they are going to do

Wahshakohró:ri', wahén:ron', "Enkwahró:ri'
He them told he said I you will tell

tsi ionkhiia'takéhnhas thí:ken érhar. Sewa-
that they us help those dog You all

terién:tare' kí:ken kaniataratátie' tsi
know this river along there

ohniare'kó:wa kontí:teron', tánon' ne
snake big they live and the

were to be killed.

Now this wise, old man, who lived alone in the forest, heard what the people were about to do and he became very upset. He immediately started on a trip to the village to tell the people that what they were about to do was not right.

He told them, "You all know that there are horrible sea monsters living at the bottom of this river passing right by our village, and these monsters are constantly

teionatonhwentió:ni   ne   aontakontiráthen'   kén:'en
they want   the   to climb up here   here

kaná:takon   akóntien'.   Ne   ká:ti'   thí:ken
village in for them to   The reason   that
stay

ahsontakwé:kon   sewathón:te'   érhar   iotihní:hen.
night all   you all hear   dog   they bark

Skonwana'te'kwáhtha'   ne   ohniare'kó:wa,   tóhsa'
they them chase back   the   snake large   do not

atiá:kta'   naontakón:ne'."
riverside for them to come

Tsi   ó:nen   waharihó:kten'   ne   rokstén:ha,
at   when   he word finished, the he is old

iah   ónhka' thé:nen'   tetiaká:wen   tánon'
not anyone   nothing   did they say   and

skennen'ahsón:'a   sahonhtén:ti'.   Iah   ne   wén:ton
peacefully   they walked back Not   ever

ónhka'   tha'teskonwana'nikónhare'   ne   érhar.
anyone   did they touch their minds the   dog

trying to climb up the riverside to come into our village! Well, that noisy barking you hear all night is the dogs chasing back the monsters into the river. This is the reason we must keep our dogs and treat them kindly."

When the wise, old man finished, not a word was spoken, and the people quietly left to go home. The dogs were never again bothered by the people, and they were always treated kindly.

Né aorí:wa', shé:kon nón:wa' tho
The reason still now there

niionkwanahskwaká:te' érhar ne kaná:takon.
our pets are many dog the village in

That is why, even to this day, we still have a great many dogs in our village.

A:nen Kaia'titáhkhe'

Annette Jacobs

KASPÉ

Né:ne wahón:nise' shé:kon askwakaión:ne
this long ago still bridge old at

sha'teionskwí:ia'ks nón:kwe ó:nen iá:ken'
when they bridge crossed people now it is said

kí:ken tontahonahtentionhátie' ken' nithotiión:sa
this back they coming little they aged young

skaniatará:ti na'tontahón:ne'.
beyond lake there they came

O:nen iá:ken' tahón:newe' tsi iotón:niate'
now it is said they came to end of point

ó:nen wahónttoke' ó:ia' ohná:ken' tahón:ne'.
now they noticed another back they coming

Sók ná:'a shaiá:ta wahén:ron',
then and one body he said

"Há'o kén:tho tewatáhset, eniethiia'tetshahníhten'
how about here we hide we will intimidate them

thí:ken ohná:ken tahón:ne'."
those behind they are coming

Long ago, when people still crossed the old bridge, it is said that several young men of the same age were on their way home.

When they got to the Point, they noticed another group behind them. One of them had an idea and said,

"Let's hide here and scare the group behind us."

Thó kí nahatí:iere'.
such then so they did

Wahón:nise' iá:ken' thó nón:we
long ago it is said there at that place

nishonókwen ronkwehkénha', Kaspé ronwá:iatskwe'.
they from water recovered man had been Gaspe he had been called

Thó kí' tsi karístote' thonwaia'táten'
there just at metal standing his body was put in

O:nen kí ne thó shiwahsontá:te' thó
now this the there when night stood there

wahonteneró:kwaien' wahonterhá:rate' ahón:newe'
they on their stomach lay they waited for them to arrive

ne ronátia'ke tahón:ne'. Kháre' ó:nen ki'
the they others they are coming finally now just

khé' ákta' rotihtharonnóntie' ne kí:ken ohná:ken'
close near they are talking along the these behind

And so they did hide.

Long ago, it is said, they recovered a man's body. His name was Gaspé. There, by the marker, he was buried.

On that special night there they were hunched, patiently waiting for the group behind to get there. Finally, now, they were close by and they were speaking, this group that was behind.

tahón:ne'.
they were
coming

O:nen ki' thók nitió:re', ó:nen enwá:ton'
now finally only so it is far now it could be done

enhsheién:tere'ne'. O:nen shaiá:ta ne rotahséhton
will you recognise someone now one body that he is hiding

wa'thohén:rehte', wahén:ron',
he called he said,

"Tóhsa' ia'satkáhtho Kaspé tsi thaiá:ta."
do not there look Gaspé at where his body is

Sok iá:ken' ki ronnón:kwe tahontihéntho'
then it is said that the men they pulled out

wahonté:ko'.
they got away hastily

O:nen ki' nen' né:'e ne kí:ken
now just as it is of this

ratineró:kwaien' wahónttoke' tsi niió:re' tsi
they are hunched they noticed as so it is far as

Now they were so close that you could recognise them. Now one of the men hiding spoke loudly. He said, "Do not behold Gaspé's grave."

Then, it is said, these men pulled out, they ran away.

Now then, these men on the ground noticed the extent

ronateronhienhtén:ni   kí:ken - ne.   ronnón:kwe
for them blue has   these   the   men
fallen

ronate'kwenhátie'.   Sok   ne   nen'   né:'e   tahonti-
they hastily   then   they also   it is   they
getting away

héntho'   wahonté:ko'.   Ne's   ká:ti'   ionsahiatkáhtho'.
pulled   they got   this   verily   back there they
away hastily   looked

Shé:kon   ká:ti'   ohná:ken'   tá:re'   ne   Kaspé
still   verily   behind   he is coming   the Gaspé

tahshakóhsere'.
he is chasing
them

Né:'e   ká:ti'   ne'   né:'e   tho   ní:iot   tsi
that   verily   this   it is   there   is as   so

wahshakotianerónhkwen'   ne   Kaspé   ne   thó
he them had spooked   him   Gaspé   the   there

shikahá:wi'.
as it carries.

Né:'e   ki   nen'   né:'e   ne   wahón:nise'
this   that   that   it is   that   long ago

of their fear of these men in such hasty departure. Then they also pulled out and ran away. Now and again they would look back, only to see Gaspé coming behind them in pursuit.

Such is the way that Gaspé scared the fellows by materialising on that special night.

This is from the time when the old folks knew

ne shé:kon shihatikaraweientehténion' ne
the still when they knew stories they

khe'nihokón:'a séns thó ní:iot tsi
my fathers used to such as it is such

ratiká:ratonhskwe'.
they used to tell stories

Né:'e ki nen' né:'e ne akwiratékha'
this this particular it is this sapling burning

ronwá:iatskwe' ne kí:ken rakkaratón:ni.
he was called the this he me story told

how to tell stories. This is how my father and uncles used to tell stories.

This particular one was told to me by my uncle Burning Sapling.

Akwirá:'es
sapling tall

Frank Natawe

O'TONHKWA'

The Flame

Tóka' iá:ia'k-iawén:re' sha'tewakohseriiá:kon
about six teen as I years had passed

teiontiatieronnión:ni istén:'a tánon' í:'i
it made strange my mother and myself

shonsaiontiahtetionhátienne' énska shiwahsontá:te'.
as back we two were walking one as night stood

O:nen ki' kwáh kén' shitio'kará:'on tánon'
Now just even little as it darkens and

teiothahá:kton tsi nón:we niiákene'. Ok
it road curving at where we walk it

tieió:ken' she's tsi tionkwanónhsote' nó:nen
can be seen then at our house stood when

kanenna'ké:ne tánon' akwé:kon ionerahtén:'en.
autumn in and all leaves have fallen

Kwáh she's ki' ken'k nón:we thí tkahnhoh-
just then just where there door

ká:ronte'.
opening

My mother and I were walking home one moonlit night many years ago, when I was about sixteen. There was a little bend in the road where we were walking, and it was such a lovely fall evening, that you could see right through the trees to the back door of our house.

Ionkenikaratóntie' ki' ná:'a, kháre' ó:nen
we two started along I suppose sudden then

ki istén:'a ia'ontkáhtho' tsi tionkwanónhsote'
this my mother there she looked at where our house stood

tánon' wa'í:ron',
and she said

"Oh nekén' kwah nón:wa' nithatiérha'
What ever now is he doing

thí:ken ia'níha?"
that your father.

O:nen ó:ni' ní:'i ia'katkáhtho'. Kén'
then also myself there I looked just

niken'tónhkwa' se'kén tsi tkahnhohká:ronte'
so small flame as well at door opening

skennen'ahsón:'a tsi teiohkwatasehátie'. Kwáh
slowly at it surrounding just

né:ne ónhka'k shi ok nahó:ten' tieken'eniónnions.
that someone what thing she examined

Iáh ki' thé:nen' teiontianonhtonniónhon',
not even anything did we think

My mother glanced up and suddenly said to me, "I wonder what your father is doing?"

I followed her gaze to our back door and there, going slowly around the frame of the door, was a small flame, no bigger than a match flame. We thought that my father was checking his work, as he had just finished

ase'kén	thó	roió'te'kwe'	thetén:re'	ne	rake'níha.
because	there	he had been working	yesterday	the	my father

Tsi	ó:nen	ionsaiákenewe'	wahonwari'wanón:tonhse'
at	when	back there we arrived	she him asked

oh	nihatiérhahkwe'	ne	átste.	Wahén:ron'	ne'
what	he had been doing	the	outside	He said	it is

tsi	iáh	ne	énska	tiehoiakén:'en.	Wa'akone-
that	not	the	one	was he out	she

khé:ren',	nek tsi	iáh	ki'	thé:nen'	teiaká:wen.
puzzled,	but	not	even	anything	did she say.

Tsi	wa'órhen'ne'	wa'akorihó:ta'se'	tsi
at	morning	she received word	that

thononhwáktani'	ne	ronwa'níha,	sok	óksa'k
there he was sick	the	her father	then	immediately

wa'onhtén:ti'.	Tho	wá:'enhte'	tsi	thonónhsote'.
she left	there	she went	to	where his house stands

hanging the storm door the day before.

When we arrived home, my mother asked him what he had been doing outside. He answered that he had not been out all evening. We looked quizically at one another, but did not think anymore of the incident.

The next morning my mother received the sad news that her father was very ill, so she quickly packed and left to go to his village. By the time she arrived

Sótsi'	wa'ako'nísko',	ok ná:'a	shithawenhé:ion
too	she was late	already	then he had died

shiahá'onwe'.	Saiakehiá:ra'ne'	oh	nahó:ten'
when she arrived	she remembered	what	

iontiatkáhthon,	tánon'	ó:nen	ó:ni'	wa'ako-
we had seen	and	now	too	she

'nikonhriaién:ta'ne'	tsi	wa'akohshónnion'se'
got on her mind	that	she bad omened

thí	thó	shiwahsontá:te'.
that	there	as night stood

there, her father had already passed away. She immediately thought about the flame we saw on our way home the evening before, and she knew that it was one of those mysterious premonitions that people sometimes experience.

A:nen Kaia'titáhkhe'

Annette Jacobs

IAKOTINENIOIA'KS
The Legend of the Little People

O:nen	ki'	ní:'i	nakká:ra'.	Wahón:nise'
now	here	mine	my story	long ago

skahwatsí:ra	onkwehón:we	ronné'skwe'	tiótkon
one family	real people	they used to roam	always

ronatonnháhere'.	Kí:ken	ne	ronwa'níha
they were happy	this	the	their father

ratoratsheraweiénhen	iáh	nowén:ton	tehontonh-
he hunts well	not	ever	are they

kária'ks	ne	raohwá:tsire'.	Kí:ken	ne
hungry	the	his family	this	the

shakoti'nisténha	ieweienní:io	iakokhonniáhtskon
their mother	she is a good homemaker	she likes to cook

tánon'	tiótkon	ionhkwennión:ni	raonawenhshón:'a
and	always	she is making clothes	their clothes

kanéhon	tánon'	óhwhare'	ióntstha',	ne	ó:ni'
skins	and	fur	she uses	the	also

Once upon a time there was a very happy Indian family. The father was a good hunter and the mother worked very hard making clothes and blankets from the animal skins and using the meat for cooking nourishing meals.

iakonniá:tha' ne raonahsire'shón:'a.
she makes of this their blankets

Kaié:ri nihotiwí:raien'. Tseiá:ta ne ísi'
four that many they children have one child was far

nón niiako'nikonhratshá:ni, Katsi'tsaró:roks
there so was she brave Gathering flowers

iontátiats. Ne kwáh iakaon'éskwani kaniatarákta'
she was called the just she likes along the water

aióntien', tiótkon nia'té:kon ionnonhtonniónkwas
she would sit always many things she thinks about

ne karihwí:io's naontá:we' nakohwatsí:rakon.
the good things it would come to her family

Ia'akó:ta'we' se'kén nón:wa'. Akoserénhtakon
she fell asleep this time in her sleep

iakothón:te' rotíhthare'. Ia'eiéhtahkwe'.
she heard they were talking she awoke

Taionnitskó:ten'. Ken' na'é:iere' ken' rón:ne'
she sat up here so she did here they were walking

There were four children in this family. They had one daughter whose name was Gathering Flowers. She had an adventurous nature. She used to love to sit by the river bank and dream of pleasant things for her and her family. One day she fell asleep on the river bank. She awoke to strange voices. Sitting up, she saw

iakotineniόia'ks,	ken'k	nihón:na's	iatathróna'
they throw stones	little	so they were tiny	they are married

tánon'	áhsen	nihotiwí:raien',	kwáh	se'kén
and	three	that many they have children	even	as well

kí:ken	owirá:'a	kahronhserá:ke	roia'tanentá:kon.
this	baby	papoose board	he is stuck to

Katsi'tsaró:roks	o'nisténha	iotká:te'	ronwati-
Gathering Flowers	her mother	often	she tells

karatón:nis	ne	ronwatiien'okón:'a,	ne	iakoti-
them stories	the	her children	the	they

nenióia'ks.	"Tóhsa'	ietshitshá:ni'k,	ietshihthárhas
throw stones	do not	be afraid of them	talk to them

tóhsa'	teietsheia'teriahtíkhon	enietshiaterá:shon'."
do not	be mean to them	they will bring you good luck

Ne	kati'	wa'akehiá:ra'ne'	tsi	nahó:ten'
this	then	she remembered	as	what

iaká:wen	o'nisténha.	Iáh	ki'	tetiakoton'nékon'.
she said	her mother	not	just	was she frightened

a family of little people, a little man, his tiny wife, and three wee children; the baby was on a wee little papoose board. Gathering Flowers' mother had often told the children stories about the little people and said, "If you ever see them, don't be frightened. Talk to them, be nice to them, and they will bring you luck." She remembered this when she saw the little

Iahonwatihthárhahse' wa'í:ron', "Ká:ts kén
she spoke to them she said come here

sewátien' tánon' sewatoríshen. Sewatonhkária'ks
all sit and all of you rest you are all hungry

kén? Kana'tarokhón:we tánon' sewahió:wane'
? real bread and large fruit

wátien'. Kóh ísewak," tánon' wahonwatihné:kanonte'
I have here all eat and she gave them a drink

ohné:kanos. Wa'í:ron', "Ka' nón nisewén:teron'?"
water she said what place do all of you live

Wahní:ron' ne iatathróna', "A'é:ren
they said the they are married away over there

onontohará:ke." Wahshakotihón:karon' aienatá:ra'
on the hill they invited her she would visit

tsi nón thatí:teron'. Wa'onthón:tate'.
at where they live she agreed

Sahón:ne' tsi sahonhten:ti', iahón:newe'
they went back to they went home they arrived there

people, so she was not too alarmed.

She spoke to them, asking them to sit down and rest for awhile. She had a piece of corn bread and apples which she offered to her new found friends. She also gave them some cool water to drink. Gathering Flowers asked the little family where they lived, and they told her they lived yonder on a hill. They invited

tsi tkentstén:rote' kí:ken iakonenióia'ks
at there stands a rock this one throws stones

rahsnonhsá:ke wahonitskerón:ti' tánon'
on his hands he spit and

kentstenhrá:ke waharánie'. Thontaiawénhstsi'
on the rock he rubbed all of a sudden

kén' ní:wa' tsi wa'tewateronhwén:tate'.
bit a little it opened a crack

Ionsahontáweia'te' raotinónhskon ne raohwá:tsire'.
they went back in in their house the his family

Wa'í:ron', "Iáh tháonton' iakatáweia'te'
she said not is it possible for me to enter

sótsi' kén' niwá:'a tsi iontaweia'táhkhwa'."
too small so is it where one uses it for entering

"Tó:ske' wáhi'," wahén:ron' ne iakonenióia'ks.
true eh he said the one throws stones

"Sonke'nikónhrhen tsi skowá:nen ní:se'."
my mind put down that you are big you

her to visit their home. She accepted their invitation and went along with them.

They came to a small rock and the little man spit on his hands and rubbed the rock with them. Suddenly the rock split open and his little family went through it into their home.

"I can't get through the tiny opening," said Gathering Flowers.

"Oh yes," said the little man. "I forgot about

Akohén:ton	wa'thá:ta'ne'	tánon'	rahsnonhsá:ke
in front of her	he stood up	and	on his hands

wahonitskerón:ti',	ienontsí:ne	wahaié:na'.
he spit	on her head	he held

Thontaiawénhstsi'	wa'ónhstho'ne'	tsi	niió:re'
all of a sudden	she got smaller	as	so it is far

tho	ok	nitsá:ka'	tsi	ni	ne	ronátia'ke
there	so	she was small	as	the	the	the others

O:nen	ón:ton'	ia'ontáweia'te'.
now	she was able	she went in

Kí:ken	raotinónhskon	ken'k	ní:wa'
this	in their house	very	it is small

atekhwá:ra,	ani'tskwá:ra,	kanakta'shón:'a
food is put	seat is put	places

kaké:ron',	tánon'	karíhstote'	é'	thó
it is laid out	and	standing iron	that	there

you being bigger than we are."

He went over to her, spit on his hands, and rubbed her head. Suddenly she could feel herself getting smaller and smaller till finally she was the same size as the little people and was able to get through the tiny opening in the rock.

Inside the home was a tiny table and chairs, beds and a stove with a pot of soup on it. Gathering Flowers was invited to sit down and have some soup with

kana'tsáhere'	karihstá:ke	onón:tara'.
pot	on the iron	soup

Wa'ontathón:karon'	Katsi'tsaró:roks	tahón:tonte'.
they invited her	Gathering Flowers	they would eat

Wa'enontararónnion'	ne	iakón:kwe	iakorákwen,
she served the soup	the	woman	she was serving

iakorákwen,	tánon'	iáh	tetewaterákwas
she was serving	and	not	was it emptying

nonón:tara'.	Iotena'tsátkon'.
the soup	magic pot

O:nen	ia'káhewe'	ne	Katsi'tsaró:roks
now	there it carried	the	Gathering Flowers

naonsaionhtén:ti',	e'	thó	ionsaiontó:roke'	tsi
she should go home	that	there	she slipped in	where

teionitstenhrakháhsion.	Khé'	thó	roia'ten'tón:ne
rock had separated in two	right	there	he was behind her

ne	rón:kwe	kén'	nihrá:'a,	sahonitskerón:ti'
the	man	small	so he was	again he spit

them. The little mother kept taking soup out of the pot, but no matter how much she took from the pot, it remained full, as if it were a magic pot, which truly it was.

When it came time for Gathering Flowers to go home, she went through the narrow opening in the rock, the little man following her. He spit on his hands,

rahsnonhsá:ke	tánon'	ienontsí:ne	iahaié:na'.
on his hands	and	on her head	he touched

Thontaiawénhstsi'	saiontehiá:ron'	tsi	nitiá:kahskwe'.
All of a sudden	she grew back	to	her regular size

Wahén:ron'	ne	iakonenióia'ks,	"Enhske-
he said	the	one throws stones	you will

rharátsten'	tsi	iáh	ónhka'	thahsehró:ri'
promise me	that	not	anyone	will you tell

tsi	wahskwá:ken',	tánon'	tsi	wahskwátho'
that	you saw us	and	that	you saw

tsi	nón	iakwén:teron'."	E:so'	shé:kon
that	place	we inhabit	much	again

saienatá:ra'	tsi	niwakénnhes.
she went back to visit	as	the summer was long

Kanenna'ké:ne'	ón:we',	ia'káhewe'	ne
Autumn	it came	there it carried	the

Katsi'tsaró:roks	tánon'	akohwá:tsire'
Gathering Flowers	and	her family

touched her head, and suddenly she grew back to her proper size. The little man made her promise not to tell a soul that she had seen or visited them. She came to visit them almost every day.

Autumn came, and it was time for Gathering Flowers and her family to move on to a new hunting

iaonsahonhtén:ti' tsi nón thatoratstáhkhwa'
they would move that place he uses it to hunt

ronwa'níha. Saienatá:ra' shé:kon nohna'kénhkha'
her father she went to visit again for the last time

tonsahonwatinonhwehrá:ton' nakoteró:sera'.
she would say good-bye to them her friends

Kí:ken iakotinenióia'ks wahatkáhtho' tsi
this they throw stones he saw that

tiakorihwaié:ri'. Wahén:ron', "Ne tsi seksa'tí:io
her matter was right he said because you are a good child

tánon' iáh tesathró:ri tsi wahskwá:ken', ne
and not have you told that you saw us the

káti' enkón:ion' áhsen niwaskanektsherá:ke."
why I will give you three wishes

Ne kí:ken tiotierénhton wa'erá:ko',
the this first one she chose

"Kaská:neks ne iotena'tsátkon' ne onón:tara',
I wish for the magic pot the soup

area. She went to visit her friends for the last time to say good-bye.

The little man saw that she was a good person and said, "Because you have been so nice to us and kept our secret, I will give you three wishes."

Her first wish was to have a magic soup pot so

né:ne	akhwá:tsire'	tóhsa'	nowén:ton	aiakwa-
which	my family	not	ever	could

tonhkária'ke',	tánon'	ónhka'	iakotohetstonhátie'
they hunger	and	anyone	one passing by

aiakhinontará:nonte'.	Tekeníhaton',	kaská:neks
we would give them soup	second one	I wish for

ne	o'nikón:ra'	ne	tóhsa'	nowén:ton	ónhka'
the	thought	the	not to	ever	anyone

akhe'nikonhráksa'te'	ne	akarihón:ni'	tsi
would I cause their thoughts to be bad	the	would the reason be	that

nahó:ten'	tkewenníneken's.	Ahsénhaton',	kaská:neks
what	words I bring out	third one	I wish for

akwé:kon	nón:kwe	enkhé:ken'	ne	tiók	nahó:ten'
all	people	I will see them	the	some	thing

akatkáhtho'	ne	ioiánere'	tóhsa'	akherihwa'tshén-
would I see	the	it is good	not to	would I find

nia'se'."
faults with them

Wahén:ron'	ne	iakotinenióia'ks,	"Akwé
he said	the	they throw stones	All

she and her family would never be hungry and that she might share the soup with any strangers who might come their way. Her second wish was to have the wisdom not

ioiá́nere' nahó:ten' wahserá:ko'. Tsi nén:we'
it is good what you chose to ever

enhsónnheke' tsi enhsatonnhá:rake', tánon'
you will live that you will be happy and

ensatera'swiióhake'."
your luck will be good

to hurt anyone with words that came out of her mouth. Her third wish was to be able to see something good in everyone she met and not to be critical.

The little man said, "You have made very wise choices. You shall be happy for the rest of your life."

Warisó:se Kaieríthon

Josephine Horne

TSI TETKAHNHOHONTION
At the Open Door

Wahón:nise'	iá:ken',	atsa:kta'	ákta'
long ago	they say	near the river	near

tkanonhsó:tahkwe'	é'	thó	rati'terón:tahkwe'
there a house used to stand		there	they used to live

iatathróna'	tánon'	ne	ronwatiio'okón:'a
they are married	and	the	their children

tánon'	akokstén:ha.
and	she is old

O:nen	iá:ken'	kí:ken	sewahsón:ta
now	they say	this	one night

iahniiá:ken'ne'	ne	iatathróna',	wahiaterenna-
they two went out	the	they are married	they went to

iénhna'.	Akokstén:ha	wa'ontenón:na'.	O:nen	ki'
church	she is old	she watched	now	just

kwáh	kén'	shikahá:wi'	tahontáhsawen'	ne
some	bit	as it carries	they started	the

It has been told that long ago in a house near the river lived a couple, their children, and an old woman. One night, when the couple went out to church, they left the old woman to tend to the children. After some time of playing, the children became noisier and

ratiksa'okó̈n:'a	wa'thonterien'takáriahte'.
children	they made noise

Ronatsharokwáhton	ki'	ná:'a	tánon'	ieshonateri:io,
they were roaring	I suppose		and	they were even fighting

ronatswá:ton	tánon'	ratitakhenóntie's.	Khåre'
they fooled around	and	they ran around	Finally

ó:nen	wa'akononniá:ni'	nakokstén:ha.	Wa'aí:ron',
now	she could not bear it	the she is old	she said

"Tha'tesewató:tat.	Tóka'	iáhten	akón:wara'
you all keep quiet	maybe	not	O Face

ientsisewaia'ténhawe'."
he will take your body away

Iáh	ki'	thé:nen'	tehonatahonhsatá:ton.
not	even	anything	did they prick their ears

Khåre'	ó:nen	thontaiawénhstsi'	tahonwaniá:ra'	ne
finally	now	all of a sudden	she grabbed him by the scruff of the neck	the

shaiá:ta	ratákhe'	ieia'tákta'	shihotohetstonhátie'.
one boy	he runs	near her body	as he was passing

noisier. They shouted, fooling around and running all over the place. After repeated warnings to quiet down, the children, of course, kept running around.

The old woman, losing patience, grabbed the first

Sok	wa'tiakonhohón:ti'	tha'akón:ni'	iahonwaia'tón:ti'
then	she opened the door	she made as	she threw his body out

átste .	Nek	tsi	tsók nahó:ten'	awenhsá:takon
outside	but		something	in the fog (darkness)

tahoié:na'	tánon'	iahoia'ténhawe'.	Iáh	ne
it grabbed him	and	it carried his body away	not	

wén:ton	teshonwaia'tatshénrion	ne	raksá:'a.
ever	was his body found again	the	boy

one running past, which happened to be the littlest one, she jerked open the door and pretending to throw him out into the darkness, she yelled,

"Here, O Face, take him!"

And with a gush of wind the child disappeared into the fog, as if grabbed by an unseen force. He was never seen again.

Konwatsi'tsaién:ni

Rita Phillips

KANA'TAROKHON:WE
The Corn Bread

Nia'té:kon	ne	ó:nenhste'	tsi	ní	tsi
many	the	corn	as	it	is

iakoia'takéhnhen	nokwehón:we,	iakoia'tahní:rats
it helps them	the real people	it makes their bodies strong

tsi	niióhseres.	Kí:ken	oká:ra'	ne	tsi
at	so the year is long	this	story	is	how

niieiérhahkwe'	aksótha	nó:nen	enienenhstóhare'
so she used to do	my grand-mother	when	she will wash corn

tánon'	eniethe'serón:ni'	ohén:ton'	tsi	niió:re'
and	she will make flour	before	to	so it is far

kana'tarokhón:we	eniena'tarísa'.	Khwató:ken	tsi
real bread	she will finish bread	still	so

ní	tsi	roné:ka's	nón:wa'	tahonatehiaróntie'.
this	as	they like	now	those growing up now

Kenkwité'stsi'	aksótha	eniahé:ron',	ó:nen
in early spring	Grandma	she will say	now

The corn had many missions for the Indians; it sustained them throughout the year. This is a story about my paternal grandmother and how she prepared the dry kernels of corn into flour and finally the end product, the corn bread.

ieióhe	ahati'tarakarhátho'.	Akwé	tenhon'kenhrakwátho'.
time	for them to plow	all	they will turn soil

ìenietáhko'	kahnenhshón:'a,	káksakon	eniakéta'
she will take out	seeds	in a dish	she will put in

tánon'	entionkhí:ion'	raktsí:'a	khe'kén:'a
and	she will give us	my older brother	my younger sister

tánon'	í:'i,	enionkhihró:ri',	"Kaié:ri	tóka-
and	me	she will tell us	four	maybe

ni'	wísk	nikanénhstake	iensewá:senhte'	áhsen
	five	kernels	you will cause to fall	three

niwahsí:take	na'tekónteron'."	E'	thó	ki'
feet number	they are apart	that	there	is what

na'kwá:iere'.	Wakwahahoktaníhon',	raksótha	tánon'
we did so	we did row upon row	my grandfather	and

aksótha	ohná:ken'	tá:ne'	tahoti'rhoronhátie'	tsi
my grandmother	behind	they come	they are covering	to

niió:re'	eniakwáhsa'.	Tsahiá:kshera	sok	ná:'a
it is far	we will finish	one it crosses		already

When spring came, every member of the family had a chore to do. We enjoyed working together. Grandma would have Father and my uncle plough the ground. They used a team of horses and a plough to get the ground ready for planting. Grandma would then carefully get out her seed corn, put it in a container, and hand it to my brother, sisters, and me. She would instruct us to drop four or five kernels every three feet. We did this, row upon row, with Grandma and Grandpa coming

eniotikó:tohte'	kén'	nikanerahtó:son's	tenkonta'ken-
they will arrive	just	so wee leaves	they will

hrótka'we'.	E:so'	tenkonwatíhsnie'ne'	kháre'
come through the ground	lots	they will be cared for	until

ó:nen	enkontehiá:ron'	kwáh	skenén:'a	tsi
now	they will grow	just	slowly	as

enwatenenhstísa'.
it will mature

Nó:nen	kanenna'kó:ne	én:wawe'	enhén:ron'
when	autumn	it will arrive	he will say

raksótha,	ó:nen	iehióhe	naienenhstaienthó:ko'.
my grand-father	now	it is time	one will unplant the corn

Akwé	tsi	tkanenhstaiénthon	ieniákwe'	tánon'
all	to	where the corn is planted	we will go	and

ieniakwahróhtenhte'.	E'	thó	né'	ó:nen
we will take off ears	then			now

behind us with a hoe in their hands, covering the kernels of corn with the rich soil. In about a week's time we would see the tiny green blades come through the ground. After much care and nurturing they grew tall and stately and slowly matured with big ears of corn.

When autumn came, it was time to harvest the corn. We all went into the corn field to take the corn from

eniakwanoróhthsi'.	Iáh	akwé	thaiakwanoróhthsi'
we will take off the husks	not	all	would we take the husks off

kwáh	nek	tsi	niió:re'	iotenénhstate'.	O:nen
just	only	to	so it is far	the end of the corn	now

ki' nen'	né:'e	enwá:ton'	aksótha	tánon'
supposedly	that	it will be done	my grandmother	and

raksótha	enhniratskentón:ni',	a'é:ren	nikaronhkwáhses
my grandfather	they two will make a braid	way over there	so the chain is long

tóka'	tekeniiawén:re'	tókani'	wisk-iawén:re'
maybe	twelve	maybe	fifteen

nikanonhkwén:take	enhnihá:ren'	naonstáthen'.	Nó:nen
so ears number	they will hang them	for them to dry	when

akwé	iostáthen	nó:nenhste'	sók	nón:wa'
all	it is dry	the corn	then	now

entsakwanenhstaron:ko'.
we will take the corn off the cob

the stalks. We then husked the corn and left the husks at the base of the corn cob. We left the husks on for a purpose. Grandma, Grandpa, and my aunts would take the husks with the ears of corn and braid them into a long string, twelve to fifteen ears in each braid, then hang them up to dry. When the kernels were completely dry, it was time to take them off the cobs.

O:nen	enwá:ton'	enienenhstóhare'.	Kén'
now	it is possible	she will wash the corn	here

niieiêrha'	tsi	ienenhstóhares,	enion'kenhrontá:ko'
how she does it	that	she washes the corn	she will take out ashes

karîstakon	o'kên:ra'	né:ne	ioté:ken'	wâhta'.
in iron	ashes	like	it burned	hard maple

Eniena'tsâ:ren'	karistâ:ke	ne	ohnê:kanos	tânon'
she will put a pot on	on the iron	the	water	and

wa'kenhrontâkwen.	O:nen	tentiohnekón:ti'	ienienenhstá-
ashes taken from the stove	now	it will come to a boil	she will pour corn

weron'	teniohnekôn:ti'	tsi	niiô:re'	nó:nenhste'
into	it will boil	to	so it is far	the corn

enkontia'tawi'tahsiôn:ko'.	Thô	ne'	ó:nen
they will take off their coats	then		now

eniehrâ:ko'	karistâ:ke,	tsi	kahionwatâtie'
she will take away	on iron	to	flowing creek

The next step was cleaning and bleaching the kernels. This was done with ashes from the wood stove. It had to be ashes that were burned from hard maple trees. Grandma would put a measured amount of ashes and water into a large enamel cooking pot, bring it to a boil, then pour the corn into the boiling ash solution, then continue boiling it until the chaff and the tiny black hearts in each kernel were loosened. She would

ieniéhawe'	e' thó	ienienenhstóhare'.	Raksótha
she will take it	there	she will clean the corn	my grandfather

rona'tsakahrón:ton'	e' thó	ienión:weron'	sok
he has made holes in the pail	there	she will pour	then

awén:ke	ieniá:kohwe'	kwáh	skenén:'a
in water	she will put into to	just	slowly

teniehkarhateníhon'	ia'otiiaken'enhátie'	ne
she turns back and forth	it is going out	the

kahnekáksen.	Wakon'éskwani	séns	akheiateró:roke'
bad water	I used to like	then	I would watch her

tekka:nere'	iorihwanerá:kwa	tsi	niió:re'	tsi
I am seeing	it is miraculous	at	so it is far	to

ontenenhstóhare'	kwáh	otsí:nekwar	neniá:wen'ne'.
corn got so clean	just	yellow	it happened

Akwé	ne	konnón:kwe	séns	kahiónwakon
all	the	women	used to	in the creek

then take it off the wood stove, take it outside, and pour it into a galvanized pail with holes all over the sides and bottom. Most of the ash solution ran out so that only what was clinging to the corn in the pail remained to be cleaned. She then took the corn to the creek to wash away whatever was left on it. This was accomplished by putting the pail with the corn into the flowing creek and swishing it around until the fresh water flushed out the ash solution. I used to love to watch the corn turn clean and yellow before my eyes.

iekontinenhstóhares. Ne thó nón shontakahá:wi'
they washed corn at that place as it carried

iáh ónhka' teiakoiéntahkwe' ohné:kanos ne
not anyone did they have water the

kanónhskon. Nó:nen wa'enenhstoharéhsi' sók
in house the now she finished washing the corn then

nón:wa' entsestátha'te'. Nó:nen kwah tokén:'en
next she will dry the now just thoroughly

enwastáthen' tsi ní ne óhstien', Ó:nen enwá:ton'
it will dry so it the bone now it can

naiethe'serón:ni'.
one would make flour

Raksótha shahahní:non' ne kathe'serón:ni'
my grandfather when he bought the it makes flour

tiotáhsawe' iakwaksa'okón:'a onkwaio'ténhsera'
it started we children our work

Most of the women took the corn to the creek for cleaning because we did not have indoor plumbing in those days; we had to draw water from the well. Then it was time to dry the corn. When the corn was dry as a bone, it was time to grind it into flour.

Up until the time we got a corn grinder, they used to have to pound the corn into flour. Now that we had the grinder it became the children's chore to grind the corn. The grinder was mounted on a very

ón:ton'   naiakwathe'serón:ni'.   Kí:ken   kathe'serón:nis
it   we would make flour   this   it makes flour
became

ká:tens   oshón:kare'   é'   thó   iora'nentá:kon
thick   board   there   it is stuck to

tánon'   iokahkwén:tonte'.   Ieniakwanenstáweron'
and   a wheel hanging   we would pour corn in

sók   teniakwatenníha'te'   teniakwakarhaté:ni'   ne'
then   we will take turns   we will turn the wheel   the

okahkwén:ta',   ná:kon   tkaksó:ron   é'   thó
wheel   under   pan is placed   there

ieiohná:ote'   othé:sera'   tsi   niió:re'
it pours into   flour   till   so it is far

eniakwáhsa'.
we finish

O:nen   kathe'seríson',   ó:nen   enwá:ton'
now   flour is ready   now   it will be possible

eniena'tarón:ni'.   Kén   niieiérha'.   Othé:sera',
she will make bread   here   so she does it   flour

strong, thick board with a large wheel attached to it. We put the corn into the feeder at the top and the flour flowed at the bottom to be caught in a large pan beneath the grinder. We took turns turning the wheel until we finished the amount that was portioned out to us to grind.

It was now ready for the end product. Grandma would take this flour, mix it with some cooked kidney

onekwénhtara'	nikasahe'tó:ten,	tánon'	ostón:ha
red	type of beans	and	a little

tiohió:tsis,	káksakon	eniakéta',	teiohnekóntie's
salt	in a bowl	she will put in	boiling water

entiónweron',	sok	tenionwénrie'	tsi	niió:re'
she will pour	then	she will stir	till	so it is far

tenkontatié:na'.	Ohnekanóhsne	ia'tenionnihsnónhsohwe'.
they have all blended together	in the water	she will put her hands

Eniontokwatsherótsenhte'	iehsnonhsá:ke	enié:ren'
she will dip a spoon into for some	on her hands	she will put

tenietakwénhtenhste'	tánon'	teniehwe'nón:ni,
she will flatten	and	she will shape into a round

tetiohnekóntie's	ieniakéta'.	Nó:nen	enwatá:kerahwe',
boiling water	she will put into	when	it will come to the surface

né	kén:ton'	tsi	ó:nen	wa'ká:ri'.	Ie'wahrakeri'táhstha'
that	it means	that	now	it is cooked	one uses meat to fry

beans, and a bit of salt, and pour boiling water into the ingredients and stir it until blended. She would then dip her hands into cold water, spoon some of the batter into her hands, and shape the hot batter into round, thick, flat, shaped corn bread. She put it into boiling water, and when it came to the surface it was cooked. She served it with steak or venison and gravy

tókani'	oskenón:ton	enié:rihte'	ne	teniakwa-
or perhaps	venison	she will fry	the	we shall

tatiéhsten'	ne	kana'tarokhón:we	tánon'	kén:ie
combine with	the	real bread	and	grease

entionkwá:ti'	iawékon'.
we will pour	it tastes good

Ne	sha'kanénhsta	iakwátstha'	nó:nen
the	same type corn	we use	the now

eniakwatkâtston'	onénhsto.	Iáh	thé:nen'	tekaiésha's
we make soup	corn soup	not	anything	goes to waste

nó:nen	kanenhstaienthôkwen.	Kî:ken	onô:ra'
when	the corn has been unplanted	this	husks

kaiarowá:nen	ronnêta'skwe',	ratiksa'okôn:'a	thó
large bag	they used to put into	the children	there

rôn:ratskwe',	tânon'	sêns	ratiratsken'tôn:nis
they used to lay on	and	also	they used to braid

kéntskare'	ionrahsi'tokewâhtha'.	Kaia'tôn:ni	ô:ni'
rug	he would wipe his feet on	made body	also

over the corn bread. Corn soup is made from the same type of corn. The corn bread and corn soup are still in great demand, to this generation.

Nothing went to waste in those days; the husks

rononniá:thahkwe'.	Shé:kon	nón:wa'	skehiá:ra's
they used to make	still	now	I remember

akwé	tsi	niiakwahwatsí:ra'	kató:ken	nahó:ten'
all	the	of my family	certain	what

ionkwaio'tensherá:ien'.	Ion'we:sen' she's	ne' skathne	tsi
we had jobs	it used to be pleasant	together	that

ionkwaió'te'.
we were working

were used to stuff mattresses for the children's beds, and scatter mats were made by braiding the husks and sewing them together. They made excellent mats for wiping muddy feet on. The husks were also used to make cornhusk dolls. I still remember how pleasant it was when the whole family worked together.

Warisó:se Kaieríthon

Josephine Horne

AHTHEN:NO
The Lacrosse Ball

Wahón:nise's	iá:ken'	tehonhthénnokskwe'
long ago	it is said	they played

tewa'á:raton.	Thihonaterien'tatshénrion'	tsi
Lacrosse	they invent a way	to

ronahthenno'tsherón:ni.	Ne	sé's	iá:ken'	thi
they make balls	that	then	it is said	there

tsikónhses	kéntson	enkonwaié:na'	tánon'
the long faced one	fish	they will catch her	and

enkonwania'tó:'ase'.	Ohén:ton'	tsi	niió:re'
they will slit her throat	before	as	so it is far

tenhatí:rihte'	ka'nionhsákta'	nón:we	nenhatikwé:taren'
they will break it up	near the nose	the place	where they will cut

kwáh	sé's	iá:ken'	né:ne	aiohnatirónhthake'
just	then	it is said	this	it would be like rubber

kwáh	sé's	iá:ken'	ó:ni'	ostón:ha
just	then	it is said	also	a little

A long time ago they used to play Lacrosse. They had to invent a way to make a ball. To do this, they would first catch a sturgeon and slit its throat. Near the nose, there is a place which is just like rubber,

teiothwe'nón:ni ne eh nón:we. Ne ki' iá:ken'
it is round the there place the just it is said

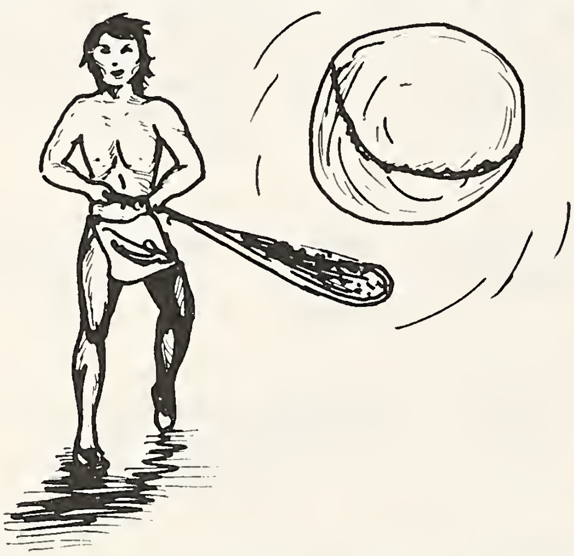
enhatikwé:taren'. Ne énhontste' ne enhonhthenno'-
they will cut the they will use the they will use

tsherón:nia'te'. Tho niió:re' ó:nen onia'tará:'a
it to make their ball there so it is far now cloth

tenhatihwawén:'eke'. Thók se's iá:ken' ní:iot
they will wrap it that then it is said so it is

tsi ká:ien' ne wahón:nise' ne ahonten'nikonhró-
that this the long ago the they would have

ria'te'. Ne se's kí iá:ken' róntstha' ne
fun the then this it is said they used the



wahón:nise' tsi
long ago to

tehonhthenno'-
they would ball

óksthahkwe'.
play with it

and sort of round. This is where they would cut to make their ball. Then they would wrap this with a cloth. That was the only kind of toy they had, long ago. They used it to play Lacrosse.

Orót́e' Karihwénhawe'

Sister Dorothy Ann Lazore

WAHSHAKOIA'TAKEHNHA' RAOHWA:TSIRE'
The Boy Who Went for Help

Ne'	thó	nón	shontakahá:wi'	shé:kon
at	this	time	as it carries	yet

í:non	sha'teionnonhsháteron'	wahotiténhta'ne'
far	so their houses were apart	they got poor

ne	onkwehón:we	ase'kén	ne'	tho	shiiohserá:te'
the	real people	because	in	there	as that year

iáh	é:so'	teiokennó:ron	sok	ná:'a	ki	iáhten'
not	much	did it rain	so	then	this	no

tehotihetiióhse'	nahonnonnhéhkwen'	ase'kén	akwé:kon
were crops good for them	for them to live on	because	all

ieiénthohskwe'.
they had planted

E' thó	nón	shontakahá:wi'	akokstén:ha
then	there	as it carries	she is old

At the time when the houses were still far apart, the Indians got very poor one year. There was no rain, so their crops were very bad, and they had little to live on that year.

It was at this time that an old woman who lived

ié:teron' iakothón:te' ónhka'k tiehnhonhtíshons.
she lives she heard someone one is knocking

Ia'ontke'tó:ten', e' thó raksá:'a íthrate'.
she looked out there boy he stands

Wahonwahnhohtónkwahse' aontahatáweia'te' wa'í:ron',
she opened the door for him for him to enter she said

"Takí:tenr na'teiawenhniseranón:iani
mercy on me it is such a horrible day

tánon' saiakenhátie', serihsión:ko ne
and you are out you take them off the

sawenhshón:'a tánon' tstátha't."
your things and you dry them

Tahén:ron' ne raksá:'a, "Iáh tháon:ton'
he said back the boy not is it possible

ase'kén tewaksteríhens iaonsá:kewe', istén:'a
because I am in a hurry I would return there my mother

ionkehnha'onhátie'. Ahsathón:tate' ken aonsétene'
she is sending me would you be willing ? we two would go back

alone heard someone knocking on her door. When she looked out she saw a little boy standing out there. She opened the door for him to enter, and said,

"Mercy, it is such a horrible day for you to be out! Take your clothes off and dry them."

The boy replied, "It's impossible because I am in a great hurry to return home. My mother sent me

ase'kén	ratikwé:kon	thotinonhwáktani'	ne
because	all of them	they are sick there	the

onkwanónhskon.	Teiako'nikónhrhare'	ne	istén:'a
in our home	she is worried	the	my mother

ase'kén	iáh	ó:nen	tetsonkwatennatsherá:ien'
because	no	now	do we have any more to eat

iáh	ó:ni'	tetsonkwanonhkwatsherá:ien'	tánon'
not	also	do we have any medicine	and

é:so'	tsi	iakononhwáktani'	ne	istén:'a.
much	that	she is sick	the	my mother

Wa'í:ron'	tóka'	ostón:ha	aesanonhkwatsheraién:take'
she said	maybe	a few	you would have medicines

tánon'	aesakhwaién:take'	ahshé:ni'	aiontshennón:ni'."
and	you would have food	you would lend her	she would be happy

Wa'í:ron'	ne akokstén:ha,	"A:ke	oh
she said	the she is old	O	how

néntiere'	ne	iá:kewe',	na'teiohahahnón:niani
will I do it	the	I can get there	the road is so bad

to ask you to please come back with me because all our family is sick. My mother is very worried because we do not have any more food and we are also short of medicine. My mother is very sick. She asked whether you would have any food and medicine to lend her. It would make her very happy."

The old woman said, "My! How can I ever get there; the roads are full of snow, and I shall get out of breath in such a bad storm."

enkatonrió:kten'	tsi	na'teionien'kwatá:se."
I shall get out of breath	so	the storm is bad

Tahén:ron'	ne	raksá:'a,	"I:'i
he said back	the	boy	I

enkonia'thahónnien'."
I shall make a path for your body

Thó	ne	wa'ontatkwatá:ko'	tánon'	sahonwá-
then	the	she got herself ready	and	she followed

hsere'	ne	raksá:'a.	Wa'akonehrá:ko'	tsi
him back	the	boy	she was surprised	how

niwatié:sen'	tsi	ní	tsi	í:ien'	wa'ónttoke'
easy it was	so	it	is	she walks	she noticed

tsi	akwáh	né:ne	t^{e}kaniehtohtárhon	tsi	nón:we
that	just	is was	the snow had been removed	at	the place

ní:ien'.
she is walking

The boy replied, "I shall make a path for you."

The old woman then got ready to follow the boy. She was surprised at how easy it was for her to walk. She noticed that it was as if the snow had been removed from her path.

Iahá:newe' tsi nón thotinónhsote' ne
they got there to where their house stood the

raksá:'a, ia'ehnhohtíshon' ro'nisténha taiehnhohtón:-
boy she knocked on the door his mother she opened the

ko' wa'í:ron', "A:ke tasatáweia't, niwenhniseráksen
door she said O you come in what a bad day

saiakenhátie'."
you are out

Taiaí:ron' ne akokstén:ha, "Ehthién:'a
she said back the she is old your son

kwi' ietsehnhá:'on ahakihnónksha'."
but you sent him he would get me

Wa'í:ron' ne ro'nisténha "Iáh ónhka'
she said the his mother not anyone

tiekhehnhá:'on ase'kén akwé:kon é:so' tsi
I have sent because all much that

When they arrived at the child's home, and she knocked on the door, the boy's mother opened it for her, saying, "My! Come on in; what a bad day for you to be out."

The old woman replied, "But you sent your son to get me."

The mother said, "I have sent no one because we are all very sick. Three days ago we buried

iontkwanonhwáktani'. Ahsen nón:ta' tsi náhe'
we are sick three days so ago

wahshakwaia'táta' ne Ohserá:se'."
we buried his body the New Year

Wa'í:ron' ne akokstén:ha, "Oh káti'
she said the she is old how is it

na'á:wen tsi né:'e rakihnonksónhne'?"
it happens that that one he came to get me

my son New Year."
The old woman said, "But how can that be, for he is the one who came to get me to help you."

Rake'níha rakkaratón:ni
my father he has told me

Niioronhiá:'a

Mae Montour

SE'NIKON:RARAK
Watch Out

Tóhka'	niiohserá:ke	tsi	náhe'	éh
several	so years number	so	it goes	thus

nikiawén:'en	kí:ken	kkaratón:ne'.
so it happened	this	I am going to relate

Ake'nisténha	ó:nen	kwáh	kén'	náhe'
my mother	now	just	a bit	ago

ionkkaratón:ni.	Kanátthen	ne	tsi	kaná:taien'
she has told me	uptown	the	at	town lies

ia'teiakohahahiia'konhákie'.	Tha'kaké:ro'k	iá:ken'
there she was crossing the street	suddenly	it seems

ísi'	na'oháhati	iakothón:te'	ónhka'k	khe
over there	across the street	she heard	someone	just

thontahohén:rehte',
he yelled right at her

"Se'nikón:rarak	wáts	ensákwahte'	thí
set your mind	later	it will get you	that

What I am going to relate took place several years ago.

My mother told me that a while ago, she was crossing the street in downtown Cornwall. All of a sudden, she heard someone yell from across the street,

ká:sere ."	Tánon'	iá:ken'	tontahohahahiia'konhákie'.
it drags	and	it seems	he was coming across the road

Tsi	wa'thiátera'ne'	ne	ake'nisténha	wa'é:ron',
as	they two met	the	my mother	she said

"Iáh	ki'	ne	ónhte'	thé	thaesewatkarón:ni."
not	even	the	at all	not	would it be a loss to you

O:nen	iá:ken'	kwáh	kén'	niió:re'	sá:re'
now	it seems	just	a bit	so it is far	he was walking again

tontahohén:rehte'	iá:ken'	ahén:ron',	"Ká:sere
he yelled back	it seems	he said	it drags

kí'	wáhe'	enkarihwén:ta'ne'."
just	certain-ly	it will break to pieces

"Watch out for that car!"

The fellow who had issued the warning crossed the road, and as she met him, my mother replied, "If the car hit me, it would be no loss to you."

After he had walked on a bit, her protector turned and yelled back, "But the car would be demolished!"

Oróte' Karihwénhawe'

Sister Dorothy Ann Lazore

ATERO:SERA'
Friendship

Ne	iá:ken'	kí:ken	tehnón:kwe,	shaiá:ta
this	it is said	this	two men	one male body

Ahkwesahshró:non'	tánon'	shaiá:ta	Kahnawa'ke-
resident of the place of the partridge	and	one male body	resident of the place of

hró:non'	nes	ne	ronatén:ro'	nek	tsi
the fast water			they were friends	but	

teiotenonhianíhton	tsi	na'tehiatateriwhanonhwéhne'.
it exaggerates itself	that	so they devised themselves a matter

Tiótkon	ok	nahó:ten'	tiorihón:ni	tehonatkénnion.
always	some	thing	reason made	they compete

Tetsá:ron	rotinahskwaién:tahkwe'	érhar,
both	they animal owned	dog

tánon'	tiótkon	she's	ó:ni'	né:'e
and	both	then	also	it was

Once there were two very good, but competitive friends. One was from St. Regis, and the other was from Caughnawaga. Not a day went by that they did not have a friendly argument about one thing or another. Every little thing was an excuse to top one another.

They were both the proud possessors of dogs, and each thought that his dog was much smarter and stronger

tehotirihwatí:ronte',	ónhka'	raotshé:nen'	sénha'
they word pulled	who	his pet	more

ra'shátste'.	Kháre'	ó:nen	wahiaterí:io'	ne
he is strong	Sudden	then	they two fought	the

raotitshé:nen'	érhar.	Sok	wa'thní:ien',	kwáh
their two pets	dog	then	they laid down	even

wahnihwistá:ren'.	O:nen	ki	enkató:ken'ne'	ónhka'
they two put money on	now	this	it will show	who

raotshé:nen'	sénha'	ra'shátste'.
his pet	more	he is strong

Kwah	iá:ken'	nek	ne	wa'tewaniwharó:ko'
Just	it is said		the	fur came out

tsi	na'thiatátienhte'	ki	érhar.	Kwáh	iáh
so	they beat each other	these	dog	even	not

thé:nen'	tetió:ken'	ka'	niká:ien'	rotkwenionhátie'.
anything	there it was seen	which	it lies	he is winning

than the other. One day the dogs had a fight, as dogs are prone to do. The two men thought that this was a fine time to find out which dog was really stronger. Each man was sure his dog would win, so sure in fact, that they made quite a big wager.

The dogs went at it so ferociously that fur was flying in every direction, and they raised such a cloud of dust that it was impossible to see which animal was winning. When all the dust had finally settled, all

Khá́re'	ki'	ó:nen	ia'tonson'kenhraién:ta'ne'.
sudden	but	then	dirt lay back down there

Kwáh	iá:ken'	nek ne	otáhshon'	o'kenhrá:ke
just	it is said	only	tails	on dirt

skaké:ron'.	Oksa'k	ki'	á:re'	ne	ronatén:ro'
back they were laying	sudden		again	the	they are friends to each other

tonsahiatkén:ni'	ka'	niká:ien'	sénha'	í:ions
again they two competed	which	it lays	more	it is long

tiotatén:ron.
there it remains.

that was left lying on the ground were two tails. That should have ended the argument, but the two friends immediately measured to see which tail was longer.

A:nen Kaia'titáhke'

Annette Jacobs

RABAHBOT
The Bullheads

Tóhka'	niiohserá:ke	tsi	náhe'	sha'té:kon
several	so years number	so	it goes	eight

nikón:ti	rabahbót	wahentsiahní:non'	ki	rake'níha.
of them	bullheads	he bought fish	this	my father

Atsiá:kta'	iahshakó'teron'	tsi	nón:we
near the river	there he left them	at	the place

iáh	akwáh	tekiohnó:tes.
not	quite	is it deep

Tsiahiá:kshera	tó:wa'	entóhetste'	kí:ken
one week	maybe	it passed	this

rakenonhá:'a	eh	tahahrárho'.	Ronehrakó:'on
my uncle	there	he pulled up	he was surprised

iá:ken'	kí:ken	tsi	nikanahskwí:io's	kí:ken
it is said	this	that	so beautiful are the animals	these

kéntsion.	Tánon'	ki'	ne	sénha'	ieshonehrakó:'on
fish	and	all	the	more	he was surprised

tsi	kwáh	akwé:kon	skáthne	tsi	nón:we
that	even	all	together	at	the place

Several years ago my father bought eight small bullheads. He left them in a shallow pool in the river.

A week or so later my uncle pulled up to the dock and was amazed to see such beautiful fish. He was all

nikontí:teron'.	Ok	ó:ni'	iá:ken'	ná:'a	iahohrión:ti'
where they live	and	also	it is said	that	he threw in his fishline

akwé:kon	wahshakoié:na'	ki	rabahbót.	Sha'té:kon
all	he caught them	this	bullheads	eight

nikón:ti	wahó:nawe'.	Kwáh	iá:ken'	khé
of them	he caught	right there	it is said	there

saháhkete'	kí:ken	rakenonhá:'a	sahentsiahsheronniá:na'.
he turned back	this	my uncle	he went back to fix the fish

Ionsá:rawe'	ki'	óksa'k	wahentsiahsherón:ni'
he arrived home	just	right away	he fixed the fish

tánon'	wahentsiakerí:tahwe'.	Tsi	nahótsiarihse'
and	he fried the fish	as	his fish was fried

ki'	kí:ken	wahén:ron',	"To	ionkiatén:ro'
just	this	he said		to my friend

rinontsianontén:ra."
I bring fish for him to eat

the more surprised to see them all together in the same spot. He threw his fishline right in and caught all eight bullheads, then returned home to prepare the fish.

At home he cleaned and fried them and, when they were ready, he decided to take them over to his friend as a special treat.

My father was mighty pleased. They were really digging in when he asked his friend where he had found such beautiful fish.

"Why, right here," replied my uncle. "Early this morning I pulled up to your dock and threw my fish hook

Otsta'	iá:ken'	ne'	tsi	nontahatshennón:ni'
my gosh	it seems	that	so	he was happy

kí:ken	rake'níha.	O:nen	iá:ken'	tó:ske'	tsi
this	my father	now	it is said	really	that

rotikhwá:tèn'	wahori'wanón:tonhse'	ne	ronatén:ro',
they were digging in	he asked him	the	they are friends

"Ka'"	wahén:ron',	"nón:we	nontahsitsiénhawe'?"
where	he said	place	did you get the fish

Kí:ken	rakenonhá:'a	wahén:ron',
this	he is uncle to me	he said,

"Satsiá:kta'	orhon'kéhstsi	takhrárho'.	Tsi	ki'
near your river	early in the morning	I pulled up	at	just

nón:we	thí:ken	iah wi'	sótsi'	teiohnó:tes.	Thó
place	there	not so	too	is it deep	there

iahonkwahrión:ti'	wa'kahrióhkawine'.	Thó,"	wahén:ron',
I threw in my fish hook	I fished	there	he said

"ní:iot	tsi	kontí:teron'	tó:wa'	shí:ken	ónhka'k
the way	as	they are placed	as if		someone

éh	konwatí'teron'	rotenahskwarákwen."
there	he placed them	he kept them as pets

into the shallows. These fish were just waiting for me, as if someone had set them in there as pets."

Wa'thohén:rehte'	iá:ken'	kí:ken	rake'níha
he burst out laughing	it is said	this	my father

tánon'	wahoiéshon'.	"I:'i,"	wahén:ron',	thí:ken
and	he smiled	I	he said	that

akitshenen'ó:kon'.	Tsiahiá:kshera	tsi	náhe'	thó
my pet	one week		ago	there

tekhé'teron'	í:'i	wakatenahskwarákwen."
I placed	I	I kept them as pets

My father burst out laughing. "These were *my* pets," he said. "I just set them in there a week ago."

Oróte' Karihwénhawe'

Sister Dorothy Ann Lazore

RAKSÓTHA RAOKÁ:RA'

My Grandfather's Story

Wahón:nise', Ahkwesáhsne iá:ken' éh
Long ago at place of it is said there
partridge

nitiawén:'en kí:ken nahó:ten' kkaratón:ne'.
there it this what I am going to
happened tell

Akohserá:ke éh niiawén:'en.
winter in there so it happened

Árok shiiotohétston ne "seaway"
not yet then it passed the Seaway

kawehnó:ton' she's thi ná:kon nekwá, kén'
islands stood then that under place just

nikawehnonhkwá:sa's. Raksótha raowenhkénha'
so islands small he to me to him used to
grandfather belong

énska kén' nikawehnóhkwa'. Kanonhsó:tahkwe'
one small so island house stood

iá:ken', tekaronta'serónnion', tánon' thó she's
it is said log on top of log and there then

A long time ago, before the Seaway passed through the reserve of St. Regis, there were many little islands on the St. Lawrence River at the north end of the reserve. These little islands were privately owned and my grandfather was the owner of one tiny little island. It had a huge pine tree, a dock, and a little log cabin. This

nón:we   na'tehatí:ta'skwe'   ne   tehonatstekawhenhátie'.
place   so they used to stop the   they were travelling

Sewatié:ren   tóhka'   nón:ta',   sewatié:ren   nek   ne
sometimes   a few   days   sometimes   only

sewahsón:ta   enhonnón:wete'.
one night   they will sleep

Iatathróna'   iahá:newe'   o'karahsnéha',
they married   there they   evening in
to each other   arrived

iatonhkariá:khe'   tánon'   tehotihwihshenhé:ion.
they are hungry   and   they are tired

Oksa'k   ne   rón:kwe   wahatsenhón:ni',   tánon'   ne
Quickly   the   man   he made sparks   and   the

iakón:kwe   taiontáhsawen'   wa'ekhón:ni'.
woman   she started   she prepared food.

O:nen   ki'   shishonahtá:'on,   wá:rehre'   ne
then   just   when they were full he thought

rón:kwe   óksa'k   ki' ná:'a   ne'   ienharáthen',
man   quickly   I suppose   that   up he will climb

was mostly used by fishermen who wanted to stay a few days on the river or by travellers who wished to rest, sometimes just overnight, and sometimes for a few days.

One cold winter evening a travelling couple arrived at the island, weary and hungry. The man immediately started to make a fire and the lady began preparing some meat to cook. They enjoyed a quiet supper, and soon after, the man went upstairs to sleep.

enhotá:wha'.   Ok ne   iakón:kwe,   khé:ken   ne'
he will sleep   but the woman   instead   it is

tonsaiakohtárho'   niá:re'.   Kwáh   ki'   thí:ken
she cleaned up   meantime   Just then   that

kén'   nikarí:wes   ó:nen   tiok   nahó:ten'
small so matter   now   some   thing
       long

wa'akothón:te'ne'.   Wa'akorihwaióha'   oh   nekén' kwáh
she heard   she wondered   what   ever

nahó:ten',   sok   ia'eiá:ken'ne',   ia'tiontkahthonnióhnwe'.
 what   then out she went   she looked around

Iáh   ki'   thé:nen'   teiakotkáhthon.   Tontaiontáweia'te'.
not at all anything   did she see   she came back in

Sok   á:re'   saiakothón:te'ne',   kwáh   né:ne   tiók
Then   again she heard   as if   some

na'kaia'tó:ten' shitaiotská:honke'.   O:nen   se'kén
such kind of body as it would be   now   as well
                       eating

wa'ako'nikonhraién:ta'ne'   tsi   kanonhsohará:ke
she had her mind   at   on housetop

nontaiawenonhátie'. Skennen'ahsón:'a   tsi   ia'ierá:then',
it was coming   slowly   that up she climbed

The lady began cleaning up the supper dishes and was just about finished when she heard a strange sound. She was puzzled and stepped outside to see what it was. She couldn't see anything, so she came back into the house, and went back about her cleaning. Again, she heard this strange sound. It sounded like some animal was gnawing on something. Just about then she realized it was coming

thó iá:ken' ki "ráhskahn" tho'wahrá:kon ne
there it is said that rahskahn he was meat eating the

rone'kénha'. Kwáh iá:ken' khe na'tontaieiá:ten'ne'
her late husband just it is said she fell back down

tsi nikanekó:tes tsi niió:re' tsi wa'ako-
that so ladder is long that so it is far that she

teronhiénhten', sok wa'tionráhtate' wa'onté:ko'.
became scared then she ran she fled

Owisa'kéhson' nia'etákhe', shakóhsere' ne
on ice here and there she ran along he chasing her the

"ráhskahn." Kwáh ki, iá:ken', ó:nen thó:ha
Even it is said now almost

ahshakohóntera'ne' ó:nen wa'onhsá:kaienhte'.
would he catch her now she sounded her mouth

Kaná:takon niió:re' iahonathón:te'ne', sok
village in so it is far there they heard then

from upstairs. It was like someone had thrown a pail of ice water on her, the way the hairs on her neck stood up. She slowly climbed the ladder and when she peeked into the room, she saw a "raskahn" eating the flesh from her husband's body. She became so frightened at what she saw, that she fell back down the length of the ladder, picked herself up and started to run, slipping and sliding across the ice!

The "raskahn" was right behind her when she gave a loud yell. The shout was so loud that they heard it miles away in the little village. They immediately

tontahsahkonaterahtá:na'.
they came to meet her

Sahá́hkete' ki' ne "ráhskahn," kwáh
back he turned just the rahskahn just

iá:ken' nek ne wahén:ron',
it is said but this he said,

"Wesani'taní:tenre' tsi iáh tekonié:na."
S--- pitied you that not have I held you

left to rescue her, for when the people hear that particular kind of yell, they know that the person is in trouble. When they reached the lady, the "raskahn" just turned back, shrugged his bony shoulders and sinisterly said, "You're darn lucky I didn't catch you."

A:nen Kaia'titáhkhe'

Annette Jacobs

OTHE:SERA
The Powder.

Kí:ken	kkaratón:ne'	rakenonhá:'a
this	I am going to tell	my uncle

rakkaratón:ni	tsi	na'thokerón:nion'se'.	Tsi
he has told me the story	that	a strange incident happened to him	that

niwakénnhe[s]	kí:ken	thó	nihoia'tawén:'en.
during the summer	this	there	so it happened to him

"Orhon'kéhstsi',"	wahén:ron',	"wa'katkétsko'
early in the morning	he said	I got up

ia'kiá:ken'ne'	wá:kehre'	enkhehnekanontén:ra'	kí:ken
I went outside	I thought	I would water	this

ohén:ton'	tewaktsi'tsaiénthon.	Kwáh,"	wahén:ron',
in front	I had planted flowers	just	he said

"ó:nen	iewakhnekonkiéhsere'	wa'káttoke'	tsi
now	I was about to pour the water	I noticed	that

ok	na'kaia'tó:ten'	í:waks	kí:ken	tsi
some	sort of animal	it was eating	this	where

This is a story that my uncle related to me, about a strange incident that happened to him during the summer.

"Early one morning," he said, "I got up and went outside, planning to water the flowers I had planted in front of the house. Just as I was about to pour

waktsi'tsaienthóhseron.	Oksa'k	ó:ni'	wa'káttoke'
I had planted flowers	right away	also	I noticed

tsi	tsiki'nhontstókhi'	wahonwahehtaká:ri'."	Kwâh
that	little blob-like creatures	they were destroying the garden	just

iá:ken'	skanó:ronks	ahontekhwí:sa'	kí:ken
it is said	just about	they would eat it all up	this

rotsi'tsiaiénthon.
he had planted flowers

Isi'	na'ohahâ:ti	rên:teron'	ronatên:ro'
over there	on the other side of the road	he lives	they are friends

wahohró:ri'	ne	wahên:ron',	"Thî:ken	ohnenna'tá:ke
he told him	this	he said	that	on the potato

ronathe'serônkie's	ne	thó	sá:ti."
they pour powder on	this	there	you throw it

Thó	ki'	iá:ken'	nahá:iere'.	Orhon'ké:ne
that	just	they say	he did it	in the morning

the water, I noticed a particular kind of creature nibbling on all of my plants. Ants were destroying my garden, devouring everything."

A friend who lived across the road told him to pour a kind of powder on the root.

He did just that. The next morning he looked out

iá:ken'	ionsahatke'tó:ten'	kwáh	iá:ken'
they say	he looked out again	just	it is said

ronatenekó:tote'	kí:ken	tsiki'nhontsókhi'.	Nek
they had set up a ladder	this	little blob-like creatures	just

iá:ken'	kí:ken	rakenonhá:'a	ne	shotakiehsón:ton
they say	this	my uncle	this	he was smiling to himself

sótsi'	iá:ken'	wa'thonwaren'kén:ni'.
so much	it is said	had they tricked him

to see what had happened. Those ants had set up a ladder! My uncle could only smile to himself at how they had tricked him.

Oróte' Karihwénhawe'

Sister Dorothy Ann Lazore

RONTONHWENTSI:SAKS
The Expedition

Kí:ken	oká:ra'	né:ne	tó:ske'	kwáh
this	story	is of	truly	what

e' thó	niiawén:'en.	Raksótha	ne	kwáh	é' thó
there	it happened	my grand-father	the	what	there

nihoia'tawén:'en.	1893	shiohseró:ten	wahonwa-
it happened to him		was the year	they were

htíhnha'ne'	ne	Hudson Bay Co,	raksótha	tánon'
hired by	the	Hudson Bay Co	my grand-father	and

áhsen	nihotate'kén:shen'	nahón:ne'	tehniiáhse
three	they are brothers	they should go	two men

nirihstí:sere's	nahshakotihahónnien'	tánon'
they drag steel	they will make the road for them	and

ahshakotihsnié:non'	nahatirihstí:sere'	kí:ken
they would help them	they would drag the steel	this

onhwéntsase'.	Othoré:ke	nón:we	niiawén:'en.
new land	at the cold	place	so it happened

This is a true story about my maternal grandfather. The story I am about to tell happened in the year 1893. My grandfather and his brothers were hired by the Hudson Bay Company as Indian guides for the two surveyors who were to chart the land in the Northwest Territory.

Raksótha	Rowí	Sohé:rase'	ronwáiatskwe',	tánon'
my grand- father	Louie	Sohe:rase'	he was called	and

Sakó,	Wíshe,	tánon'	Kanenrahtí:ron	ronwatí-
Sako	Mike	and	Kanenrahti:ron	they were

iatskwe'	ne	rontate'ken'okón:'a.	Kenkwitéhstsi'
called	the	they are brothers	early spring

wahonhtén:ti'	wahontonhwentsisákha',	tióhton
they went away	they went to look for new land	nine

niwenhní:take	karhakonhkó:wa	rón:ne's.	Oná:ke
months numbered	in the forest	they were walking	in canoe

tánon'	érhar	iotikarenionhátie'	ne	raonawenshón:'a.
and	dog	they are bringing	the	their things

O:nen	sha'tontahonahtentionhátie'	nia'té:kon	tsi
now	as they were coming home	many things	that

nahotiia'tawénhseron'.	Great Slave Lake	konwá:iats
it happened to them	Great Slave Lake	it is called

tsi	nón	seréka'	tahonatenonhianihtén:ni'.
at	where	almost	tragic things happened to them

My grandfather's Indian name was Rowi Sohé:rase, and his brothers were Sakó, Wíshe, and Kanenrahtí:ron. The expedition started in the spring. They were in the wilderness for nine months with canoes, dogs, and dogsleds as their mode of transportation. They were on their return trip when they ran into tragic circumstances. The tragedy occurred in Great Slave Lake.

O:nen	akohserá:ke	ón:we'	ioweiennatshá:ni
now	mid winter	it arrived	it was rough

tsi	na'tkanien'kwataséhon',	iáh	thietsó:ken',
there	it was a blizzard	not	was it clear there any longer

wahontia'táhton'.	O:nen	ni'	wahoná:karahwe'
they were lost	now	it	darkness fell on them

wahontenaktón:ni'.	Tsi	wa'órhen'ne'	akwé
they made their beds	at	following day	all

raona'tóhsera'	óniehte'	tioterhó:ron,	soronhké:ne
their tent	snow	it covered	barely

ón:ton'	tahatiiá:ken'ne'	tánon'	ne	raotitshé:nen'
can it	they come out	and	the	their animals

érhar	wa'kontia'táhton'.	Raonatenná:tshera'	ó:nen
dog	they were lost	their food	now

ehtá:ke	ní:we'	kháre'	ó:nen	iahóntshahte'.
low	it is	until	now	it was all gone

Tóhka'	nón:ta'	óniehte'	khók	rononnhéhkwen.
several	day	snow	only	they were staying alive

Winter had set in. It started to snow. The storm became so ferocious and cruel that they could see only a few feet away, and as a result they became lost. They put up camp for the night. The next morning, their camp was completely covered with snow and they had to dig their way out. The storm lasted for days. They lost their dogs and were now walking and pulling their equipment. Their food was starting to dwindle and they were now on rations until finally they had nothing left to eat.

Skenén:'a	ó:nen	sénha'	tsi	rón:ne',
slowly	now	more	so	they walking

rontonhkária'ks,	ratiwístos,	tánon'	tehotihwishen-
they were hungry	they were cold	and	they were

hé:ion.	O:nen	ni	tó:ske'	tsi	tehoti'nikonhrahrí:'on.
tired	now	it	is true	that	their minds are broken

Ia'thotirihwaién:ta'se'	tsi	enhati'wahstará:ko'
they set the matter	that	they will draw lots

ónhka'	tsi	rónnhe'	enhatátka'we',	enhón:neke'
who	that	his life	he will sacrifice himself	they will eat it

tsi	rónnhe'	ne	tóhsa'	ahonníheie',	óh
that	his life	the	not to	for them to die	how

naiá:wen'ne'	ronátia'ke	ahonnónnheke'.	Né:ne
can it be	others	they would stay alive	the one

kwáh	ken'	niehrá:'a	tsi	nihontate'kén:'a
that	small	so he is	that	they are brothers

For days they were surviving on eating snow. They were slowly and laboriously working their way back to the Hudson Bay Company fort. They were now starving, freezing, and getting weaker each day. They were desperate.

The six men decided to draw lots with matches. Whoever got the short match would be the one to sacrifice himself for food in order for the others to survive. Sakó, the youngest of the brothers, took

Sakó waha'wastará:ko' ne kén' nika'wastésha.
Sako he chose the stick the small so the stick is

Kwáh í:ken tsi roti'nikonhráksens tánon'
very much so their minds were bad and

tehoti'nikonhrahrí:'on tsi wahoná:karahwe'.
their minds were broken as night came upon them

Tehniiáhse iatate'kén:'a ia'thotirihwaién:ta
two of them they are brothers they set the matter

tsi énska shé:kon enshiate'nién:ten'
that once again they will try

nahiatorátha' oskenón:ton. Tsi í:ne' tahonahsí:-
for them to go hunting caribou as they walk it crossed

tia'ke' wahkwari'tará:ken raia'tá:ke, wa'thá:ta'ne'
their feet white bear on his body he stood up

kí:ken ohkwá:ri tekeniawén:re' niwahsí:take
this bear twelve feet number

the short match. There was sadness and despair in the camp that night.

Two of the brothers decided to try once more to go out and hunt for caribou. As they were hunting, they tripped and fell over a white polar bear. The bear stood up. He was about twelve feet tall. When he

nihahnén:ies,	wa'thatskára'we'	kwáh	né:ne
so he was tall	he opened his mouth	just	like

o'tónhkwa'	ne	rahsá:kon.	Tóhka	nia'káienhte'
fire	the	in his mouth	several	times number

nahonwarón:tate'	tsi	niió:re'	iahrénheie'.
they shot him	to	so it is far	he died

Oksa'k	sahiathroiá:na'	tsi	wa'konwário'
right away	they went back to tell	that	they killed it

ohkwá:ri.	Ronatshennonnihátie'	tsi	wahoti'waraién:-
bear	they were happy	that	they got meat

ta'ne'	iáh	ó:nen	ne	Sakó	thahrénheie'.
	not	now	the	Sako	will he die

Sakonwaia'tisákha'	ne	ohkwá:ri	sakonwaia'ta-
they went back to look for his body	the	bear	they could not find the body

ióha',	sok	ná:'a	akwé	tioteniehtó:ron.
again	then	that	all	it was snow covered

opened his mouth, the inside of it looked like a ball of fire next to his huge white teeth. It took several shots to kill the bear. The two brothers were all excited. They quickly went back to the camp and happily reported to their comrades that they had killed a bear, and now Sakó would not have to be sacrificed.

By the time they got back to the spot where the bear had been killed, he was nowhere to be found, as the blinding snow storm had completely covered him up. The

Wahonnó'kwate'   iáh   tehotitshénrion   ase'kén
they dug   not   did they find it   because

tioia'tataríhen   ne   ohkwá:ri   wa'kawistaná:wen'
its body was warm   the   bear   ice became damp

ne   óniehte'   kaia'tó:kon.   Tewenhniserá:ke
the   snow   under its body   two days number

ronnókwas   ó:nen   shihon'nikonhró:ktha'   ó:nen
they were digging   now   as their minds were running out   now

ní   sakonwaia'tatshén:ri'   ne   ohkwá:ri.
this   they found the body again   the   bear

Wa'konwaiénsehre'   sok   wahati'wá:rarihte'.   Tewenhniserá:-
they skinned it   then   they cooked meat   two days

ke   ohnekákeri   khok   wahatihnekí:ra'   thó   ne'
broth   only   they drank   then   the

ó:nen   wahati'wá:rake',   akwé   wahotinonhwákten'
now   they ate meat   all   they were sick

heat from his body had melted the snow beneath him and buried him still deeper. After two days of digging and no sight of the bear they were about to give up when they finally found the bear. They skinned him and cooked the meat. The first two days they only drank the broth, then they ate the meat. In the meantime, Kanenrahtí:ron's toes were all frozen and he could no longer walk. One by one they started to get sick

sótsi'	io'wahráre'sen	tánon'	sótsi'	karí:wes
too	meat is fat	and	too	long matter

tsi	náhe'	tethonatská:honhkwe'.	Kanenrahtí:ron
at	time	they were eating	Kanenrahti:ron

rahiakwirá:ke	wakanennió:kwanoste'	iáh	téshre's.
his toes on	it froze	not	did he walk

O:nen	ni	wahón:newe'	ne	shakotiia'tí:saks
now	this	they arrived	the	they sought their bodies

nahonwatiia'takéhnha',	ionsahonwatiia'ténhawe'	tsi
they came to help them	they took their bodies back	to

nón	thonatenatíson'	ne	Hudson Bay Company.	Kaié:ri
where	they settled	the	Hudson Bay Company	four

nihá:ti	iosnó:re'	sahón:newe'	tsi	nón
of them	it is fast	they arrived back	at	where

ienakerénion'	nón:kwe.	Raksótha	Rówi	Shohé:rase',
various people live	the people	my grandfather	Louie	Shohe:rase'

from eating the bear meat. They eventually all became ill as the meat was too rich for them after not having any nourishment for days. Help came, but none too soon.

They were finally rescued. They were all taken to the Hudson Bay Company fort. Four of the men returned to civilization that winter; the four were

ro'kén:'a Sakó, tánon' ne tehniiáhse
his brother Sakó and the two men

niristí:sere sok ne Wíshe, tánon' Kanenrahtí:ron,
they drag iron then the Mike and

khe ithne's sótsi' rotinonhwáktani'. Wa'thonwatíhsnie'
they remained too they were sick they looked after them

ne kwáh skenén:'a sahiata'karí:tate'.
the just slowly they regained their health

Kanenrahtí:ron, seréka' tsi rónnhe' ia'thaioné:non'
Kanenrahti:ron almost as he lives he gave up

tetsá:ron wahonwahsí:nia'ke'.
both they cut his legs

E:so' wahatiiésha' tsi ronahtentión:ne',
much they suffered as they were away

tiótkon ki iahatirihwaié:rite' tsi nahó:ten'
always then they finished their task for what

ronathonkaiá:kon. Kí:ken ne tionathonwí:sen'
they hired them selves for this the women

my grandfather, Rowí Sohé:rase', Sakó, the brother who was almost sacrificed, and the two surveyors. The other two brothers, Wíshe and Kanenrahtí:ron, had to stay behind at the Hudson Bay fort while they were slowly nursed back to health. Kanenrahtí:ron had to pay a great price for his part in the expedition, as he had to have both legs amputated.

After much hardship, their mission was

rotiniákhon	onónha'	ó:ni'	wa'kontiiésha'.
they are married	they	also	suffered hardship

Ronaterihwasherón:ni	né:ne	Hudson Bay Company	tsi
they made an arrangement	that	Hudson Bay Company	that

rotiniákhon	enkonwatikária'kse'	tsi	nikarí:wes
they are married	they will pay them	as	for time long

othoré:ke	iehón:ne's.	Kí:ken	ne	Hudson Bay
at the cold	they were there	this	the	Hudson Bay

Company	ó:nen	kwáh	kén'	náhe'	iáh	thé:nen'
Company	now	just	a bit	time	not	anything

tehshonwatiwennahrónkha'	wahonte'nikonhrí:sa'	tsi
they did not hear their voice again	they made up their minds	that

iáh	tha'onsakonwatikária'kse'	ne	rotiniákhon.
not	would they pay them again	the	they are married

Wahonní:ron',	iáh	ó:nen	tha'onshakwakária'kse',
they said	not	now	would they pay them

accomplished, charting the Northwest Territory. The wives of the men also went through great hardship. There was an agreement made with the Hudson Bay Company that as long as the explorers were away their pay would come regularly to their wives. In the meantime, the Hudson Bay Company had lost contact with the men and the Company decided to cut off the payments to the wives.

"ase'kén iá:kwehre' thonenhé:ion."
because we think they are dead

Taioti'nikón:ren'ne' tsi na'teiotenonhianíhton
their minds fell that it was so terrible

nahó:ten' wa'konwatihró:ri'. Oh nenkontiié:re'
what they told them what will they do

ó:nen wa'onátia'kse' tsi kontihwistatáhkwas.
now it was severed the they were taking money out

Akwé nieiotiwiraién:ton taiakotíhsnie'ne'.
all they have children they should look after

Aksótha áhsen niiakówiraién:tahkwe' istén:'a
Grandma three she had that many children mother

shiiewirá:'a. Kon'tátie' iakoió'te' tánon' tó:k
when she was a baby all day she is working and so

nitio'kará:'on otsinéhtara iakoió'te' ská:ti ne
as the night beads she works one side of

ionhsi'tá:ke teiontatkarén:ron owirá:'a. Tsi
on her foot she is rocking baby what

They told the women they could no longer pay them as they thought the men had perished.

It was a horrible shock to the women to be told that their husbands were given up as dead and that their means of support was severed. They all had young children to support. My grandmother had three children to support; my mother was a mere babe in arms. Grandma had to work all day and late into the night, one foot rocking the cradle, while she did bead work. She would

nahó:ten'	eniéhsa'	kaio'ténhshera'	teniontá:ton',
ever	she will finish	beadwork	she will exchange

atenná:tshera'	tánon'	ne	karístakon	nahó:ten'
food	and	the	inside iron	what

aionté:kate'	nahotiia'tatarí:hen',	iakén:'ak	tsi
for her to burn	for their bodies to keep warm	barely	to

ronnónnhe'.
they live

Ontsharó:ko'	tsi	ó:nen	sá:newe'	ne
chattering	for	now	they returned	the

iatate'kén:'a,	Akwé	ne	rontátenonhkwe'	tánon'
they are brothers	all	the	they are related	and

ronatenro'shón:'a	ronatshennón:ni	ronatonnháhere'
their friends	they are glad	they are happy

tsi	sá:newe'	ne	iatonhwentsí:saks.
that	they returned	the	they search for land

exchange the beadwork for food and fuel, barely staying alive.

What a happy day it was when the men returned home. All the relatives and friends were there to welcome the explorers back home again.

Warisó:se Kaieríthon

Josephine Horne

TSITHA
The Bird

Ne	iá:ken'	kí:ken	ranekénhteron'
this	it is said	this	he is young

ionsahatáweia'te'	tsi	thonónhsote'	wahori'wanón:-
he went back into his home	at	where his house stands	he asked

tonhse'	ne	ro'níha	aón:ton'	kén	ne
	the	his father		?	the

aho'seréhtani'.	"I:kehre'	akaterohrókha'	kí:ken
would he lend it drags	I want	I would go watch	this

teióia'aks."
it flickers

Wahén:ron'	iá:ken'	ne	ro'níha,	"Wá:s,
he said	they say	the	his father	go ahead

nek	ki'	ná:'a	ne	enhsaten'nikón:raren'.	Tóhsa'"
but	just	that	the	you will set your mind on it	do not

wahén:ron',	"nón:wa'	enhse'niakenhtánion'."
he said	this time	will you speed around

Once a young boy returned home and asked his father whether he would be willing to lend him the family car, so that he could go to the movies. His father said,

"Go ahead, but take good care of it and don't go speeding around."

Sahén:ron'   iá:ken'   kí:ken   ranekénhteron',
he said   it is   this   he is young
back   said

"Enkaten'nikón:raren'se'."
I shall set my mind on it

Orhon'ké:ne   iá:ken'   saharihwá:ronke'   ne
in the morning   it is   he heard   the
said

ro'níha   ákte'k   nón:we   iehshohonwí:sere's   tánon'
his   every   place   he was driving   and
father   around

ákte'k   ó:ni'   nón:we   ronwá:kens   tethoke'tóhton.
every   also   place   people were   coming out
seeing him

Ohstón:ha   iá:ken'   ó:ni'   tsi   ní:iot   nahorihwáksha'se'
a little   it is   also   so   it is   he was angry
said

ne   ro'níha.   Thók   shé'   ní:iot   tsi
the   his   the   only   so   as
father

ronaterihwahsherón:ni   tsi   thók   nón:we
they had made plans   so   just   that place

"I'll be careful," answered the boy.

The next morning the father heard of his son's adventures during the previous evening. People had seen him driving all over. He was somewhat angry. They had agreed that he would only go to the movies. He said

ienhakwátho'	kí:ken	teioia'áksne.
he will go	this	it flashes

Iáh	ó:ni'	óksa'k	the	tehá:wen	kí
not	also	right away	not	did he speak	this

ro'níha.	Tohkára'	nón:ta'	ontóhetste'.
his father	several	days	it went by

Ronwaia'tanontaktónhne	o'karahsnéha	shonsá:rawe'
Friday	in the evening	when he arrived

ne	roién:'a	sahori'wanón:tonhse'	ne	ro'níha
the	his son	he asked him again	the	his father

enhathón:tate'	ken	shé:kon	ne	aonsaho'seréhtani'.
will he be willing	?	again	the	he would lend him it drags

Thó	ki'	niió:re'	ó:nen	wahori'wanón:tonhse'
at	that	so it is far	now	he asked him

ne	roién:'a	tó:ske'	ken	ki	oh	nahó:ten'
the	his son	it is true	?	this	what	thing

rarihwahrónkha'.
he is hearing about

nothing, and several days passed.

The following Friday evening the son again returned home and again asked to borrow the car. At that point the father asked whether what he had heard were true.

Wahén:ron'	iá:ken'	ki	roién:'a,	"Tó:ka'."
he said	they say	this	his son	I don't know

Sahén:ron'	ne	ro'nîha,	"Wa'kerihwá:ronke'
he said back	the	his father	I heard

thî	tóhka'	niwahshontá:te'	tsi	náhe'
that	several	night		ago

kon'serehtanihén:ne'	tsi	sa'niaken'én:ne',
I lent you it drags	that	you went all over the place

akté:shon'	iá:ken'	nón:we	nonkwehshón:'a
every other place	it is said	place	people

iesá:ken's	tetisake'tóhton'."
they were seeing you	you were appearing from everywhere

Wahén:ron'	iá:ken'	kî:ken	roién:'a,
he said	it is said	this	his son

"Hónhka'	ne'	ne	rá:ton'?"
who	was it	who	he is saying

Ranonhtonniónkwas	iá:ken'	kî;ken	ro'nîha
he was thinking	it is said	this	his father

His son told him that he did not know.

"I heard that several nights ago when I lent you the car, you drove around all over the place, and people saw you everywhere."

The son asked who had said such a thing.

thó	niió:re'	ó:nen	iahén:ron',	"Tsítha	wahakhró:ri'."
there	so it is far	now	he said there	bird	he told me

Ia'tehononhsonhtiia'konhátie'	iá:ken'	ki	roiená:'a.
he was going into the other room	it is said	this	his son

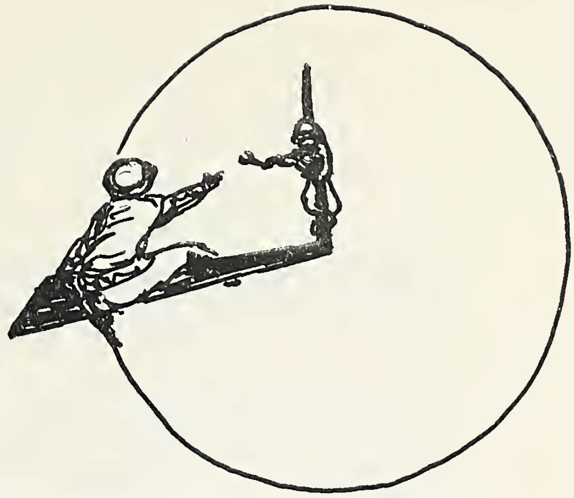
Kwáh	ó:nen	ranhotón:ne	wahén:ron',	"Ronó:wen	kí'."
just	now	he was closing the door	he said	he lies	just

"A bird told me," replied the father.

The son went into the next room, but just as he was closing the door, he said, "That bird sure knows how to lie, then."

Oróte' Karihwénhawe'

Sister Dorothy Ann Lazore



KA;R NAHSONTHEN

11:45 P.M.

Ká'tsi	ok	nón:we	kí:ken	kanón:no	karístatsi
some		place	this	New York City	ironwork

thotiió'tehkwe'	tóhka'	nihá:ti	kahnawakehró:non'
they were working	a few	of them	residents of the place at the rapids

tánon'	shaiá:ta	ne	ahkwesahshró:non'	ostón:ha
and	one man	the	resident of the place of partridge	a bit

tethona:kara's.	Shaiá:ta	ó:ni'	iá:ken'	ne
he was dark	one man	also	they say	the

rahón:tsi	skáthne	thonatoróhon	ronkwe:tase'.
he is black	together	they partnered	a new man

Ne	ki'	kí:ken	ahkwesahshró:non'	thé:nen'
Well	just	this	St. Regis man	something

ki'	ná:'a	iahori'wanón:tonhse'	aontahó:ion'	ne
I guess		he asked for	would he give him	the

There is this story of a few guys working on steel somewhere in New York City. A couple of them were from Caughnawaga, and one from St. Regis who was a bit on the dark side. A new guy was also working in the gang who was a black man.

The St. Regis man asked the black man to give him

rahón:tsi.   Sok   iá:ken'   wahén:ron'   tó:k
he is black   then they say   he said   such

na'tehawennakaré:ni,
so his voice was loud,

"Niá:wen   kí'   ahsónthen."
Thanks   midnight

Khé   ki'   niiohsnó:re'   wa'tharihwaserá:ko'   ne
right   just   as it is   he answered back   the
fast

rahón:tsi,
he is black

"Iáh   tekarí:wa',   ákta'   ki'k   ní:se'   ne
not   a matter   near   this   yourself   the

ká:r   nahsónthen   nihsia'tó:ten."
quarter midnight   such you are
a kind of

something and as he was handed it, he said,

"Thanks, Midnight!" to which the black man promptly replied,

"You're welcome; you're pretty near quarter to midnight yourself!"

Konwatsi'tsaién:ni

Rita Phillips

TSIK A TSIK, TSIK A TSIK, TSIK A TSIK

Tsi	niióhseres,	iá:ken',	kí:ken	iatathróna'
At	winter long	it is said	this	they are married to each other

wahiatonhkária'ke',	tánon'	wahiatienhtó:kten'	ó:ni'.
they two hungered	and	they two were out of wood	too

Wahatateweiennén:ta'ne'	ne	rón:kwe	ahatorátha',
he himself ready made	the	man	for him to hunting go

tánon'	wahshakohró:ri'	ne	ró:ne'	tóhsa'
and	he her told	the	his wife	do not

aionté:ka'te'	tsik	énshrawe'.
for her it to burn cause	until	will back he come

Iáh	teiakotahonhsatá:ton,	kaní:io'k
Not	did she her hears prick	as soon as

iahaiá:ken'ne'	sok	wa'etsenhón:ni'	tánon'	sótsi'
out he went	then	she sparks made	and	too

One long and cold winter, a man and his wife ran out of food, and had very little firewood left. The husband got ready to go out on a hunt, and he told his wife not to make a fire and use up the wood until he returned with meat to cook.

Now the wife was very cold and very hungry. She did not listen to her husband, and instead started a fire the minute he left. She stood warming herself

ákta' niahá:'en' tsi iotékha' wa'onnihsnonhsótshi'
near she went at it burns she her finger scorched

Wa'tiakohén:rehte' ki' ná:'a tánon' wa'ako-
she yelled I suppose and she her

'tsí:reke' ne iehsnonhsá:ke. Tsi niió:re' tsi
finger sucked the her finger on As so it is far as

iontonhkária'ks, wa'akawé:ka'we' sekén ne
she hungry taste pleased her as well the

iehsnonhsá:ke tánon' wá:'eke', wá:'eke' ó:ni'
her finger on and she ate it she ate it also

ne ienentshá:ke, tánon' ne ieia'tá:ke, tánon'
the her arm on and the her body on and

ne iehsiná:ke, akwé:kon ne ionhsi'tá:ke.
the her leg on all the her feet on

Kwáh iá:ken' wa'ako'tsirékhon' ne ionhiakwirá:ke.
Even it is said she sucked the her toes on

O:nen ki iá:ken' kwáh iah thé:nen'
Now this it is said just not anything

tetsako'wá:rare', tánon' shé:kon niiontonhkária'ks
meat on her and still so she hungered

next to the fire, when she accidentally burned her finger. "Aki:'i ," she yelled and stuck her finger in her mouth to try and ease the pain. She was so hungry that she discovered her burned finger tasted good, so she nibbled at it until she had eaten it all up. Then she burned her hand, and ate it, burned her arms and ate them, burned her body and ate it, burned her legs and ate them, even burned her toes and sucked and sucked on them! The lady ate herself all up, and did not have a speck of meat left on her

sok ia'eiá:ken'ne' wahonwaia'tisákha' ne ró:ne'.
then out she went she his body seek-ing went the he is married

Ne sekén ne ó:ia' nikawennó:ten tsi
The as well the other kind of sound as

wa'onhtén:ti'. Tsi ní:iot ne wa'ohstien'tá:kahre',
she walked so as it is the noisy bones

"tsik a tsik, tsik a tsik, tsik a tsik."

Wa'tharáhtate' iá:ken'ne' raotshé:nen'
he ran it was said his pet

érhar wahohroriá:na' tsi na'akoiá:tawen' ne
dog he him to tell went that what to her body happened the

ró:ne'. Tánon' ó:nen ó:ni' iahothón:te'ne'
he is married and now also it to his ears came

"tsik a tsik, tsik a tsik, tsik a tsik,"

taiohstien'takaré:re', sok iá:ken' wahaté:ko'.
noisy bones coming then it is said he fled.

bones. She made the wierdest kind of noise when she moved, like a pile of rattling bones, "chick a chick, chick a chick, chick a chick."

Even after eating herself all up, she was still hungry, so she went out looking for her husband. In the meantime, the man's dog went and found his master and told him what had happened to his wife. Just then the husband heard a faint sound in the distance, "chick a chick, chick a chick, chick a chick." He knew what it was and he started running.

Iahá:rawe'   kí:ken   tsi   ní:iot   ne   a'é:ren
there he arrived   this   at   as it is   the   over

ní:wa'   ioká:ronte'   tánon'   khe   ieiotiá:kton.
big   it hole   and   there it itself cut off

O:nen   ki   wá:rehre'   oh   nenhá:iere'   ne
now   this he thought   what   way   the

tahiá:ia'ke'.   O:nen   ó:ni'   wahatkáhtho'   ken'
for him to cross   now   also   he saw it   small

nikanónhsa'   tkanónhsote'.   Tho   niahá:re'   tánon'
such a house   there house standing   There   there he went   and

iahahnhonhtíshon'.
he door shook

Tahahnhotón:ko'   rokstén:ha   ken'k   nihahnén:ies,
he door opened   he is old   just   so he is tall

Wahori'wanón:tonhse'   ne   rón:kwe   ahoié:nawa'se'
he him asked   the   man   for him to him help

tahiá:ia'ke'.
for him to cross there

After running for some time, he came to a huge canyon. He ran along the edge of it trying to figure how he was going to cross, when he saw a little house in the distance. He ran up to it and knocked hard on the door.

A little old man answered. He asked him to help him cross the huge canyon, and the old man agreed, but

Wahén:ron'	ne	rokstén:ha,	"Thí	kawenní:io'
he said	the	he is old	this	word is good

entá:'on	ki'	niáhkwe'	enhsahiákha'	tánon'
it will be necessary	just	meantime	you will berry pick	and

enhsanitsatorátha'	tánon'	kén:'en	nentéhshawe'."
will you fish to hunt go	and	here	will you bring

Thó	ki'	nahá:iere'	ne	rón:kwe.	Wa'thosteríhen'
there	just	there he went	the	man	he hurried

ki' ná:'a,	ó:nen	she'á:re'	sahothón:te'ne'
I suppose	now	again	again to his ears it came

"tsik a tsik, tsik a tsik, tsik a tsik"	taiohstien'takaré:re'.
	noisy bones coming

Tahó:ion'	ne	káhi,	tánon'	ne	kéntson,
he him gave	the	fruit	and	the	fish

sok	ne	rokstén:ha	wa'tatia'karatirón:ten'	tánon'
then	the	he is old	he his body stretched	and

told him, "First you must pick me some berries and catch me some fish." The man raced around picking berries and catching fish, and in no time at all he had a big basket of berries and a long string of fish. Again, in the distance, he heard the strange sound coming closer, "chick a chick, chick a chick, chick a chick." He ran even faster back to the house.

The little man said, "Come with me." They stood at the edge of the canyon. The little man stretched

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wahatatia'tahní:rate',   sok   raia'tá:ke   wahahtén:ti'
he his body hard made    then  his body on    he went
```

```
ne   rón:kwe   wa'thaiá:ia'ke'.   Iahá:rawe'   ki
the   man        he crossed       he arrived   that
```

```
ne   ísi'   nekwá   ne   rón:kwe,   ok   ná:'a   ne
the  over   place   the    man        then        the
     there
```

```
rokstén:ha   sahatatáhsthohte'   tánon'   kanónhskon
he is old     back he himself     and     house  in
                small made
```

```
nionsá:re'.
there back
 he went
```

```
        Ken'k   nikarí:wes   kanónhskon   iéshre's,   sok
        just a  so matter     house in    there back  then
        little    long                      he went
```

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wahothón:te'ne'   "tsik a tsik, tsik a tsik, tsik a tsik."
it to his ears
    came
```

```
Aktóntie'   nontaiawenonhátie'.   Khare'   ó:nen   kwáh
 closer        it was coming      sudden    now    just
```

himself and made himself hard and stiff, so that the man and his dog were able to walk on his back and get safely to the other side. Then, the little old man made himself normal and went back into his house.

A short time later, the little man heard a weird sound in the distance, getting louder and louder! "Chick a chick, chick a chick, chick a chick." Finally the sound was right outside his door. There was a loud

átste tho taiorá:kahre'. Iahahnhotón:ko'. Thó
outside there there noise He door opened there

í:tsete' kí:ken iakón:kwe iah thé:nen'
she this lady not anything
standing

teiako'wá:rare'.
meat on her

Wa'í:ron' "Taki'terónhna' ísi' nekwá."
she said place me over there

Wahén:ron' ne rokstén:ha "Thí kawenní:io',
he said the he is old that good word

entá:'on ki' niáhkwe' enhsahiákha' tánon'
it will be just meantime will you and
necessary berry pick

enhsanitsatorátha' tánon' kén:'en nentéhshawe'."
will you fish to and here will you bring
hunt go them

Iah teiakothontá:ton, wa'í:ron', "Iah
not did it to her come she said not

tewakenáktote' kwáh óksa'k taki'terónhna'."
does place stand just fast place me there
for me

pounding on the door, and when he opened it, there stood the lady without a speck of meat on her bones.

She demanded, "Take me across the canyon." The little old man agreed, but told her,

"First you must pick me some berries and catch me some fish."

"I have no time," she said, "Take me across immediately!" she angrily answered him.

Sok ki ne rokstén:ha wa'thatia'karatirón:ten'
Then this the he is old he his body stretched

tánon' raia'tá:ke wa'onhtén:ti' ne iakón:kwe,
and his body on she walked the lady

nek tsi iah tieiá:ko ne ísi' nekwá, sótsi'
but not did she go the over there too

wahatatia'tahnhétskwahte', wa'ekháhen', tánon'
he his body soft made she slipped and

ia'eiá:ten'ne'. Iáh ne wén:ton ónhka'
down her body dropped Not ever anyone

teskonwawennahrón:ken.
again one her voice heard

Shatatáhsthohte' ne rokstén:ha tánon'
back he his body small made the he is old and

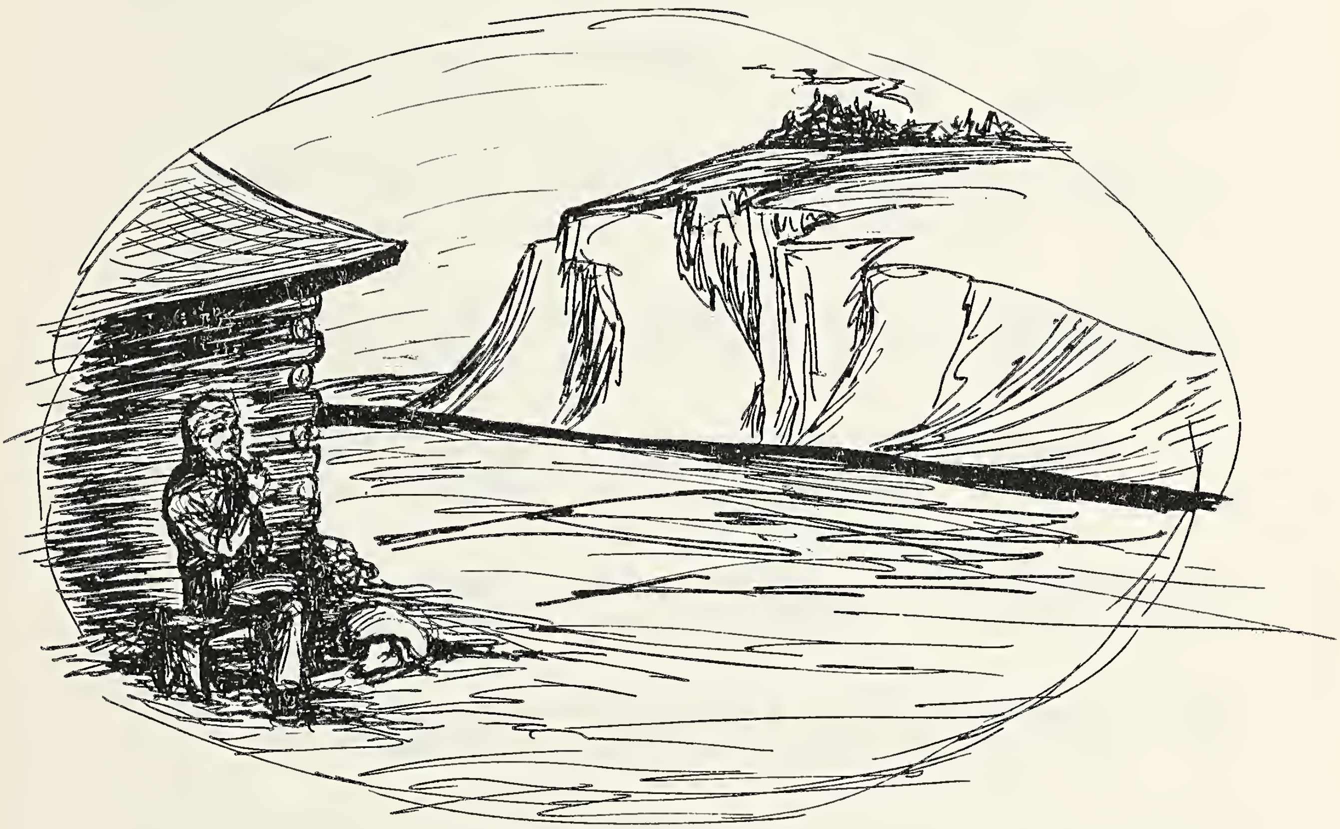
kanónhskon nionsá:re'.
house in there back he went

The little man said, "Come with me." They stood at the edge of the canyon. He stretched himself right over the canyon and the lady started walking across his back, slipping and sliding, because instead of making himself hard and rigid, he made himself soft and flexible. The lady lost her balance and fell right to the bottom of the canyon. She was never heard of again.

The man and his dog lived very happily on the other side of the canyon.

A:nen Kaia'titáhkhe'

Annette Jacobs



IAH TEHOTEWEN:NARA

The Disobedient Youth

Iekaratónhkhwa'	tsi	kí:ken	kén'	nithoión:ha
it is told	that	this	small	he is aged

onkwehón:we	raon'eskwaníhahkwe'	iotahsontatíhen
real person	he used to like	middle of night

shé:kon	ahoiakenhatié:seke'	tsi	ní:kon
still	he would be out	that	time

ienhaiá:ken'ne'	eniaí:ron'	ne	ro'nisténha,
he goes out	she will say	the	his mother

"Tóhsa'	sasa'nikónhrhen	ohén:ton'	ahsónthen
do not	set out your mind	before	midnight

tontasahtén:ti'	ase'kén	nó:nen	enwatóhetste'
to return home	because	when	it will pass

ne'	thó	nitsohwistá:'e		nek ne	iáh
at	this	as is	strikes metal	just	not

tekon'tkonhserí:io	teskón:ne's."
is spirit good	they are around

It is said that there was this Indian youth who liked to go out till after midnight. Every time he left the house his mother would say,

"Don't forget to be home before midnight, because after this hour there is nothing but evil spirits outdoors."

Tia'tewahsón:take	ne	kén'	nithoión:ha
night after night	the	small	he is aged

enharhá:ratste'	tsi	iohsnó:re'	énshrawe'.	Nek
he will promise	that	it is fast	he will come back	but

ki'	tsi	tiótkon	sho'nikónhrhens	iahatkáhtho'
just	because	always	he puts his mind back	he would look there

to	nitsohwistá:'e	nó:nen	ne	rontenro'shón:'a
how	many it strikes metal	when	the	they are friends

tánon'	raotihwá:tsire'	enthontáhsawen'	kakarí:io's
and	their family	they will start	good stories

tahontatkaratón:hahse'.	Iotká:te	iotkarátteron's.
they tell one another	often	scarey stories

Kí:ken	wahsontá:te	iahatkáhtho'	karahkwaka'-
this	night	he looked	clock

ión:tha'.	Tontahani'tsónhkwahkwe'	ionsahaiakénhstahkwe'
	he jumped up	he ran back out

ase'kén	ó:nen	tékeni	tetsohwistá:'e.	Iohsontáhskats
because	now	two	it strikes metal	beautiful night

Night after night the youth would promise to get home early, but he always lost track of time when his friends and family started to tell one another good stories, often scarey ones.

One night he looked at the clock and saw that it was two o'clock, so he jumped up and left the house. It was a beautiful moonlit night, so he was not frightened.

ahson'thénhka' iorâhkote' iáh othé:non tehohte-
moon is out moon not anything is he

ron'nî:sere'. Onhka'k wahshakó:ken' taiakawenon-
frightened of someone he saw her she is coming

hátie' tsi niahawenonhátie'. Tsi ó:nen ákta'
toward where he was going when now near

wá:'onwe' tsakothonwî:sen' wa'î:ron,
she arrived she is feminine she said

"Kwé, iohsontâhskats wâhi'. Ka' wáhse'?"
hello beautiful night isn't it where are you going

"Sonkwahtentionhátie'," tahén:ron'.
I am going back home he replied

"Niiohsontáhskats ánio ostón:ha tiahtén:ti,"
such a beautiful night let's a little we could walk

wa'kén:ron'. Tahén:ron',
she said he replied

"A:ke iáh tháon:ton' ase'kén sók ná:'a
oh not is it possible as already

He saw someone come toward him and, as they got close, he saw that it was a girl. She said,

"Hello, isn't it a beautiful night? Where are you going?"

"I'm on my way home," he said.

"It's such a beautiful night, let's take a walk," she said.

"Oh no, I can't. I'm already late going home," he replied.

ohná:ken' í:ke' tsi sonkwahtentionhátie'."
late I am going that I am returning home

Takén:ron', ne tsothonwí:sen',
she replied the she is feminine

"Enskon'terónhna'." Skáthne í:ne' tsi
I will walk you home together they went to

Ó:nen iahá:newe' ate'én:rakon wa'kén:ron',
now they got to in the yard she said

"Anio tsi iakennekeraientáhkhwa' ietiátien'
let's in hay loft we sit

tánon' entenikárá:raton'. Iáhse' thaiesaná:khwahse'
and we will tell stories not so she could get angry at you

ase'kén ó:nen se' tsí:sa."
because already you are back

Iahiatáweia'te'. Kanekó:tote' ontkáhtho',
they two entered ladder she saw

wa'kén:ron',
she said

The girl said,
"I'll walk you home." They walked together and when they got to his yard, she said,
"Let's go and sit in the hayloft and talk. Your mother can't get angry at you, after all you are already home."
The two of them entered and she saw a ladder. She

"Anio ietenirá́then a' ká́ts í́:se' í́shent,"
let's we two go up o come on you go first

nek ki' tsi ne ranekénhteron' wahén:ron',
but the young man he said

"I:se' í́shent," sók kí tontáhsawen'
you you go first so then she started

akará́then'. Sha'tekanekotí́:hen sháhe' ó:nen
for her to climb up half way up the ladder she was going now

teka'nhia:ronhwe' iahaié:na' wahathon'kwá́weron'
rod across it he touched he looked up

ó:nen wahatká́htho' tsi iáh tha'tewahsí́:tonte'
now he looked that not did she have feet

teiotshinarén:tonte'. Tsi niió:re' tsi
she had hoofs so it is far that

wahoteronhiénhten' takaiakén:seron' ne raoká:ra'
he got frightened they came out the his eyes

said,

"Let's go up there. Ah come on, you go up first." But the young man said,

"No, you go first." So she started to climb the ladder. When she was half way up, he started to climb. As he touched the rung, he looked up and saw that the girl did not have feet but heavy hoofs. He was so frightened that his eyes bulged out of their sockets.

tánon'	tehohenrehtá:ne'	raotinónhskon	nionsa-
and	he screaming	in their home	he went

hatákhe'	iowennatshá:ni	wá:ton,
running	harsh voice	it says

"Wesatera'swí:iohste'	tsi	iáhten	í:se'
your luck is good	that	not	you

tesahén:ton	ase'kén	tóka'	aesahén:ton'	iaonsakon-
have you gone first	because	if	you would have gone first	I would

ia'ténha'	tsi	nén:we'."
have taken you away	till	ever

Shé:kon	na'tehohenréhtha'	wahonwaié:na'	ne
still	he screaming so	she held him	the

ro'nisténha	tánon'	wa'í:ron',
his mother	and	she said

"E:so'	ó:nen	konhró:ri	tsi	iáh
much	now	I have told you	that	not

He went running into their home, with a harsh voice saying,

"You are very fortunate that you didn't go up first, for had you, I would have taken you away with me."

Still screaming, he was held by his mother, who said,

"I have told you many times that evil spirits

tekontkonhserí:io tiótkon ionatahsetonhátie's
is the spirit good always they are lurking

nahsonthenhnéhshon'."
in the night

are always lurking in the night."

Rake'níha rakkaratón:ni
my father he has told me

Niioronhiá:'a
Mae Montour

TEHOSTERIHENHSERE'
He Is in a Hurry

Kiótkon	iá:ken'	kí:ken	rón:kwe	énhtsken'
always	they say	this	man	you will see him

ro'thahitáhkhe'.	Sawátis	ronwá:iats.	Kiótkon
he is walking along the road	John	he is called	always

ó:ni'	io'shátste'	tsi	rostorónkie'.	Tsi	nón:we
also	it was fast	that	he was rushing	any	place

ién:re'	ó:nenk	iá:ken'	tsi	enhathahíta'.	Iáh
he walks	no matter	they say	there	he will walk	not

shé's	iá:ken'	tha'tahatate'nikonhá:ren'	ne
then	they say	would he trouble his mind	the

ahréhsake'	ken	ne	hónhka'k	ken	ahonwaia'títa'.
for him to look	for	the	someone	there	he would give him a ride

Tha'kakié:ro'k	ki'	iá:ken'	hónhka'k
suddenly	just	they say	someone

You can always see a fellow walking along the road. John is his name. He always seems to be rushing, but wherever he goes, he goes on foot. He would never put himself to the trouble of finding a ride.

One time, they say, someone came driving along.

tahohonwí:sere'.	Wa'thá:ta'ne'	wá:rehre'
he came by car	he stopped	he thought

enhoia'títa'.	Wa'thanhohón:ti'	iá:ken'	ne
he will give him a ride	he opened the door	they say	this

Sawátis.	Iáh	ki'	tehawé:ren	ratíta.
John	not	just	he thinks	he gets in

Wahén:ron'	iá:ken'	kí:ken	tsi	niká:ien'
he said	they say	this	the	so it lies

roia'tita'áhne',	"Ka'	wáhse'?"
he was going to give him a ride	where	are you going

Wahén:ron'	iá:ken'	ne	Sawátis,
he said	they say	this	John

"Tekahson'kahró:rens."
to Hogansburg (split planks)

"Enkonia'títa'	katí'	ken?"
shall I give you a lift	then	?

The driver stopped, thinking he would give this hurried man a lift. John opened the door, but never thought of getting in.

The driver asked, "Where are you going?"

John replied, "To Hogansburg."

"Would you like a ride then?"

Sahén:ron'   iá:ken'   ne   Sawátis,   "Iáhten,
he said   they   this   John   not at all,
  back   say

tewaksterihénhsere'."   Ok ná' iá:ken'   ó:ni'
I'm in a hurry   then   it   also
                                seems

sahanhóhaienhte'.
he closed the
    door again

"Oh, no," replied John. I'm in a hurry." Then, it seems, he just closed the door and rushed off.

Oróte' Karihwénhawe'

Sister Dorothy Ann Lazore

IAH TESHATA:TI'
Silence

O:nen	kwáh	kén'	náhe'	kiotáhsawen	ki
now	just	a bit	ago	it started	this

onkwehón:we	ronhténkie's.	Okia'ke	ákte'k	nón:we
original people	they would leave	some	several	places

iehshotiio'tákie's.	Ronekiohkowá:nen	ó:ni'	ákte'k
they were working	they were a large group	also	other

nón:we	iehonwanatenniéhtha'	ne	ahonterihwaienstá:na'.
places	they were sent to	the	for them to go to school

Okia'ke	iá:ken'	kí:ken	onkwehón:we	enshón:newe'
several	it is said	this	original people	they would come back

ne	onkwehonwé:ke	kwáh	se's	iá:ken'	iáh
the	Indian	just	then	it is said	not

thé:nen'	tehshonhrónkha'	ne	onkwehonwehnéha'.
anything	would they know how to say	the	the way of the original people

Kwáh	iá:ken'	ó:ni'	ókia'ke	tohkára'k
just	it is said	also	several	a few

Not too long ago people began to leave the reserve to work or to go to school. When they would come back, they would have forgotten how to speak Mohawk. After

niiohserá:ke,	tó:wa'	ó:ni'	tohkára'k
years	maybe	also	several

niwenhní:take	ronahténkion'	nek	shé's	ne
months	they have gone	but	then	the

shatikwáthos	tsi	nón:we	nihatí:teron'.
they would return	at	the place	where they live

Tenhshontátken'	iá:ken'	ne	ronatenro'shón:'a
they would meet	it is said	the	they are friends

ne	onkwehonwé:ke	kwáh	she's	iá:ken'	iáh
the	original people	just	then	it is said	not

tha'taontahontá:ti'	ne	onkwehonwehnéha'.	Kwáh
did they speak a word	the	way of the original people	just

she's	iá:ken'	ó:ni'	ókia'ke	thihonnéhtha'.
then	it is said	also	several	they would do it on purpose

Shaiá:ta	iá:ken'	kí:ken	onkwehón:we
one man	it is said	this	original person

iahonwaia'ténhawe'	tsi	iakenheion'taientáhkhwa'.
they took him	to	the hospital

several years or even several months they would return home for a visit. When they met up with their Mohawk friends, they would not be able to speak a word of Mohawk. They say some did it on purpose.

It seems that they had to take one fellow to the

Wahonwahnia'sakwé:taren'	iá:ken'	ohén:ton	tsi
they operated on his throat	it is said	before	so

niió:re'	tontahonwáhtka'we'.	Tontahonwen'terónhna'
as it is far	they let him go back home	they brought him back

ne	onkwehonwé:ke.	Tonsahontátken'	ne	ronatenro'shón:'a:
the	place of the original men	they met again	the	they are friends

Tsi	iahonwawén:nara'ne'	nia'té:kon	wahonwari'wa-
as	they spoke to him	a lot of things	they asked

nontennión:hahse'	tho	niió:re'	iá:ken'	ó:nen
him	there	as it is far	it is said	now

iahónttoke',	kwáh	iá:ken'	ne'	kí:ken	ronatén:ro'
they noticed	just	it is said	it is	this	their friend

iah	teshatá:ti'.
not	does he speak anymore

hospital. Before he could come home, they operated on his throat. After he returned to the reserve, he met up with his friends, who asked him all kinds of questions. It was then that they noticed that he could not speak Mohawk. In fact, he could not speak at all.

Oróte' Karihwénhawe'

Sister Dorothy Ann Lazore

IEHATIIEN:TERE'SKWE'
Prophesy

Ne	khok	ki'	niwakká:raien'	rake'níha
the	and	just	so he has told me	my father

tsi	oh	nahó:ten'	rakaratónhkhwahkwe'	ken'
that	what	thing	he used to relate	then

shiiakwaksá:'a	né:ne	rotikstohokon'kénha'	né:ne
when we were small	which	they were old	which

iehatiién:tere'skwe'	tsi	niiawénhshere'	rontónhahkwe'
they used to predict	as	so it was happening	they used to say

tá:we'	nenhnísera'	ensewatkáhtho'	kí:ken
it is coming	the days	you will see	this

kaniataratátie'	enkontohétstake'	katsi'noniowá:nen's
along the river	they will pass	large insects

né:ne	iáh	nonwén:ton	tesewatkáhthon	ok	ó:ni'
which	not	ever	have you seen	only	also

ne	karonhia'kéhshon'	enkontítie'	sekén	ne
the	along the sky	they will fly	also	these

My father used to tell us, when we were small, what the old people had predicted. They used to say that the day was coming when strange insects would pass by along the river, and that they would fly through the skies, killing many people.

katsi'noniowá:nen's	é:so'	nón:kwe	eniakório'.
large insects	many	people	they will kill them

On:wa'	ki'	wenhniserá:te'	kerihwaién:tere's
today	just	this day	stories I know

oh	nahó:ten'	ratí:ton'.	Ne	kí:ken	kén'
what	thing	they mean	the	this	this

nón:we	nikaná:taien'	tenwatté:ni'	iáh	kahnawá:ke
place	so the town lies	it will change	not	Caughnawaga (rapids place)

thenskénhake'.	Iáh	ó:ni'	onkwehonwehnéha'
will it live again	not	also	original people

thenhshako'nikonhrotákwen	iáh	ó:ni'	ónhka'
will it confuse one's mind	not	also	anyone

thaonsaiontatíhseke'	nonkwawén:na'	enionkwatewennáhton'se'
will they speak	our language	will we lose our word

ok	ó:ni'	nonkwaianerénhshera'	tenwatté:ni'.
and	also	our law	will it change

O:nen	ki'	tiotáhsawen	tsi	teiottenionhátie'.
now	even	it has begun	that	it is changing

Now, today, I understand what they meant by these stories. This very place will change. It will no longer be the Caughnawaga we know. We Indians will no longer speak our language, and, along with our words, we will lose our law. Already we can see this. The white man's

Ne sewatkwénie's ne ratihnara'kenhnéha'.
the it takes over the white man's way.

I:'i wakhiá:ton.
I I wrote this

A:nen Karonhiahén:te' Sky
Ann Before the Skies

Rówi Shohé:rese' rake'nihkénha' ne
Louie my late father he

rakkaratónhkhwahkwe'.
he used to tell me

way is taking over.

This was told by Ann Sky, who heard it from her father, Louie Shohé:rese'.

(Orote' Karihwenhawe')
Sister Dorothy Ann Lazore

KAHNAWA:KE AOKA:RA'
The Story of Caughnawaga

Tóka' iá:ia'k - iawén:re' tewen'niáwe'
about six teen hundred

tánon' iá:ia'k -niwáhsen tsá:ta shiiohserá:te'
and six ty seven such was the year

tohkára' nikahwatsí:rake onkwehón:we
a few families original people

wahonhtená:taien' ákta' kenhtá:ke tsi
they towned near La Prairie to

kaniataratátie'. Tóka' iá:ia'k - iawén:re'
along the river about six teen

tewen'niáwe' tánon' tsá:ta - niwáhsen shi-
hundred and seven ty such

iohserá:te' wa'thoná:tahkwe' kén:'en, kahnawá:ke
was the year they moved here Caughnawaga

wahóntien'.
they sat

Tóka' iá:ia'k máir tsi nikaná:tes tánon'
about six miles as so the settlement is long and

About 1667 some Mohawk families settled near La Prairie by the rapids of the St. Lawrence River. In 1670 they moved to their present location but kept the name kahnawa:ke, which means "by the rapids."

kaié:ri	máir	na'tekanataká:ron.	Tóka'	wísk-
four	miles	so the settlement is wide	about	fif-

niwáhsen	tewen'niáwe'	niiá:kon	ié:teron'.
ty	hundred	of them	they live here

Skaniatará:ti	othoré:ke	neká:ti,	kenhtá:ke	ná:kon
beyond the river	at the cold	the side	La Prairie	under (east)

neká:ti,	St. Isidore	tánon'	St. Constant	éntie
the side		and		south

neká:ti	sharhé:'on	é:neken	neká:ti.	Akta'	ne
the side	Chateauguay	west	the side	near	the

kahnawá:ke	ne	tiohtiá:ke.	Tewáhsen	wísk	mínit
Caughnawaga	the	Montreal	twenty	five	minutes

iá:ionwe'	aiakohonwí:sere'.	Tiohtiá:ke	ne	kwáh
for one to arrive	for one to drive	Montreal	the	most

tkanatowá:nen	ne	koráhne	neká:ti.
the town is large	the	govern-ment	side

Kén'	nikanatá:'a	ne	kahnawá:ke.	Thó:ha
like	a small city		Caughnawaga	most

The reserve covers about twenty-four square miles and has a population of five thousand. The St. Lawrence River and the city of Lachine are to the north, to the east is the city of La Prairie, to the south is the city of St. Isidore, and to the west, the city of Chateauguay. Caughnawaga is only nine miles, or approximately twenty-five minutes' drive by car from Montreal, Canada's largest city.

Caughnawaga is urban in character. Most buildings

akwé:kon	ne	kahwá:tsire'	rotinónhsote'.	Otia'ke
all	the	family	their house stands	some

ne	raotinónhsa'	ó:nen	tiotí:ion	ne	tsi
the	their house	now	on the sides	the	there

otstén:ra'	wátston	tho	ni	tsi	ronón:nihskwe'
stone	it was used	there	the	as	they used to build

norihwaká:ion'.	Otia'ke	ó:nen	énska	tewen'niáwe'
the thing is old	some	now	one	hundred

tánon'	wisk -	niwáhsen	niiohserá:ke	tsi	náhe'
and	five	tens	so many years	so	it goes

tkáhson'.	Teionáktane'	ne	raotinónhsa'	ne
there it is	two places	the	their house	the

ronón:ni'	ô:nen	tsi	ki'	ní:iot	ne	ronátia'ke
they have built	now	as	just	as it is	the	other

tsi	rotinonhsó:ton	ne	koráhne	neká.	Tsi
as	their kind of house	the	government	side	at

iakenheion'taientáhkhwa'	ne	kwâh	tkanonhsowá:nen.
they use it to lay the dead	the	most	large building

are single family dwellings. The very old homes are made of stone, and the owners proudly informed me that they are about one hundred fifty years old. The other houses are similar to the newer ones built throughout Canada. The largest building is the three story Kateri Memorial Hospital.

Tsi	tenhsatstekáhwha'	tsi	kanatakwe'niió:ke
as	you will travel	at	the main part of town

ne	kí:ken	enhsatkáhtho' :	tsi	iontenhninón:tha',
the	this	will you see	where	one sells things

tsi	ionterihstahninón:tha',	iah tha'tekaiahsonthá:ke
where	one sells iron	not does one make the sign of the cross

ionterennaientáhkhwa',	tsi	ratitsenhaientáhkhwa',
one uses it to pray	where	they use it to lay sparks

tsi	ratirihtón:ke,	tsi	ron'swáhtha',	tsi
where	the place of the police	where	they extinguish	where

teiontska'hónhkhwa',	tsi	ionteiennahninón:tha',
one uses it to eat	where	one sells oil

karonhianónnha'	ionterihwaienstáhkhwa'.
she watche s the sky	one uses it to lay words.

Tsi	tiotierénhton	enhsatkáhtho'
at	first	will you see

kana'tsheraktátie',	tsi	iaken-
along the canal	where	the

heion'taientáhkhwa',	tsi	shakotitsén:tha',
hospital	where	they heal them

As you travel along the main highway, you will see signs such as these: store, hardware, United Church, Iroquois Council Office, Police Department, Fire Department, restaurant, garage, and the Karonhianonnha' School.

Along the old main highway, these signs greet you:

Katerí Ionterihwaienstáhkhwa', tekaiahsonthá:ke
Kateri one uses it to lay words one signs the cross

ionterennaientáhkhwa', tsi ienohare'táhkhwa'
one uses it to pray where one uses it to wash

tehatatié:nas Billy Two-Rivers raó:wen, tánon'
he wrestles it is his and

tsi iehiatonhseratahkwáhtha'. Nia'tekanónhsake
where one uses it to pick up written matter so many buildings

kanonhsó:ten.
buildings stand

Tiótkon teiotiweiennhará:'on ne kawennanó:ron'
always they are busy the dear word

tsi ionterihwaienstáhkhwa' né:ne kén'
at they use it to lay words which just

nihonná;sa' ratiksa'okón;'a ronteweiénstha'.
they are new children they learn

Katerí tsi ionterihwaienstáhkhwa' ne ne' ne
Kateri where they use it to lay words

Kateri Memorial Hospital, Clinic, Kateri School, St. Francis Xavier Catholic Church, Billy Two-Rivers' laundromat, and the Post Office.

Caughnawaga is always humming with activity. The children, in three schools, Kawennanó:ron Nursery and Kindergarten, Kateri with grades one to three, and

tiotierénhton	tsi	niió:re'	ne	ahsénhaton
first	so	so it is far	the	third

tánon'	karonhianónnha'	kaieríhaton	tsi	niió:re'
and	she watches the sky	fourth	so	as it is far

iahiá:khaton	ronteweiénstha'.	Akwé:kon
sixth	they are learning	all

ronteweiénstha'	ahontá:ti'	tánon'	ahonterennó:ten',
they are learning	for them to speak	and	for them to sing

tiorhén:sha',	o'seronni'kéha'	tanon'	onkwehonwehnéha'.
British	the way of the axe makers	and	the way of the original people

Kaié:ri	tewen'niáwe'	nihá:ti	iehonterihwaiénstha'
four	hundred	of them	they cause words to lay there

sharhé:'on.	Tsá:ta	nikahiá:ton'	tsi	niió:re'
Chateauguay	seven	-th	so	as it is far

enska-iawén:re'	thonwatirihonnién:ni.	Otia'ke
one teen .	they make words for them there	some

onkwehonwehnéha'	ronteweiénstha'	akté:shon'	ó:ni'
in the way of the original people	they learn	all over	also

Karonhianonnha' with grades four through six, are busy learning to speak and to sing in English, French, and Mohawk. Four hundred pupils attend H. Billings High School in Chateauguay. They study there from grades seven to eleven. Other young people study in various

nón:we	nithotiión:sa	iehonterihwaiénstha'.
place	they are young	they cause words to lay there

Otia'ke	ó:ni'	"Manitou College"	iehón:ne's.
others	also		they go there

Tiótkon	nia'té:kon	ronaterihwahtentiá:ton
always	many things	they are starting matters

ne	ratinákere'	ne	ratiksa'okón:'a	raoterihwá:ke.
the	they live	the	children	on their behalf

Tóhka'	niiohserá:ke	tsi náhe'	rotinonhsíson
several	years	ago	they finished a building

ne	ratiksa'okón:'a	raotitióhkwa'	raoná:wen.
the	children	their group	it is theirs.

Tóhka'	na'teionáktane'	ionáktote'	tsi	nón:we
several	there are two places	place stands	at	now

ne	ahatihson'karakè:tate'	tánon'	tahatitsi'nehtará:ron.
the	for them to scratch the planks	and	they are stringing beads

Ratiwennahnotáhkhwa'	ió:ien'	tánon'	ó:ni'
they use it for reading	it lays	and	also

ió:ien'	tsi	nón:we	niiontia'tahkariohstáhkhwa'
it lays	at	the place	which they use to make their bodies supple

schools in Montreal. Still others go north to Manitou College.

The residents of Caughnawaga are always involved in projects for the children. Several years ago they completed the Girls' and Boys' Clubs, where the children

kanonhsowá:nen	ne	eh	nón:we	nia'té:kon	ó:ni'
large building	the	there	the place	many things	also

né:'e	nón:wa'	ioterihwahtentiá:ton'.	E'	thó
it is	now	they have started matters	that	is where

tehonhthénno'ks.	Akte'	nithonéhtha'	nahonte'ni-
they play ball	all over	they come	for them to

konhró:ri'.
have fun

Tóhka'	niiotióhkwake	rotinén:raien'	ne
several	clubs	they have a group	the

iakotehiá:ron' :	Legion, Knights of Columbus, Moose,
they are adults	

tánon'	Marine Club.	Ionkhihsothokón:'a	ó:ni'
and		grandparents	also

rotinén:raien'.	New Horizon Club	konwá:iats.
they have a club		it is called

Ronatiohkowá:nen	ne	kahwá:tsire'	né:ne
a large group	the	family	who

can go to do crafts and beadwork. There is a library there and also a gymnasium. Children come from all over to play ball there.

Parents are busy at the Legion, Knights of Columbus, Moose Club, Marine Club, and other organisations. Grandparents enjoy themselves at the New Horizon Club.

Summer is a happy time. Many families return

kanón:no	iehati'terón:ton	tethatinatá:re's	ne
New York City	they live there	they return to visit	the

kahnawá:ke	ne	akenhnhá:ke.	E:so'	rón:ti	ne
place at the rapids	the	in summer	many	of them	the

ratiiénthos	ne	áhsen,	né:ne	ienakarótha',
they plant	the	three	which are	pole beans

onenhste'ón:we	tánon'	onon'onsera'shón:'a.
original maize	and	various squashes (including pumpkins, melons, cucumbers, etc.)

Rono'éskwani'	ahontawénha'	kana'tsherá:kon
they like it	for them to go bathe	in the canal

tánon'	ratiksa'okón:'a	tsi	iontawenstáhkhwa'
and	children	at	one uses it to bathe

rontawénhe's.	Tsi	iakenheion'taientáhkhwa'	ísi'
they go to bathe	at	the hospital	over there

na'oháhati	tho	nón:we	nihontawenstáhkhwa'	tánon'
across the road	there	the place	where they use to bathe	and

from New York City to visit their Caughnawaga relatives. Most residents can be seen working in their gardens, where they plant the three sisters: corn, beans, and squash.

People like to swim at the town beaches, and the children especially enjoy the public pool near the

tehonthénno'ks. Roti'nikonhró:ris ne
they play ball they enjoy it the

rotinonhwaktanión:ni. Ken'k ó:ni' niió:re'
they are sick there also so it is far

ne ronten'nikonhró:ris ne ratiksa'okón:'a
the they enjoy it the children

ronteweiénstha' ne ahatiká:we' í:non akté:shon'
they learn they would paddle far all over

nón:we enthón:ne' ne kwáh tenhontátien'te'
the place they will come the just they will arrive

tsi tenhonré:ron'.
so they will race

Otia'ke ronon'éskwani' tewa'á:raton tánon'
some they like lacrosse and

golf tahonhthénno'ke'.
they play

Né:ne kwáh aonhá:'a roti'nikonhroriá:tha'
that which most they they enjoy

nó:nen enhatinenhríneken'ne' tánon' tenhonatatá:se'
when they will bring the whole crowd out and they will go around town

hospital. The patients enjoy watching the children swim and play ball there. The children can also be seen practicing in kayaks and canoes for their races

Others enjoy lacrosse and golf.

The big event is the Fire Brigade Parade. We are

ne	ron'swáhtha'.	Teiakhirénhsarons	ne
the	they extinguish	we are proud of them	the

onkonkwe'tahshón:'a	ne	ron'swáhtha'.	Tsi
men	the	they extinguish	so

nihá:ti	akwé:kon	rontatsnié:nons.
of them	all	they help freely

Ionkwe'éskwani'	tsi	niiátion	kahnawá:ke
we like it	so	many of us	the place at the rapids

iakwanákere'.
we inhabit

very proud of the skills of our volunteer firemen.

Life is nice at Caughnawaga.

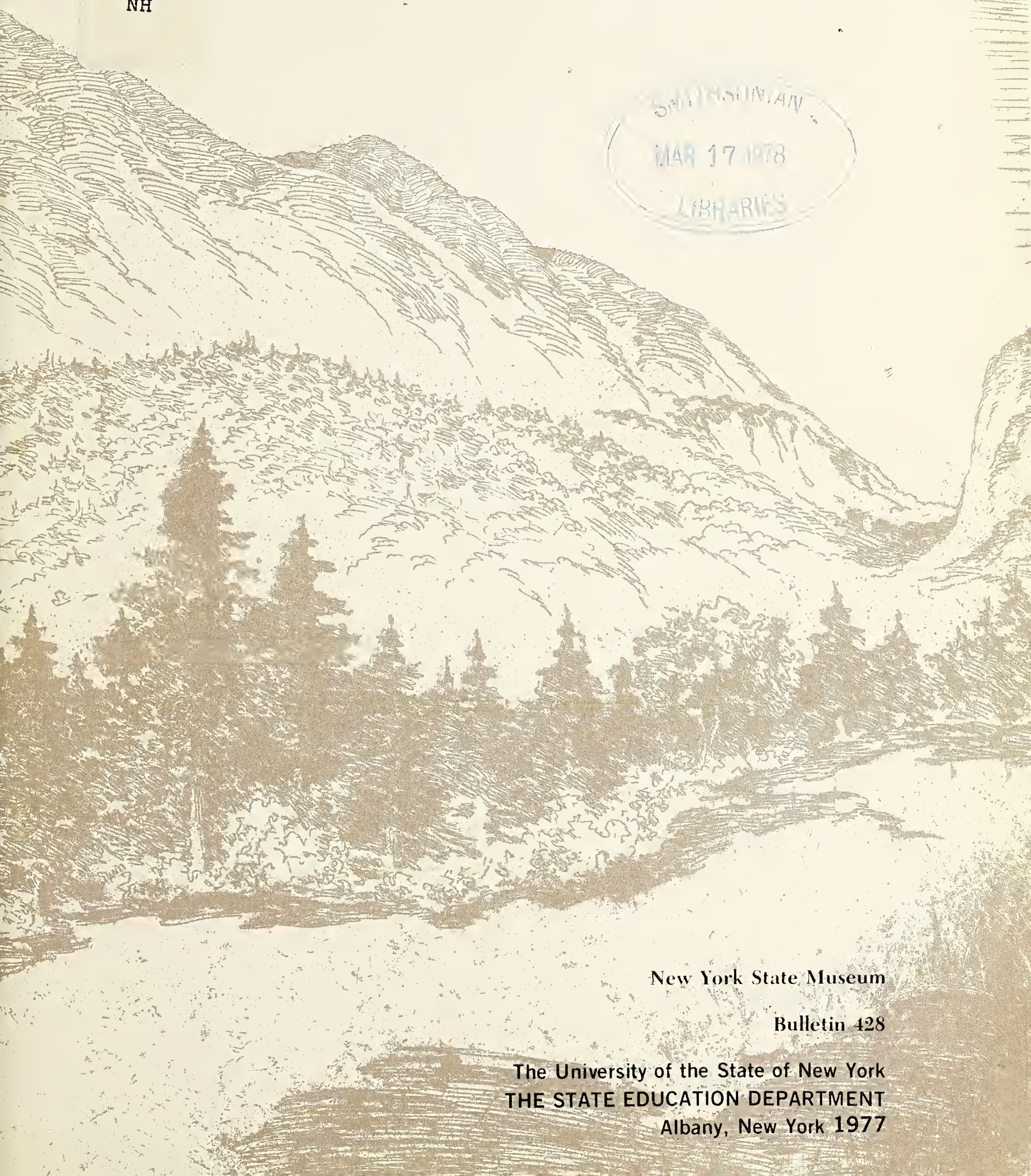
Kawennanó:ron'

Dorris Montour

THO NI:KON

Species Diversity and Community Structure in Bryophytes: New York State Studies

Nancy G. Slack



New York State Museum

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THE STATE EDUCATION DEPARTMENT
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Russell Sage College

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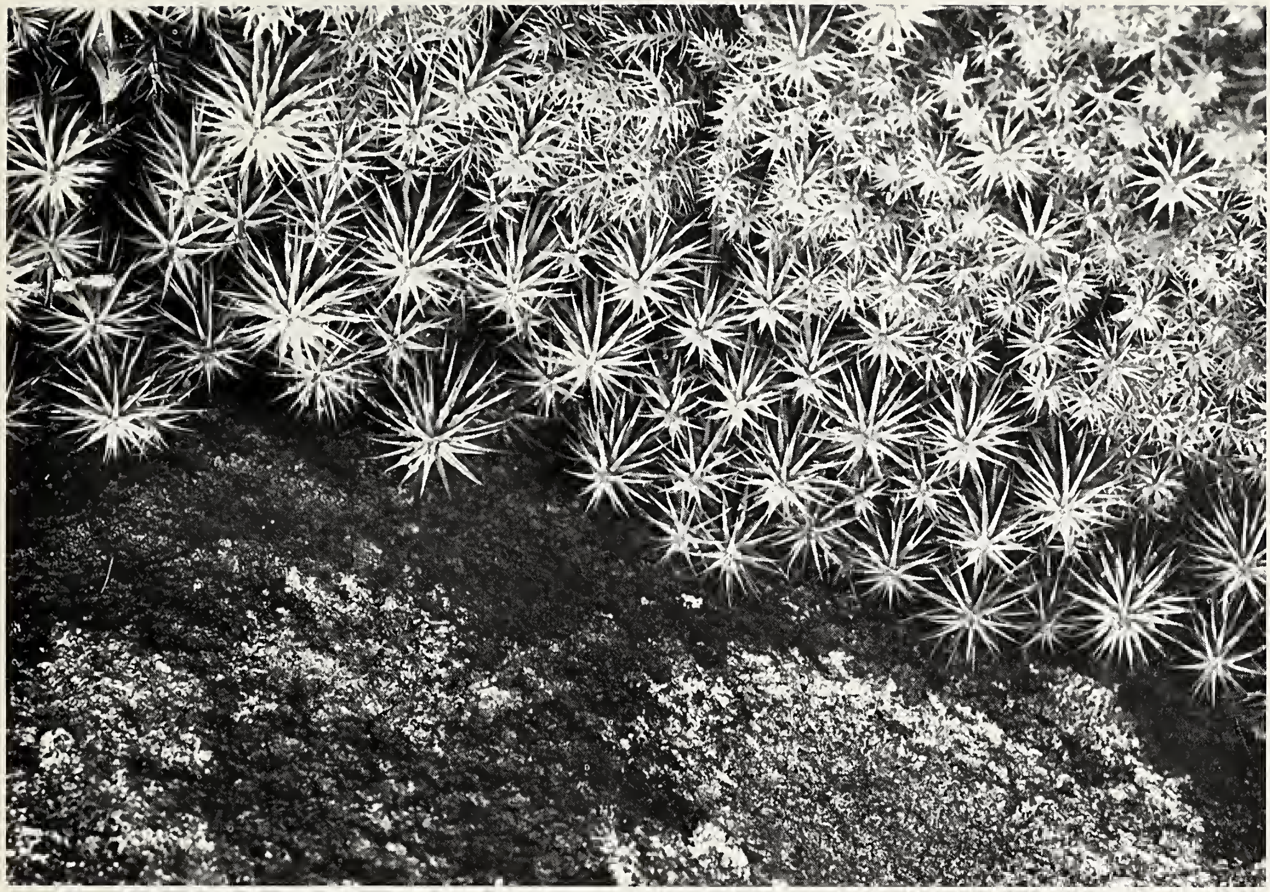

Polytrichum juniperinum **and** *P. piliferum* **near timberline, Whiteface Mountain.** *(photo by A. B. Wellborn)*

Both Forbes and Darwin realize struggle but see that it has produced harmony. Today perhaps we can see just a little more. The harmony clearly involves great diversity, and we now know . . . that every level is surprisingly diverse. We cannot say whether this is a significant property of the universe; without the model of a less diverse universe, a legitimate but fortunately unrealized alternative, we cannot understand the problem. We can, however, feel the possibility of something important here, appreciate the diversity, and learn to treat it properly.

G. Evelyn Hutchinson, 1965
in *The Ecological Theatre and the Evolutionary Play*

Acknowledgments

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Finally, I wish to thank Dr. Richard Monheimer of the New York State Science Service for his help in seeing the manuscript through to publication, and the Donald Richards Fund, The New York Botanical Garden, for a grant to aid in the publication of this Bulletin.

COVER: **Mt. Whiteface in the Adirondack Mountains. Etching by Herbert S. Kates.**

Contents

Species Diversity and Community Structure in Bryophytes: New York State Studies

by Nancy G. Slack

Introduction

The Early Study of Bryophytes in New York State

The study of the mosses and liverworts of New York State has a long history. Collections in the New York Botanical Garden go back 150 years. During the period between 1830 and 1910, more than 40 different men and women made permanent collections of bryophytes in New York State.

Charles Horton Peck, who was the first official New York State Botanist and is now known primarily as a mycologist, did important work on bryophytes early in his career. He eollected specimens in both the Adirondacks and the Helderbergs, the two areas included in this study. In 1866, he published a list of New York State bryophytes in the Nineteenth Annual report of the Regents of The University of the State of New York. This early list included 274 mosses and 66 liverworts.

Three other important bryologists also contributed to this list: Leo Lesquereux, the Hon. George W. Clinton, and Coe Finch Austin. Austin collected specimens mostly in Orange County, New York, but also near Albany, and he determined specimens for other bryologists, including Peek. He was also the first American authority on liverworts. Clinton, son of Governor DeWitt Clinton, was a judge in Buffalo, and colleeted mainly in western New York and around Niagara Falls. Lesquereux, who came to this country from Switzerland in 1848, was primarily a paleobotanist, the authority on the Appalachian coal flora and, as such, the first member to be eleeted to the newly formed National Academy of Seienees. He was also a very active bryologist who worked with William S. Sullivant in Columbus, Ohio, but collected widely in areas including the Adirondack Mountains of New York. Before 1866, he had collected on the top of Mt. Marcy, the highest Adirondack peak, as well as on Whitefaee Mountain, on which most of this study was done. He eorresponded with and encouraged Peek, as can be seen from the following letter, written in 1867:

Cambridge, 23 October, 1867

My dear Mr. Peck,

Your letter of the 5th and package of mosses was sent to me here in Columbus. I received it today only. I shall return home about the 7th of November and will then examine your specimens and report. I was glad to hear from you again and expect some fine things from you from the Adirondaek Mts. I found also some mosses especially Orthotricha around Placid Lake [Lake Placid] but still more at and near the top of White side [Whiteface?] Mt. and Mt. Marcy. Did you reach Mt. Marcy?

Your friend,
L. Lesquereau

These early bryologists worked almost entirely without manuals. In another letter to Peck, Lesquereux replied to a question of Peck's that no, there was not any manual to use for hepatics. Lesquereux and Thomas P. James first published a *Manual of the Mosses of North America* in 1884. There were, however, early collections of bryophytes both in Albany and New York City, and later at Cornell University in Ithaca, as well as in private collections. Many specimens were exchanged among bryologists; Austin, for example, received collections from bryologists in British Columbia, New Brunswick, South Carolina and Florida, as well as from New York State. Peck corresponded with a dozen other bryologists, and sent out many specimens.

The nineteenth-century bryologists came from a variety of professions, and many of them traveled widely. Thomas Potts was a druggist, Clinton, a judge. George Best, Elliot C. Howe, and Smith Ely Jeliffe were all physicians, as well as aetive bryophyte collectors in different parts of the State. William Brewer was a geologist and botanist and later professor of agriculture at Yale University. He made collections in California and Alaska as well as in New York. Orator Cook, an early collector of hepatics in New York State, was an agent for the State colonization Society in Liberia, and collected specimens there and also in the Canary Islands. George Nash, head gardener at the New York Botanical Garden, collected in Florida and Haiti as well as in

(photo by A. B Wellborn)

Closeup of *Hylocomium splendens.*

New York. Anna Murray Vail, librarian at the Garden, colleeted in New York before moving to France.

Perhaps the most interesting of the earlier collectors was Robert Statham Williams (Steere, 1945). At the age of 20, he moved out to the Montana wilderness where he was a homesteader, miner, explorer, and Pony Express rider. During the gold rush, he moved to the Yukon and became the first resident bryophyte collector. After trips to Peru, Bolivia, the Philippines and Panama, all in the early 1900's, he gave up his travels and worked for most of his remaining years at the New York Botanical Garden.

In the Adirondack region of New York State, much bryological exploration has taken place since Lesquereux's early mountain trips. Among the collectors near the turn of the century were Elizabeth Knight Britton, Charles H. Peck, Annie Morrill Smith, and Caroline Haynes. Elizabeth Britton, who was brought up in Cuba and later made many West Indian bryophyte collections, was largely responsible for building up the early bryophyte collections at Columbia University and the New York Botanical Garden. She did much collecting in the Adirondack high peaks area, particularly in the 1890's while staying in several of the early lodges, such as the Ausable Club Lodge, St. Hubert's, and Adirondack Lodge near Lake Placid. She collected in the heart of the mountains from these locations, as I have discovered by examining her herbarium specimens at the New York Botanical Garden.

Charles Peck, then State Botanist, published in 1898 an account of the plants of the town of North Elba, Essex County. This town includes several of the Adirondack high peaks, including Mt. Algonquin (McIntyre). He also commented on collections made on Whiteface Mountain, although this mountain is north of the town boundary. Peck listed 149 mosses and 32 liverworts, most of which were eollected by Britton or himself. Other collectors included George Atkinson, mycologist and Cornell professor. Peck gave habitats as well as localities for the more unusual species. The localities given show that some of the best collecting areas for bryophytes, such as Mt. Algonquin and Indian Pass, were already well explored at this early date.

(photo by A. B. Wellborn)

Hylocomium splendens, **a moss collected early in bryological exploration of the Adirondacks, by Peck on Mt. Marcy.**

Annie Morrill Smith and Caroline Haynes also collected bryophytes in the Adirondacks in the early 1900's. Annie Morrill Smith studied botany in Europe, was editor of *The Bryologist* from 1900 to 1910, and eventually gave 20,000 moss and lichen specimens to the Brooklyn Institute of Arts and Sciences. In 1906, she published in *The Bryologist* a list of mosses from the vicinity of Little Moose Lake, near Old Forge in the western Adirondacks. In the same issue Caroline Haynes published a list of hepatics from the same region.

Much bryological exploration was also done in the Lake George region and the southern Adirondacks. One of the earliest collectors (1864–68) was Dr. E. C. Howe of Yonkers. Dr. Smith Ely Jeliffe collected in 1888–89 around Huletts Landing, and Dr. George Hulst, a Brooklyn botanist, at Assembly Point in 1898–99. Stewart Burnham (1919, 1920, 1929) of Hudson Falls published lists of bryophytes of the Lake George region. The region was broadly defined and specimens from Washington, Saratoga, and even Essex and Warren Counties were included. Many bryologists were involved in the compilation of these lists, in addition to the above. Among them were George Clinton, Charles Peck, Elizabeth Britton, and also Wallace Greenalch of Albany, who collected in many parts of the State at the turn of the century. Burnham's own collections were first made in 1892 and were determined by Professor John Holzinger. Later, A. L. Andrews and Carl Warnstorf were involved in determining *Sphagnum* species; A. W. Evans and Caroline Haynes were among those determining hepatic species. Daisy Levy (1919) also published a separate list of mosses from Lake George.

It is clear that a great many bryologists were active in New York State and particularly in the Adirondack region prior to 1920. More recent Adirondack collectors include F. J. Herman, Stanley J. Smith, E. H. Ketchledge, Daniel Norris, Norton Miller, Richard Andrus, and myself.

All the early work on bryophytes in the State was floristic. That work continues and species new for the State and for the Adirondacks are still being discovered. In the checklist of the mosses of New York State compiled by E. H. Ketchledge (1957), the State was divided up into floristic districts based on latitude and longitude. A few more mosses have been discovered in the State since then, and there are many new district records, including a few from my studies. No similar published checklist is yet available for hepatics. Habitat information was given by some of the above authors, notably Peck and Burnham, but there is a lack of published ecological studies of bryophytes in New York State. In this respect, the present work is a pioneering venture; much of it could not have been carried out, however, without the floristic work of so many of these bryologists.

The Study of Species Diversity

Although diversity has long been of interest to biologists and naturalists, the interpretation of diversity has been a great challenge to ecologists in the past 15 years. Species diversity is of prime importance in understanding community structure and the dynamics of natural communities. Diversity, both in terms of species richness or variety (the number of species present) and of the relative abundance of these species, has been related to other important aspects of community structure. These include productivity, succession, stability, competition and habitat complexity. In addition to its theoretical importance in understanding community structure, diversity is also of practical importance for interpreting vegetation changes following human disturbance.

Species diversity has been studied in a great variety of organisms including diatoms, insects, fish, lizards, birds, mammals, and vascular plants. Vascular plant studies relevant here include those by Johnson, Mason, and Raven, 1968; Whittaker, 1965, 1969; Pielou, 1966, 1969; Monk, 1967; Monk, Child, and Nicholson, 1969; Johnson and Raven, 1970; Auclair and Goff, 1971; Risser and Rice, 1971; Reiners, 1972; Shafti and Yarranton, 1973; Nicholson and Monk, 1974; and Siccama, 1974. Most of the vascular plant work deals largely with tree diversity, although several of the above also include shrubs and herbaceous vascular plants.

Few diversity studies have been carried out on nonvascular plants other than phytoplankton. Nash (1972) discussed lichen species diversity in relation to pollution; Hoffman (1971) discussed diversity of epiphytes on Douglas fir, and a study of plant diversity in Alaska by Reiners, et al., includes bryophytes. Nonvascular plants, and especially bryophytes, show high species richness in many different habitats, and constitute a relatively important component of the vegetation at a variety of latitudes, as, for example, in tropical and temperate rainforests, boreal bogs, and Arctic tundra. The relationships of bryophytes to other primary producers in a community have been explored to some extent in terms of biomass (Bliss, 1966) but not in terms of diversity or of theoretical aspects of community structure.

Phytosociological studies of bryophytes, or analyses of vegetation in which bryophytes are recognized as an important component, have been carried out especially in Europe (Dahl, 1957; Gimingham, 1966; Yarranton, 1967a) and in Canada (Stringer and LaRoi, 1970; Yarranton, 1970; Neal and Kershaw, 1973; Stringer and Stringer, 1973).

Bryophytes differ from most vascular plants in some aspects of their basic biology: nutrient procurement (lack of roots), dispersal (spores, swimming sperm, vegetative propagules) and genetic system (dominance of haploid plant). It seems likely that some of these differences cause bryophytes to play a different role in community structure from vascular plants of similar size. The present study was undertaken to elucidate diversity relationships among bryophytes, and the relation of bryophytes to the structure and evolution of communities in which they are found.

Some basic questions can be asked about diversity in the Adirondack and Helderberg plant communities analyzed in the present study. Trees, shrubs, and herbaceous vascular plants as well as bryophytes were included. For example, by sampling a particular segment of a community, e.g., vascular plants, is one "obtaining an index to the overall diversity of the system" (Johnson and Raven, 1970)? Are diversity patterns for shrubs, for example, similar to those for bryophytes as one ascends Whiteface Mountain? Is species number a sufficient indicator of diversity, or is an evenness component, based on the relative abundance of the species present, also important? This evenness component of diversity has also been related to the question of whether certain groups of organisms consist largely of opportunistic or equilibrium species (Tramer, 1969). The present study provides data on this question for bryophytes, some of which are considered opportunistic on other grounds (Schofield, 1971; Schuster, 1966).

Other questions concern taxonomic diversity. Should all species be considered ecological equivalents in terms of diversity? Should a forest with three species of oaks as dominants or a bryophyte community with three species of *Polytrichum* be considered as diverse as one with three dominants, each belonging to a different genus?

If there are relatively few species in a community, as, for example, in the arctic-alpine communities above timberline, are the species more likely to belong to different genera than if there are many species? Such questions of taxonomic diversity have been explored for other organisms (Lloyd, Inger, and King, 1968; Simberloff, 1970) but not previously for bryophytes.

In many previous studies, attempts have been made to correlate diversity with environmental factors, both biotic and abiotic. This has not been done for bryophytes except in specialized communities, such as bryophytes of bogs (Vitt and Slack, 1975) or epiphytic bryophytes (Hoffman, 1971). I have studied bryophyte diversity in relation to a number of such factors in the Helderbergs (Kenrose Preserve), part of the present research.

Several workers have attempted to determine the variables affecting species diversity in a particular region using multiple regression analyses. Such studies largely concern birds or vascular plants. I have made a similar analysis of mosses of New York State, using the checklist compiled by Ketchledge (1957), based on districts into which the State has been divided for floristic studies. Variables used in the analysis and results obtained are discussed below. One result, that the range of elevations within a district is an important determinant of diversity, was used in setting up my field studies. These studies included gradient analysis of bryophyte diversity in relation to other environmental factors. Biotic factors such as diversity of other primary producers in the community have also been considered. The methods used in these studies are described in the following sections.

The Study Areas

Adirondack Areas—Whiteface and Ampersand Mountains

Adirondack field studies were carried out in the two floristic districts with the greatest range of elevation in New York State, districts 3 and 4 (see map, fig. 1). These districts include the Adirondack high peak area, including the highest mountain in the State, Mt. Marcy, 5344 ft (1629 m). The summits of this mountain and of several other Adirondack peaks including Whiteface Mountain, 4867 ft (1484 m) are above timberline and support an arctic-alpine flora. One major part of this study was conducted on Whiteface over an elevation range of 1600 to 4800 ft (488-1463 m). Whiteface, the fifth highest peak, is located at 44°21′, ten miles north of the major high peak area of the Adirondacks. As a solitary peak it is more exposed than the other mountains in that area, and the summit is particularly subject to rigorous climatic conditions.

The winter is long and the growing season correspondingly short, only 80–105 day in this part of the Adirondacks (Stout, 1956; Feuer and Hager, 1956; Hartwig and Peech, 1963). At the higher elevations of Whiteface, it may average only 50–70 days (Nicholson and Scott, 1969). I have seen several feet of snow in June in the balsam fir (*Abies balsamea*)[1] forest at 4400 ft (1341 m) on Whiteface.

The other Adirondack study area was Ampersand Mountain in district 3, south of Saranac Lake (see map, fig. 1). This mountain, just over 3300 ft (about 1000 m) shows little sign of disturbance by fire, logging, or other human activity. Epiphytic vegetation is well developed on this mountain, bryophytic epiphytes occurring on a variety of hardwood and conifer trees. These epiphytes were also included in the present study. The elevations studied on Whiteface and Ampersand Mountains overlap between 1600 and 2800 ft (488–854 m) so that both hardwood forest and spruce-fir forest vegetation could be compared on the two mountains.

Heimberger described the vegetation types for the Adirondacks (1934), but little work was published on the Adirondack forest for the next 30 years. Since 1963, a large scale study of the vegetation of the Whiteface area, particularly in relation to topographic gradients has been conducted (France and Lemon, 1963; Holway, Scott, and Nicholson, 1964; Scott and Nicholson, 1969; Scott and Holway, 1969; Nicholson and Scott, 1969; Breisch, et al., 1969). Soil (Witty,

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[1] Names of vascular plants follow Fernald, M. L. 1950, Gray's Manual of Botany, American Book Co., New York, with the exception of *Quercus borealis* Michx.f. and *Betula alleghaniensis* Britt.

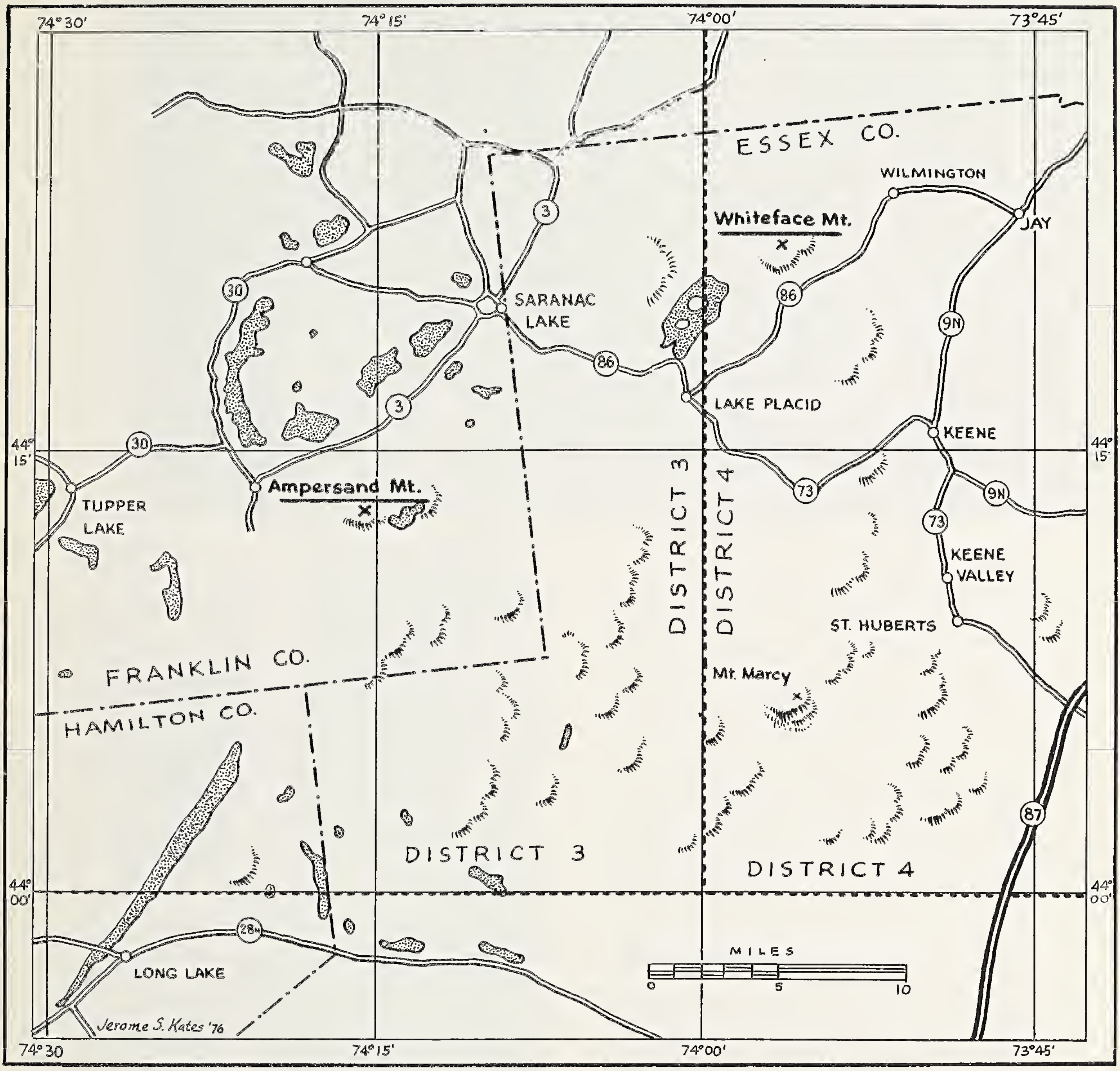


FIGURE 1 Whiteface Mt. and Ampersand Mt., sites of Adirondack field studies. By Jerome S. Kates.

(photo by N. G. Slack)

Deciduous forest of considerable *Betula papyrifera*, along Wilmington trail, Whiteface Mountain.

1968) and weather data (Falconer, 1963) have also been published. Very little of the published work bears directly on diversity of bryophytes. According to the above authors, nonvascular plants were not included in their studies because of the difficulty of identification.

The Wilmington trail area of Whiteface Mountain, in this study, has not been damaged by tourists; it is, in fact, much less used than the trails in the Marcy-Algonquin region of the Adirondack high peaks. Summit disturbance is confined to the relatively small area visited by tourists; no quadrats were established in that area. The great majority of the area above timberline is undisturbed except by natural rockslides. Some areas at lower elevations on Whiteface, particularly between 2000 and 2500 ft (about 600–750 m) are undergoing secondary succession, probably as a result of fire, as indicated by the presence of *Betula papyrifera*, *Populus grandidentata*, and other successional trees. Disturbance is not recent; there have been no major fires here for at least 50 and probably 70 years (Holway, Scott, and Nicholson, 1969). There has been no lumbering since 1896 when protective forest legislation was established. By using one of these areas, bryophyte diversity and species composition could be compared for "disturbed" and "undisturbed" areas (or earlier and later stages of succession of canopy trees) at the same elevation. I have made this comparison both on Whiteface and between Whiteface and Ampersand Mountains.

(photo by N. G. Slack)

Base of Whiteface Mountain trail, near Wilmington, N.Y.; hemlock-hardwood forest.

Helderberg Area: Kenrose Preserve

The third area I used in this study was Kenrose Preserve, a deciduous forest area on the Helderberg plateau. It is the property of The Nature Conservancy and is located in the Rensselaerville Quadrangle (U.S.G.S.) in West Berne, New York, west of Albany (42° 36′N, 74° 12′W). Although the whole preserve is on Hamilton shale and is completely within the Deciduous Forest Formation (including Hemlock-hardwoods, Braun, 1950), there is much variation in tree composition. Forest types include oak-hickory, beech-maple, hemlock, and other combinations of dominants. The elevation range is from 1120–1500 ft (335–457 m).

The vascular flora of Kenrose Preserve was studied quite extensively in 1968-69 by Carl George, Robert Carlson and their students (unpublished manuscript). They set up permanent quadrats for the purpose of establishing a base line for future vegetation studies. Some of their vascular plant and environmental data are used in conjunction with my bryophyte data in the present study.

Field Methods

Adirondacks

Quadrats were set up on both Whiteface and Ampersand Mountains at 400 foot (122 m) elevation intervals beginning at 1600 ft (488 m), with two quadrats at each elevation. In addition, five quadrats were set up in the arctic-alpine summit area on Whiteface. The quadrat size was five by eight meters. I selected this large quadrat size because it was adequate for sampling vascular ground flora as well as bryophytes, and also because bryophytes were rather sparsely distributed at some elevations. With the large quadrats, I was able to compare bryophyte cover at different elevations and in different forest types.

As it was not possible to place transects straight up the mountains, quadrats were placed perpendicular to and at a predetermined distance from the trail, where the trail reached the selected elevations. At these distances, eight meters on Whiteface and 15 meters on Ampersand, there were no apparent disturbance effects of the trails. Because quadrats were regularly placed, there was no possibility of choosing them either for bryophytes or forest type, except as these are influenced by elevation, the independent variable in the study. Quadrats were delineated with iron spikes and copper wire and are relocatable.

Quantitative methods were used to record bryophytes as well as vascular plants. Vascular plants were counted as individuals in all quadrats except those on the summit of Whiteface (see below). For some plants, e.g., *Ribes glandulosa*, it was difficult to determine what constituted an individual. In such cases, separate stems were counted. It is rarely possible to accurately determine what constitutes an individual bryophyte plant; therefore, cover was measured for bryophytes. The area covered by each species was computed by measuring length and width, radius, or triangle base and height for variously shaped clumps. I have found these methods repeatable to within five percent accuracy. Actual measurements are more precise than estimates using a cover scale, especially since cover scale data are often converted into percentage cover by statistically questionable techniques. In addition, many bryophyte species, e.g., *Ptilidium pulcherrimum* or *Dicranum montanum*,[1] are present in numerous small pieces within a quadrat, so that cover is hard to estimate. In the summit areas of arctic-alpine flora, cover measurements were used for vascular plants as well as for bryophytes because all the plants occurring there, e.g., *Vaccinium uliginosum*, have a clumped or cespitose growth form and cannot be counted as individuals.

Studies made at only one season may underestimate total diversity. Whittaker (1965) found this to be especially true for winter ephemerals in the desert. In order to find out whether spring ephemerals were significant in the Adirondacks, I restudied several quadrats on both mountains. Spring data were compared with those of the previous summer and fall to determine the extent of seasonal diversity.

Certain specialized bryophyte habitats are not represented or are underrepresented in a large study of this type. One such habitat is that for epiphytic bryophytes, living trees. I have collected data on species richness of epiphytic bryophytes on Ampersand Mountain. The epiphyte study is discussed separately below.

Helderbergs

At Kenrose Preserve, George and Carlson had set up permanent stations and quadrats. I relocated and used 13 of their original stations, all in wooded areas. George and Carlson (unpublished data) recorded the number of individuals for each species of vascular plant, using five 12 by 48 foot quadrats at each station. They also collected soil and micro-climatic data for each station. These collected soil type, pH, and nutrient content; soil and air temperature; relative humidity, and light intensity. (For further details of the design of this original study see Slack, 1971.) In the present study, I have used 4 by 16 meter quadrats, but

[1] Names of mosses follow Crum, Steere, and Anderson, 1973, and of hepatics, Schuster, 1953.

(photo by C. J. George)

Kenrose Preserve, showing one of the slopes studied.

have collected data for the included 12 by 48 foot quadrats as well. The small extension made virtually no difference in the diversity index results; bryophytes are relatively sparsely distributed in the whole area as compared to the Adirondack sites.

At least one 4 by 16 meter quadrat was sampled for each station. At six of the 13 stations, at least two quadrats were sampled in order to compare within-station and between-station variation in diversity and species composition. Twenty quadrats were completely sampled for bryophytes, using the same cover measurements as explained above for the Adirondack quadrats. The study was set up to include pairs of stations at the same elevations so that I could determine whether elevation differences over the relatively small range of 1120 to 1510 ft (335–457 m) are statistically important determinants of diversity.

Analysis of Data

Diversity Indices

The term "species diversity" has been used for two different types of measurements. The first type, which measures species richness, is sometimes called a variety index (Auclair and Goff, 1971). It is essentially based on the number of species per area. (Gleason, 1922; Willis, 1922; Margalef, 1957; Menhinick, 1964) or on species number and a hypothetical distribution of relative abundance (Fisher, Corbet and Williams, 1943; Preston, 1948, 1962). Number of species (signified by S) is used in the present study.

The second type of index includes an evenness or equitability component in that the relative abundances of the species in the sample are included in these measures. The most commonly used of these came originally from information theory. Margalef (1957) suggested an analogy between diversity in biological communities and "information" content. The usefulness of this analogy and the biological meaning of diversity, particularly in regard to stability, has been questioned (Paine, 1969; Pielou, 1969; Auclair and Goff, 1971; Hurlbert, 1971; Goodman, 1975). The indices themselves, however, have been used in studies with many kinds of organisms as empirical measures of species richness and relative abundance of species. When used in this way the information theory type of measure is considered a "more meaningful index when used as a comparative statistic within taxonomically restricted groups" (Goodman, 1975). The index most often employed by ecologists and therefore most useful as a comparative statistic is Shannon's formula (Shannon and Weaver, 1963):

$$H' = -\Sigma p_i \ln p_i \qquad (1)$$

where p_i is the proportion represented by the i^{th} species. This is the diversity index I have used in the present research. Pielou (1966a, 1966b, 1969) has discussed the use and misuse of this and similar indices for different types of biological collections. The use of this form of Shannon's index is justified in terms of the sampling methods used in this study. Several workers have compared this index and other diversity indices such as Simpson's (1949) and McIntosh's (1967) using the same data and found very high correlations among them (Auclair and Goff, 1971; Nicholson and Monk, 1971, Gauch, Chase, and Whittaker, 1974). It appears that in spite of somewhat different theories on the part of their authors, these indices measure essentially the same parameters.

Measures of Importance

In Shannon's formula (1, above) the term p_i refers to the proportion of the total number of individuals (or total biomass, cover, etc.) belonging to the i^{th} species. The number of individuals has usually been used, particularly in the study of bird diversity (e.g., MacArthur and MacArthur, 1961; MacArthur, 1964; Tramer, 1969; Recher, 1969), by other animal and plankton ecologists (e.g., Lloyd, Inger, and King, 1968; Margalef, 1968), and in most plant studies (e.g., Pielou, 1966a; Nicholson and Monk, 1974). I have used proportions of individuals for vascular plants in the present study except in the alpine quadrats. For alpine vascular plants and for bryophytes, I have used proportion of cover for each species.

Other measures of relative importance have been suggested for both animals and plants, particularly where there are large differences in size among the species sampled (Dickman, 1968). I have treated trees, shrubs, and herbaceous plants separately in most analyses, eliminating the relative size problems. Cover measurements do underestimate the importance of tall clump-forming species as compared to prostrate pleurocarpous mosses with the same cover value. It would be possible to measure height as well as area covered and compute a volume for use in the index. Alternately, one could harvest the bryophytes and use biomass (dry weight) or energy (caloric value as measured in a calorimeter). Forman (1968) has attempted to correlate cover measurements with biomass and caloric value on a species basis, but results are not entirely consistent; Bliss (1962) and Forman (1968) found somewhat different values for *Polytrichum juniperinum*, the only species used in both studies. Variations in growing conditions probably affect the cover-biomass-calorie relationships.

Biomass has been used as a measure of importance in tree diversity studies (Wilhm, 1968). Since a very high percentage of tree biomass consists of dead xylem tissue, the values are out of proportion to the present dynamics of the community. Whittaker (1965, 1970) has championed the use of productivity measurements and has used these successfully for both woody and herbaceous plants (Whittaker, 1965, 1966; Whittaker and Woodwell, 1969). From a theoretical point of view, productivity (or net photosynthesis for primary producers) per unit time is probably the best measure of the importance of a species in a community. It is, however, difficult to obtain the necessary data for a large number of different species. Tree productivity is usually estimated by using dimension analysis as Whittaker and Woodwell (1969) have done.

Productivity measurements are especially difficult to obtain for bryophytes because information on growth rates in the field is available for only a few species (Longton and Greene, 1969). Furthermore, in contrast to the situation in most vascular plants, it is often extremely difficult to ascertain what constitutes the current year's growth. Techniques worked out by Watson (1975) for *Polytrichum* species might be useful here. Without biochemical tests involving the breakdown of chlorophylls to pheophytin, it is often impossible to tell what portion of a moss is alive, and even such tests are not discriminating in certain genera such as *Sphagnum*. Although progress is currently being made on productivity measurements for bryophytes in the Arctic, it is doubtful that these measurements will ever be feasible for as many different species as were encountered in the present study. For the present, cover measurements appear to be the best available for bryophytes for use in diversity studies. However, volume measurements may be preferable when there are striking differences in height among species. Biomass measurements of living material are perhaps equally suitable, but these require destruction of the community, or a portion of it, in the process of studying it. Such measurements have recently been used successfully for studies of epiphytes on old-growth *Pseudotsuga* (Denison, et al., 1972, Pike et al., 1975).

The Evenness Component of Diversity

Lloyd and Ghelardi (1964) and others (Kricher, 1972, Murdock, et al., 1972) have pointed out that it is desirable for some purposes to be able to isolate the relative abundance component of diversity as measured by Shannon's index. Margalef, under the subject of "redundancy," had already pointed out the importance of this component in his original 1957 paper. The ecological meaning of this evenness (or equitability) component has been the subject of considerable discussion (Sager and Hasler, 1969; Tramer, 1969; Hill, 1973). Some of this discussion concerns the relationship between the evenness component of diversity and opportunistic versus equilibrium species groups. This question will be explored further in conjunction with my results for bryophytes.

The measure for evenness used in the present research is

$$J' = H'/H' \max \qquad (2)$$

where $H'\max = \log_e S$. Pielou (1966a) suggested using $H'/H'\max$ to measure evenness of distribution of species abundance, and Tramer (1969) subsequently called it J'. J' is not based on any hypothetical ecological maximum for evenness, and has the further advantage of being the most widely used measure; therefore, comparisons can be made with other research.

(Note: $H'\max$ represents the maximum possible diversity for a given number of species (S) ; i.e., the value of H' if all species were equally abundant. For further discussion of this and other evenness or equitability measures see Slack, 1971.)

Comparison of Species Composition

Diversity indices themselves cannot tell us anything about changes in the actual species composition. We may find, using Shannon's formula, that the diversity of bryophytes is almost the same for quadrats at 1600 ft (490 m) and at 4000 ft (1220 m) on Whiteface Mountain, but this gives no information about floristic similarity at the two elevations. Southwood (1964) reviewed a number of indices for comparing faunas (or floras) over space or time. Two types of indices have been used. One group, collectively called Coefficients of Community, are based solely on species presence. These include those of Jaccard (1922), Kulezynski (1928) and Sϕrensen (1948). The latter, a variant of Jaccard's, as pointed out by Dahl (1960), has been most often used:

$$\text{Sϕrensen's Quotient of Similarity (Q.S.)} = \frac{2w}{m + n} \qquad (3)$$

in which m is the total number of species in the first sample (or quadrat), n the total number in the second, and w the number of species common to both samples

The second type of index uses the relative abundance of the species in the sample, not merely their presence, in making comparisons. In so doing it tends to emphasize the importance of dominant species in weighting similarity between samples. An often used measure of this type is the Percentage of Similarity (Raabe, 1952)

$$\text{Percentage of Similarity (\% Sim.)} = \Sigma \min (a,b, \ldots x) \qquad (4)$$

where min = the lesser of the two percentage compositions for species a, b, . . . x in the two samples. For example, given the following percentage compositions or two quadrats A and B having species a, b, and c:

		a	*b*	*c*			*a*	*b*	*c*
case 1	A	.95	0	.5	case 2	A	.95	0	.5
	B	.20	.75	.5		B	.75	.20	.5

the % Sim for case 1 = .20 + 0 + .5 = .25
whereas Sϕrensen's Q.S. = 2(2)/5 = .80

the % Sim for case 2 = .75 + 0 + .5 = .80
whereas Sϕrensen's Q.S. remains the same

Thus it can be seen that the Percentage of Similarity index (4) rates as most similar those samples (quadrats) that have similar dominants. In this example, Sϕrensen's index (3) appears to overvalue the rare species (species c in both cases 1 and 2 above) as pointed out by Whittaker and Fairbanks (1958). This is not always so, however. A large number of rare species can give low Sϕrensen values as compared with Percentage of Similarity for the same quadrats. Comparison of the two types of indices have been made by Kontkanen (1950) for leafhoppers and by Whittaker and Fairbanks (1958) for freshwater plankton. Kontkanen found the Coefficient of Community type of index more satisfactory; Whittaker and Fairbanks, the Percentage of Similarity. The group of organisms with which one is working is probably the important factor.

I have used both Sϕrensen's index and Percentage of Similarity as well as two variants of Sϕrensen's with my data. These variants involve the calculation of Sϕrensen's index using only those species which, respectively, constitute at least 1 percent (referred to as Sϕr. .01) and at least 5 percent (Sϕr. .05). The objective was to compare the effectiveness of all four methods in evaluating floristic similarity. The latter two methods evaluate the effect of the inclusion of rare species. Cluster analysis was used to compare these measures of floristic similarity. The method used was essentially a modification of Harmon's B-coefficient (Fruchter, 1954; Slack, 1971).

In addition to the above methods, which all compare quadrats in pairs, I have used a method of Dahl's (1960) to compare the vegetation, both bryophyte and vascular, of Whiteface Mountain with that of Ampersand Mountain, and the vegetation of both Adirondack sites with that of the Kenrose Preserve. The deciduous forest, spruce-fir forest, and arctic-alpine vegetation were compared both within and among the areas (Slack, 1971).

Taxonomic Diversity

A question was raised in the introduction as to whether all species are ecological equivalents in terms of diversity; e.g., is a bryophyte community with three species of *Polytrichum* (or *Sphagnum*, or *Dicranum*) as dominants as diverse as one having three dominants each belonging to a different genus? One way in which this question can be examined is in terms of niche separation; congeneric species with widely separated niches can, it seems to me, be considered ecological equivalents of species in different genera in terms of diversity. Congeneric bryophytes in genera such as *Dicranum*, *Polytrichum*, *Grimmia*, and *Brachythecium* were found in the same quadrats in this study. I have examined these genera in regard to possible niche separation.

Quantitative analyses of taxonomic diversity can also be made. I have calculated the number of congeneric species in a quadrat in relation to the total number of species in that quadrat. In bird studies (Grant, 1969), the proportion of congeners has been found to vary directly with the total number of species; it was not known whether this was true for bryophytes.

In addition, total species diversity (H′) for bryophytes in each quadrat has been partitioned into specific, generic, and familial portions, as was done by Lloyd, Inger, and King (1968) for frogs, lizards, and snakes in the Borneo rain forest. These calculations are subject, of course, to decisions of taxonomists as to what constitutes a genus or a family. Family lines in particular are in considerable dispute for bryophytes, and some larger genera have been especially subject to splitting, for example, *Lophozia, sensu latu*. Species lines are in general less of a problem with most genera of bryophytes. Hybridization appears to be uncommon in bryophytes (Khanna, 1962; Williams, 1966).

Gradient Analysis

The major gradient used in this study was elevation. Changes in bryophyte and vascular plant vegetation were analyzed in relation to elevation. These changes included the following: changes in species richness (S) and in species diversity (H′); changes in species composition; changes in relative cover of bryophyte species. Comparisons of species composition at different elevations were made by using Sϕrensen's and Percentage Similarity indices as explained above. Other methods were graphical and are self-explanatory.

Multiple Regression Analysis

Multiple regression analyses were carried out in regard to determinants of species richness in bryophytes both for New York State as a whole (see following section) and for Kenrose Preserve. In Kenrose Preserve, a large number of abiotie and biotic factors were used in the regressions. A stepwise multiple regression program (STEPREGI: SUNYA code: STAT/02) was used. Correlation coefficients between bryophyte diversity (H′) and environmental and other parameters were also calculated.

Bryophyte Diversity in New York State

Bryophyte diversity in the whole was examined by means of a multiple regression analysis of data from Ketchledge's (1957) checklist of mosses of New York State. Since there are no comparable data for hepatics, this analysis is restricted to mosses. The checklist gives the moss species present in each of the districts of New York State (see fig. 2) as determined from herbarium and field studies. These data are largely free of taxonomie problems; the specific status of only a few

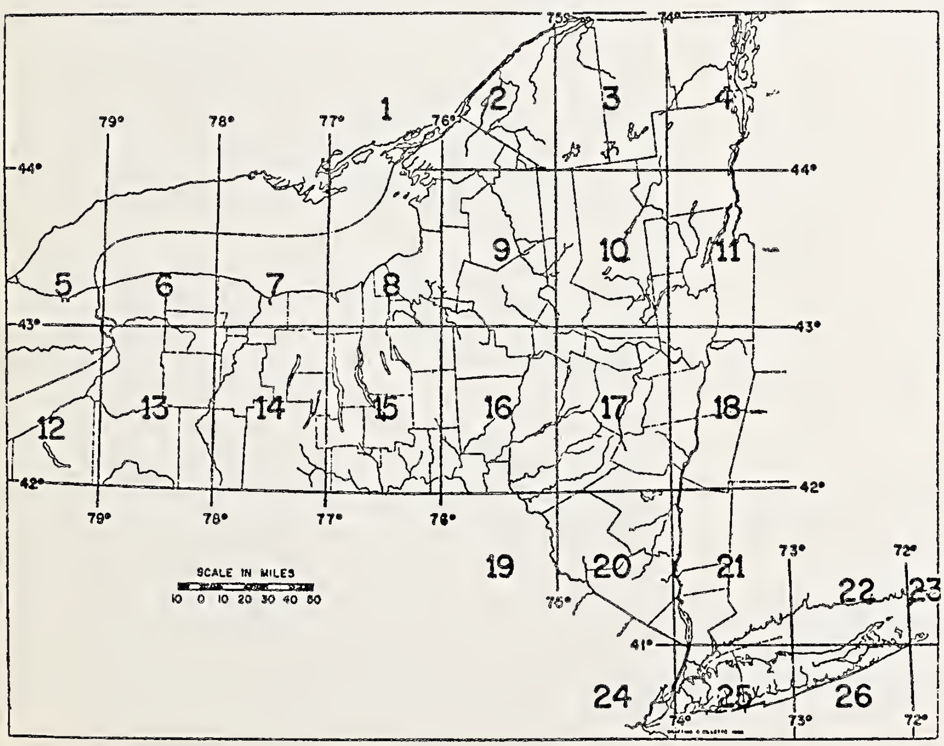


FIGURE 2 Floristic districts of New York State, from Ketchledge, 1957.

taxa is in doubt. Some of the districts, however, had been better explored than others, for example, those close to New York City and to Cornell University. Moreover, additional species have since been discovered for various districts, including a few that I found in the three districts involved in my studies. Nevertheless, these are probably the best data of this sort available for American bryophytes.

The parameters used in the linear regression analysis of these data were latitude, area, and the range of elevations within one district. The range of elevations ("elevation range" on the table) was obtained from topographic maps (USGS) of the State. Areas of districts were determined by planimeter measurements from State roadmaps.

Results of the multiple regression analysis are shown in table 1. In this table r^2 and R^2 are the coefficients of determination and multiple determination, respectively. It can be seen that range of elevation acts as a major determinant ($r^2 = 0.5159$) of moss diversity in terms of species richness (S). Area adds very little as a determinant ($R^2 = 0.5665$).

TABLE 1

Coefficients of Determination (r^2) and Coefficients of Multiple Determination (R^2) from Multiple Regression Analysis based on Checklist of the Mosses of New York State

Parameters	r^2	R^2
Area	0.3745	
*Latitude	0.0001	
Area with Latitude		0.3748
Elevation Range	0.5159	
Elevation Range with Area		0.5665
Elevation Range with Area and Latitude		0.5679

*Latitude is not a significant variable.

Although there is a latitude range of almost five degrees in New York State, latitude is of no importance as a predictor of diversity ($r^2 = 0.0001$). A few species may be affected by latitude. *Pogonatum brachyphyllum*, a coastal plain species is found only as far north as Long Island, and there are old records for such southern species as *Syrrhopodon floridanus* and *S. texanus* in the southernmost districts (Ketchledge, 1957). Two far northern species, *Aulocomnium turgidum* and *Conostomum tetragonum* are found in a northern district, but at elevations over 5000 ft (1525 m). Their presence is almost certainly an effect of elevation, not latitude; no unusual species are found in the northwestern districts of the State, which are at the same latitude but do not include the higher elevations.

Area has surprisingly little value as a predictor of species richness, in contrast to the results of other studies, particularly island studies, in which area was the most important predictor. These include bird studies (Hamilton, Barth, and Rubinoff, 1964) and vascular plant studies (Johnson, Mason, and Raven, 1968; Slack and Nicholson, in preparation). Hamilton, et al., (1963) did find elevation more important than area for vascular plants of the Galápapos, but this conclusion has been questioned (Johnson and Raven, 1973) because of the inadequacy of the plant data used. Vuilleumier (1970) studied bird species richness on continental "islands," páramo vegetation on isolated mountain tops. He, too, found area, together with distance from the source, the important predictors of species richness.

Since this is not an island study, distance from the source of the vegetation is probably not a factor in New York State. It probably is a factor, however, in comparing species richness of bryophytes in New York and in the Southern Appalachians, or for example, in the Adirondacks and the Southern Blue Ridge (Slack, 1976). Larger area provides a larger target size for propagules and also more spacial heterogeneity, resulting in a wider range of habitats. The problems of immigration and establishment, so important for island species, are less important for bryophytes in New York State as a whole, except for species restricted to special "islands." Principles of island biogeography do apply to *Sphagnum* and hepatic species restricted to bogs and to those bryophytes found in tundra areas above timberline on Adirondack high peaks. (From my own experience this seems to be true. More arctic-alpine species of both vascular plants and bryophytes are found on the extensive tundra areas of Marcy and Algonquin than on peaks with less extensive areas. More *Sphagnum* species are found in the extensive Bloomingdale Bog area than in smaller bogs. Specific data are needed, however.) Apart from these special circumstances, it can be seen that area alone is not the important determinant by examining adjacent districts of essentially equal area—districts 14, 15, 16, and 17 (see fig. 2). Species richness varied in these districts from 102 to 281 species. Three of the smaller districts (4, 11, and 18), on the other hand, are among the five having the highest number of species in the State.

As shown in table 1, range of elevation was the best determinant of moss diversity. Those districts with the greatest elevation range, districts 3, 4, and 17 in the Adirondack and Catskill Mountains, all had high numbers of species—180, 266, and 281, respectively. Two of these districts were used in the present study in order to investigate further and more specifically the effect of elevation in relation to both moss and liverwort diversity. Another indication of this relationship within an area comes from a survey of the literature on latitudinal diversity of bryophytes (Slack, 1971). The number of bryophyte species reported for 31 different geographical regions at all latitudes was given together with the area of each region. Although the data for many of these areas, especially tropical ones, are admittedly incomplete, a number of tentative conclusions could be drawn. The one relevant here was that species richness is greater in regions of greater elevation range and low evapo-transpiration rates. Two more recent publications, giving compilations of the mosses of Japan (Iwatsuki and Noguchi, 1973) and of the Southern Blue Ridge of southeastern United States (Anderson and Zander, 1973) further substantiate these conclusions.

The regression analysis leaves a large part of the variance in species richness unexplained. It seems likely that a variable indicating the amount of bryological exploration for each district up to 1957 would have been helpful. When a new checklist is published with data collected since 1957, this analysis should be rerun. In addition, climatic factors such as annual precipitation (or precipitation in relation to temperature) could be added to the analysis. Variables indicative of spatial heterogeneity, such as types of rock outcropping, might also be important.

That elevation range is an important determinant of hepatic as well as moss diversity has been brought out in the field studies I conducted in New York State. The results of these studies will now be presented.

Results of the Adirondack Studies

Summary of Results

The results of the field studies, outlined here, are discussed in more detail under the separate headings below. A greater diversity of bryophytes occurred in a larger range of elevations. Increased overall diversity largely resulted from changes in species composition of bryophytes with change in elevation and, therefore, with forest type. Throughout the elevation range, species composition changed with increasing elevation difference between the quadrats sampled. Although a few species occur throughout the elevation range, I identified several distinct distribution patterns for bryophyte species by plotting their relative abundance at different elevations. Both species present and abundance varied with elevation. Species composition of bryophytes in deciduous forest was similar both between quadrats on one mountain and between mountains; this was true, but to a lesser extent, for coniferous forest. Arctic-alpine quadrats showed considerable variation in species composition, and almost no similarity existed between arctic-alpine and coniferous forest bryophyte communities.

Diversity, whether measured by S or H′ (see page 8), showed different patterns along the elevation gradient for each of the plant groups studied: bryophytes, trees, shrubs, tree seedlings, and herbaceous vascular plants. S and H′ also showed somewhat different patterns for any one group. For bryophytes, H′ changed very little up to 3600 ft (1100 m). High elevation balsam fir quadrats with late snow cover showed highest diversity (both S and H′) largely because of an increase in the number of species of hepatics. Both mean and maximum number of moss species per quadrat were similar for deciduous and spruce-fir forest, but lower in the arctic-alpine quadrats. For hepatics, species richness was higher in the coniferous than in deciduous forest, and lowest in the arctic-alpine summit quadrats although some species are restricted to this elevation.

In the deciduous forest at 1600 ft (490 m), S and H′ were about equal for bryophytes and for all vascular plants together; at all other elevations, bryophyte diversity was higher than that of vascular plants.

The evenness component of diversity (J′) varied greatly; in some circumstances extreme dominance by one species resulted in very low J′ and lower H′ values. Most of the J′ values were lower than reported by other investigators for birds and for vascular plants.

Diversity was not correlated with bryophyte cover (a long-term measure of productivity) for the whole elevation range. There is some indication, however, substantiated by the Kenrose results (see page 40), that within a deciduous forest area, H′ is positively correlated with total percent of bryophyte cover.

An inverse relationship was found between shrub and tree diversity and that of bryophytes, indicating interaction between these groups of plants. Competitive interaction between a bryophyte, *Pleurozium schreberi* and an herbaceous plant species, *Oxalis montana* was also studied.

Seasonal diversity, the epiphyte study made on Ampersand Mountain, and taxonomic diversity are each discussed separately below.

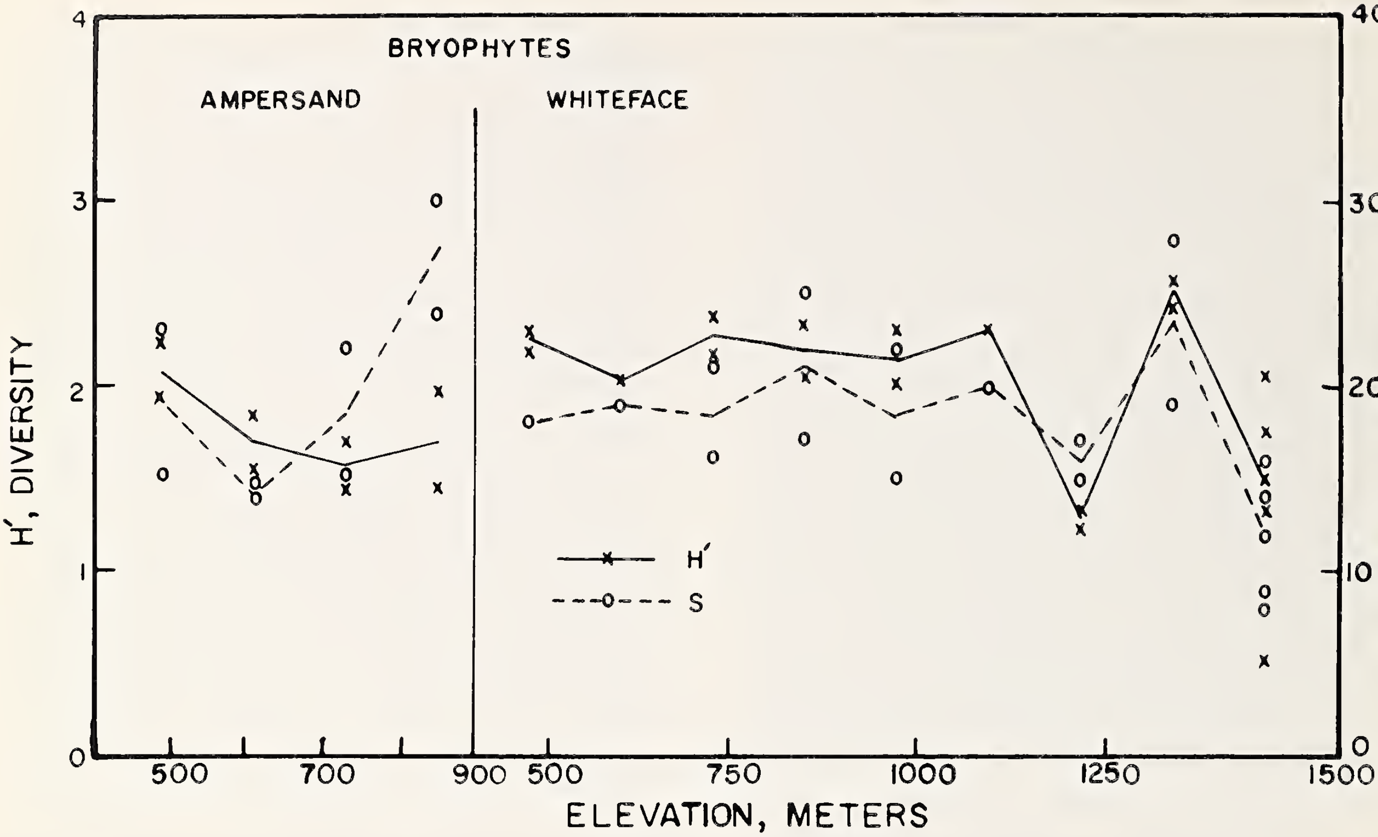


FIGURE 3 Changes in species richness (S) and diversity (H′) with elevation for bryophytes at Whiteface and Ampersand Mts.

Elevation in Relation to Diversity

Figure 3 shows changes in species diversity in terms of species richness (S) and for the Shannon function (H′). The latter contains an evenness component as explained above. Data for Ampersand and Whiteface Mountains are shown separately. H′ is seen to change surprisingly little from 1600 ft (490 m) to at least 3600 ft (1100 m) on Whiteface. At 4000 ft (1220 m) there was a sharp drop in H′ with, however, little change in the number of species, S. The low diversity (H′) is due here to the high dominance of one species, *Pleurozium schreberi*, which accounts for 59 to 67 percent of the total bryophyte cover. The resulting evenness values are very low, J′ = 0.44 to 0.49.

At 4400 ft (1340 m) on the other hand, both H′ and S increase. At that elevation, where there is dense *Abies balsamea* forest and very late snow cover until mid-June or later, an unusually high number of hepatic species increase the diversity.

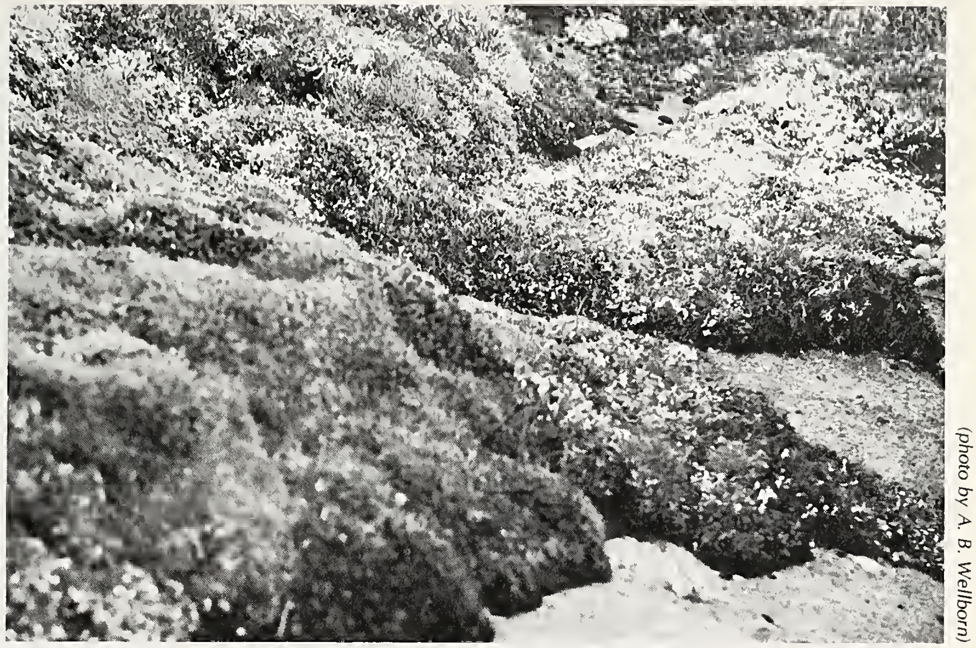
I studied additional quadrats at these elevations after the completion of the main study to determine whether the findings at these two elevations might be chance effects of sampling. Very similar results were obtained in this resampling at the same elevations:

4000 ft (1220 m):	first sampling	H′ = 1.33
	second sampling	H′ = 1.25
4400 ft (1340 m):	first sampling	H′ = 2.63
	second sampling	H′ = 2.41

The latter value (2.41), though not as high as in the first quadrat at 4400 ft, is nevertheless higher than that for any other elevation in the whole study.

The arctic-alpine quadrats vary greatly in diversity (H′). Many factors such as microtopography, slope aspect, wind exposure, snow and water retention changed over very short distances on the summit of Whiteface, producing a mosaic of vegetation. These factors are important in determining the vegetation types, both on Whiteface (Nicholson, 1969) and in the alpine communities of the White Mountains (Bliss, 1963). In general, both H′ and S are lower than in the deciduous forest or the spruce-fir, or in pure fir at 4400 ft (1340 m), but considerable variation was found

Author working in krummholz zone, Whiteface Mountain. *Andreaea rupestris* on rock in foreground.

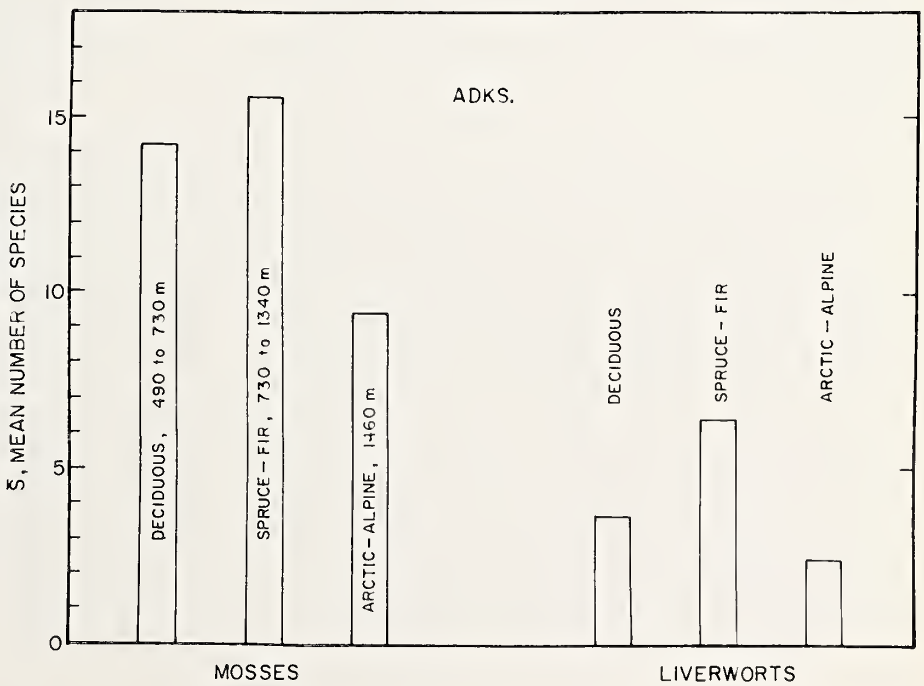


Bryophyte-lichen mat over rock, arctic-alpine zone, Whiteface Mountain.

both in numbers of species and in dominance relationships. Evenness (J′) varies from 0.25 to 0.80 for two summit quadrats with almost the same number of species (S = 9,8) resulting in diversity indices (H′) of 0.55 and 1.66, respectively. The bryophytes are important members of the plant communities on the summit is shown by the fact that the percent of bryophyte cover averages 20 percent.

Ampersand Mountain also shows little change in diversity (H′) with elevation, except that the highest diversity occurs at 1600 ft (940 m), an elevation where there is mature hemlock-northern hardwoods forest. Species richness (S) is similar to that of Whiteface quadrats at the same elevations, and is even higher at 2800 ft (850 m). H′ values are lower than on Whiteface, however, because of high dominance,

FIGURE 4 Changes in mean species richness (S) of mosses and liverworts with elevation and forest type for Whiteface and Ampersand Mts.



especially at 2400 ft (730 m) and 2800 ft (850 m), both of which are in the spruce-fir zone.

Figure 4 shows changes in species richness (S) with elevation for mosses and liverworts separately. (Data for Whiteface and Ampersand Mountains are combined.)

One can see that for mosses little difference exists between the deciduous and the spruce-fir forest. Mean species richness (S), however, decreases greatly from the spruce-fir to the arctic-alpine zone. The maximum number of species drops also, from 20 to 10. For liverworts, however, mean species richness (S) increases significantly between deciduous and spruce-fir forest (see fig. 4), from a maximum of six in the deciduous to 11 per quadrat in the spruce-fir. Higher humidity, lower light intensity and persistent snow cover may all contribute to the higher liverwort diversity, especially under the pure *Abies balsamea* at 4400 ft (1340 m). The summit quadrats show the lowest mean number of species with few or no liverworts in the drier, rockier quadrats. Several liverwort species, however, often with relatively high cover value, are found in wetter, more protected parts of the summit area. Such liverworts as *Gymnocolea inflata*, *Anastrophyllum michauxii*, *Lophozia ventricosa*, *Ptilidium ciliare* and *Scapania nemorosa* add considerably to the diversity of arctic-alpine quadrat 21, just northeast of the summit.

Changes in Species Composition with Elevation

The original hypothesis, that bryophyte diversity is higher when a greater range of elevation is included in the analysis, was tested and appears to be tenable for the State as a whole. This is based on the results of the multiple regression analysis, for the elevation range of the Adirondack study, 1600 to 4800 ft (490 to 1460 m). The hypothesis assumes that species composition changes along this gradient. Two techniques of direct gradient analysis (Whittaker, 1968, 1970) were used to test this hypothesis. Since the first of these involved using a similarity value for comparison of species composition between quadrats at different elevations, the results of the comparison of four such similarity measures are presented first.

The four methods used to compare species composition were Sφrensen's Q.S., Percent Similarity, and Sφrensen's using only those species having at least five percent cover and one percent cover, respectively (see Analysis of Data section). I compared these four methods, using data from all three areas and all five plant types. I also made comparisons for various combinations of plant types, for example, shrubs, seedlings, and ground flora. Results presented here, however, refer to bryophytes on Whiteface and Ampersand Mountains, unless otherwise stated. Percentage Similarity and Sφrensen's Q.S. values for all combinations of Adirondack quadrats are shown in table 2. Table 3 below shows correlation coefficients between the methods.

TABLE 3

Similarity Methods Compared	Corr. Coeff.
Percentage Similarity and Sφrensen's Q.S.	0.79
Percentage Similarity and Sφrensen's (.01)	0.85
Percentage Similarity and Sφrensen's (.05)	0.87

Correlation coefficients among these indices for trees, shrubs, and tree seedlings were equally high whereas those for ground flora were somewhat lower. Correlation (0.87) is especially high between Percentage Similarity and Sφrensen's (.05), in which species with less

TABLE 2

SORENSON INDICES (TOP RIGHT) AND PERCENTAGE OF SIMILARITY (BOTTOM LEFT) BETWEEN PLOTS

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.	17.	18.	19.	20.	21.	22.	23.	24.	25.
1	.000	.421	.341	.439	.263	.378	.238	.263	.267	.227	.154	.298	.226	.286	.250	.178	.263	.279	.158	.314	.000	.057	.054	.063	.000
2	.289	.000	.485	.485	.600	.483	.294	.267	.378	.389	.258	.256	.311	.412	.375	.324	.333	.229	.200	.326	.000	.074	.069	.083	.000
3	.208	.374	.000	.556	.424	.438	.378	242	.400	.462	.412	.333	.333	.432	.400	.400	.364	.316	.242	.478	.059	.133	.125	.148	.077
4	.185	.279	.530	.000	.545	.500	.378	.182	.350	.359.	353	.238	.250	.432	.514	.400	.424	.263	.303	.478	.059	.133	.063	.074	.000
5	.104	.310	.227	.182	.000	.483	.294	.400	.486	.333	.323	.410	.444	.529	.438	.432	.533	.343	.400	.465	.000	.148	.069	.083	.000
6	.163	.312	.194	.238	.284	.000	.242	.207	.278	.400	.200	.263	.273	.424	.323	.278	.483	.235	.207	.333	.000	.154	.071	.087	.000
7	.136	.357	.365	.365	.150	.429	.000	.059	.341	.500	.743	.093	.204	.316	.500	.293	.353	.256	.118	.340	.057	.129	.121	.214	.074
8	.043	.038	.039	.024	.359	.269	.003	.000	.432	.111	.065	.513	.489	.294	.188	.270	.267	.457	.400	.372	.065	.074	.138	.083	.000
9	.092	.125	.119	.125	.182	.239	.220	.491	.000	.233	.316	.348	.385	.439	.359	.364	.378	.429	.324	.520	.105	.118	.167	.065	.000
10	.157	.271	.322	.298	.167	.227	.332	.003	.078	.000	.541	.133	.196	.350	.421	.279	.333	.146	.111	.286	.054	.061	.114	.200	.069
11	.120	.253	.287	.315	.115	.199	.392	.003	.091	.702	.000	.100	.174	.229	.424	.263	.387	.222	.129	.318	.063	.071	.133	.240	.083
12	.016	.086	.019	.033	.441	.230	.003	.434	.151	.008	.004	000	.704	.419	.293	.348	.308	.500	.359	.462	.100	.167	.105	.061	.063
13	.010	.033	.057	.040	.090	.098	.023	.136	.077	.039	.020	.313	.000	.490	.255	.462	.400	.480	.400	.483	.087	.143	.182	.103	.053
14	.132	.253	.410	.300	.314	.257	.276	.083	.144	.246	.237	.102	.101	.000	.444	.585	.647	.462	.471	.596	.057	.258	.061	.000	.000
15	.145	.367	.360	.342	.259	.426	.511	.007	.088	.328	.322	.017	.042	.504	.000	.462	.438	.270	.188	.489	.182	.138	.194	.154	.080
16	.030	.149	.221	.159	.252	.199	.129	.183	.233	.123	.095	.123	.094	.496	.339	.000	.649	.571	.378	.640	.316	.353	.389	.258	.200
17	.047	.113	.123	.175	.173	.267	.143	.187	.187	.121	.155	.189	.159	.387	.182	.304	.000	.514	.400	.605	.194	.296	.276	.250	.174
18	.033	.145	.248	.118	.256	.169	.130	.245	.130	.097	.094	.293	.194	.282	.151	.240	.457	.000	.629	.625	.222	.375	.235	.138	.071
19	.024	.031	.074	.037	.107	.089	.013	.156	.098	.013	.013	.146	.173	.115	.019	.092	.561	.607	.000	.512	.129	.222	.069	.000	.000
20	.045	.118	.120	.173	.198	.268	.109	.243	271	.065	.079	.243	.178	.313	.144	.292	.427	.375	.341	.000	.227	.200	.190	.162	.111
21	.000	.000	.002	.001	.000	.000	.001	.005	.010	.004	.027	.020	.009	.029	.005	.227	.039	.059	.030	.033	.000	.429	.600	.320	.333
22	.004	.007	.005	.010	.008	.010	.011	.007	.011	.003	.003	.022	.015	.042	.011	.057	.237	.281	.228	.062	.354	.000	.385	.190	.200
23	.001	.008	.010	.008	.003	.008	.009	.007	.016	.012	.035	.020	.011	.028	.012	.074	.047	.060	.028	.039	.347	.195	.000	.522	.455
24	.001	.001	.002	.001	.001	.001	.004	.001	.001	.006	.006	.006	.006	.000	.001	.014	.008	.007	.000	.003	.263	.560	.253	.000	.824
25	.000	.000	.002	.000	.000	.000	.001	.000	.000	.004	.027	.016	.005	.000	.001	.072	.011	.018	.000	.003	.156	.041	.199	.161	.000

CORRELATION COEFFICIENT BETWEEN SORENSON INDEX AND PERCENTAGE STABILITY = .754

(photo by A. B. Wellborn)

Pleurozium schreberi, **dominant moss of the forest floor, spruce-fir zone, Whiteface Mountain (see fig. 8).**

(photo by A. B. Wellborn)

(closeup of above)

than 5 percent cover value were eliminated. The Percentage Similarity measure not only stresses dominance but also effectively ignores species of low cover value. These species are not necessarily rare, however; *Tetraphis pellucida*, for example, occurs in 12 different quadrats, but in only three of these is its relative cover value greater than five percent. This moss is an important member of the bryophyte community, occurring very regularly on decaying stumps, but rarely in large quantities since its substrate is limited. Thus the Percentage Similarity index may ignore a frequent species with a highly specific niche but low cover value. Sϕrensen's index, on the other hand, is said to overvalue rare species. This is not true where the rare species differ in the quadrats compared; different rare species lower the Sϕrensen index, but have no effect on Percentage Similarity.

The relatively high correlation (0.79) between Sϕrensen's Q.S. and Percentage Similarity arises from the fact that, in general, bryophytes do not show very high dominance; where dominance is not unusually high, the two methods give similar results. High dominance exists in two very different habitats in this study. In the spruce-fir forest, particularly at higher elevations under fir, carpets of *Pleurozium schreberi* accounted for up to two-thirds of the total bryophyte cover. Percentage Similarity is unusually high here (0.784). Similar unispecies bryophyte carpets occur in conifer forest elsewhere. For example, *Hylocomium splendens* forms such carpets in northern Sweden as does *Tomenthypmum nitens* in western Alberta. Unusually high dominance also occurs in some of the arctic-alpine quadrats, particularly those in which conditions are particularly rigorous. A comparison of arctic-alpine quadrats 22 and 24 in table 2, for example, shows a Sϕrensen's Q.S. of 0.190, but Percentage Similarity of 0.560. The high Percentage Similarity results from the dominance of one species, *Polytrichum strictum* (formerly *P. juniperinum* var. *gracilius*) which comprises 55 percent and 84 percent of the total bryophyte cover in the two quadrats. On the other hand, a comparison of quadrat 24 with another arctic-alpine quadrat, 25, gives a very different result, Sϕrensen's 0.824, Percent Similarity only 0.161. In this case, seven of the ten species are found in both quadrats, but the dominance relationships in the two quadrats are completely different.

These indices are used in examining the following important aspects of community structure:

1) Which species have physiological tolerances that enable them to grow at certain elevations?
2) How is niche space divided up within a community?

(photo by A. B. Wellborn)

(photo by N. G. Slack)

(photo by N. G. Slack)

(photo by N. G. Slack)

TOP LEFT:

Ground flora, Ampersand Mountain, with *Aralia nudicaulis, Oxalis montana,* **seedlings of** *Acer saccharum, A. spicatum* **and** *A. pensylvanicum.*

TOP RIGHT:

Acer saccharum, **dominant canopy tree, deciduous forest, Whiteface Mountain.**

ABOVE:

Acer pensylvanicum, **common understory tree, deciduous forest on Whiteface and Ampersand Mountains.**

LEFT:

Abies balsamea **and** *Picea rubens,* **dominants of coniferous forest, upper slopes, Whiteface Mountain.**

Søensen's index, which "counts" species if they are present even in small quantities, gives better answers to the first question. Percent Similarity, stressing dominance relationships, gives better answers to the second. Therefore, I have retained both of these indices in showing changes in species composition with elevation (tables 2 and 3; figs. 5 and 6). Question 1 is discussed further below. Question 2, including dominance-diversity relationships and the division of niche space is discussed in a later section.

Both the Sørensen and Percent Similarity values have been used for comparison at the same elevation in pairs. Table 4 shows values for some elevations. (For the complete matrix for all Adirondack quadrats, see table 2.) It can be seen in table 4 that comparisons between quadrats at 1600 ft (490 m), numbers 1–4, give high values whether compared on the same mountain or between mountains. At this elevation, a relatively mature deciduous forest dominated by *Acer saccharum* occurs on both mountains. At 2400 ft (730 m), comparisons of quadrats on the same mountain (8 and 9; 10 and 11) show high similarity values; comparisons between mountains (quadrats 9 and 10; 8 and 11) show very low values. The transition between deciduous forest and spruce-fir forest occurs at somewhat different elevations on different mountains in the Adirondacks, and even on different sides of the same mountain. At 2400 ft (730 m) there is already spruce-fir on Ampersand; on Whiteface, at least on the northeastern slope used in this study, there is still deciduous forest. The forest type is thus shown to be significant in terms of species composition of bryophytes in the ground layer.

Table 4 also shows comparisons within the spruce-fir and arctic-alpine groups of quadrats, and between quadrats of these two groups. In almost all cases within-group similarity is much higher than between-group similarity in the arctic-alpine area and those in the spruce-fir zone. The lower values for some spruce-fir quadrats using Percent Similarity results from the high dominance of one species, *Pleurozium schreberi*, in these quadrats, as pointed out above. Notable also is the complete lack of similarity (0.0) of bryophytes with either index in some comparisons of spruce-fir and arctic-alpine vegetation. (See quadrats 19 and 24, and 19 and 25 compared in table 2 and at the bottom of table 4).

TABLE 4

Bryophytes—Species Composition vs. Elevation
Ampersand (A) and Whiteface (W) Mountains

Zone	Mountains compared	Elevations compared	Q.S.	% Sim.
Deciduous	A–A	490 m	0.421	0.289
(Quadrats 1–4)	W–W	490 m	0.556	0.530
	A–W	490 m	0.485	0.374
	A–W	490 m	0.485	0.279
Deciduous to Spruce-Fir Transition	A–A	730 m	0.431	0.491
(Quadrats 8–11)	W–W	730 m	0.541	0.702
	A–W	730 m	0.111	0.003
	A–W	730 m	0.065	0.078
Spruce-Fir	W–W	1220-1340 m	0.512	0.341
(Quadrats 18–20)	W–W	1100-1340 m	0.625	0.375
	W–W	1100-1220 m	0.629	0.607
Arctic-Alpine	W–W	1460 m	0.429	0.354
(Quadrats 21–25)	W–W	1460 m	0.600	0.347
	W–W	1460 m	0.190	0.560
	W–W	1460 m	0.824	0.161
Spruce-Fir-Arctic-Alpine	W–W	1220-1460 m	0.221	0.059
	W–W	1340-1460 m	0.129	0.030
(Quadrats 18, 19, 21, 24, 25)	W–W	1340-1460 m	0.000	0.000

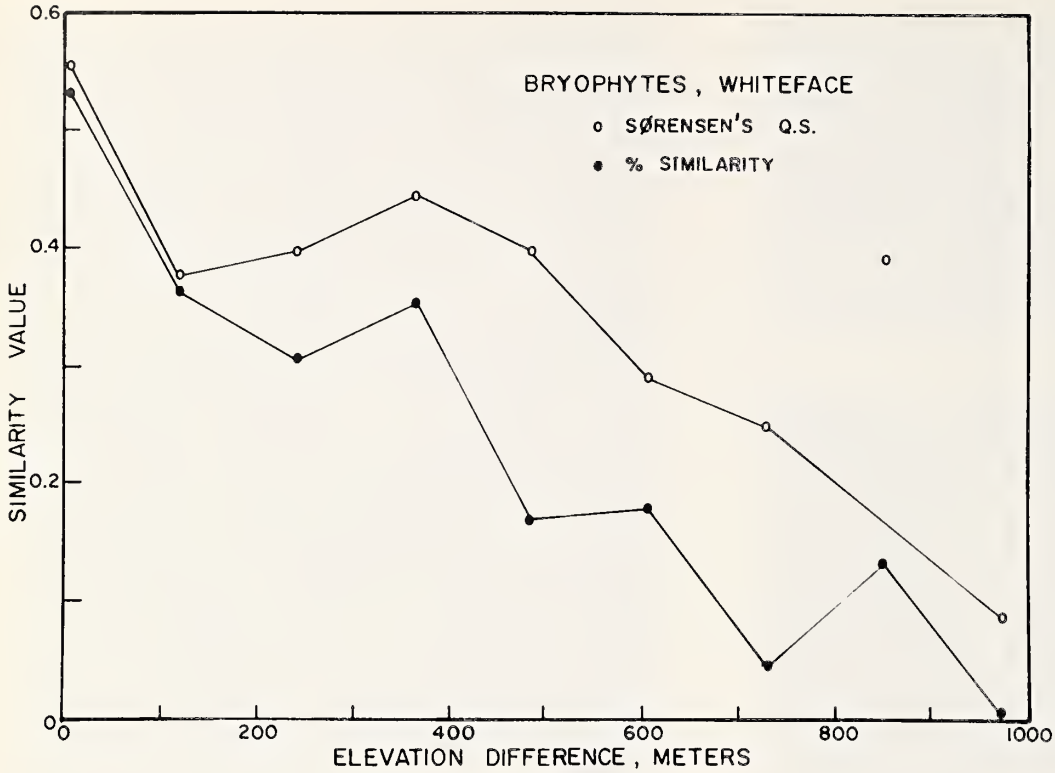


FIGURE 5 Changes in bryophyte species composition with increasing separation in elevation on Whiteface Mt.

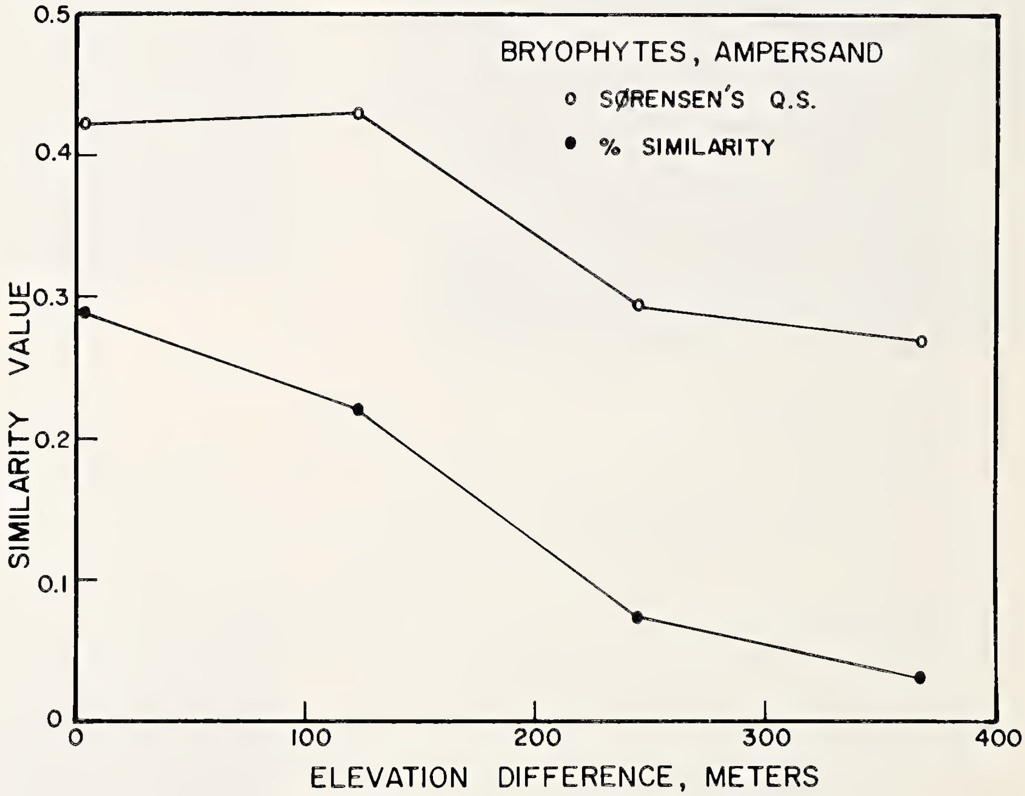


FIGURE 6 Change in bryophyte species composition with increasing separation in elevation on Ampersand Mt.

Figures 5 and 6 show changes in bryophyte species composition with increasing separation in elevation. The 0.0 separation point for both Whiteface (fig. 5) and Ampersand (fig. 6) is at 1600 ft (490 m). Thus on Whiteface (see fig. 5), the quadrats at 490 m show a similarity of over 0.5, whichever index is used. In the spruce-fir zone, 600 m higher, the similarity with the 490 m quadrats is about 0.3 using the Sφrensen, and about 0.2 using the Percent Similarity. The arctic-alpine quadrats at almost 1000 m separation from the lowest quadrats used in this study show similarities of less than 0.1 using either index. The fact that it is not 0.0 shows that some species do occur in both the lowest and highest elevations on Whiteface, examples being *Ptilidium pulcherrimum* and *Dicranum montanum* (of fig. 12). A general decrease in similarity of species composition is seen on both mountains as the distance from the lowest quadrats increases. A sharp decrease in similarity is seen at about 250 m separation on Ampersand Mountain (fig. 6), which is the region of transition from deciduous to spruce-fir forest. On Whiteface, the greatest change occurs between 370 and 490 m separation, again at the deciduous forest to spruce-fir transition. Although forest type has been shown to be an important determinant of bryophyte species composition, Sϕrensen values of 0.3 or more indicate the presence of some of the same bryophyte species in both deciduous and spruce-fir forest. Many species (cf. figs. 9–12) are found in both forest types, for example, *Dicranum scoparium*, *Polytrichum ohioense*, *Plagiothecium laetum*, *Hypnum pallescens*, *Ptilidium pulcherrimum*, and even *Brotherella recurvans*, usually thought of as a spruce-fir indicator species. Like *Brotherella*, the relative cover values of most of the species change with elevation, as discussed in the following section.

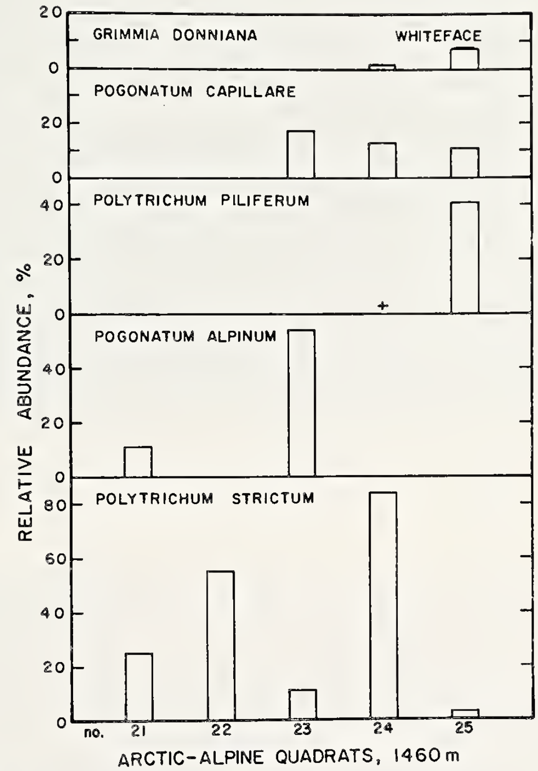


FIGURE 7 Relative abundance of species restricted to the arctic-alpine zone on Whiteface Mt.

Distribution Patterns of Bryophytes in Relation to Elevation

Correlation coefficients between relative cover (percent of total cover of all bryophytes) and elevation for each bryophyte species were computed. All those species which had significant correlation coefficients as well as all those that were present in at least five quadrats were used to study patterns of distribution of species on Whiteface and Ampersand Mountains. Bar graphs were made for each of these species for all quadrats on both mountains. Figures 7 to 12 show the resulting distribution patterns for representative species. The following distribution patterns were found:

- arctic-alpine (fig. 7)
- spruce-fir and arctic-alpine (fig. 8)
- entirely or predominantly spruce-fir (fig. 9)
- deciduous and spruce-fir (fig. 9)
- predominantly deciduous (fig. 11)
- deciduous, spruce-fir, and alpine (fig. 12)

In figure 7, all five arctic-alpine quadrats are shown separately so that dominance relationships in the various quadrats can be compared. Although all the bryophytes shown in figure 7 are species of specialized habitats and, to varying extents, extreme conditions, they are not all limited to arctic-alpine habitats. *Polytrichum piliferum*, for example, is found in dry, ex-

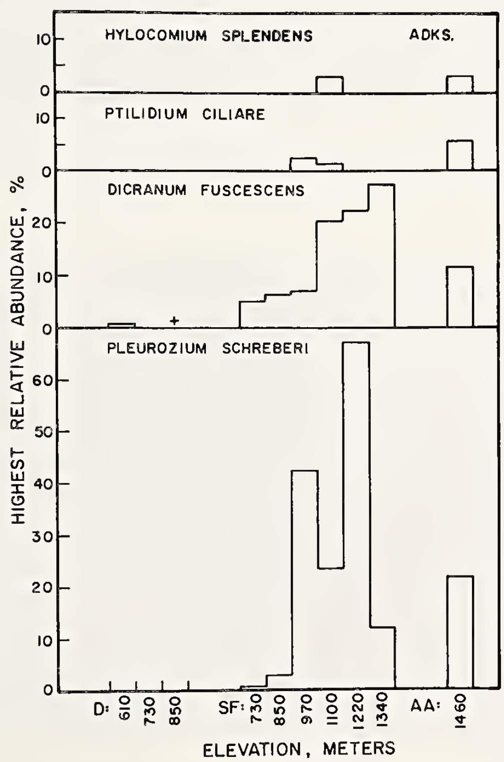


FIGURE 8 Spruce-fir and arctic-alpine

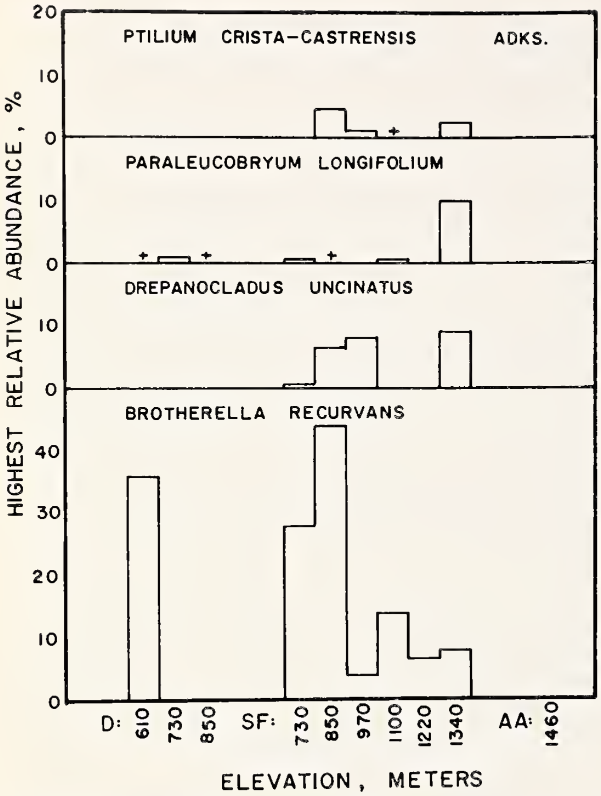


FIGURE 9 Entirely or predominantly spruce-fir

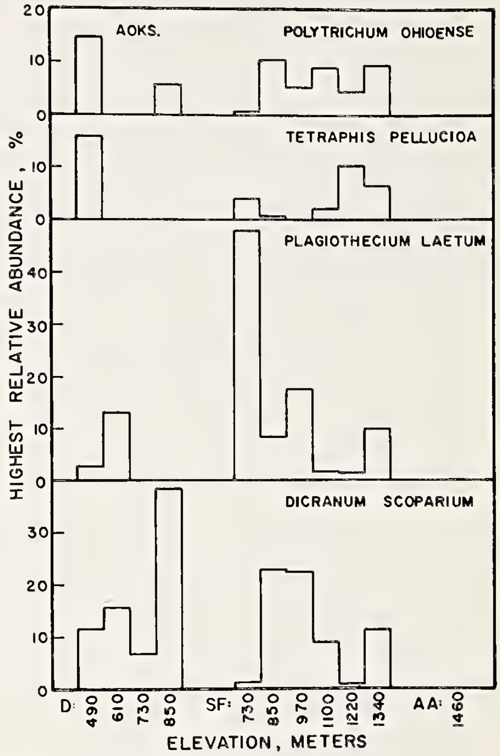


FIGURE 10 Deciduous and spruce-fir

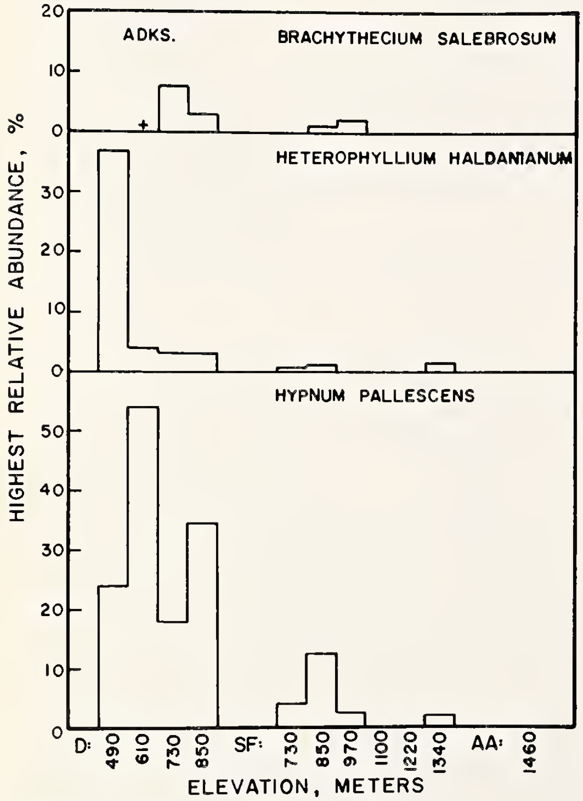


FIGURE 11 Predominantly deciduous

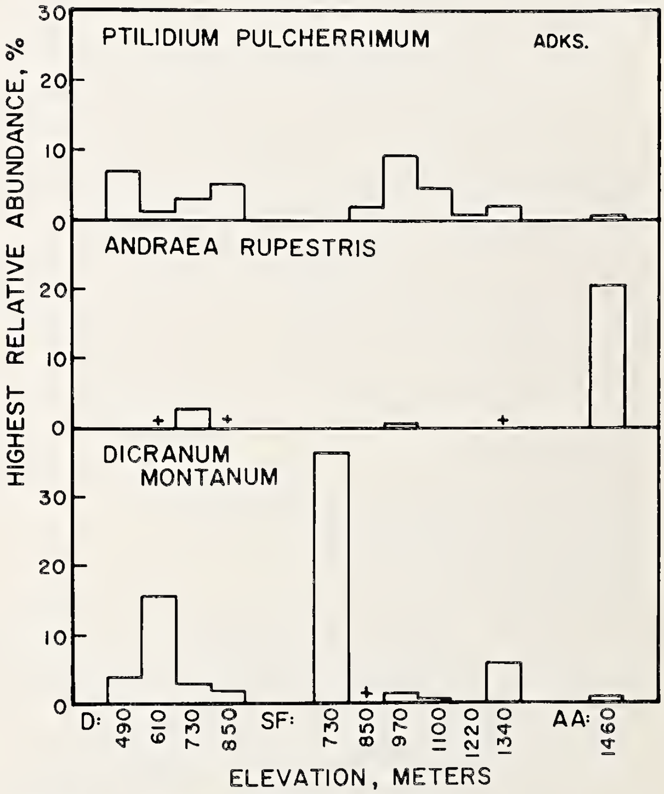


FIGURE 12 Deciduous, spruce-fir, and alpine

FIGURES 8–12 Distribution patterns for representative species of bryophytes on Whiteface and Ampersand Mts.

posed nonalpine areas as well. It is noteworthy that four out of five of these species belong to one family, the Polytrichaceae. The fifth, *Grimmia donniana* is restricted to this zone, but *Grimmia apocarpa* is also found here. This species and *Andreaea rupestris* are found both in the arctic-alpine zone and at lower elevations where suitable rock substrates occur. The Polytrichaceae and Grimmiaceae (including *Rhacomitrium heterostichum,* also found at high elevations on Whiteface), as well as *Andreaea,* show a variety of adaptations to high winds, drying, and other aspects of exposure. These include lamellae, hair points, and a clumped or turfed growth form. Other bryophytes found only in the arctic-alpine quadrats, but in more moist habitats, were, *Sphagnum russowii, Calliergon stramineum, Anastrophyllum michauxii,* and *Gymnocolea inflata.*

Many lichens, particularly crustose lichens, also show the same pattern of distribution. Lichens were noted but not included in the present study. At lower elevations, they form a very minor component of the plant communities except as epiphytes. Above timberline in the arctic-alpine summit area, however, they become a major component, both as fruticose forms, largely *Cetraria* and *Cladonia* species, on the ground, and crustose species on rocks. In one summit quadrat, I distinguished fifteen species of lichens, giving a higher species richness (S) than for either bryophytes or vascular plants. Further work on plant diversity in this zone should include lichens.

(photo by A. B. Wellborn)

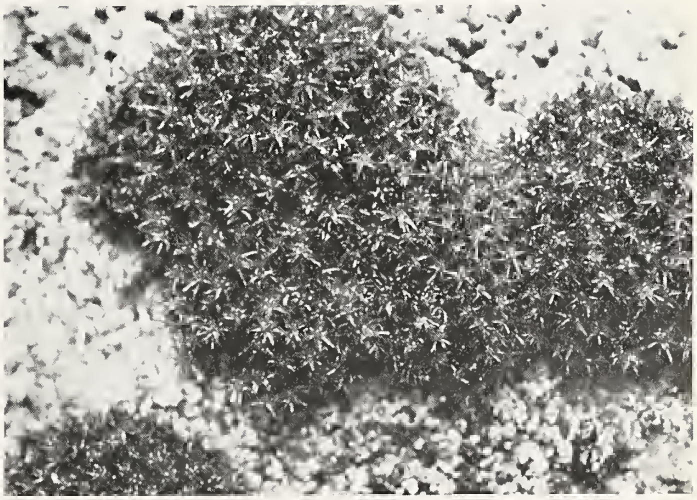
Dicranum scoparium, **a dominant moss of deciduous forests, also found in spruce-fir forests (see fig. 10).**

(photo by A. B. Wellborn)

Andreaea rupestris, **characteristic moss of arctic-alpine zone, also found on suitable rock outcrops at lower elevations.**

(photo by A. B. Wellborn)

Polytrichum piliferum, **showing hair points, near summit, Whiteface Mountain.**



(photo by A. B. Wellborn)

Andreaea rupestris **with crustose lichens on rock face near summit, Whiteface Mountain.**

Species characteristics of the spruce-fir zone and also found in the arctic-alpine area are shown in figure 8. One of these, *Ptilidium ciliare,* reaches its highest cover value in the latter area where it grows among lichens, particularly *Cetraria islandica.* (It is found at altitudes of at least 4500 ft in the krummholz, associated with *Polytrichum juniperinum.*) Some of the predominantly spruce-fir species are shown in figure 9; two of these, *Ptilium crista-castrensis* and *Drepanocladus uncinatus,* were found only in spruce-fir quadrats, though both were occasionally found at lower elevations. Two very charaeteristic species of this zone, *Bazzania trilobata* and *Brotherella recurvans* (fig. 9) were found also in deciduous forest quadrats.

Several other species were restricted to the spruce-fir zone, but found only in small quantities. One of these, *Isopterygium distichaceum* (formerly *I. subfalcatum*), is of particular interest because it does not appear in the New York State eheeklist (Ketchledge, 1957) for the Adirondacks, and there was only one report for the whole State at that time. Six collections were made in this study, at 2400 ft (730 m) and 2800 ft (850 m) on Ampersand and at 4000 ft (1220 m) on Whiteface, all within the spruce-fir zone.

Representative species present in both deciduous forest and the spruce-fir zone, the most common distribution for bryophytes in the study, are shown in figures 10 and 11. Of these, probably only *Plagiothecium laetum* is more characteristic of spruce-fir than of deciduous forest. Two other species of *Hypnum,* in addition to *H. pallescens* (including *H. reptile* Michx of the New York checklist, fig. 11), *Hypnum lindbergii* and *H. imponens* were also found predominantly in the deciduous forest quadrats. Of the eight species of *Brachythecium found,* six, including *B. salebrosum* (fig. 11) had distributions largely in deciduous forest. Two species, *B. curtum* and *B. reflexum,* grow in both deciduous and spruce-fir forest.

A few species occur throughout the elevation range wherever conditions are suitable. These include species growing on rock, such as *Grimmia apocarpa* and *Andreaea rupestris,* as noted above, and those growing on wood such as *Dicranum montanum* and *Ptilidium pulcherrimum* (fig. 12.). Weedy species such as *Dicranella heteromalla* and *Pohlia nutans* occur over the whole elevation range, but are uncommon in mature forest quadrats, although common along the trails and in other open, disturbed areas even above timberline.

It is clear that differing distributions of the bryophyte species over the elevation range used in this study add to the overall bryophyte diversity. Both species presence and relative density (cover) change with elevation for the great majority of species. Differing physiological tolerances and competition among species are probably both involved; only an experimental approach could distinguish these two causes of change in species along the elevation gradient. Tolerance and competitive ability are, of course, related. Species only moderately tolerant of arctic-alpine environmental conditions are unlikely to be good competitors in that zone. Competition, both among bryophyte species and between bryophytes and vaseular plants, is discussed in a later section.

(photo by A. B. Welborn)

Polytrichum juniperinum **and** *Ptilidium ciliare* **bryophyte mat, characteristic of krummholz zone, Whiteface Mountain.**

The Relation Between Total Bryophyte Cover and Diversity

In figure 13, the actual percent cover of Adirondack bryophytes is shown graphically with diversity (H') of bryophytes at each elevation. The cover value is the percent of each quadrat covered by all bryophytes. It varies in the Adirondack quadrats from 0.6 to 44.3 percent. It can be seen that the cover value, which indicates the relative importance (incorporating both density and basal area) of bryophytes in the whole plant community, increases rapidly where the spruee-fir zone is reached. This occurs at a lower elevation on Ampersand than on Whiteface, as noted above. Diversity, on the other hand, did not change greatly with elevation, at least below 4000 ft (1220 m). The arctic-alpine quadrats also have high cover values, often 20 percent or higher except in unstable rockslide areas, but with relatively low diversity compared to lower elevations. Diversity is highest at 1600 ft (490 m) on Ampersand, where cover values reach a maximum of only 2.2 percent! Thus the total cover of bryophytes is not correlated in the Adirondack quadrats with diversity, nor is any such correlation found when species richness (S) is used instead of Shannon diversity index.

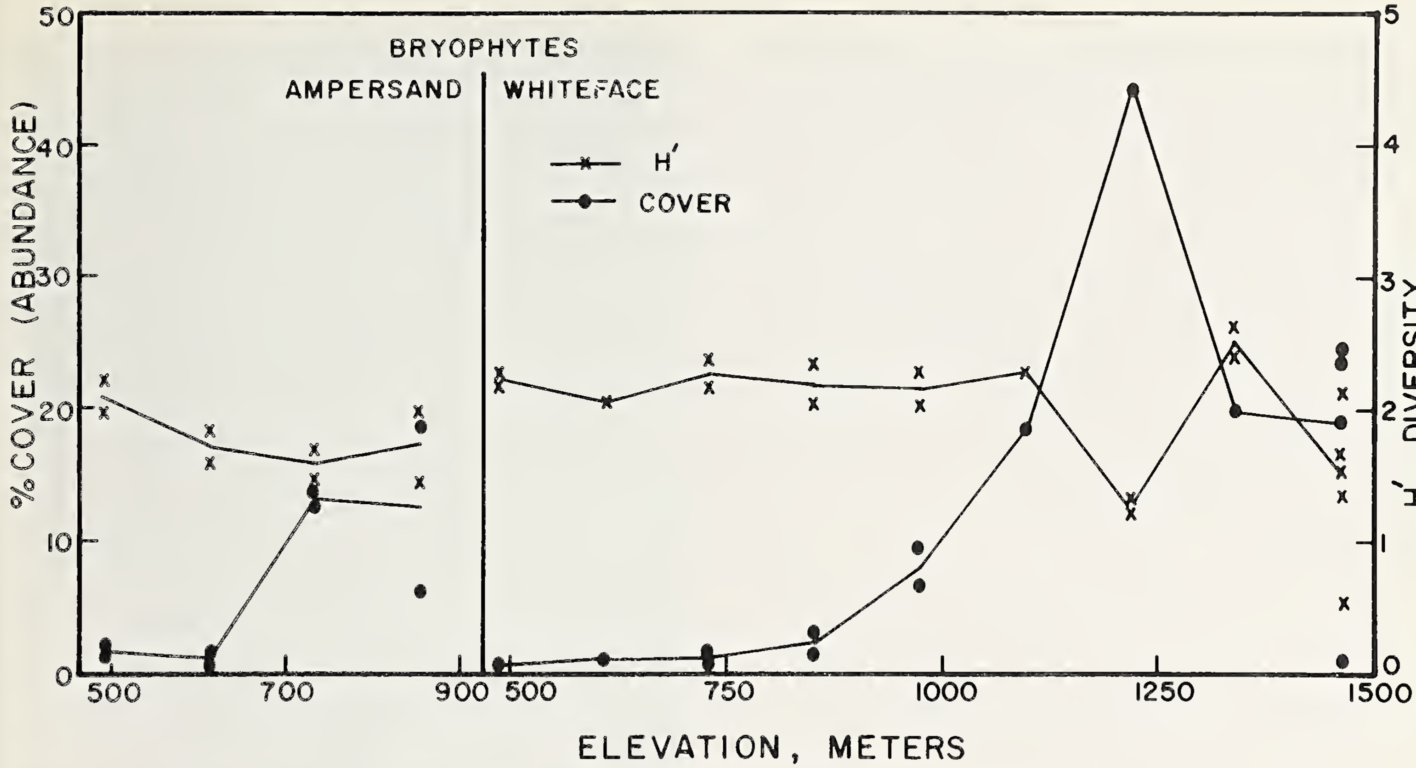


FIGURE 13 Percent cover bryophytes and diversity (H') at each elevation at Ampersand and Whiteface Mts.

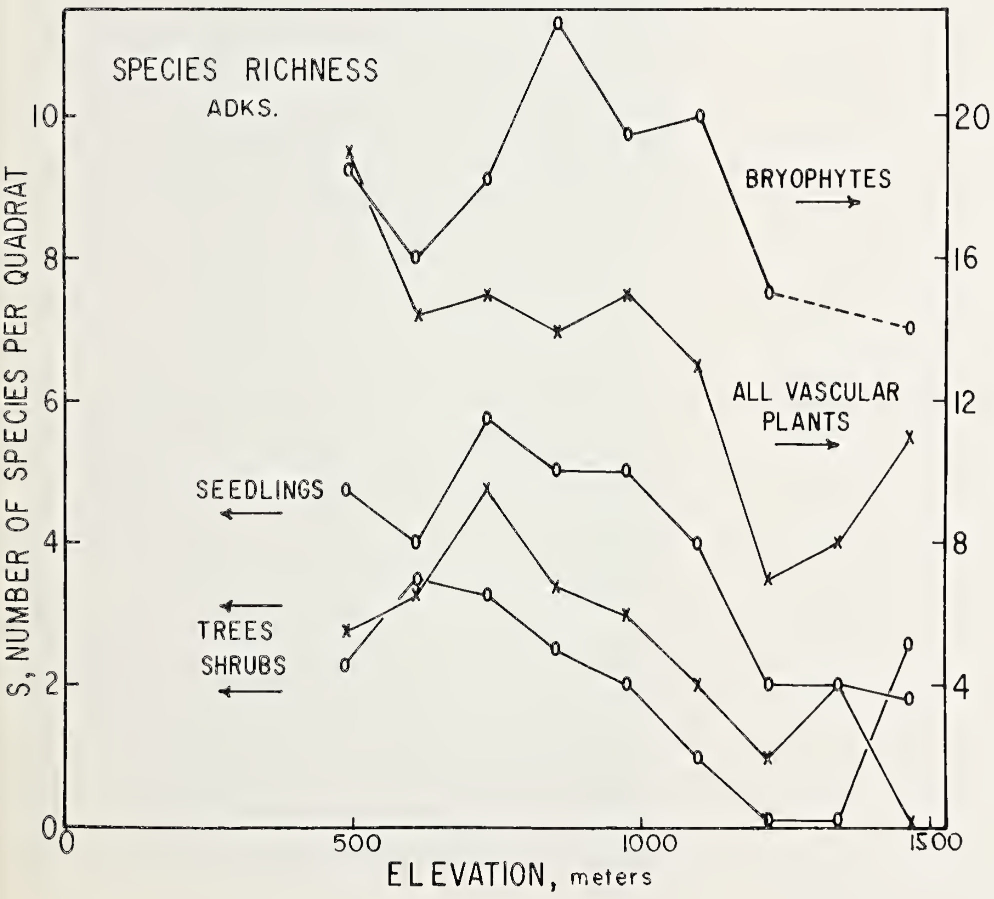


FIGURE 14 Changes in species richness (S) with elevation for: bryophytes, all vascular plants, tree seedlings, trees, and shrubs at Whiteface and Ampersand Mts.

Within any one vegetation zone, however, diversity (H′) and cover may be correlated. In the deciduous forest on Ampersand, diversity and cover values are as follows for the four quadrats:

% cover:	0.55	0.98	1.5	1.8
H′:	1.59	1.83	1.96	2.21

On Whiteface, however, the diversity values are all quite similar for the deciduous quadrats (2.0 to 2.38 for six quadrats) and there is no such direct relationship. The Kenrose Preserve data (see separate section below) do show positive correlation (r = − 0.63) of total bryophyte cover and bryophyte diversity in the deciduous forest.

Bryophytes in Relation to Other Plant Strata

Figure 14 shows changes in species richness (S) with elevation on Whiteface and Ampersand for trees, shrubs, seedlings, and bryophytes. For clarity, ground flora is not shown separately here but is included in "all vascular plants." (It is shown separately in figure 15.) It can be seen that bryophytes show higher species richness than all vascular plants together except at 1600 ft (490 m) where they are about equal in numbers of species. Both trees and tree seedlings peak at about 2400 ft (730 m), where a variety of deciduous trees and seedlings occur together with a small admixture from the spruce-fir forest. The total number of vascular plant species, however, decreases with elevation, although there is a sharp increase at the summit. This increase results from a large number of shrub species such as *Vaccinium uliginosum* and *Ledum groenlandicum,* which only occur in the arctic-alpine zone in this study.

The number of species of bryophytes present within quadrats of one vegetation zone varied considerably. Within the larger forest types, such as spruce-fir, much variation exists. One can subdivide this type into a number of subtypes, based on relative dominance of red spruce and balsam fir. The presence of the latter depends on ground moisture as well as on elevation. Balsam fir becomes dominant at the higher elevations, but, even within pure balsam fir stands, the trees differ in age and density. Such structural differences within one forest type should be studied further in relation to bryophyte diversity. In some stands of fir, the presence of dead lower branches resulted in more light and lower humidity and a bryophyte layer on the forest floor quite different from that in other stands. At 4400 ft (1340 m) on Whiteface, where there is dense fir forest and very late snow cover, species richness of bryophytes and especially of liverworts, rises very sharply (see fig. 3). The high humidity in *Abies* stands, so dense that one can hardly stand up in these quadrats, is increased by the late snow melt, and creates conditions favorable to many liverworts.

(photo by N. G. Slack)

Less mature deciduous forest with much *Betula papyrifera*, Whiteface Mountain; high bryophyte diversity was found here.

The deciduous forest stands also vary in species composition, in part a result of differences in maturity. The maximum number of bryophyte species was almost as high (25) in deciduous forest quadrats as in spruce fir (30) or in pure fir (28), in spite of the much greater cover of bryophytes under spruce and fir. Within the deciduous forest zone, a slightly higher maximum number of species occurred in the less mature deciduous forest with much *Betula papyrifera* (25) than in the mature sugar maple-beech forest (23). In each of the above forest types, the species composition differed. Thus the within-habitat (alpha) diversities for the different forest types add up to a high between-habitat (beta) diversity over the whole elevation range. This finding further corroborates the original hypothesis regarding species diversity and elevation range.

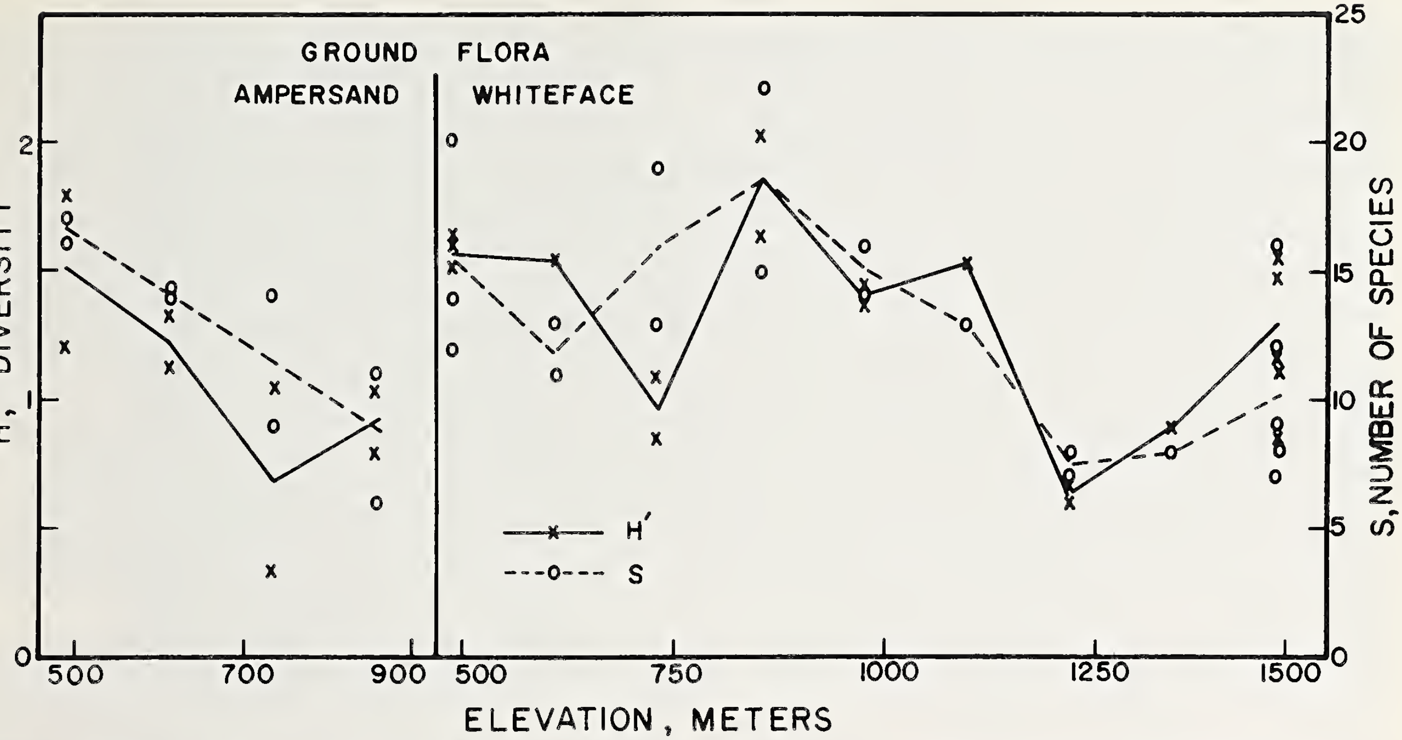


FIGURE 15 **Changes in species richness (S) and diversity (H') for ground flora with changes in elevation at Ampersand and Whiteface Mts.**

(photo by A. B. Wellborn)

Oxalis montana, **dominant herbaceous vascular plant in spruce-fir zone on Whiteface and Ampersand Mountains.**

Vascular ground flora was studied quantitatively in each of the quadrats (see field methods). When species richness (S) and diversity (H′) are plotted for the ground flora in relation to elevation (fig. 15), no clear relationship is seen over the whole range of elevations on Whiteface. On Ampersand, with a more limited elevation range, both S and H′ are seen to decrease with elevation; they are higher in the deciduous than in the spruce-fir forest. On Whiteface, high and low diversities were found in both forest types; factors other than elevation appear to be important in determining the number of species in the ground flora and their relative abundances. At 4000 ft (1220 m) a dominant herbaceous vascular plant, *Oxalis montana*, accounts for 82 to 85 percent of the ground flora density in these quadrats, and accounts for the low evenness values (J′ = 0.40, 0.36). In these same quadrats, one bryophyte, *Pleurozium schreberi*, similarly accounts for a low J′ and consequently low H′ value for bryophytes as explained above.

As has already been seen for bryophytes, the species composition of the ground flora changes with elevation; also, the range of elevations adds to the diversity of the ground flora for the whole mountain. For example, at 4800 ft (1490 m), in the arctic-alpine quadrats, many plants appear that do not occur at lower elevations, even at 4400 ft (1340 m). These include *Agrostis borealis*, *Arenaria groenlandica*, *Carex bigelowii*, *C. brunnescens*, *Juncus trifida*, *Lycopodium selago*, *Potentilla tridentata*, *Scirpus caespitosus*, and *Solidago cutleri*. Thus, Sϕrensen and Percent Similarity values

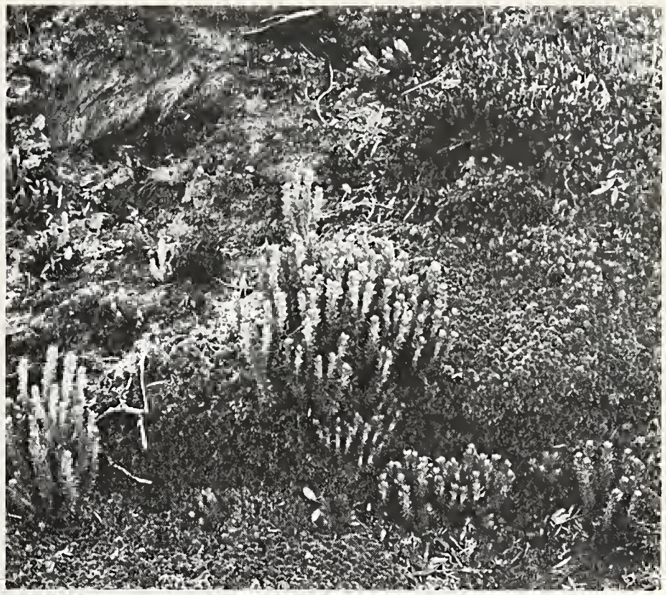
(photo by N. G. Slack)

Lower layers in *Abies balsamea* forest, Whiteface Mountain, showing *Oxalis montana* and young balsam reproduction.

(photo by N. G. Slack)

Ground flora of transition zone, Whiteface Mountain, including *Cornus canadensis, Lycopodium lucidulum, Monotropa uniflora, Oxalis montana,* and the moss, *Dicranum scoparium.*


(photo by A. B. Wellborn)


(photo by A. B. Wellborn)


(photo by N. G. Slack)


(photo by A. B. Wellborn)

TOP LEFT:

Ground flora of deciduous forests, including *Medeola virginiana, Dryopteris spinulosa, Acer saccharum* **and** *A. pensylvanicum* **seedlings.**

TOP RIGHT:

Bryophyte community and *Lycopodium selago,* **arctic-alpine zone, Whiteface Mountain.**

ABOVE:

Ground flora of *Abies balsamea* **forest including** *Oxalis montana,* **and mosses** *Hylocomium splendens* **and** *Pleurozium schreberi.*

RIGHT:

Lycopodium selago **with** *Ledum groenlandicum* **and** *Cetraria islandica,* **arctic-alpine zone, Whiteface Mountain.**

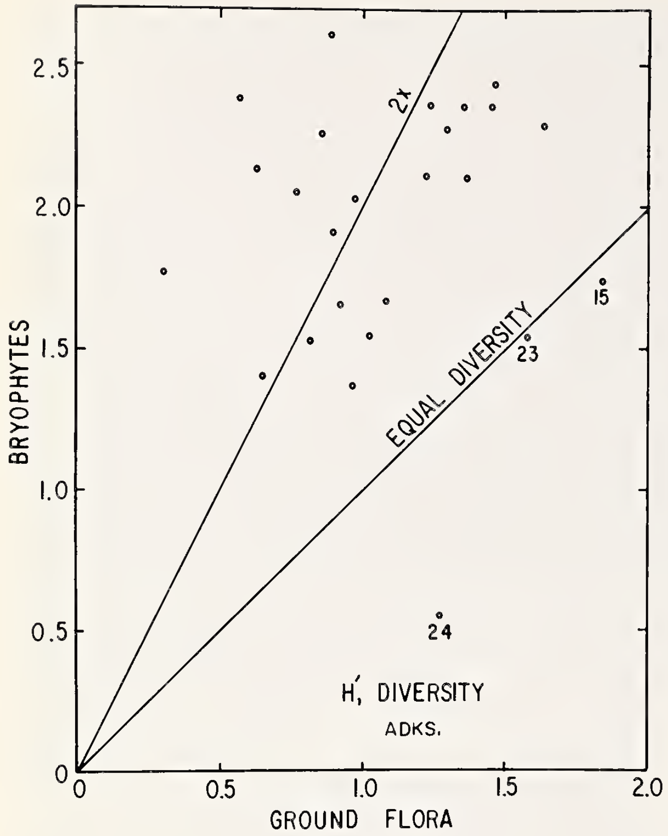


FIGURE 16 Bryophyte diversity (H') versus ground flora diversity (H') at Ampersand and Whiteface Mts.

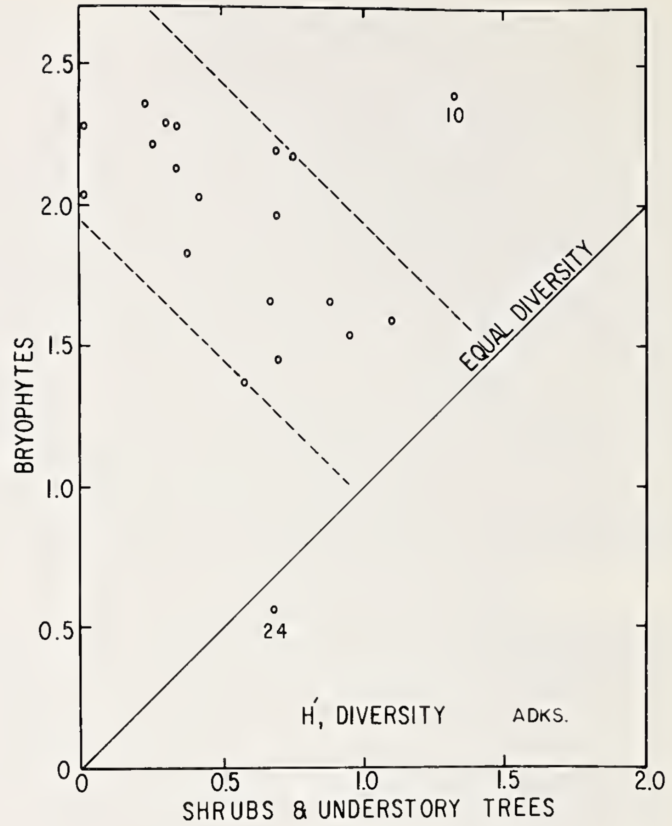


FIGURE 17 Bryophyte diversity (H') versus shrub diversity (H') for Ampersand and Whiteface Mts.

between quadrats at 4400 ft and 4800 ft are very low (0.00 to 0.14). Similarly, some species occur in the deciduous forest quadrats but not at higher elevations. Thus, the ground flora showed patterns over the elevation gradient similar to those shown for bryophytes in figures 5 and 6 and 7 through 12.

The diversity (H') of the ground flora and that of shrubs is compared with that of bryophytes in figures 16 and 17. The shrub category included shrubby understory trees such as *Salix*. The large quadrat size (40 m^2) makes comparison of these strata possible, but it is probably too small for reliable comparison with canopy trees. With the notable exception of quadrat 24, diversity (H') is approximately equal or higher for bryophytes than for the ground flora of shrubs. For almost all quadrats, it is considerably higher (see figs. 16 and 17). Even in arctic-alpine quadrat 24, the number of species of bryophytes (9) is higher than the number of species on the ground flora (5) or of shrubs (2), but the evenness component (J') is only 0.25, the lowest for bryophytes in the entire study. *Polytrichum strictum* accounts for more than 80 percent of the bryophyte cover in this quadrat.

I have compared the Adirondack data with those for other mountain areas such as the Great Smokies and the Rocky Mountains (Whittaker, 1956, 1967; Bliss, 1963). The number of vascular plant species is lower in the Adirondacks than in the other areas, so that this high ratio of bryophytes to ground flora may not be a general one. It may, however, be characteristic of spruce-fir forest, in which low light levels and high humidity favor bryophytes over herbaceous vascular plants; more data are needed to resolve this question. In the Southern Blue Ridge of North Carolina, where I have also been working, species richness of both vascular plants and bryophytes is higher than in the Adirondacks, at least in deciduous forest. Within-habitat diversity of bryophytes and vascular plants has not yet been studied there, in a comparable way; therefore, further comparisons are not yet possible.

No particular effect of ground flora diversity on that of bryophytes can be seen in figure 16. Interactions are present, however. Apparent competition between an herbaceous vascular plant, *Oxalis montana*, and a bryophyte, *Pleurozium schreberi*, was noted in the quadrats at 4000 ft (1220 m); where *Oxalis* density was very high, the moss was absent or appeared dead. *Oxalis* seedlings had germinated in the *Pleurozium* carpet, however, and where the *Oxalis* was less dense, both occurred together. The moss can photosynthesize both early in the season before the *Oxalis* leaves expand and in early fall after they have been killed by frost, to allow some seasonal variation in resource use. Here, the question of competition could be studied by removal of *Oxalis* and/or moss completely or to various density levels in different plots. Very little is known, however, about growth rates of bryophytes in nature. A one dm^2 plot of *Pleurozium* adjacent to quadrat 19 at 4000 ft (1220 m), which I removed, showed no sign of regrowth after more than a year, although surrounded by undisturbed *Pleurozium schreberi.*

Figure 17 does show an inverse relationship between bryophyte diversity (H') and shrub and understory tree diversity (r = −0.31). This may be the result of competition; with more shrub species there may be less light, less water, or less space available for bryophytes. Quadrat 10 (fig. 17), in which both shrub and bryophyte diversity are high, has many young understory trees. It is in a relatively immature open deciduous forest, with many species of bryophyte growing in exposed places on both soil and rock. It seems unlikely that bryophyte diversity can affect that of shrubs and understory trees, but that the reverse is true is only suggested, not proven, by a significant negative correlation.

(photo by N. G. Slack)

Oxalis montana **and** *Pleurozium schreberi,* **probable competing species on forest floor under** *Abies balsamea.*

Is Seasonal Diversity a Factor?

Seasonal diversity is of interest largely in respect to the ground flora stratum of the plant communities studied. There is virtually no seasonal diversity of bryophytes in these Adirondack forests, since bryophytic ephemerals do not occur in these habitats. Nor is there appreciable seasonal diversity on woody plant strata, although some tree seedlings do not appear until summer and many die out in the winter. Seasonal diversity is, however, a noticeable aspect of the herbaceous ground flora. Bulbous or rhizomatous perennials tend to show high productivity early in the season and to die back later, often using light resources available in early spring, but less available under an expanded leaf canopy. This phenomenon increases the total annual diversity of deciduous forests. Several deciduous forests quadrats on Ampersand and Whiteface were surveyed in late summer and again in May to determine the extent of seasonal diversity. Six species were found in the spring survey that had not been found in the same quadrats previously, notably *Erythronium americana*, *Smilacina racemosa*, and *Trillium undulatum*, all spring-flowering perennial herbs with food storage organs. The quadrat in which most additional species were found, quadrat 3 on Whiteface at 1600 ft (370 m), is compared below for late summer (3) and the following spring (3'):

Quadrat	S	H'
3	14	1.6
3'	20	1.4

There is an increase in species richness from 14 to 20, but very little change in diversity (H'). The Shannon function continues to increase indefinitely as new species are added, but at a diminishing rate. Thus, if one species with a relative abundance of 5 percent were replaced by five equally abundant species, the increase in H' would be only 0.08. If the additional species are not equally abundant, the function may even decrease, as in the present case. The Shannon function may thus undervalue seasonal diversity, but in this forest ecosystem neither the species richness nor the productivity of spring ephemerals is very great compared to that of the plant community as a whole. A much greater contribution in both respects is made by ephemeral vascular plants in other ecosystems, for example, desert summer ephemeral (Whittaker, 1965).

Hemlock-hardwood forest on Ampersand Mountain, containing sugar maple, yellow birch, American beech and hemlock.

Epiphytes of *Acer saccharum* **on Ampersand Mountain, including** *Neckera pennata* **and** *Porella platyphylloidea.*

Study of Epiphytic Bryophytes (Ampersand)

One possible objection to the Adirondack study is that all bryophyte habitats have not been adequately sampled. None of the quadrats was chosen for its "good" bryophyte habitats; the only predetermined factor in the choice of locations was altitude. Since the main object of this study was to measure diversity, areas in which bryophytes were known to be particularly diverse could not be purposely chosen. Nevertheless, certain "good" bryophyte habitats, such as streambanks and wet rock ledges, have been undersampled by these methods. Many species of bryophytes of specialized microhabitats, found elsewhere in the Adirondacks, have not appeared in any of the quadrats. Detailed studies of communities in such habitats would complement the present study. A valuable quantitative study of one such community, that of rotten logs, has recently been completed by Mühle and LeBlanc (1975). In addition to the quadrat studies, I have made a pilot study of epiphytic bryophyte communities, to determine whether this specialized habitat adds significantly to bryophyte diversity in the Adirondack forest.

Epiphytes on northern hardwood trees are characteristic of undisturbed Adirondack areas with high rainfall. Such epiphytes occur on both Whiteface and Ampersand Mountains, but are relatively uncommon except at the lower elevations on Ampersand (1600 to 2000 ft). True epiphytes on tree trunks were not included in the quadrat studies; tree base communities were measured up to three decimeters from ground level, but these are quite different from true epiphyte communities further up the trunk.

Epiphytic bryophytes are present largely on four species of trees on Ampersand: *Acer saccharum, Betula alleghaniensis, Fagus grandifolia,* and *Tsuga canadensis* (sugar maple, yellow birch, beech, and hemlock). Ten trees of each species were sampled, the only criterion being the presence of epiphytes up to at least two meters. In many cases they were present to 10 m.

I attempted to record all species present, by using a ladder and long pole to reach the upper trunks. As in all parts of this study, specimens which could not be identified with certainty in the field (e.g., species of *Frullania* and *Brachythecium*) were brought back to the laboratory for further study. Diameter at breast height (dbh) was measured for all trees studied. Each tree was treated as a "quadrat" in the analyses of species composition. The results, which follow, have proven interesting even with this limited amount of data.

Nine species of bryophytes were found growing as epiphytes and not found elsewhere in the quadrats on either Ampersand or Whiteface, indicating that this habitat is indeed an additional source of diversity. Furthermore, three other epiphytic species had been found only once before, on a tree base on Ampersand at 1600 ft (490 m). Although tree base communities contain a mixture of true epiphytes and others that are primarily terrestrial, these three species did not occur elsewhere on the ground. Thus I found a total of twelve species growing only as epiphytes.

Different species of trees offer different microhabitats for bryophytes in terms of bark porosity, roughness, exfoliation, chemistry, pH, etc. (Billings and Drew, 1938; Barkman, 1958; Slack, 1976). The effects of such differences among the four species of host trees or phorophytes were examined in terms of species richness (S) of the bryophytes growing on them. The results are as follows:

	Species richness (S)	Max. no. species/tree
Betula alleghaniensis	23	11
Fagus grandifolia	20	10
Tsuga canadensis	7	5
Acer saccharum	23	13

I found a total of 36 species of epiphytic bryophytes, 26 mosses, and 10 liverworts. Many additional species occurred in humus on the tree bases, but these are not true epiphytes and were not included. For comparison, Brown (1948), in a study of epiphytes throughout New York State, found 35 mosses and 19 liverworts growing as epiphytes as defined above. (She found eight additional mosses and six additional liverworts on stumps or tree bases.) Brown's study included 25 stations at elevations from sea level to 5000 ft (1525 m). Seventy-four percent of the moss epiphytes and 53 percent of the liverworts found by Brown, on 63 tree species and over an elevation gradient of 5000 ft throughout the State, were present on only four tree species over an elevation gradient of 5000 ft throughout the State, were present on only four tree species over an elevation gradient of only 400 feet on Ampersand Mountain. Comparisons of my data with those of Brown (1948) and of Phillips (1951) in Michigan are shown in table 5. The bryophytic epiphytes found in the Ampersand study are shown in table 6. Phillips found 38 species of epiphytic bryophytes on 25 different host trees over all of Michigan, including 22 species on the four trees used in the present study. Brown found 38 species on these same four trees, only two more than on Ampersand, although Brown observed trees at more than twenty different sites in the State.

A great many studies have been made of epiphytic bryophytes in North American temperate forests in addition to those of Brown and Phillips. Examples include those of Beals (1965), Billings and Drew (1938), Cain and Sharp (1938), Coleman, Muenscher, and Charles (1956), Culberson (1955), Hale (1955), Hoffman (1971), LeBlanc (1961), and Quarterman (1949). Barkman, who has made extensive studies in Europe, has reviewed the American as well as the European epiphyte literature (1958). I have reviewed much of the subsequent epiphyte literature (Slack, 1976). Many of the earlier studies are concerned with the classification of epiphyte communities by phytosociological methods. Hoffman studied diversity of epiphytes but on only one host tree, Douglas fir. Beals, Culberson, and Hale considered diversity of epiphytes on a variety of trees in Wisconsin, but, although both tree and epiphyte species overlap with those on Ampersand, the overlap is insufficient to justify extensive comparisons with my data. The number of species and the cover of bryophytes may vary with the age of the tree for any one species, as Quarterman, (1949) showed for red cedar. However, diameter at breast height is a reasonably good indicator of relative age for any one species of tree within a single locality and was used in this study. The relationship between tree size and the number of bryophyte species it supports varies with the species of tree. A linear relationship was not found for any of the four species, but such a relationship was suggested for beech (shown in comparison with sugar maple in figure 18) and might be significant with a larger sample and larger maximum size of trees. I have seen larger beeches and larger yellow birches elsewhere in the Adirondacks, each of which supported a larger number of epiphyte species than the Ampersand trees.

(photo by N. G. Slack)

Acer saccharum, **showing large population of epiphytic moss,** *Neckera pennata* **on lower trunk.**

TABLE 5

Epiphytes Compared for Ampersand (present study), New York State (Brown, 1949), and Michigan (Phillips, 1955)

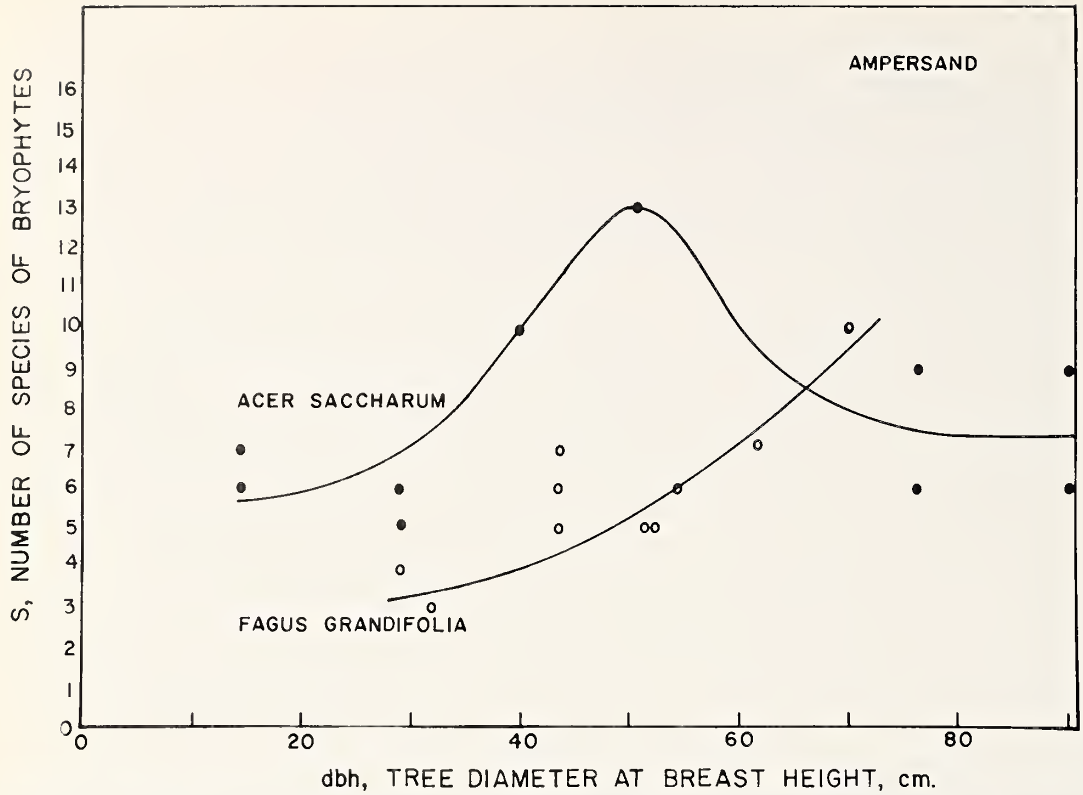
	Acer.sac.			*Fagus grand.*			*Betula alleg.*			*Tsuga can.*		
	Mich.	NY	Amp.	Mich.	NY	Amp.	Mich.	NY	Amp.	Mich.	NY	Amp.
Mosses												
Amblystegium serpens			x					x				
Anomodon attenuatus	x	x	x		x	x		x			x	
A. minor	x			x								
A. rostratus		x			x						x	
A. rugellii		x	x		x							
Brachythecium oxycladon		x	x		x	x		x			x	
B. salebrosum			x			x			x			
B. starkei		x			x			x				
Brotherella recurvans						x		x	x			x
Dicranum flagellare		x			x			x			x	
D. fuscescens		x			x			x				
D. montanum	x				x	x	x	x	x	x	x	x
D. viride	x	x			x	x	x	x	x	x	x	
Drepanocladus uncinatus	x							x				
Haplohymenium triste	x											
Heterophyllium haldanianum		x			x			x	x			
Herzogiella striatella		x			x			x				
Homomallium adnatum	x			x			x			x		
Hylocomium splendens			x									x
Hypnum pallescens (H. reptile)		x			x	x	x		x		x	x
H. cupressiforme								x				
H. imponens		x			x				x		x	
Leskeella nervosa	x											
Leucodon sciuroides	x		x	x		x	x			x		
Mnium affine			x			x			x			
Mnium punctatum			x			x						
Neckera pennata	x	x	x	x		x	x	x		x		
Orthotrichum elegans	x						x					
O. obtusifolium	x			x			x			x		
O. pumilum	x			x								
O. sordidum	x			x			x			x		
O. strangulatum								x				
Paraleucobryum longifolium					x			x	x			
Plagiothecium denticulatum		x			x			x			x	
P. laetum			x			x			x			
Platygyrium repens		x	x		x	x		x	x		x	
Pylaisiella intricata		x	x			x						
P. selwynii	x	x	x	x			x			x	x	
Rauiella scita		x										
Thuidium delicatulum			x		x	x		x	x		x	
T. recognitum												
Ulota crispa	x	x	x	x	x	x	x	x	x	x		
U. ludwigii				x								
Liverworts												
Bazzania trilobata								x	x		x	x
Cololejeunea biddlecomiae		x						x				
Frullania asagrayana			x			x		x	x	x		x
F. bolanderi	x			x			x			x		
F. eboracensis	x	x	x	x	x	x	x	x	x	x	x	
F. inflata						x			x			
Jamesoniella autumnalis					x	x		x	x			
Lophocolea heterophylla		x			x			x	x		x	
Lophozia ventricosa								x				
Plagiochila asplenioides			x									
Porella platyphylloidea	x	x	x	x	x	x	x	x		x	x	x
Ptilidium pulcherrimum	x	x			x	x	x	x	x		x	x
Radula complanata	x	x	x	x	x	x	x	x		x	x	

TABLE 6

Bryophytic Epiphytes, Ampersand Mountain

	Acer.sac.	*Fagus grand.*	*Betula alleg.*	*Tsuga can.*
Mosses				
Amblystegium serpens	x			
Anomodon attenuatus	x	x		
A. rugellii	x			
Brachythecium oxycladon	x	x		
B. salebrosum	x	x	x	
Brotherella recurvans		x	x	x
Callicladium haldanianum			x	
Dicranum montanum		x	x	x
D. viride		x	x	
Homalia trichomanoides	x			
Hylocomium splendens	x			
Hypnum imponens			x	
H. pallescens		x	x	x
Leucodon brachypus	x	x		
Mnium ciliare	x	x	x	
M. punctatum		x		
Neckera pennata	x	x		
Paraleucobryum longifolium			x	
Plagiothecium laetum	x	x	x	
Platygyrium repens	x	x	x	
Pylaisiella intricata	x	x		
P. selwynii	x			
Rhodobryum roseum	x			
Rhytidiodelphus triquetris	x			
Thuidium delicatulum	x	x	x	
Ulota crispa	x	x	x	
Liverworts				
Bazzania trilobata			x	x
Frullania asagrayana	x	x	x	x
F. eboracensis	x	x	x	
F. inflata		x	x	
Jamesoniella autumnalis		x	x	
Lophocolea heterophylla			x	
Plagiochila asplenioides	x			
Porella platyphylloidea	x	x		x
Ptilidium pulcherrimum		x	x	x
Radula complanata	x	x		

The fact that 23 different species grow on beech and 20 on yellow birch, even though no individual tree had more than 10 or 11 epiphyte species, respectively, indicates a higher potential diversity for larger, older trees. The bark on both of these trees roughens with age, increasing its water-holding capacity and the ease of attachment for bryophytes. Some bryophytes can become established on smooth bark, *Frullania* species for example, but most cannot. Trees whose bark remains smooth, such as striped maple, *Acer pensylvanicum*, rarely support epiphytes in the Adirondacks. (In the southern Appalachians, under different climatic conditions which affect the bark, it does support epiphytes). Sugar maple, which has a rough bark even



(photo by D. M. Slack)

FIGURE 18 Relationship between tree diameter (dbh) and number of bryophytic epiphytes for *Acer saccharum* and *Fagus grandifolia* on Ampersand Mt.

(photo by N. G. Slack)

Epiphytic moss, *Leucodon brachypus*, v. *brachypus*, higher on trunk of *Acer saccharum*.

(photo by N. G. Slack)

Epiphytes on Fagus grandifolia, including *Hypnum pallescens* and *Frullania eboracensis*, as well as lichens.

as a young tree, was found to support a large number of epiphytic species even at small dbh.

A succession of species and changes in their relative abundance was found on sugar maple, with *Porella platyphylloidea*, *Neckera pennata*, and *Anomodon attenuata* dominant on different trees, but each of these species, as well as pioneer species sueh as *Radula complanata*, were found to persist at least in small quantities after their periods of dominance. The present data show an increase in species richness (S) of sugar maple epiphytes up to about 18 in (46 cm) dbh, followed by an increase in dominance and reduction in both S (fig. 18) and H′ diversity, but larger numbers of trees and further cover measurements are needed to test this hypothesis. Age-size correlations are not completely reliable even for one locality; trees of one species may grow at different rates because of differences in microtopography, competition, or genetic factors. Increment boring to determine age is currently being used in further studies.

Host specificity of the epiphytic bryophytes on the four trees species was also considered. Using each tree as a separate "plot," I calculated Sφrensen indices to compare all 10 trees of one speeies with respect to species composition of epiphytes. Means for the 45 resulting comparisons for each of the four species were as follows:

Acer saccharum	0.57
Betula alleghaniensis	0.58
Fagus grandifolia	0.48
Tsuga canadensis	0.42

These are high values, especially for sugar maple and yellow birch, showing similar composition of epiphyte eommunities on any one tree species. Sφrensen values between each pair of host tree species were also calculated. Resulting means were as follows:

Acer-Tsuga	0.02
Acer Fagus	0.13
Acer-Betula	0.15
Fagus-Tsuga	0.27
Fagus-Betula	0.39
Betula-Tsuga	0.41

These values are all lower than those for single species, much lower except for *Fagus-Betula* and *Betula-Tsuga* comparisons, indicating that, while epiphytic bryophytes may not be closely host specific, within any one forest of particular age and climatic conditions, they show preference for particular tree species. Each of these trees presents somewhat different niche opportunities, probably because of differences in bark characteristics. It does appear, however, that bryophytes distinguish poorly between *Fagus* and *Betula* and between *Betula* and *Tsuga*. In the present study, 13 species were present on only one of the four host trees, eight of these on sugar maple. In addition, four epiphytic species, very characteristic of sugar maple, were found only on that species and on one beech tree, indicating that these and probably most other epiphytes are not strictly host specific, but occur on additional trees of the correct age and stage. All the species found on only one tree species on Ampersand Mountain were also found on other host trees somewhere in New York State in Brown's, (1948) study; in other words, no species was host specific when the whole State was considered.

Some epiphytes switch preferred hosts with relatively small change in latitude, sometimes even where the host tree is present throughout the epiphyte's range. This has been shown in Europe (Barkman, 1958) and in Wisconsin (Hale, 1955). Conversely, the same host tree may bear different epiphytes in different regions. Sugar maple was found to support different "associations" in lower and upper Michigan, *Homallium adnatum* in the former, *Leucodon* and *Neckera* in the latter (Phillips, 1951), climatic differences being important in this study. Many species of epiphytic bryophytes are much more widely distributed than their host trees. For example, many of the species found on American beech (*Fagus grandifolia*) are also present as epiphytes in Europe, but on European beech, *Fagus sylvatica*. But often they also occur on unrelated tree species. Moreover, bryophytes, such as *Neckera*, *Homalia*, and *Leucodon*, which are restricted to or generally occur on trees in tropical and temperate regions, and are found solely as epiphytes in the present study, are epipetric in treeless arctic or alpine regions.

Such switches of substrate are also seen in temperate regions. For example, the liverwort *Frullania asagrayana*, a common Adirondack epiphyte, is found in Minnesota on rock walls. The majority of epiphytes found in the Ampersand study, for example, *Mnium* and *Brachythecium* species, are facultative, not obligate epiphytes. Most of them occur also on rock, soil, or dead wood. Many species occur on both soil and trees, a smaller number on rock and trees, but rarely is a species found on all three substrates. The preferred habitat within one region may be dependent on climate, as noted above. Species epiphytic on beech in the Adirondacks or the Upper Peninsula of Michigan do not occur on beech at Kenrose Preserve (this study) or in lower Michigan (Phillips, 1951). The climate in the two more southern areas is less cool and humid, and the beech trunk habitat correspondingly more xeric. Many of these species do occur at Kenrose and in lower Michigan, but on the ground or on moist logs. A similar change from epiphytic to terrestrial habitats can be seen in Finland (Barkman, 1958).

Few, if any, temperate bryophytes are host-specific in the same sense as fungal parasites of plants. The host tree, sometimes called a phorophyte to distinguish it from a parasitc host, is merely a substrate. The actual bryophyte substrate is usually dead bark tissue. Bryophytes exhibit habitat preference (or degrees of tolerance) in relation to roughness of bark, as well as bark acidity and other chemistry. It appears that relatively few species are tolerant of the tannin in hemlock bark. Roughness of bark is related to water-holding capacity; some epiphytes are found only in fissures or knotholes of the otherwise smooth bark of beech. Sone of these variables have been measured (e.g., Hosokawa, et al., 1964; Grubb, et al., 1969), but it is often difficult to interpret factor interactions.

Host tree preferences of closely related species were examined for possible niche separation. More than one species of each of seven genera were present, including two species of *Anomodon*, *Brachythecium*, *Dicranum*, *Mnium*, *Pylaisiella*, and *Hypnum*, as well as three species of *Frullania*. Two species of each of these genera were recorded on one species of tree, indicating that habitat selection in terms of tree species is not all-important for niche separation. (Intrageneric niche separation in terms of substrate certainly occurs in some of these genera. Two closely related species of *Dicranum*, for example, occur in the Ampersand study area, *Dicranum viride* on wood, as an epiphyte and elsewhere, and *D. fulvum* on rock.)

Data for presence (+) or absence (−) of the tree species of *Frullania* on the four host trees are given below:

	Betula	*Tsugu*	*Fagus*	*Acer*
F. asagrayana	+	+	+	+
F. eboracensis	+	−	+	+
F. inflata	+	−	+	−

The fundamental niches (Hutchinson, 1957) of these species probably differ. The fact that *F. asagrayana* was the only species found on hemlock bears out Schuster's (1953) comment that it is the most xerophytic of these *Frullania* species. Niche overlap does, however, appear to be present at least in terms of tree species, and I could discover no habitat preference on the tree itself, for example, north vs. south side, for any of the species. A fourth species, *F. bolanderi*, present in New York but not found in this study, occurs on all four of these trees in Michigan (Phillips, 1951). On the other hand, on only three occasions were two of the *Frullania* species found on the same individual tree. It appears that these sympatric, congeneric species do not have well separated niches; I think they are opportunistic species kept apart largely by stochastic factors. The role of bryophytes as opportunists is discussed below.

It should be noted that epiphytic bryophytes occur on other tree species as well as the four studied on Ampersand and Whiteface Mountains. At lower elevations, these included *Fraxinus americanus*, *Quercus borealis*, *Ostrya virginiana*, and *Acer rubrum*. At higher elevations, epiphytes were found on *Picea rubens*, *Abies balsamea*, *Pyrus melanocarpa*, and *Betula papyrifera* v. *cordifolia*. Trees of the same genus do not necessarily have similar epiphyte floras; those of *Betula alleghaniensis* and *B. papyrifera* and of *Acer rubrum* and *A. saccharum* are not similar. *Ostrya virginiana*, on the other hand, has a similar epiphyte flora to that of *Acer saccharum*. Bark characteristics are more important than genetic relationships except where these result in similar bark chemistry, as is probably true in the black oak group. All the bryophyte species found as epiphytes on the trees at higher elevations on Ampersand (i.e., spruce-fir zone), as well as all those found by Brown (1948) at four other Adirondack stations, were found also in nonepiphytic habitats in this zone. The epiphytic habitat thus does not increase the bryophyte diversity in terms of species richness at higher elevations on these mountains. That it adds significantly to species richness at lower elevations in the Adirondacks is shown by the present study on Ampersand Mountain.

Contrary to general European (Barkman, 1958), Japanese (Iwatsuki, 1960) and even some recent American (Hoffman and Kazmierski, 1969) practice, no attempt has been made to classify epiphyte communities (or associations, unions, etc.) on the trees on Ampersand Mountain. Although groups of species characteristic of particular trees, especially of sugar maple and hemlock, do occur, the particular combination of species varied with height and aspect even on a single tree, and on any one species of tree with size and location. Dynamic relationships appeared more obvious than fixed associations of species. In many places a bryophyte species, though still recognizable, was dead and had been overgrown by another species. Quarterman (1949) has studied bryophyte succession on red cedar bark, particularly in terms of changing dominants. She aged the trees by increment boring and, although she studied only nine trees, her demonstration of "dynamic behavior of bryophyte species" is impressive. I think this is a good approach to understanding relationships among epiphyte species. Doignon, as reported in Barkman (1958) studied actual succession in time on a single tree over a 30-year period. This is perhaps the ideal method, but in the modern era of pollution and publish-or-perish policies, it seems unlikely that either the epiphytes or the ecologists would survive that long.

New ecological techniques have been applied recently to epiphyte-host systems (see Slack, 1976, for a review). Beals (1965), for example, used ordination methods in the study of corticolous bryophytes and lichens. With such methods, it is possible to sort out the importance of the host tree as substrate as compared to the age or location of the tree. Gradient analysis can also be used with time as the gradient and measured changes in the importance of individual species, species groupings, total biomass and diversity. This can be done with individual trees, trees of one species in one location but of different ages. In the Southern Blue Ridge in North Carolina, I have observed and measured such changes on different aged trunks of the same sugar maple (Slack, 1976). If changes in microhabitat, such as water-holding capacity of bark, could also be measured in relation to time, this would constitute direct gradient analysis.

Another approach to epiphytic vegetation would be to treat trees as islands and to apply principles of island biogeography (MacArthur and Wilson, 1967). Invasion and extinction rates of epiphyte species could be measured and the influence of nearby "islands" determined. Although there has been much discussion of possible long-distance dispersal of bryophytes in relation to their strange geographical distributions (e.g., Crum, 1972), there is little information about their short-range dispersal. It would be interesting to determine whether adjacent trees of the same species and similar size have more similar species composition than those further apart. In the present study, adjacent trees of the same species were eliminated from the sample to avoid this possible factor, but it has not been measured as far as I can discover. In these Adirondack forests, this factor could be tested by using trees that are regularly present but uncommon and have distinctive epiphyte floras. Examples would be hop hornbeam, *Ostrya virginiana* and white cedar, *Thuja occidentalis*, both of which are present together with the major species of the Ampersand study in a forest in the Adirondack Mountain Preserve near St. Huberts, N.Y., where I am currently investigating epiphytes.

Another interesting question in regard to host-epiphyte "island" systems is whether chance "invaders," those species such as *Hypnum imponens*, and *Mnium ciliare* or *M. punctatum*, which are not primarily found as epiphytes, persist for any length of time on these tree "islands" in competition with more usual epiphyte species. An even more intriguing question, which must have been asked by all earlier pursuers of epiphytes and is mentioned by a few, is why are there so many "empty islands?" A tree of the same species and of similar size may grow next to one covered with epiphytes and yet be completely barren of them itself, for no apparent reason. In addition to that source of "empty islands," each new young tree as it grows, like a new oceanic island produced by volcanic activity, represents a new target for invasion. Thus, a continuous supply of open niches for epiphytes exists even in a mature or climax forest.

The relationship between productivity and diversity, one of considerable current interest (Whittaker, 1967; Loucks, 1970; Auclair and Goff, 1971; Goodman, 1975), can also be considered in regard to epiphytic systems. Whether high diversity, even for trees, can generally be related to high productivity, as Loucks contended, has been questioned by others (Whittaker, 1965; Auclair and Goff, 1969). I have herein questioned this relationship for bryophytes generally; higher diversity did not necessarily accompany the much higher bryophyte productivity found in the spruce-fir forest as compared to the deciduous forest. The same appears to be true in terms of epiphyte productivity and diversity. From my own experience in the Pacific Northwest and from studies in Oregon (Pike, et al, 1975) and in the Olympic Peninsula, (Hoffman, 1971), where extensive mats of epiphytic bryophytes are present, diversity of epiphytes is no greater than in the Adirondacks. The diversity of epiphytes on Ampersand seems high in view of the much lower productivity of epiphytic bryophytes there than in the Northwest. This question needs further quantitative investigation, especially of trees other than *Pseudotsuga menziesii*, on which most of the western studies have been conducted. I have found both higher productivity and higher species richness of epiphytes in the Southern Blue Ridge than in the Adirondacks, but this probably is a result of historical as well as climatic factors (see Anderson and Zander, 1973, and Slack, 1976).

Although much is to be learned from further quantitative studies of epiphytes and from the measurement of ecological factors affecting them, some of these factors can only be distinguished experimentally. Transplant experiments of the sort that Brodo (1961, 1968) has done with lichen epiphytes could be used to study the substrate factor vs. other factors, such as location on the tree or in the forest. Barkman (1958) suggested other methods of experimental manipulation, such as putting up a baffle to prevent water movement down the trunk, or removing certain species to determine the effects of competition. Trees could be thinned to change the light intensity; some balance between sufficient light for photosynthesis and the detrimental effects of heat and exposure in increasing transpiration rate appear to be important. Climatic factors are of primary importance since epiphytes generally occur in areas of high rainfall and low evapo-transpiration rates, but great differences also exist within a single forest. Manmade factors, which also affect epiphyte growth on the tree species studied here, include nutrient-rich roadside dust, probably a partially unrecognized factor in epiphyte studies, and toxic substances near cities or factories, a human disturbance much studied particularly in relation to lichens but also to bryophytes (e.g., LeBlanc, 1961, LeBlanc and Sloover, 1970, and Nash, 1972, for Eastern North American trees). Whether the investigator uses disturbances created by others, as with pollution effects, or creates his or her own less drastic perturbations, much can be learned from such studies. It seems to me that the living tree with its epiphytes is an easier system to disturb, and thus to study experimentally, than most other aspects of plant communities.

In conclusion, the present study presents well-replicated data on diversity, in terms of species richness, for the four dominant trees of the hemlock-hardwood forest of northern New York. Many suggestions for further research are given. Additional quantitative data, the techniques of gradient analysis and of island biogeography would make possible the study of dynamic relationships of epiphytes. Lichens should be included in future epiphyte studies; competitive relationships between brophytes and lichens are obvious to an ecologist looking at epiphytes. The majority of past epiphyte studies, however, have been done by specialists on one taxonomic group such as hepatics or lichens in temperate regions, or orchids in the tropics, rather than by ecologists. The interesting problems that epiphytes present to the ecologist are made difficult by the problems of identifying cryptogams (which are omitted from most investigations of plant community ecology for the same reason). Bryophytes, wrote Crundwell (1970), are "the wrong size." They must be identified by a combination of macroscopic and microscopic characters. If we were the size of cockroaches, he wrote, bryophytes would all look distinctive and would even be known by vernacular names "to the cockroach in the street." The same problems apply to lichens, but these problems are not insuperable, even for noncockroach-sized ecologists. Theoretical ecology would also benefit from the study of epiphyte systems.

Results of the Kenrose Preserve Study

The elevations studied as Kenrose Preserve ranged from 1120 to 1510 ft (335–457 m), thus nearly reaching the lowest elevation on Whiteface and Ampersand Mountains, 1600 ft (488 m). The forests at Kenrose Preserve are of entirely deciduous hemlock-hardwood, except for a small admixture of white pine. Many of the same trees, such as *Acer saccharum*, *Acer rubrum*, *Acer pennsylvanicum*, *Fagus grandifolia* and *Tsuga canadensis* are present as on the lower Adirondack slopes. While ash, (*Fraxinus americanus*) is, however, more common at Kenrose. Also, oak-hickory (*Quercus borealis*, *Carya ovata*) forest is present at Kenrose Preserve, but not on Whiteface or Ampersand.

I wanted to determine whether the limited range of elevation at Kenrose Preserve affected the diversity of bryophytes. Both H′ and S are plotted against elevation in figure 19 Elevation is significantly correlated with H′ (r = 0.66). In general, higher elevations have

(photo by C. J. George)

Mixed deciduous forest, Kenrose Preserve showing open aspect.

greater bryophyte diversity than lower elevations at Kenrose, the major exception being at 1380 ft (420 m), where station 5 shows greater diversity (H′) than the highest stations at 1510 ft (457 m). Station 5 also has high species richness (S), but other stations at 1380 ft show considerable variability in both H′ and S. Elevation is also significantly correlated with degrees of slope (r = 0.50), and is negatively correlated with pH (r = 0.54). Thus elevation is here, as elsewhere, a complex variable.

Diversity (H′) is plotted against log (percent cover) of all bryophytes in figure 20. The correlation coefficient between H′ and percent cover is significant (0.65). There was no consistent relationship between bryophyte cover and diversity (H′) for the Adirondack quadrats. For the spruce-fir and arctic-alpine zones, the correlation between cover and diversity was negative. For the deciduous forest it was positive, significantly so on Ampersand (r = 0.98 for four quadrats). Further investigation is needed. Diversity (H′) appears to be low with low percent cover of bryophytes and high where the bryophyte cover is unusually high, but there is a significant amount of variations in intermediate cover values (figure 20).

Figure 21 shows diversity (H′) plotted against $\log_e$ S for Kenrose bryophytes, from which it can be seen that $\log_e$ S is a relatively good predictor of diversity (H′); i.e., an approximately straight line relationship is seen on the graph. (See also multiple regression analysis below.) This means that the evenness component of diversity (J′) is relatively constant. The J′ values do show less variation than in the Adirondacks; all but three of these values fall between 0.52 and 0.75. Thirty percent of the J′ values were under 0.6 and 75 percent under 0.7, with a mean of 0.63, which are low values as compared with those found by other workers for birds (Tramer, 1969) and for higher plants (Pielou, 1966). Adirondack values were mostly low, also. The most extreme low evenness value (J = .31) at Kenrose was at a station at the base of an unstable steep bank down which water runs each spring. Only one species of moss, *Fissidens taxifolius*, appears to be well adapted to these conditions and accounts for 87 percent of the bryophyte coverage.

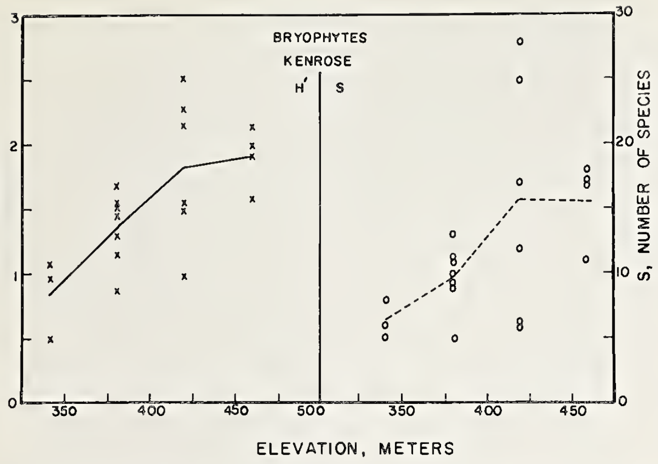


FIGURE 19 Changes in species richness (S) and diversity (H') of bryophytes with elevation change at Kenrose Preserve

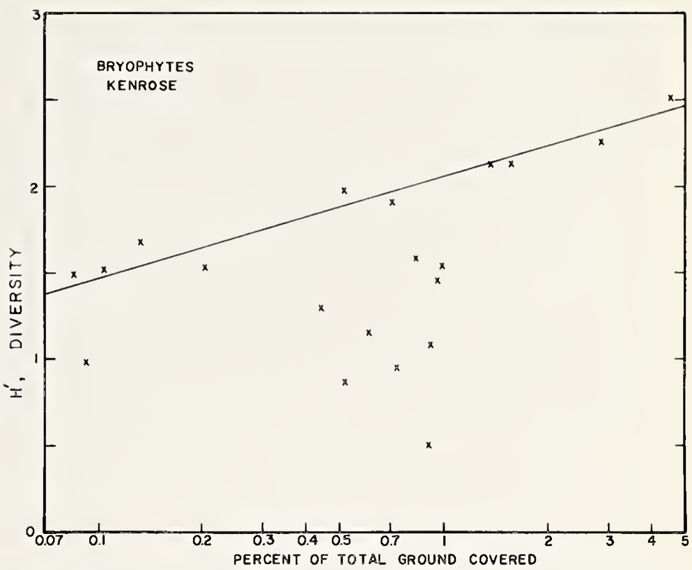


FIGURE 20 Diversity (H') versus log of percent cover of bryophytes at Kenrose Preserve

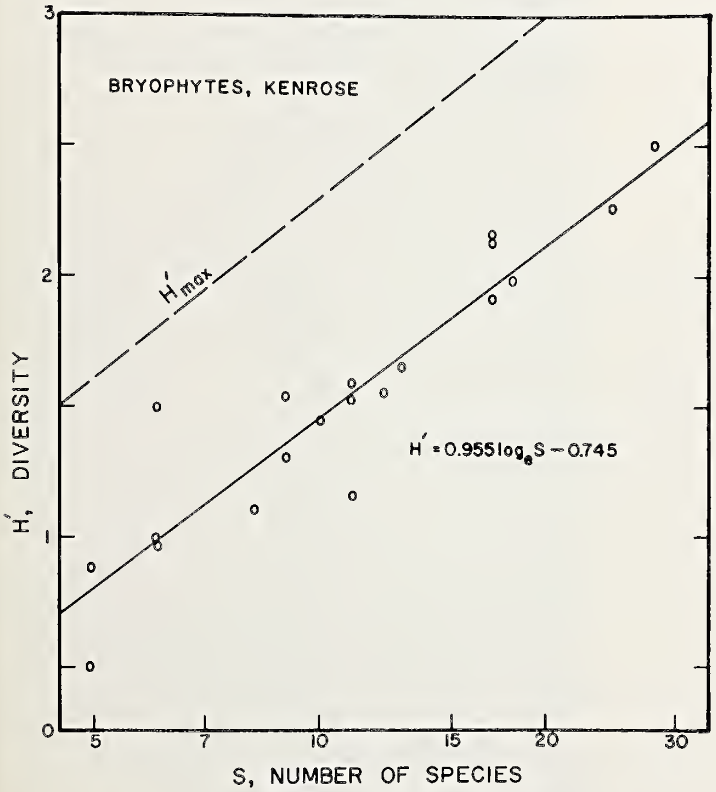


FIGURE 21 Diversity (H') plotted against species richness ($\log_e S$) for bryophytes at Kenrose Preserve

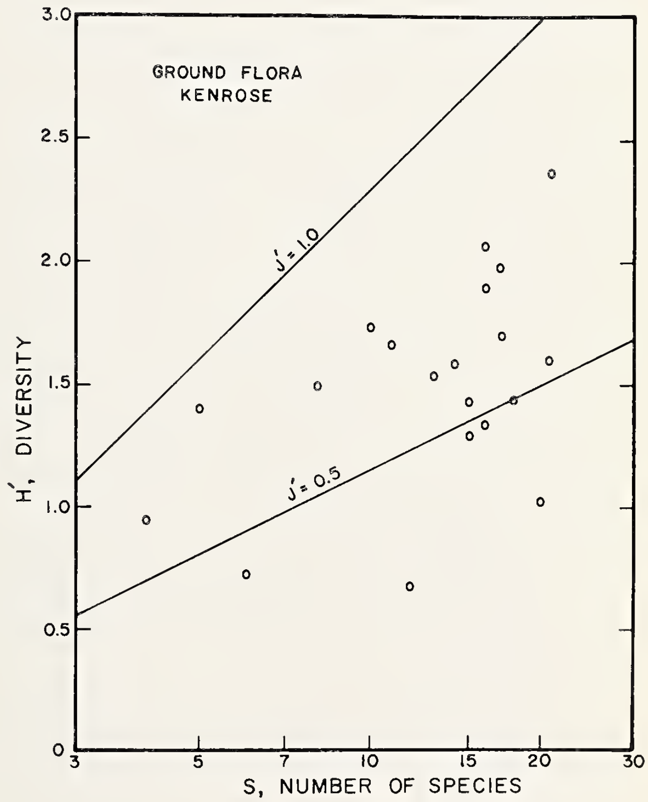


FIGURE 22 Diversity (H') plotted against species richness ($\log_e S$) for ground flora at Kenrose Preserve

Figure 22 shows the relationship between H′ and $\log_e$ S for the vascular ground flora at Kenrose Preserve. The majority (65%) of the quadrats have J′ values between 0.50 and 0.75, a very similar range to that for bryophytes in almost all quadrats. Low J′ values for ground flora, however, do not coincide with low J′ values for bryophytes. Dominance relationships for bryophytes are thus independent of dominance relationships for the vascular ground flora. Several vascular plants, for example, are adapted to the unstable bank conditions where *Fissidens taxifolius* was the only important bryophyte.

When bryophyte diversity (H′) is compared with that for vascular ground flora, an interesting relationship appears. At the higher elevations, bryophytes show higher diversity for almost all quadrats. Below about 1300 ft (400 m), the opposite is true; that is, all the quadrats at 1120 ft (340 m) and the majority at 1250 ft (380 m) show higher diversity of ground flora. It appears from the soil data (see below) that such factors as high calcium and concomitant high pH as well as poor drainage found at the lower elevations may limit bryophyte diversity more than that of vascular plants. Even shrubs show higher diversity than bryophytes in two quadrats at the lowest elevations, 1120 ft (340 m). At all other elevations at Kenrose (fig. 23) and at all stations in the Adirondacks, bryophyte diversity is higher than that of shrubs.

The number of tree species (S) and dominant tree species at the four elevations at Kenrose are seen in figure 24 in relation to bryophyte diversity. The number of tree species per quadrat is correlated with diversity of bryophytes (r = 0.59). Highest bryophyte diversity is found in quadrats in which sugar maple is one of the dominants, with several other trees such as hemlock, striped maple, and ash as associates. Diversity is lowest in quadrats in which ash is the sole dominant. High diversity was found also in the oak-hickory forest present on the crest of a hill at 1500 ft (525 m) and above. Although diversity here is not as high (H′ = 1.98) as in some of the quadrats under sugar maple (H′ = 2.3, 2.5), seven of the 18 species found in this oak-hickory forest were not found elsewhere in the Kenrose study. Thus, forest type can add to the overall beta diversity for an area whether or not one type of forest has a more diverse bryophyte flora than another. This was found to be true in the Adirondack study areas which encompassed both deciduous and conifer forest, but that it is true even within the deciduous forest biome shown here.

Many environmental factors were measured at Kenrose Preserve. These measurements were made in the same quadrats in which the vegetation was investigated by Carl George and associates. (See Study Area section.) The following variables, which might have some significance for bryophyte diversity, were selected for a multiple regression analysis: elevation, degree of slope, percent of full sun under tree canopy, pH of soil, calcium content of soil, soil temperature, relative humidity, and maximum air temperature. In addition, the following aspects of the vegetation were included in the analysis: total density of bryophytes per 4 by 16 meter quadrat, total density of vascular plants, $\log_e$ S for bryophytes, and number of tree species. Other variables, such as soil type, slope angle, phosphorus and organic content of soil, and minimum summer temperature were eliminated earlier when no correlation with bryophyte diversity was found for any of these factors. Two factors not included may be important. These are drainage, which ranges from poor to good in the study area, and the relative maturity of the forest. Good drainage and later successional stages appeared to favor bryophyte diversity, but neither of these variables had been sufficiently quantified to use in the regression analysis.

Hemlock-hardwood forest, Kenrose Preserve, *Acer saccharum* **and** *Tsuga canadensis* **dominants. Bryophyte diversity was high in forests where sugar maple was dominant.**

(photo by C. J. George)

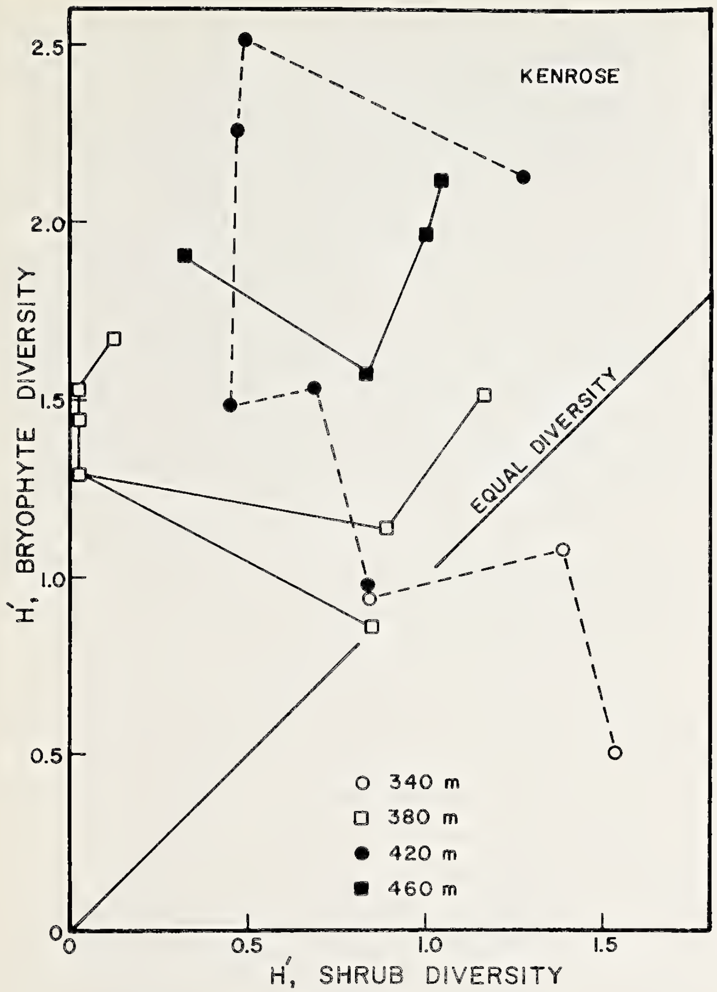
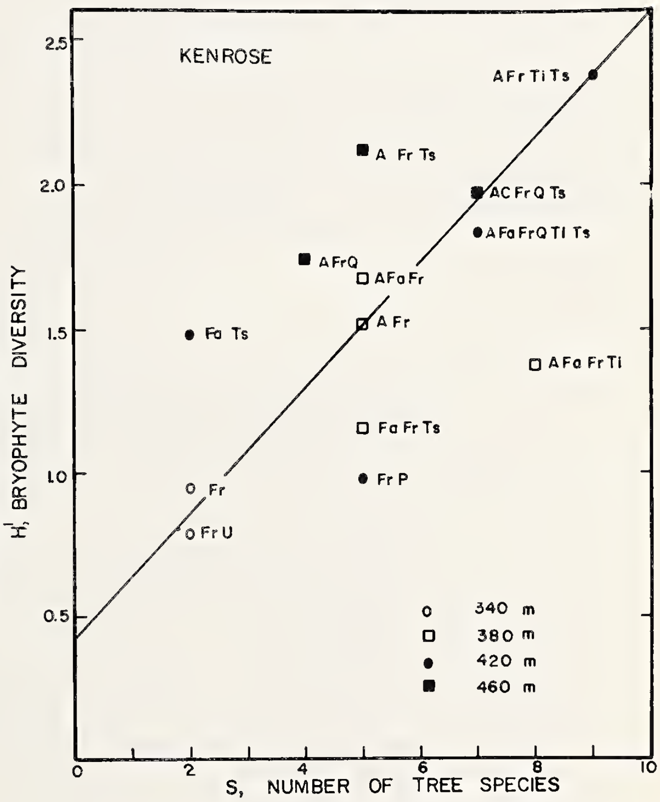


FIGURE 23 Bryophyte diversity (H′) plotted against shrub diversity (H′) at Kenrose Preserve

FIGURE 24 Number of tree species (S) in relation to bryophyte diversity (H′). Dominant tree species at each of the four elevations are also shown. Key:

A	*Acer saccharum*
C	*Carya ovata*
Fa	*Fagus grandifolia*
Fr	*Fraxinus americana*
P	*Pinus strobus*
Q	*Quercus borealis*
Ti	*Tilia americana*
Ts	*Tsuga canadensis*
U	*Ulmus americana*



Regression Analysis

Four separate analyses were made using some or all of the 11 variables, in a stepwise multiple regression analysis program (STEPREGI; SUNYA Code: STAT/02). The results of the regression analyses are shown in table 7. Correlation coefficients between bryophyte diversity (H′) and various environmental and other parameters are shown in table 7b. The entire correlation matrix is given in table 8.

The first analysis (1, table 7a utilized $\log_e$ S (or H'_{max}) only. (Recall the evenness component of diversity, $J' = H'/H'_{max}$). As stated above, the evenness component of bryophyte diversity was low but relatively consistent. Therefore, at Kenrose (but not in the two Adirondack study areas), diversity (H′) can be predicted reasonably well from the number of species present. The coefficient of determination is 0.87; the regression equation predicts H′ from $\log_e$ S as follows:

$$H' = 0.9553 \log_e S \quad -0.745$$

When all variables except $\log_e$ S are retained in the regression analysis (2, table 7a), only elevation and bryophyte percent cover were significant, although several other variables are significantly correlated with H′. These other variables are not significant in the regression analysis because they themselves are correlated with the significant variables (table 8). For exam-

TABLE 7a

Results of Stepwise Multiple Regression Program for Environmental Factors and Other Parameters Determining Bryophyte Diversity (H′) at Kenrose Preserve

Type of Analysis	variables	Reg. Coeff.	Std. Error	T	Coeff. Det.
1. $\log_e S (=H'_{max})$	Log S (bryophytes)	0.955	0.087	11.01	0.87
		(cumulative)			
2. Best X (excluding $\log_e$ S)	Elevation	0.0021	0.0005	4.25	(0.47)
	Bryophyte cover	0.0000	0.0000	3.13	0.72
	(No. tree species	0.0535	0.0304	1.76	0.77)
3. Best X (excluding all bryophyte variables)	Elevation	0.0023	0.0006	3.67	(0.47)
	No. tree species	0.0919	0.0342	2.69	0.67
4. Best X (excluding all plant variables)	Elevation	0.0021	0.0007	2.93	(0.47)
	Slope (degrees)	0.0219	0.0111	1.98	0.57

TABLE 7b

Correlation Coefficients Between Bryophyte Diversity (H′) and Environmental and Other Parameters at Kenrose Preserve

Significant correlation coefficients with H′	
$\log_e S (=H'_{max})$	0.93
Percent cover, bryophytes	0.63
Number of tree speeies	0.58
Degree of slope	0.59
pH of soil	−0.45
Nonsignificant correlation coefficients with H′	
Percent cover, vasc. plants	0.037
Percent of full sun	−0.14
Calcium (kg/hectare)	−0.36
Soil temperature	0.087
Maximum air temperature	0.099
Relative humidity	0.072

ple, the number of tree species (table 7b) would raise the coefficient of determination to 0.77 but is not quite significant in the present analysis (2) because of its correlation with bryophyte cover (Denbry, table 8).

The third equation used (3, table 7a) excluded all bryophyte variables including bryophyte cover. Here elevation and number of tree species had significant regression coefficients and together account for 67 percent of the variation in H′.

Finally, a fourth analysis (4, table 7a) utilized an equation excluding all the plant variables, using only nonbiotic factors. Here elevation and the degrees of slope, the latter being only marginally significant, accounted for 57 percent of the variation in H′. Although elevation alone accounts for almost half of the variation in bryophyte diversity (H′), biotic factors are also important variables, and together with elevation account for about 75 percent of the variation found.

It should be noted that pH has a significant negative correlation (r = 0.45) with H′ but does not have a significant regression coefficient in any of these analyses. This is explained by the fact that soil pH also has a significant negative correlation with slope (r = −0.79) and with elevation (r = −0.47), both of which were used in all analyses. Brophyte diversity in this study is low where the pH is high (pH 6 or above), and these quadrats are in areas of both low elevation and low slope at Kenrose. The pH of the soil was found to be correlated with Kg/hectare of calcium in the soil (r = 0.88), high pH resulting from high calcium. The correlation between calcium and diversity is not quite significant (r = −0.36); very high calcium is associated with low diversity, but so is very low calcium. Intermediate ranges of calcium have little relationship to diversity. The relationships between soil calcium, elevation, and bryophyte diversity (H′) can be seen in figure 25. I interpret these data to indicate that the tolerance range for bryophytes both in terms of biomass (measured as total percent cover) and of diversity (H′) is limited by low and very high calcium. In the intermediate range for soil calcium, presumably optimal for most forest bryophytes, diversity and biomass are limited by other factors such as humidity, or more likely by an interaction of such factors.

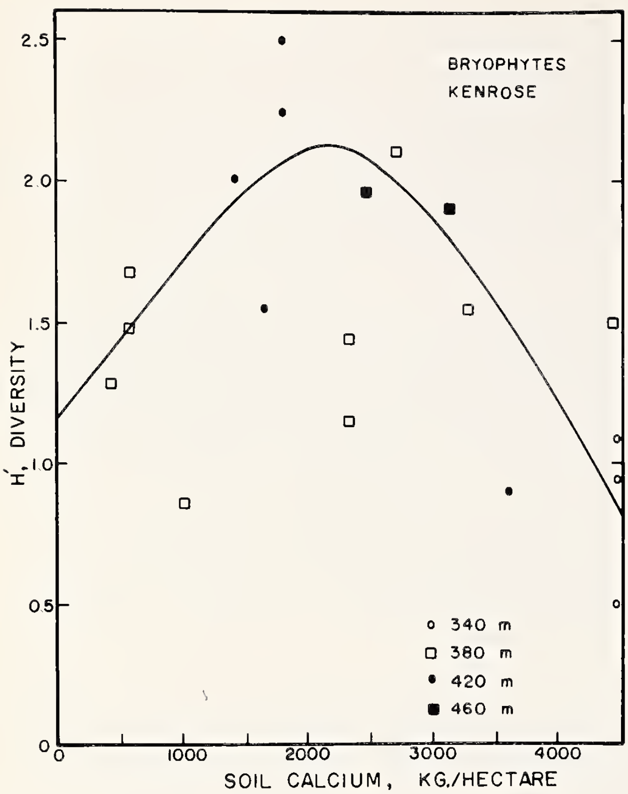
Elevation, even over the short range found at Kenrose Preserve, is a complex variable involving slope angle, soil chemistry, and probably soil drainage as well. Even more complex interactions are indicated. Slope angle, for example, was found to influence temperature, incident light, and relative humidity, none of which, when examined separately, was found to be a significant determinant of diversity. Such interactions cannot always be sorted out by multiple regression analysis techniques. Ultimately, experimentation is needed.

Perhaps the most striking result of the study of microclimatic variables at Kenrose was that so few of them were significantly correlated with diversity. Two conclusions can be drawn from this result: first, some variables sueh as summer soil and air temperatures are probably not relevant to bryophyte growth or diversity over the small range of these factors within the study area. The same factors might be important in a similar-sized or smaller area in which the microclimates are more severe, such as the summit of Whiteface Mountain. Important studies correlating microclimate and plant growth, such as those of Bliss (1969), have been made in areas with sharp microclimatic gradients.

TABLE 8

Correlation Matrix for Environmental and Other Parameters at Kenrose Preserve

H'_{max}	Denbry	Denvasc.	Trees	Slope	Elev.	%Sun	pH	Ca.	Soil temp.	Rel. hum.	Max. temp.	H′	
	.64	.043	.65	.53	.59	−.15	−.36	−.24	.023	.025	.033	.93	H'_{max}
		.26	.44	.44	.11	−.19	−.22	−.059	−.21	.27	.057	.63	Denbry
			−.24	−.14	−.11	.50	.52	.55	−.010	.015	.090	.037	Denvasc.
				.44	.31	−.32	−.44	−.41	−.16	.19	−.15	.58	Trees
					.46	−.26	−.79	−.60	.16	−.067	.11	.60	Slope
						−.18	−.47	−.32	.22	−.14	.29	.66	Elev.
							.48	.24	.58	−.57	.23	−.14	%Sun
								.88	−.30	.26	−.19	−.45	pH
									−.45	.51	.012	−.36	Ca.
										−.94	.50	.087	Soil temp.
											−.34	−.072	Rel. hum.
												.099	Max. temp.
													H′



Oak-hickory forest, Kenrose Preserve; seven bryophyte species were found only in this forest type at Kenrose.

FIGURE 25 The relationship between soil calcium, elevation and bryophyte diversity (H') at Kenrose Preserve

Second, microclimatie measurements should be as closely related as possible to the stratum or type of plant under study. Relative humidity and light intensity at two meters above ground level are appropriate to the shrub layer, but may be of little significance for bryophytes growing at two centimeters or less above the soil.

When I reexamined the high diversity quadrats at Kenrose Preserve after the completion of this study, I observed another probable factor affecting bryophyte diversity, the heterogeneity of the quadrat or station in terms of possible bryophyte substrates. Since most bryophytes cannot survive being covered by annual leaf fall, they are restricted in deciduous forest to substrates not covered by leaves. These include rotting logs, tree bases, tree trunks, outcropping rock, boulders, and steeply sloping ground. Such substrate diversity could be measured by the Shannon formula, using percentages of area covered by rock, logs, etc. Poulson and Culver (1969) have used a similar measure in their study of diversity of cave inhabitants (all heterotrophs), but it has not been used to my knowledge in alpha diversity studies of plant communities. Further subdivisions of substrate, for example, into acid and basic rock, decorticated logs and those with bark intact, etc., would also be appropriate in relation to bryophyte diversity. Different species are adapted to particular substrates as Mühle and LeBlanc (1975) have recently shown for both mosses and hepatics on logs in various stages of decay. This method of study of alpha or within-habitat diversity would also be applicable to quite different communities, for example the attached microflora and fauna of freshwater ponds, where the substrates would be macrophytes, filamentous algae, wood, etc.

Beta or between-habitat diversity was evident at Kenrose Preserve in spite of the small elevation gradient. Cluster analysis (see Slack, 1971) showed that clusters of quadrats at the same station all had significant B-coefficients based on the Sϕrensen index for species similarity, whereas clusters of quadrats including the highest and lowest elevations have B-coefficients ranging down to zero, that is, zero similarity of species composition within a cluster. Beta diversity is also evident in the species composition of the station in dry oak-hickory forest. In one 4 by 16 quadrat at this station, seven species of mosses were recorded that were not found elsewhere in the Kenrose Preserve study.

Taxonomic Diversity

Table 9 shows the partitioning of bryophyte diversity (H') into components by family, genus, and species. If each species in a quadrat belongs to a different family, 100 percent of the diversity is family diversity. This was the case in the low diversity quadrats at Kenrose Preserve. Similarly, if each species belongs to a different genus, 100 percent of the H′ diversity is family plus genus diversity. If there are thus no congeneric species, H′ is the same whether calculated by species or by genera, as in arctic-alpine quadrat 21 on Whiteface Mountain. (See the last column of table 9 for H′ calculated by genera.)

Where H′ is high, as in the spruce-fir quadrats at Whiteface and in some of the deciduous forest quadrats at Kenrose Preserve, it can be seen (table 9) that a relatively high percentage of the diversity is at the species level; that is, many belong to the same genera. For these high diversity quadrats (H′ = 2.13 to 2.63), the percentage of diversity resulting from congeneric species ranged from 10.4 to 16.0 (mean = 13.5). For the two highest diversity quadrats in these two locations (3 at Kenrose and 20 at Whiteface; see table 9) generic diversity was also high, 11.0 and 12.9 percent, respectively. These two quadrats also had high specific diversity (because of congeneric species), indicating that species packing goes on at both the generic and specific levels where there are many species per quadrat. Other quadrats in these two groups (table 9) show generally low generic diversity, from 1.9 to 6.3 percent (mean = 3.9). In all of the quadrats discussed above, the familial fraction of diversity is high, from 71 to 86 percent, that is up to 86 percent of the species in a quadrat are members of different families. When I compared these with those of Lloyd Inger, and King (1968), who partitioned diversity of amphibians and reptiles of a Bornean rain forest, I found the familial fraction of diversity in their study much lower, up to 50 percent for frogs and lower for lizards and snakes. These three groups, however, constituted a total of only 15 families, whereas over 40 bryophyte families are represented in the present study. The generic fraction of diversity for both amphibians and reptiles was higher than in my bryophytic study as is the specific fraction for frogs and lizards, but not for snakes. The authors concluded that "only a small part of the total species diversity. . . . is attributable to congeneric species living together," but actually that percentage was 20 percent for frogs and 27 percent for lizards; these percentages do not seem to me to be insignificant.

TABLE 9

Taxonomic Diversity—Partitioning of H′ by families, genera and species

Quadrat No.	Total Diversity (H′)	% Family	% Genera	% Species	Diversity (H′) by Genera
Whiteface Mt.—Spruce-fir quadrats					
16	2.29	78.60	6.32	15.08	1.94
18	2.28	86.07	3.50	10.43	2.04
20	2.63	71.08	12.92	16.00	2.21
Whiteface Mt.—Arctic-alpine quadrats					
21	2.13	82.96	17.04	0.00	2.13
22	1.37	94.53	0.00	5.47	1.30
23	1.54	52.77	21.28	25.95	1.14
24	0.56	25.13	69.38	5.49	0.53
25	1.66	75.07	16.52	8.41	1.52
Kenrose Preserve—Deciduous forest quadrats					
Low diversity quadrats					
8	0.50	100.00	0.00	0.00	0.50
11	0.98	100.00	0.00	0.00	0.98
15	0.95	100.00	0.00	0.00	0.95
17	0.86	100.00	0.00	0.00	0.86
High diversity quadrats					
3	2.51	74.12	10.95	14.93	2.14
4	2.26	85.94	1.93	12.13	1.98
12	2.13	85.33	3.54	11.13	1.90
18	2.14	80.76	4.17	15.07	1.81

Species diversity was also partitioned for two other groups of quadrats: the low diversity quadrats (H′ less that 1.0) at Kenrose, and the five arctic-alpine quadrats at Whiteface. In all four of these Kenrose quadrats (table 9) the familial diversity was 100 percent; that is, each of the species belonged to a different family. This result is not surprising since the total number of species for these quadrats ranges only from five to nine; a random selection of species could yield this result. Apparently, species belonging to several different families are adapted to conditions in these quadrats: high soil calcium, high pH, and instability because of spring soil movement. High Percentage Similarity between some of these quadrats, especially the value of 0.77 for quadrats 8 and 15, which are separated from each other, indicates that certain species are indeed specialists for these conditions.

The arctic-alpine quadrats differ greatly from each other when diversity (H′) is partitioned into familial, generic, and specific portions. Quadrats 23 and 24 (table 9) have the highest specific diversity (26 percent) and/or generic diversity (69 percent) of any of the quadrats computed, whereas two other quadrats (21 and 22) have 0.0 specific and generic diversity, respectively. Quadrats 21, 22, and 25 show high familial diversity (75 to 95 percent of the species belonging to different families). In 23 and 24, however, only 25 and 53 percent of the diversity is familial. In these quadrats, two families, Grimmiaceae and Polytrichaceae and three genera, *Grimmia*, *Polytrichum*, and *Pogonatum* account for a large percentage of total diversity. A total of seven species is involved. These genera, and particularly their representatives on the summit of Whiteface, have adapted to the high winds and insolation found on the summit by the reduction of transpiration. In these quadrats, the selection of a few species from a large number of families is not random, as it may be in the low diversity quadrats at Kenrose; a much smaller number of families have representatives adapted to these severe arctic-alpine conditions.

Figure 26 shows some general relationship between the number of congeners and the number of species (S) for all Kenrose quadrats; quadrats with large numbers of species tend to have more congeners than those low species richness. The quadrat with highest species richness had 14 congeneric species, indicating that high species diversities are made possible, at least in part, by species packing and habitat selection in such genera as *Dicranum* (see below). On the other hand, MacArthur (1969) has pointed out that the higher number of bird species within a limited area in the tropics may be largely an increase in genera rather than in congeneric species. He cites an example from Barro Colorado Island, Panama, compared with a

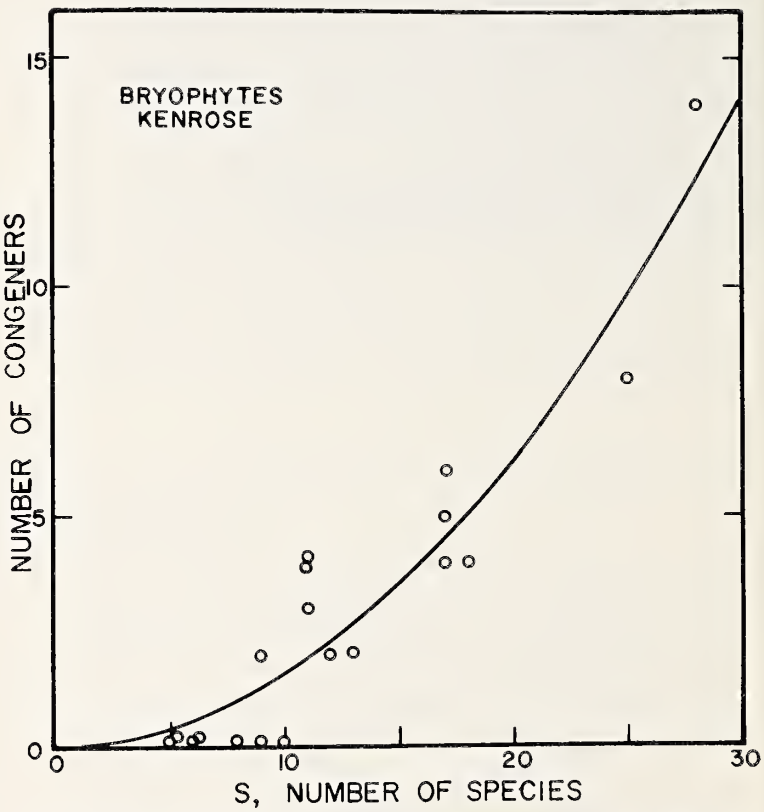


FIGURE 26 Number of congeneric bryophyte species in relation to species richness (S) at Kenrose Preserve

Vermont woodland. Simpson (1964) has pointed out the increase in the number of families of recent mammals in the American tropics as compared with the temperate zone.

There is much evidence, however, that a large percentage of tropical diversity, at least for plants, is at the specific level. Tropical congeners abound both in bryophytes and vascular plants. The liverwort genus, *Plagiochila,* which has only one representative in New York State, is tremendously diverse in the tropics, with several hundred species, many occurring together (Schuster, 1966, S. R. Gradstein, personal communication). Richards (1969) noted that the large number of species of several different vascular genera, *Shorea* and *Miconia,* for example, which occur as congeners in the tropical rain forest in Asia and tropical America, respeetively.

My data suggest that the relative number of bryophyte congeners increases in both diffieult low diversity habitats and in very favorable high diversity habitats. The large number of congeners in high diversity areas may be a widespread phenomenon in plants and perhaps in some groups of animals also. Wake (1970) notes the remarkable speciation of one tribe of tropical salamanders, the Bolitoglossini of the family Plethodontidae. He attributes this speciation to the availability of numerous types of niche that are suitable for these salamanders in the tropics.

From the analysis of taxonomic diversity, I conclude that the species is the most appropriate level on which to study bryophyte diversity. Questions that are raised concerning taxonomic diversity can also be examined by analyzing habitat preferences of congeneric species occurring in the same quadrat. Johnson and Raven (1970) state that a forest with four different oaks should be considered just as diverse as one with species of four different genera as dominants. I think that at least as good a case can be made for some bryophyte genera in the present study as for oaks. Consider, for example, the moss genus, *Dicranum,* of which at least six relatively common species occurs in the Adirondacks. Three species of *Dicranum* were found as congeners in 70 percent of the spruce-fir and deciduous quadrats at Whiteface and Ampersand Mountains; 25 percent of the quadrats contained four species of *Dicranum.* The various species were found to have distinct habitat preferences which, although not absolute, are at least as well marked as between many species of different genera. For example, *Dicranum fulvum* is found on rock, whereas the morphologically similar *Dicranum viride* is found on wood, sometimes as an epiphyte on tree trunks. *Dicranum montanum* is found in several habitats, but commonly on tree trunks. It is, however, a more xeric species than *D. viride* and is often found higher up the trunk on the same species of tree, or on more xeric tree species. For example, *D. montanum* was regularly found on *Tsuga; D. viride* never was. (This might be due to chemical rather than water-holding differences in the bark, but in either case the two species of *Dicranum* show habitat preferences.)

Dicranum scoparium, although also occurring in rotten wood, was the only one of these species commonly found on the ground. *Dicranum fuscescens* was found on rotting wood, as was *D. flagellare.* Here there was at least a partial separation by elevation, with *D. fuscescens* at higher elevations. *Dicranum flagellare* occurs regularly on very rotten wood. Other species, such as *D. undulatum,* occur largely in boggy areas. In this genus at least, species are indeed ecological equivalents in terms of diversity. It would be possible, although somewhat more difficult, to make a similar case for congeneric species of *Hypnum* and even for most species of *Brachythecium* found in this study, some of which, however, are not congeneric in the same quadrat because of altitude preferences.

In a few genera, habitat preference was not evident among congeneric species. This was true for epiphytic species of *Frullania* on Ampersand Mountain and for arctic-alpine species of *Polytrichum*, *Pogonatum*, and *Grimmia.* These genera, all living under extreme conditions, seem to me to represent a different phenomenon from the above. The species of *Pogonatum* or *Grimmia* living on a treeless mountain summit and the species of *Frullania* living on the smooth, dry bark of a beech, are each similarly adapted to these particular environmental conditions. It seems that a community of three macroscopically similar *Frullania* species is less diverse than a *Neckera, Porella, Anomodon* community on a neighboring sugar maple, whose bark does not constitute so extreme an environment. The example of four oaks may be more similar to that of the three *Frullania* species than to the *Dicranums.* Several species of oak may live under rather extreme conditions, such as those of drought and recurrent fire in the Albany pine bush (sand plains) area, and have similar adaptations to these conditions. For oaks in this sort of environment and for bryophyte genera of difficult environments, a good case could perhaps be made for studying diversity in terms of genera. The majority of the congeneric species of bryophytes in less extreme habitats in this study, however, showed ecological separation, although not in all genera as distinctly as in *Dicranum.*

Further Aspects of Community Structure

Populations, Communities, and the Elevation Gradient

Elevation has proved to be a very important variable for bryophyte species diversity in this study. The effect of elevation range within a large area, the changes in species composition of bryophytes (and also of vascular plants) over a 1000 m range of elevation in the Adirondacks, and diversity changes even over the 130 m range of elevation at Kenrose Preserve have all been documented in this research. Each plant stratum has been shown to have a different pattern of diversity (H′) and of species richness (S) over the elevation gradient studied on the two Adirondack mountains. Numbers of species of mosses and especially of liverworts varied with elevation and with vegetation types resulting from elevation change. In New York State and also in other geographical areas, for example, Glacier National Park, Montana (Herman, 1969) and Costa Rica (Crosby, 1969), species richness of bryophytes is high in areas where the elevation gradient is large.

The type of analysis used in this research, especially that involving the comparison of species composition along the elevation gradients at Whiteface and Ampersand and at Kenrose Preserve, is generally called direct gradient analysis (Whittaker, 1956, 1968, 1970). In contrast to this type, indirect gradient analysis is used where there are no obvious environmental gradients that can be measured; the latter are inferred from the vegetation samples themselves and their changes in species composition.

Population of single species can also be studied by direct gradient analysis. The term "plant community" has been used throughout this paper in Whittaker's (1967) sense of a "particular, limited area of vegetation which seems homogeneous." The vegetation of any particular quadrat may be considered a sample of the immediately surrounding homogeneous appearing community. These communities do not, however, have sharp boundaries except where a very sharp edaphic or topographic change occurrs. Although the composition of these communities changes with elevation (as can be seen in this study from the Sϕrensen and Percent Similarity indices), this community change is a result of separate density changes for each species along the elevation gradient. The pattern of density change with elevation differs for each species and usually takes the form of a bell-shaped curve for tree species. Whittaker (1968) shows such curves for pines and oaks in the Great Smoky Mountains between 400 and 1400 m. Similar curves can be drawn for beech, sugar maple, yellow birch, red spruce, and balsam fir from my Adirondack data, with peaks for each species as follows, based on density of individual trees:

Fagus grandifolia	1600 ft	(490 m)
Acer saccaharum	2000 ft	(610 m)
Betula alleghaniensis	2800 ft	(850 m)
Picea rubens	2800 ft	(850 m)
Abies balsamea	4000 ft	(1200 m)

Curves for these species from 53 sites in the Whiteface area (Scott and Holway, 1964) show very similar peaks. Such changes with elevation for each species are not so marked over the much smaller elevation range at Kenrose Preserve, but even here some species, such as elm and ash, have their highest density at the lowest elevation while others, such as red oak and hickory, have highest density at the higher elevations. Some species, sugar maple, for example, are present throughout the elevation range at Kenrose.

When such curves are examined for individual bryophyte species, simple bell-shaped or binomial curves do not always result. The physiological tolerances of some species (c.f. *Andreaea rupestris*, fig. 12), enable them to live over the whole elevation range on Whiteface Mountain. For trees and almost all other vascular plants on Whiteface, the vertical distributions are limited by physiological tolerances, or where tolerances are marginal, by competition with other species better adapted at particular elevations. Sϕrensen and Percent Similarity values for vascular plants at 1600 ft (488 m) and at 4800 ft (1463 m) are all 0.0; i.e., no vascular plants extend over the entire elevation gradient. For bryophytes, however, the values for these indices, although very low, do not reach 0.0. Such species as *Andreaea rupestris* and *Grimmia apocarpa* occur in both deciduous forest and arctic-alpine vegetation on Whiteface. They are absent, however, where suitable rock substrate is not found; thus, plotting relative density (cover) vs. elevation for such species may result in bimodal or irregular rather than smooth binomial curves.

Figures 27 and 28 show generalized curves, prepared from the relative cover data, for 13 bryophyte species. It can be seen that each species has its own distribution pattern, although these patterns may be similar. Whether we see a continuum, with each species in turn reaching a peak density at a particular elevation, the view of most current American ecological theory, or communities of speeies with similar physiological tolerances occurring together in a quadrat at a particular elevation, as in most current continental European ecology, depends largely on our point of view. Both points of view are valid and useful, provided that the dynamic aspects of communities are not

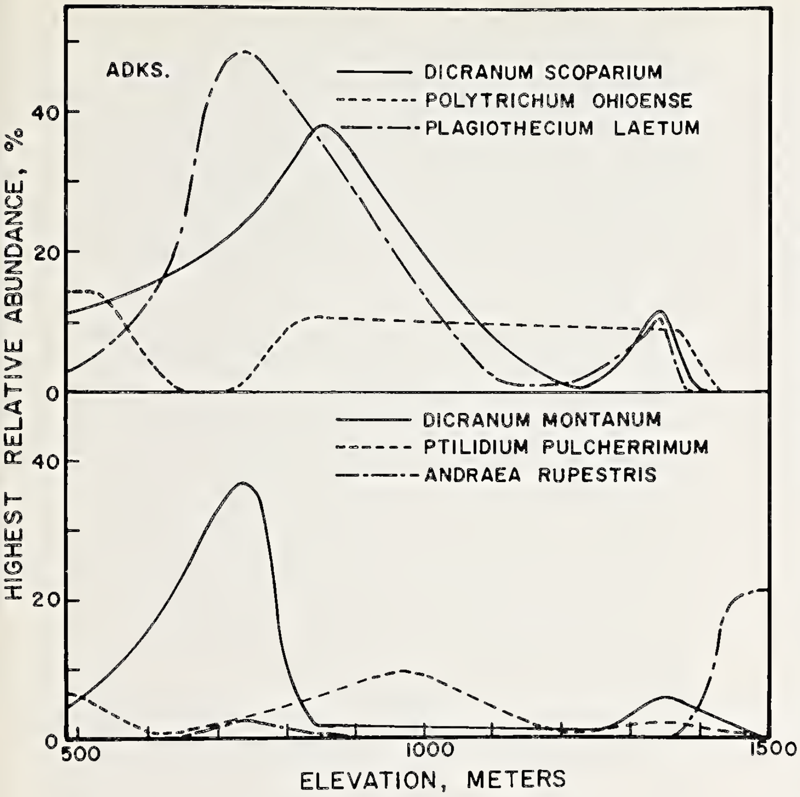
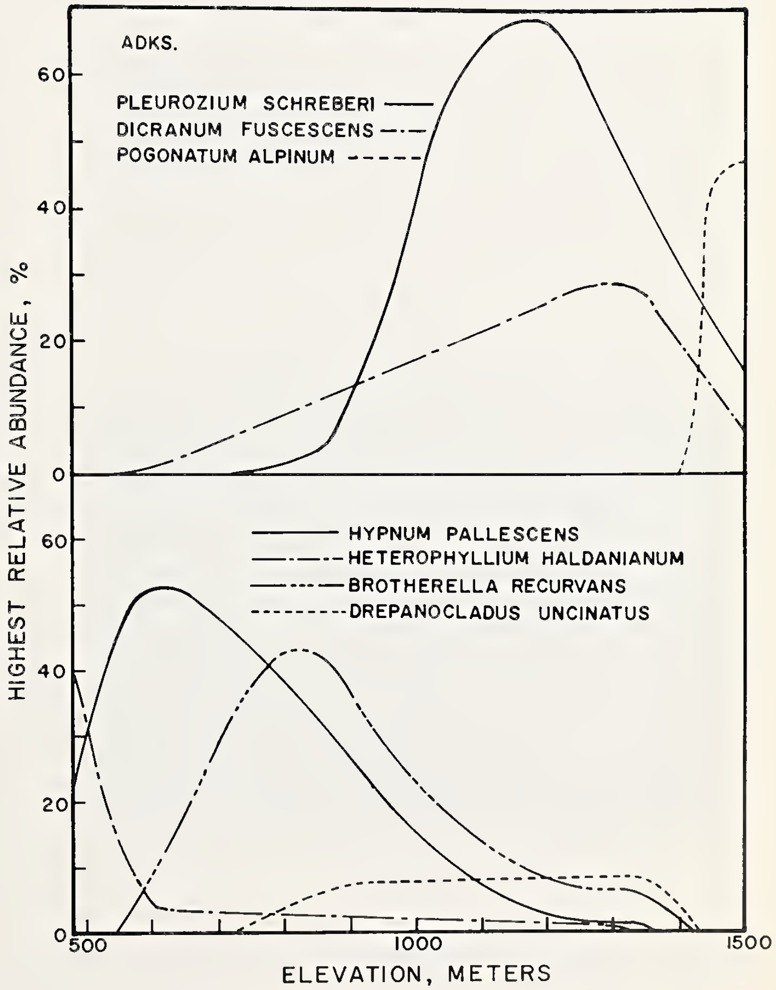


FIGURE 27 Generalized curves for abundance of the following bryophyte species in relation to elevation on Whiteface and Ampersand Mts.

Andreaea rupestris
Dicranum montanum
Dicranum scoparium
Plagiothecium laetum
Polytrichum ohioense
Ptilidium pulcherrimum

FIGURE 28 Generalized curves for abundance of the following bryophyte species in relation to elevation on Whiteface and Ampersand Mts.

Brotherella recurvans
Dicranum fuscescens
Drepanocladus uncinatus
Heterophyllium haldanianum
Hypnum pallescens
Pleurozium schereberi
Pogonatum alpinum



(photo by A. B. Wellborn)

Flag trees *(Abies balsamea)* below timberline, Whiteface Mountain, showing importance of prevailing wind direction.

(photo by D M Slack)

Whiteface Mountain in late December showing snow cover, spruce-fir and arctic-alpine zones.

obscured by overzealous classification. Phytosociological methods have sometimes been used by Americans working with bryophytes, as, for example, by Norris (1964) in his Adirondack study, and by various students of bryophytic epiphytes. As pointed out above, epiphyte systems are especially dynamic, although characteristic groupings of species (communities in the sense used here) were found on particular tree species in this study.

Although the comparison of communities and of species populations along an elevation gradient is termed by myself and others direct gradient analysis, it must be kept in mind that elevation is in reality a complex gradient. Organisms do not respond to changes in elevation per se, but to a variety of environmental factors that change concomitant with elevation change. There is a striking change in the vegetation on Whiteface Mountain at about 2500 ft (760 m) where deciduous forest is replaced by spruce-fir forest. This change occurs at somewhat different elevations on different slopes of Whiteface and at somewhat lower elevations on Ampersand. In this study, no sharp differences in environmental conditions were observed at these elevations, and even the large-scale study of environment and vegetation on Whiteface (Scott and Holway, 1969) has been unable to document microclimatic changes at the transition elevations. Different environmental factors, such as growing seasons, maximum and minimum temperatures, annual precipitation, date of spring snowmelt, etc., could all be measured and graphed as the individual species populations were; each one probably follows a different pattern. At some elevation the "community" of these factors is such that the growth of red spruce and balsam fir is favored over that of most deciduous trees. (*Betula alleghaniensis*, *B. papyrifera* var. *cordifolia* and *Pyrus americana* do grow in the spruce-fir zone.) Environmental variables, such as exposure and prevailing winds, change with the direction of slope; thus, the community of factors favoring spruce-fir vegetation may occur at somewhat different elevations on different slopes.

In a recent study of the Green Mountains of Vermont, which are quite similar to the Adirondacks, Siccama (1974) concluded that the boundary between deciduous and coniferous (spruce-fir) forest was climatically, not edaphically controlled. His measurements showed a vertical climatic discontinuity accounting for the change in forest type. The two most important factors appeared to be the number of frost-free days per year and the frequency of the cloud base. The latter increased at about 790 m, which resulted in increased fog drip and hoarfrost, favoring coniferous over deciduous forest. The mean number of frost-free days decreased from 142 at 732 m to 103 at 914 m in deciduous and spruce-fir forest, respectively. With a larger number of stations to record microclimatic data, these or similar factors could probably be shown to be important on Whiteface Mountain in the transition zone. The extent to which the transition is sharp or gradual will depend on the extent to which the changes in each of the important microclimatic factors occur at similar elevations.

The change from spruce-fir to arctic-alpine vegetation passes through a krummholz stage with stunted trees on some slopes occurring below the summit. Changes in environmental factors are more evident above timberline. Such changes within the arctic-alpine zone have been measured and related to the vegetation on Mt. Washington, New Hampshire, by Bliss (1963, 1969). On Whiteface, the effect of slope angle on vegetation has been measured by Nicholson and Scott (1969), who found it to be a major determinant of the altitude of timberline, and also of the diversity of vascular vegetation. These findings were comfirmed in my study, but other microclimatic and topographic factors such as available water and habitat instability caused by rockslides also affect diversity of both bryophytes and vascular plants.

Duration of snow cover is another important factor that has not been examined systematically in the Adirondacks. Certain vascular plants and also bryophytes, e.g., *Polytrichum sexangulare* (formerly *P. norvegicum*) are known to be characteristics of areas of persistent snow cover. Winter and spring snow cover varies with location on Adirondack summits. I have been on the 5,000-foot summit of another Adirondack high peak, Mt. Algonquin, in March and observed sizable areas of arctic-alpine vegetation without any snow cover. On the other hand, on June 1, at least in some years, the 4400 ft (1340 m) quadrats are still under several feet of snow. The summit area of Whiteface, exposed to wind and high daytime insolation, was free of snow at that date. The high diversity found at 1340 m and the particularly high number of liverwort species are probably a result of increased moisture from the late snowmelt, and to the advantage of bryophytes over herbaceous vascular plants when the growing season is shortened by persistent snow cover. Bryophytes, unlike most vascular plants, can photosynthesize virtually as soon as uncovered; there is even evidence of photosynthesis of bryophytes under snow (Rastorfer, 1970; Longton, 1974). Photosynthesis at subzero (0°C) temperatures in the arctic has been recorded (Wilson, 1957) and may occur at these temperatures on Whiteface Mountain also. On the other hand, *Oxalis montana* comprised 84 percent of the total vascular ground flora at 1220 m, but is reduced to 22 percent in the quadrats with high bryophyte diversity at 1340 m.

At Kenrose Preserve the much shorter elevation range also proved important in terms of species diversity. In fact, elevation is the factor most highly correlated ($r = 0.69$) with bryophyte diversity (H'). Attempts to discover which aspects of elevation are important, that is, what actually happens to the bryophyte environment over the 130 m elevation gradient, were partially successful. Degrees of slope ($r = 0.46$) and pH ($r = 0.48$) were both significantly correlated with elevation and highly correlated with each other ($r = 0.79$). They are also each correlated with diversity (H'): $r = 0.60$ for degrees of slope and 0.45 for pH. Thus, elevation range at Kenrose is a complex factor including degrees of slope, pH, and probably differences in drainage as well, some combination of which are important for bryophyte diversity.

Bryophyte Diversity and Community Diversity

G. Evelyn Hutchinson's paper, 1959, "Homage to Santa Rosalia, or Why Are There So Many Kinds of Animals" was one of several that spurred the current interest in species diversity. The great majority of the research on diversity has involved animals or planktonic organisms in spite of the following, perhaps overlooked, statement in Hutchinson's paper:

> Extraordinary diversity of the terrestrial fauna. . . . is clearly due largely to the diversity provided by terrestrial plants.

He assumed that the three-fourths of a million insect species are in part a product of the diversity of terrestrial plant species and posed the really relevant question: "Why are there so many kinds of plants?"

Is the diversity of one segment of a community indicative of the overall diversity of the community, as suggested by Margalef (1963) and Johnson and Raven (1970)? This question can be asked regarding the various strata or taxonomic groups of the plant community.

My data suggest that one cannot obtain an index to the overall diversity of the plant community by sampling one segment. High bryophyte diversity is not correlated with high diversity of vascular plants whether H' or S is used as an index. Each stratum showed a different pattern of diversity with elevation in the Adirondacks. No correlation between diversity of vascular ground flora and that of bryophytes existed; shrub diversity showed an inverse correlation with that of bryophytes. The only direct correlation, in fact, was between diversity (H') of bryophytes and the number of tree species at Kenrose Preserve ($c = 0.58$). Even this relationship was not found elsewhere; that diversity of bryophytes is highest in the Adirondacks under pure stands of balsam fir. In the arctic-alpine quadrats, the diversity of bryophytes is low, but that of another taxonomic group, the lichens, is high. Among vascular plants at that elevation, the shrub component of the communities has relatively high diversity, but the herbaceous vascular plant segment does not.

A closer relationship between the diversity of one segment of a community with another may exist when the segments have direct predatory-prey relationships, either between consumers, or between herbivore and host plant. High plant and high insect diversity are both found in the tropics, for example. MacArthur and MacArthur (1961) found that bird species diversity was more closely related to structural aspects of the vegetation than to the number of plant species present. Foliage height diversity (FHD) was the aspect of vegetation structure used, and this or similar measures of vegetation structure have since been found to be determinants of bird, lizards, and rodent diversity in other studies (MacArthur, Recher, and Cody, 1964; Pianka, 1966; Rosenzweig and Winakur, 1969). Tomoff (1974) found that FHD does not predict the number of bird species in desert scrub, but that a physiognomic coverage diversity based in part on the life forms of plants was a good predictor. Tomoff also found nest site specificity for desert birds in relation to plant species. Some other recent studies (Karr and Roth, 1971, Kricher, 1972, Cody, 1974) have discussed bird diversity in terms of vegetative structure, including beta (between-habitat) diversity of vegetation. The within-habitat studies have largely been of forest birds, usually secondary consumers and therefore not directly related in their food habits to specific plants. Prairie studies include herbivorous birds, but even these are rarely restricted to a particular species of plant. Studies of tropical fruit-eating birds might show closer bird and plant species diversity.

From an evolutionary point of view, there is no question that birds of one family can evolve in relation to plant species available, at least in the absence of competition from birds of other taxonomic groups. The niches of almost all the Galápagos finches (Lack, 1947) can ultimately be related to plant species on the islands.

The relationships between diversity of the insect and angiosperm sectors of the community can also be examined from an evolutionary viewpoint. The whole Cretaceous period was probably a time of extensive angiosperm and insect coevolution. Ehrlich and Raven (1964) cite coevolution of Papilionoidea (butterflies) and dicotyledons. Other examples of specific plant-insect coevolution, a subject initiated by Darwin, have been more recently given by Brower (1958) and Janzen (1969, 1970). Ehrlich and Raven (1964) conclude that the converse of Hutchinson's (1959) assumption may be true: phytophagous insects augment the diversity of plants! Janzen (1970) supports a similar view in regard to seed-eating insects and tropical tree diversity. Two recent papers have discussed the relation between plant and insect diversity. Sharp, et al. (1974) found little relationship between butterfly and plant diversity in subalpine areas, but Murdoch, et al. (1972) working with Homoptera in fields, found high plant-insect correlation for both H′ and J′. The butterflies were not as closely tied to particular plants as the Homoptera, some of which are host specific. Such specificity should increase the importance of plant diversity in relation to that of insects.

Bryophytes have few close ties with animals, apart from the species of the family Splachnaceae that live on dung, and whose spores are carried by Diptera. Several of these occur in the Adirondacks, though I have only found *Splachnum rubrum;* Splachnaceae are a more important part of bryophyte communities in the Arctic. Few herbivores eat bryophytes, although some animal unknown to me eats moss sporophytes, particularly those of *Polytrichum*, even on the summit of Whiteface. Tardigrades live on and apparently feed on bryophytes, and I have seen a variety of rotifers associated with bryophytes I have collected, but no one has yet made a diversity study of either of these groups of microscopic animals or their relation to bryophyte species.

Within the various sectors of the plant community, relationships are not as specific as between most bird or insect and plant species. Parasitic and semiparasitic plants (including angiosperms) are exceptions, as are those plants which produce chemicals inhibiting the growth of other plants. In this study a few species of epiphytic bryophytes were specific to their host trees, at least within the area studied. Higher epiphyte diversity was present on Ampersand Mountain in the mixed deciduous forest with many tree species than in the spruce-fir forest with fewer tree species. A pure beech or hemlock forest would have fewer epiphytic bryophyte species than a mixed hardwood-hemlock forest at the same elevation. Relationships between plant species in different strata are, in most cases, much less specific, usually involving environmental factors. The particular bryophytes found only in the oak-hickory forest at Kenrose Preserve are probably there in response to the same factors (low humidity? drier soil?) that favor the growth of these trees over maple or beech; the bryophytes are not there because of the particular tree species.

Especially harsh conditions, such as at the summit of Whiteface, may affect bryophytes and vascular plants similarly, resulting in a community consisting of species with similar tolerances in both of these strata. Species diversity is low in both these strata; relatively few species of either group are tolerant of summit conditions.

Species diversity relationships between segments of the plant community can also be looked at from an evolutionary viewpoint. The great majority of bryophytes in a temperate or tropical forest region are dependent on vascular plants for many aspects of their niches. Some bryophytes are obligate epiphytes on living trees; some liverworts are obligate epixyls on rotten logs (Barkman, 1958). In the tropics, in southern United States (Guerke, 1973) and even in the Pacific Northwest (Vitt, et al., 1973), some bryophytes are epiphyllic, that is, are epiphytes on living leaves, largely on evergreen angiosperms (or conifers in the north). In Puerto Rico, I have observed liverworts growing on ferns and aroids.

Even those forest bryophytes that are not so directly dependent on vascular plants as substrates are usually dependent on the shade and humidity provided by these plants. Although bryophytes are an ancient group and are not noted in general for rapid evolution, "explosive" evolution in some genera with many species is probably a relatively recent phenomenon. As such it is dependent on relationships with the vascular plant strata. I quote Schuster (1966) on this subject, with particular reference to liverworts:

> . . . any explosive evolution in the Bryophyta came about only *after* evolution of a polytypic, complex, and rather complete cover of such groups as Pteridospermae, conifers, tree ferns, and Angiospermae, which, together with a rich ground and shrub flora (of ferns, lycopods, etc.), served to maintain humidity and reduce insolation. *Only after this* were conditions on land created that favored speciation in the Hepaticae. Indeed, I would go so far as to say that *today* conditions of so much greater diversity exist (compare tropical montane rain forests . . . and . . . cool subarctic rain forests . . .) than prior to the Mesozoic, so that extensive present-day microevolution (i.e., speciation) of Hepaticae and Musci is much more likely on a large scale than in most prior periods of their existence. [Italics Schuster's.]

Schuster goes on to give examples of recent "explosive" speciation in such families as Plagiochiliaceae and points out that the majority of these species are arboreal and that their evolution "must postdate that of the dense, humid forests in which they have evolved most copiously." Thus, in the tropics and even in a temperate forest, there exists a very important relationship between the bryophyte diversity and that of vascular plants, in terms of bryo-communities. It is interesting to note that bryophytes have evolved to fill quite different niches provided by vascular plants, niches in which neither shade nor high humidity is present. In this study, species of *Frullania* were found on tree trunks in highly xerophytic conditions, i.e., in open niches available to no other groups of plants except, perhaps, some lichen species. Evolution of special water-holding structures may have made the occupation of such niches by *Frullania* possible.

Two conclusions can be reached from the above discussion. First, one cannot assume that, by measuring the diversity of one segment of a community, whether birds, vascular plants, bryophytes, etc., the diversity of the community as a whole, or even of the plant or animal portion of it can be predicted. Significant correlations may exist, but more often they do not. Secondly, one segment of a community may be related, at least in an evolutionary sense, to the diversity of another or of several other segments. Present diversity relationships are complicated by other factors, such as competition both between and within segments of each trophic layer of a community.

Dominance-Diversity Curves and the Division of Niche Space

Dominance relationships among members of a community or one stratum of a community can be studied in several different ways. One method is by the calculation and comparison of evenness or "J" values. These have already been presented and compared, and are discussed further in the following section. Another method consists of plotting dominance diversity curves, as Whittaker (1965, 1970) has done for plant communities of the Great Smoky Mountains and elsewhere. These two methods have been used with my data, separately and in combination.

I have plotted dominance-diversity curves for bryophytes in the quadrats studied at Whiteface and at Kenrose Preserve, using relative cover values to rank the species in order of dominance. Whittaker's curves are plotted for vascular plants and are based on net annual production, although he has also used cover values and has stated (1965) that curves of similar form resulted for both types of values. The species are arranged (figs. 29 and 30) in order of their decreasing cover values, from highest to lowest cover value on the abscissa. The curve origins are spaced out for clarity; for example, the five species of the first Kenrose quadrat run from 1 to 5, but the 25 species of the last quadrat run from 25 to 49 (fig. 29). Relative cover value (or "abundance") is on a log scale.

Several different forms of curves result, some of them similar to those of Whittaker. In my quadrats of low diversity (low H′ and low S) as in low diversity communities of Whittaker, straight lines of steep slope result. Whittaker pointed out that this type of curve approximates a geometric series. Translated into niche theory, such a series may be used as a model in which a dominant species preempts a certain percentage of

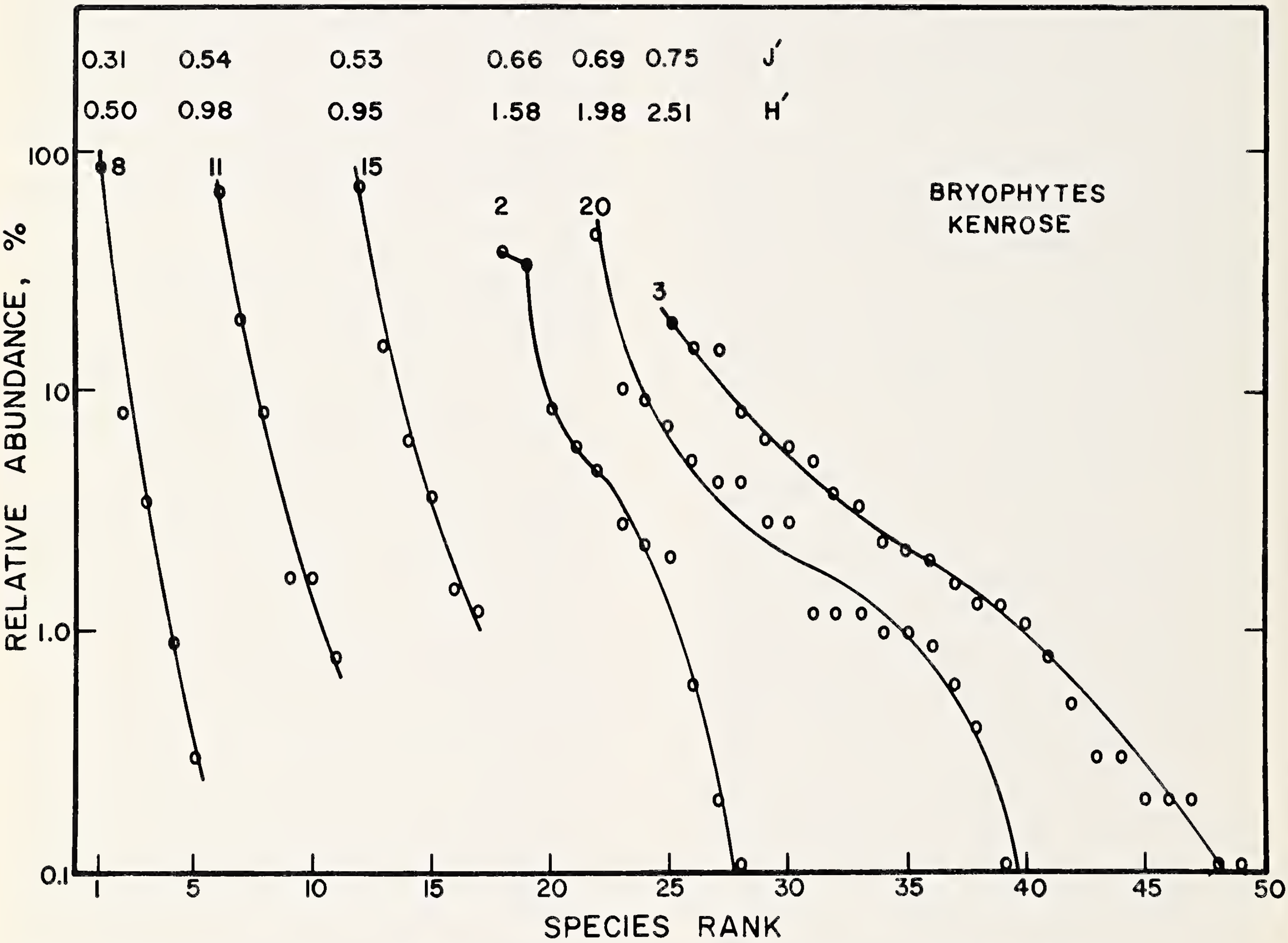


FIGURE 29 Dominance-diversity curves and J′ and H′ values for six quadrats at Kenrose Preserve (Nos. 8, 11, 15, 2, 20, and 3).

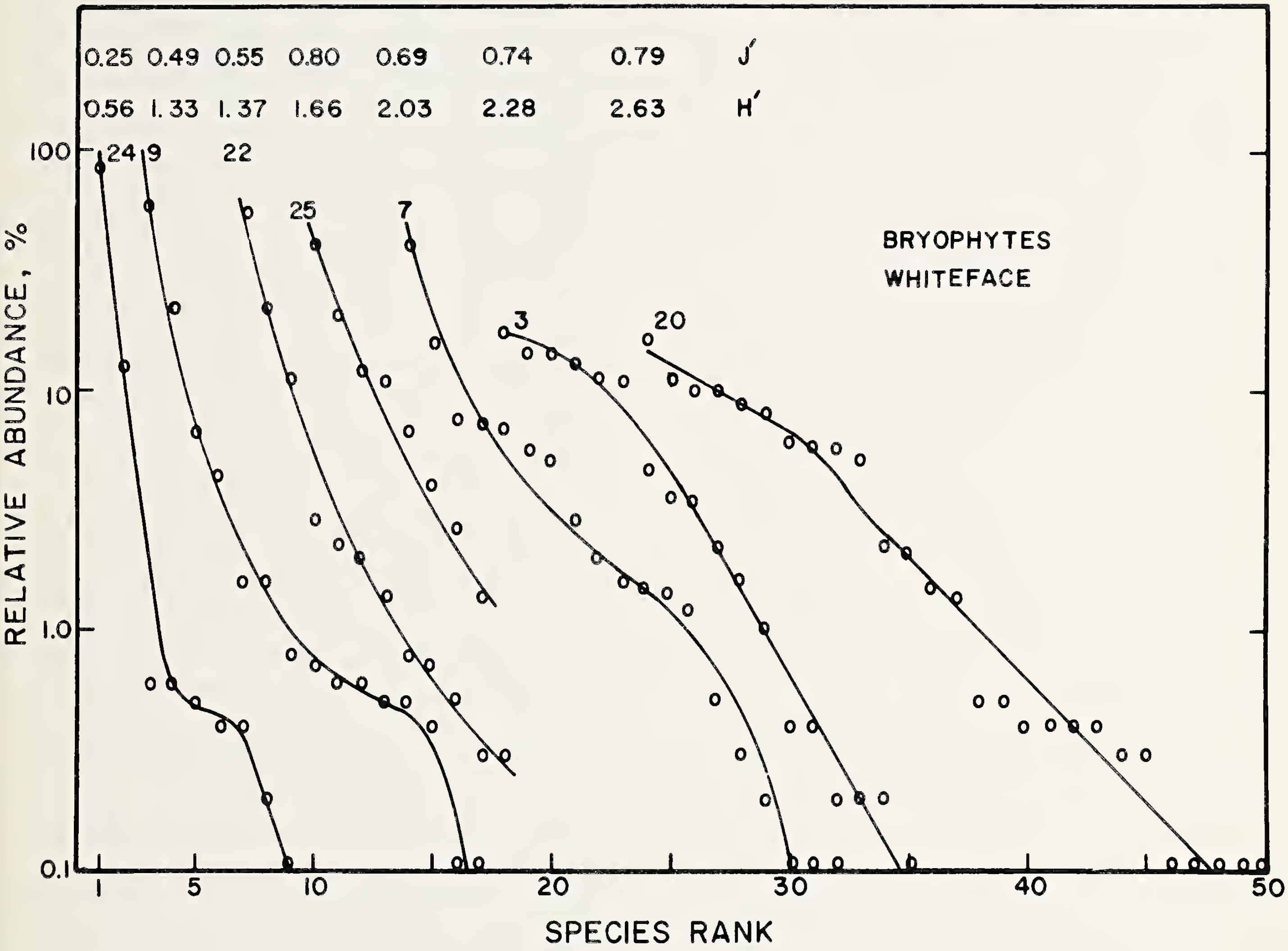


FIGURE 30 Dominance-diversity curves and J′ and H′ values for seven quadrats at Whiteface Mt. (Nos. 24, 9, 22, 25, 7, 3, and 20).

available niche space, c, approximated here by its percent cover, as follows:

> The second ranked species occupies the same percentage of the remaining cover, 1–c, generating the equation:
> $$y = C\,(1-c)^{x-1}c$$
> where y is the fraction of cover representing niche space for all species, C is total cover, and x is the species' rank.

None of the bryophyte curves shows a constant or nearly constant c, nor do those presented by Whittaker (1965, fig. 3). There is no particular reason to believe that each species should utilize the same proportion of niche space. Among the low diversity quadrats (8, 11, and 15 at Kenrose, and 24 and 25, both summit quadrats at Whiteface), considerable differences in division of niche space exist to an extent that this is actually reflected in dominance relationships. In quadrat 8 at Kenrose and 24 at Whiteface, one species has usurped the greatest extent of total bryophyte niche space, over 90 percent in quadrat 8. In these two quadrats either two or three species occupy over 99 percent of the niche space, resulting in very steep curves for this portion. Whiteface quadrats 24 and 9 (which has a large number of species but also a steep upper curve) have a relatively large number of species of low cover value. This pattern of dominance and diversity results in a sigmoid type of curve (fig. 30) not found among Whittaker's. Whittaker has omitted from his curves species of very low productivity, which may account for his steep lower curves, but it is also quite likely that bryophytes are able to divide remaining niche space more finely than can vascular plants.

I pointed out earlier that different dominance relationships are present even in low diversity quadrats in the same area, even when they have the same number of species as in quadrats 24 and 25 on the summit of Whiteface. The dominance-diversity curves for these quadrats (fig. 3) show these differences very strikingly. In 25, the initial curve is less steep with abundances of bryophyte species more evenly distributed than in 24, and there are no rare species. Different possibilities exist for the division of bryophyte niche space even under similar rigorous conditions.

Sigmoid curves similar to Whittaker's is, at least over the upper and middle portions, also resulted from my data. In terms of niche allocation, such curves (2 and 20, Kenrose, fig. 29, and 7, Whiteface, fig. 30) represent communities with more competing species, no one species usurping an especially large portion of niche space and with a large "middle class" utilizing similar portions of the niche space. In quadrat 2, Kenrose, there are two codominant species, a distribution also found by Whittaker.

Whittaker's communities of highest species diversity form similar sigmoid curves but of smaller slope. He used Preston's "lognormal" distribution as a model for these communities. This distribution consists of many species of intermediate abundance with fewer of greater and lesser abundance, approximating a normal curve when abundanees are plotted on a log scale. The most diverse quadrats in my study area, represented here by 3, Kenrose (fig. 29) and 3 and 20, Whiteface (fig. 30) do not fit Preston's model. Preston's curve would be truncated at the upper end since no species in any of my high diversity quadrats has a relative abundance as high as 20 percent. The lower end of the curve would also differ because of the large number of bryophyte species of low relative abundance in these quadrats. These species can be seen on the dominance-diversity curves, which lack the steep drop at the end in contrast to Whittaker's curves for the high diversity communities in his studies.

As Whittaker himself noted (1965), there is no good reason to expect different strata of a community "subject to different environmental factors and modes of population limitation" to show parallel dominance-diversity relationships. When a plant community is extended to include the too often ignored bryophytes, differences in basic biology could be important. For example, Whittaker suggested that the lower portions of dominance-diversity curves may be affected by only partially adequate seed dispersal into the potential rare niche, leaving suitable niches empty, and presumably resulting in a steep lower curve. Bryophyte spore dispersal appears to me to be more successful in filling these niches. The ability of appropriate bryophytes to arrive at "rare" niches is often very striking, even when these niches are manmade. *Bryoerythrophyllum recurvirostrum* and *Encalypta procera* occur on a cement wall near the summit of Whiteface but were found nowhere else on the mountain (Reilly, 1964). Other species, such as *Tetraphis pellucida*, are nearly always found where their appropriate niches occur. This is true to such an extent that I am always surprised not to find *Tetraphis* on rotting conifer stumps of the appropriate stage of decay when I am out of the range of this species.

Furthermore, various types of open niches may each be filled by a number of different species of rare bryophytes, and this sort of opportunism, to be discussed below, probably also fills in the lower end of the dominance-diversity curve. Fitting any of these curves to mathematical models of niche space division may be premature. We know little about their multidimensional niche spaces, or their competitive relationships. Forman's (1964) experimental study of the physiological ecology of *Tetraphis pellucida* is probably the closest approach to elucidating the fundamental niche in Hutchinson's (1957) sense for any bryophyte speeies. Other recent studies, though not experimental, have succeeded in measuring or identifying niche factors for bryophytes in particular habitats, for example, *Sphagnum* species in bogs (Vitt and Slack, 1975) and bryophytes on rotting logs (Mühle and LeBlanc, 1975). More such studies are needed before ecological theories of the division of niche space can be fully extended to bryophytes.

Finally, the shapes and slopes of dominance-diversity curves can be related to evenness (J′) values as calculated from the Shannon function. These values, as well as those of H′ are shown for each quadrat plotted in figures 29 and 30. For example, compare quadrat 3 at Whiteface with quadrats 7, Whiteface, and 20, Kenrose. All of these quadrats contain one or two dominant species and have the same evenness value (J = 0.69). Quadrat 3 with six nearly equally dominant species at the top of the curve and therefore a higher evenness value (0.79), also has considerably higher diversity (H′ = 2.28 as compared to 2.03 and 1.98 for the other two quadrats).

Although Whittaker stated that diversity is largely determined by the number of species in the middle portion of these curves, he was referring to diversity in terms of species richness (S). When highest diversity measured as H′ is considered, it is obvious from the curves that H′ is greatest when the species are evenly distributed throughout the curve; that is, over the upper as well as the middle portion. Such distribution results, of course, in the highest J′ values. This pattern, and the resulting dominance-diversity curve, is an unusual one for bryophytes, at least in the forest habitats I have studied. High J′ values were exceptional in this study; almost all were very low compared with Tramer's (1969) for birds or Pielou's (1966a, b) for herbaceous plants and shrubs.

Opportunism Among Bryophytes

Tramer (1969) has suggested that some groups of organisms tend to be "equilibrium" groups and to have their diversity (H′) regulated largely by variation in species richness (S), while other groups are "opportunistic" and are more likely to have their species diversity regulated by variation in relative abundance or evenness (J′). Thus territorial birds living in stable, nonrigorous environments and having relatively stable population densities over time may be thought of as equilibrium species. Plankton, at the other extreme, live in unpredictable environments and a species' number may increase rapidly, but temporarily, when eonditions are favorable.

All species in one group need not be entirely opportunistic or entirely equilibrium species; the Cape May warbler, a territorial bird, may be considered opportunistic because its population increases in response to the periodic abundance of spruce budworms. MacArthur (1960) defined the terms "opportunistic" and "equilibrium" and pointed out that photosynthetic organisms, including diatroms aand early successional vascular plants, could also be placed in the opportunistic category.

According to Tramer (1969), groups of organisms with low and variable J′ values can be considered opportunistic. He found high J′ values (from 0.84 to 0.92), except for gregarious marsh birds. In addition, the J′ values were stable; increased diversity (H′) in his bird communities is closely correlated with increase in species richness (S). Thus, by his criteria, the species in these bird communities are not opportunistic. Sager and Hasler (1969), on the other hand, found lower J′ values in their phytoplankton studies. Diversity (H′) could not be predicted from species richness alone; the J′ values were not stable. Therefore, according to Tramer's criteria, these phytoplankton species could be considered opportunistic, as MacArthur earlier suggested for diatoms.

By the same criteria, bryophytes, at least in certain habitats, can also be considered opportunistic. The J′ values in my studies were low, as pointed out above, and also variable, at least in the Adirondacks. Out of all the quadrats studied, 29 percent had J′ value under 0.6, 46 percent under 0.7, and 89 percent under 0.8. Most of the values ranged between 0.5 aand 0.8, but values as low as 0.25 were found under rigorous summit conditions, as would have been predicted by Tramer. For bryophytes at Kenrose Preserve, entirely within deciduous forest biome, there was also great variation in J′, with values as low as 0.3. The majority of values are between 0.5 and 0.75, lower than those found by Pielou (1966a, b) for the herbaceous-shrub community in a Quebec study. Although species diversity (H′) and species richness (S) are correlated for Kenrose bryophytes, there is great scatter of J′ values at lower species numbers, indicating that even in deciduous forest in the more rigorous habitats (see Kenrose discussion) with low species richness, H′ is not predictable from S. In the Adirondack study areas, J′ is highly variable even in higher diversity quadrats; therefore, H′ is not predictable from S even in these quadrats. In the summit quadrats on Whiteface, as pointed out above, quadrats with the same number of species sometimes have very different J′ values.

Rigorous or unstable environments, e.g., the summit quadrats at Whiteface and the low elevation, seasonally mud-covered quadrats at Kenrose, are notable in these studies for low species richness and for low, though variable J′ values as well. Some of the bryophytes species living in these environments probably are opportunistic in that they can persist and reproduce effectively in rapidly changing environments. Some are able to reestablish populations quickly after a landslide or mudflow. I do not mean to imply that all or most bryophyte species are opportunistic; most forest bryophytes probably are not. Other groups of organisms that consist largely of equilibrium species often contain some species or groups of species that are opportunistic in changing environments, such as the Cape May warbler (MacArthur, 1960), cited above, or black cherry (*Prunus serotina*) in disturbed oak forests in Wisconsin (Auclair and Cottam, 1971). For black cherry, the authors cited widespread dispersal, delayed seed germination, and flexible seedbed requirements as "opportunistic characteristics." Adaptation for successful establishment under nonequilibrium conditions seems to be as important as high reproductive rate for opportunistic species, at least among plants.

There is evidence besides that of J′ or evenness values that some bryophytes are opportunistic, at least in certain environments. Schofield (1971), discussing bryophytes in the Arctic, wrote that "mosses are opportunistic in the high water table conditions, various taxa invading the shaded sites. . . . yet others succeeding in the open well-illuminated areas." He also pointed out a number of species that were able to invade unoccupied sites such as rocks in streams and bare silt, and cited a study of Whitmire (1965) on the early establishment of opportunistic species on dung, followed, as pH becomes more like that of the surrounding bog, by common bog species, perhaps the equilibrium species of this environment Other arctic bryophytes, e.g., *Bryum wrightii* (Steere and Murray, 1974), also appear to be opportunists, appearing in such disturbed habitats as lemming runways.

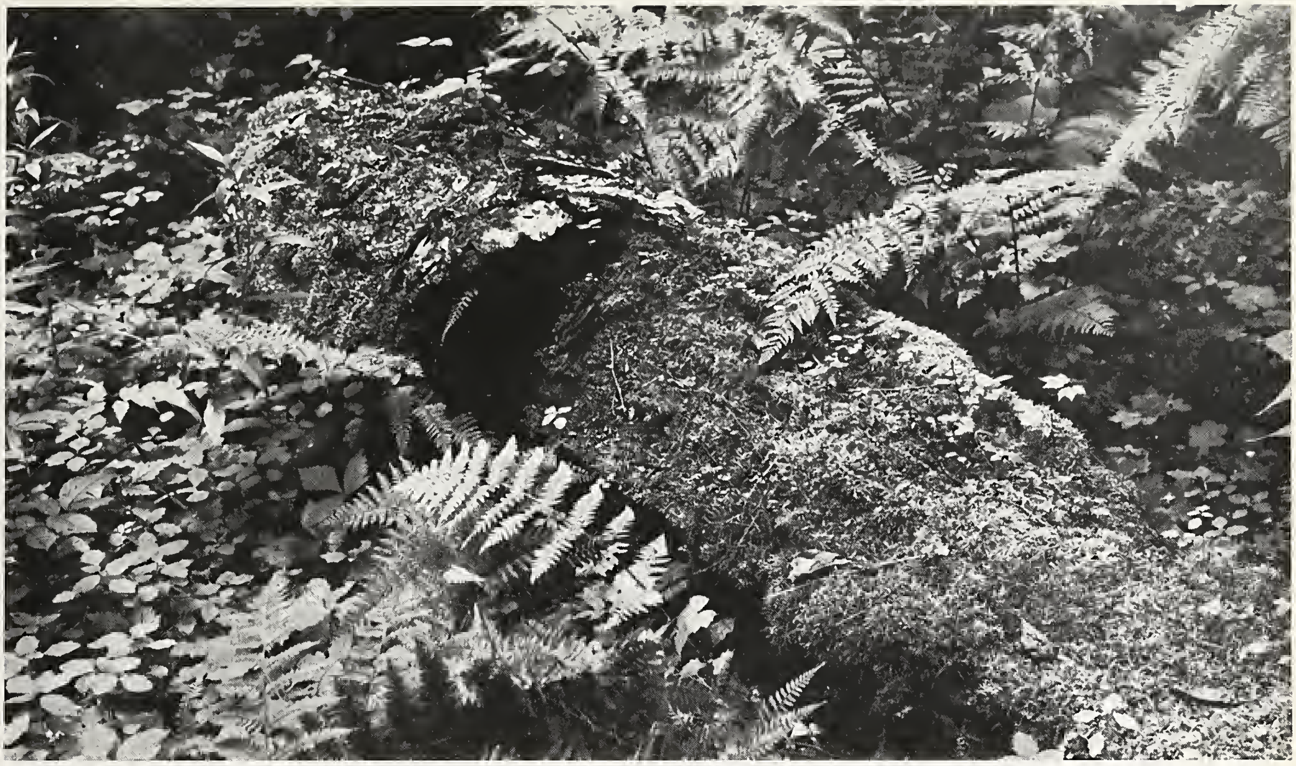
Crum (1966) stated that "open disturbed situations are usually quickly occupied by species of broad ecological tolerances and short life cycles or both," although he does not believe disturbed sites to be suitable to the majority of mosses. Many mosses, such as *Pleurozium schreberi* in balsam fir forest in the Adirondacks, appear to be occupants of stable sites and represent the "equilibrium species" among bryophytes.

Schuster (1966) described the exploitation by bryophytes, and especially by liverworts, of sites in the tropics not occupied by other plants, such as the surfaces of living leaves and twigs (also of interest in connection with the high species diversity of tropical liverworts). The exploitation of the twig habitat is also illustrated by Herzog (in Gams, 1932) with a photograph of a small twig of *Berberis* in Bolivia bearing five different bryophyte species. The epiphyllous habitat also is a short-lived, unstable one. Although the leaves are usually evergreen and persist long enough for the bryophyte to reproduce, sexually or asexually, the population perishes when the leaf falls. Propagules are easily and quickly dispersed to other leaves, as is characteristic of opportunistic species.

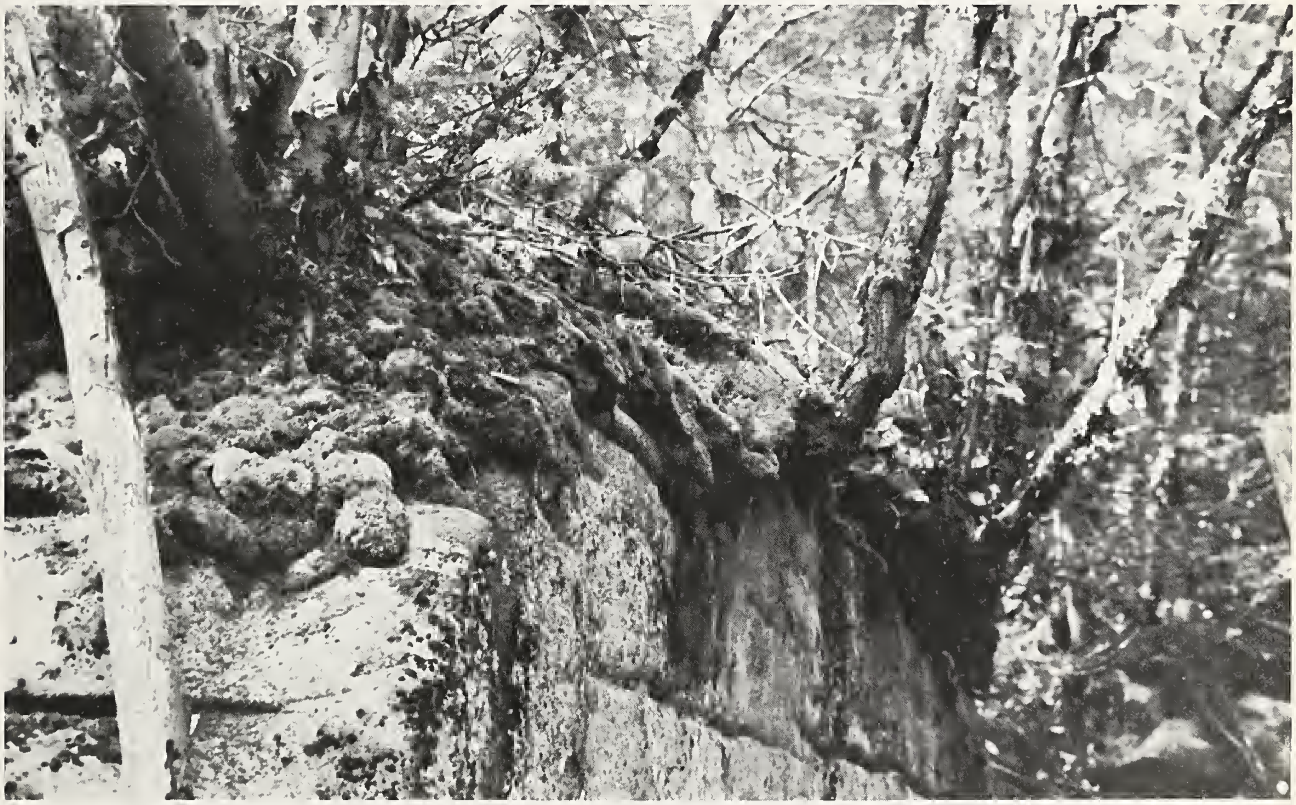
Outside the tropics, many liverworts are equally limited to temporary or extreme habitats such as decaying logs or snowfield margins, or, as in this study, the bark of trees. Schuster (1966) considered liverworts, and perhaps bryophytes as a group, to a large extent opportunistic; "the less mature and more extreme [the environment] the more diverse and conspicuous the bryophyte flora." He also cited some rare experimental evidence: Griggs (1934, 1935) found two liverwort species (both of Adirondack genera) that could grow and reproduce on nitrogen-free volcanic ash where other plants could not. When nitrogen was added, algae and moss protomema crowded the liverworts out. Opportunism and lack of competitive ability under conditions of higher productivity and stability appear to be correlated for certain species. This correlation may be found in liverworts as a group more often than in mosses, though it is not characteristic of all liverworts, e.g., *Bazzania trilobata*, in the Adirondacks.

Another somewhat different type of opportunism has to do with stochastic or chance factors and is related to the last question I want to consider here: the relationship for bryophytes of species diversity, niche space, and the Gausian principle. Schuster discussed elsewhere (1957) the composition of pioneer bryophyte communities growing as epiphytes on *Thuja*, and in another example, on decorticated logs. On *Thuja* he found 11 different combinations of liverwort species alone. He stated that these species were all ecologically very similar and concluded that the most important factor in the determination of groupings was chance; that is, which species happened to arrive first. In the decorticated log habitat, he found a total of 25 ecologically similar "candidates" for invasion of this environment. He concluded that "environment plus chance plus time governed what species shall undergo ecesis [successful establishment] . . . If a species has a slight advantage in time . . . it tends to form large, pure patches, due to extraordinary high reproductive potential." The latter is due largely to asexual reproductive structures, another frequent characteristic of opportunistic plant species.

Schuster, also noted the occurrence on some of these logs of a great number of ecologically similar species that "undergo ecesis on the same site at the same time." The heterogeneous community formed "results from gregariousness of sociability of many species of Hepaticae (and mosses)." This same gregariousness, the presence of many different species occupying one small area of apparently uniform environment, has been noted by many bryologists. Steere (1951) noted it on Cornwallis Island in the Arctic.



Bryophyte community of a rotten log, hemlock-hardwood forest, Ampersand Mountain, containing 15 or more species.



(photo by N. G. Slack)

Diverse bryophyte community overhanging rock face, Whiteface Mountain.

Schofield (1971) wrote that "the apparent lack of competition among a diversity of taxa of bryophytes in a small area is shown by the universal occurrence of this phenomenon in the arctic." It is also a common phenomenon in the deciduous and spruce-fir forests I have studied, particularly on logs, both decorticated and in earlier stages of decay. I have frequently found as many as fifteen species of bryophytes on one log, with little apparent differentiation of microhabitat for the majority of them, though a few are characteristic of damper undersides.

Do Gausian principles of "competitive exclusion" really hold for bryophytes in such habitats? In many habitats the bryophytes found in such assemblages belong to the same genera, *Mnium*, *Brachythecium*, and *Hypnum*, for example, on logs in early stages of decay, and *Cephalozia* on decorticated logs. Must we believe Slobodkin (1961) that the "portions of the fundamental niches of two [ten?] species. . . . that are found to coexist are not identical"? Or, "if they seem to be identical the study is incomplete"? Perhaps we can use Slobodkin's phrase "persist indefinitely" to wriggle out of this dilemma. These apparently coexisting species obviously do not persist indefinitely; their habitats are temporary. When the log decays completely, as when the leaf with its epiphyllous bryophytes falls, the species coexist no longer. These are in a sense fugitive species (Hutchinson, 1965) which when displaced, in this case not by a competitor but by the disappearance of their habitat, are mobile enough in terms of sexual or vegetative propagules to establish themselves on new open sites (e.g., another newly fallen log in the Adirondack forest). Hutchinson pointed out that a similar idea as been advanced by Skellam for annual plants, which must find a new site each year. Perhaps they, too, thus avoid the problems of competitive exclusion.

Even with a long-persistent rotting log, there is another way of avoiding Gausian fate, suggested both by Hutchinson (1964) and by Levin (1970). In Hutchinson's terms, "If two species were almost equally efficient over a wide range of environmental variables, competitive exclusion would be a slow process." It seems to me that with nearly equal efficiency in the rotten log habitat, exclusion could be slow enough even without the random environment suggested by these authors.

In conclusion, I believe that the solution to this problem of coexistence of closely related species of bryophytes is very important to the understanding of bryophyte diversity and its importance in a plant community. Bryophyte diversity, where measured as S or H′ (or very likely by any other method) increases as the number of suitable bryophyte habitats increases, whether this increase consists of spatial heterogeneity in terms of logs, rocks, etc., within one quadrat, or consists of a large elevation range with resulting vegetation types. Furthermore, diversity is increased where a large variety of bryophytes apparently coexist in any one such suitable habitat, whether it is a moss (and liverwort) covered log in the Adirondack spruce-fir zone, or an epiphytie site in a montane tropical rain forest. It is surely true that "the study is incomplete" and we may yet find differences between realized niches of all the apparently coexisting bryophytes. We may as likely find that bryophytes are in large part opportunistic species, and that their primary role and in their contribution to the species diversity of plant communities is in their coexistence, not indefinitely but persistently, in ultimately temporary habitats, and in their ability to exploit a variety of habitats not suitable to other sectors of the plant community.

These intensive studies of bryophyte ecology in New York State forests have identified some problems of bryophyte species diversity and community structure, and have provided data for some tentative answers. Many more studies are needed of bryophytes in forest habitats of other regions, and in other types of habitats before we can gain a better understanding of these problems.

Bibliography

Anderson, L. W. and R. H. Zander. 1973. The mosses of the southern Blue Ridge province and their phytogeographic relationship. Jour. Elisha Mitchell Sci. Soc. *89*: 15-60.

Auclair, A. N. and G. Cottam. 1971. Dynamics of black eherry *(Prunus serotina* Erhr.) in southern Wisconsin oak forests. Ecol. Monogr. *41*: 153-177.

Auclair, A. N. and F. G. Goff. 1971. Diversity relations of upland forests in the western Great Lakes area. Amer. Midl. Natur. *105*: 499-528.

Barkman, J. J. 1958. Phytosociology and ecology of cryptogamic epiphytes. Van Grocum and Co., Assen, Netherlands.

Beals, E. W. 1965. Ordination of some corticolous cryptogamic communities in south central Wisconsin. Oikos *16*: 1-8.

Billings, W. D. and W. B. Drew. 1938. Bark factors affecting the distribution of corticolous bryophytics communities. Amer. Midl. Natur. *20*: 302-333.

Bliss, L. C. 1962. Caloric and lipid content in alpine tundra plants. Ecology *43*: 753-757.

Bliss, L. C. 1963. Alpine plant communities in the Presidential Range, New Hampshire. Ecology *44*: 687-697.

Bliss, L. C. 1969. Alpine community patterns in relation to environmental parameters. *In* Essays in plant geography and ecology. K. N. Greenidge, (ed.) Nova Scotia Museum. Halifax, N. S.

Bowers, F. D. 1974. The mosses reported from Costa Rica. The Bryologist 77: 150-171.

Braun, E. L. 1950. Deciduous forest of eastern North America. Hafner Publishing Co., New York.

Breisch, A. R., J. R. Scott, R. A. Park and P. C. Lemon. 1969. Multidimensional ordination of boreal and hardwood forests on Whiteface Mountain. Publ. No. 92. Atmos. Sci. Res. Center, SUNY, Albany, N.Y., 89-135.

Brodo, I. M. 1961. Transplant experiments with corticolous lichens using a new technique. Ecology *42*: 838-841.

Brodo, I. M. 1968. The lichens of Long Island, New York: a vegetational and floristic analysis. Bulletin No. 410. N.Y. State Museum, Albany, N.Y.

Brown, B. I. 1948. A study of the distribution of epiphytic plants in New York. Amer. Midl. Natur. *39*: 457-497.

Burnham, S. H. 1919. Hepaticae of the Lake George flora. The Bryologist *22*: 33-37.

Burnham, S. H. 1920. The mosses of the Lake George flora. The Bryologist *23*: 17-26: 54-60.

Burnham, S. H. 1929. Supplementary list of the bryophytes of the Lake George region. The Byrologist *32*: 94-98.

Cain, S. A. and A. J. Sharp. 1938. Bryophytic unions of certain forests of the Great Smoky Mountains. Amer. Midl. Nat. *20*: 249-301.

Cody, M. 1974. Competition and the structure of bird communities. Princeton Univ. Press, Princeton, N.J.

Coleman, B. B., and W. C. Muenscher and D. R. Charles. 1956. A distributional study of the epiphytic plants of the Olympie Peninsula, Washington. Amer. Midl. Natur., *56*: 54-87.

Crosby, M. R. 1969. A revision of the tropical American moss genus *Pilotrichum*. The Bryologist *72*: 275-343.

Crum, H. A. 1966. Evolutionary and phytogeographic patterns in the Canadian moss flora. pp. 28-42. *In* The evolution of Canada's flora. Taylor and Ludwig (eds.). Univ. of Toronto Press, Toronto.

Crum, H. A. 1972. The geographical origins of the mosses of North America's eastern deciduous forest. Jour. Hattori Bot. Lab. *50*: 1851-1857.

Crum, H. A., W. C. Steere and L. E. Anderson. 1973. A new list of mosses of North America north of Mexico. The Bryologist *76*: 85-130.

Crundwell, A. C. 1970. Infraspecific categories in Bryophyta. Biol. J. Linn. Soc. *2*: 221-224.

Culberson, W. L. 1955. Qualitative and quantitative studies on the distribution of corticolous lichens and bryophytes in Wisconsin. Lloydia *18*: 25-36.

Culberson, W. L. 1955a. The corticolous communities of lichens and bryophytes in the upland forests of northern Wisconsin. Ecol. Monogr. *25*: 215-231.

Curtis, J. T. 1959. The vegetation of Wisconsin: an ordination of plant communities. Univ. of Wisc. Press, Madison.

Dahl, E. 1956. Rondane: mountain vegetation in South Norway and its relation to the environment. Skr. utgitt. av Det. Norske Vidensk-Akad, i Oslo, I. mat-Naturv. Klasse No. 3 1-374.

Dahl, E. 1960. Some measures of uniformity in vegetation analysis. Ecology *41*: 805-808.

Denison, W. C., D. M. Tracy, F. M. Rhoades and M. Sherwood. 1972. Direct, nondestructive measurement of biomass and structure in living, old-growth Douglas fir. *In:* Proceedings-Research on Coniferous Forest Ecosystems-a Symposium. Pac. Northwest Forest and Range Exp. Stn., Portland, Oregon.

Dickman, M. 1968. Some indices of diversity. Ecology *49*: 1191-1193.

Ehrlich, P. and P. Raven. 1964. Butterflies and plants: a study in coevolution. Evolution *18*: 586-608.

Falconer, R. 1963. Weather summary for Whiteface Mountain, Wilmington, New York. Report of

Whiteface Mountain activities of the Atmospheric Sciences Research Center. Publ. *15*: 46-59.

Fernald, M. L. 1950. Gray's Manual of Botany. American Book Co., New York.

Feuer, R. C., C. Lowe, H. B. Hartwig and M. Peech. 1963. New York Agriculture at a glance. N.Y.S. Col. of Agriculture, Ithaca, N.Y.

Fisher, R. A., A. S. Corbet and C. B. Williams. 1943. The relation between the number of species and the number of individuals in a random sample of an animal population. J. Anim. Ecol. *12*: 42-58.

Forman, R. T. 1964. Growth under controlled conditions to explain the hierarchical distributions of a moss, *Tetraphis pellucida*. Ecol. Monogr. *34*: 1-25.

Forman, R. T. 1968. Caloric values of bryophytes. The Bryologist *71*: 344-347.

France, O. and P. Lemon. 1963. Preliminary observations on forest tree ecology of the Whiteface Mountain area. Publ. No. 92. Atmos. Sci. Res. Center, SUNY, Albany, N.Y.

Fruchter, B. 1954. Introduction to factor analysis. Van Nostrand, Princeton, N.J.

Gams, H. 1932. Bryocenology (moss societies). *In* Manual of bryology. M. Nijhoff. The Hague.

Gauch, H. G., G. B. Chase and R. H. Whittaker. 1974. Ordination of vegetation samples by Gausian species distributions. Ecology *55*: 1382-1390.

Gimingham, C. H., N. M. Pritchard and R. M. Cormack. 1966. Interpretation of a vegetational mosaic on limestone in the island of Gotland. Jour. Ecol. *54*: 481-502.

Gleason, H. A. 1922. On the relation between species and area. Ecology *3*: 158-162.

Goodman, D. 1975. Theory of diversity-stability relationships in ecology. Q. Rev. Bio. *50*: 237-266.

Grant, P. R. 1969. Colonization of islands by ecologically dissimilar species of birds. Can. J. Zool. *47*: 41-43.

Griggs, R. F. 1934. Growth of liverworts from Katmai in nitrogen-free media. Amer. Jour. Bot. *21*: 265-277.

Griggs, R. F. 1935. Hepaticae as pioneers on nitrogen-free volcanic ash. Ann. Bryol. *8*: 74-79.

Grolle, R. 1969. Grossdisjunktionen in artarealen Latinamerikanischer Lebermoose. *In* Biogeography and ecology in South America, E. J. Fittkau, et al. (eds.). Dr. W. Junk, N.V., The Hague.

Grubb, P. J., O. P. Flint and S. C. Gregory. 1969. Preliminary observations on the mineral nutrition of epiphytic mosses. Trans. Brit. Bryol. Soc. 5: 802-817.

Guerke, W. 1973. Epiphyllous Hepaticae in Louisiana. The Bryologist *76*: 201-202.

Hale, M. E. 1955. Phytosociology of corticolous cryptogams in the upland forest of southern Wisconsin. Ecology *36*: 45-63.

Hamilton, T. H., T. H. Barth and G. Bush. 1963. Species abundance: natural regulation of insular variation. Science *142*: 1575-1577.

Hamilton, T. H. and I. Rubinoff. 1963. Isolation, endemism, and multiplication of species in Darwin Finches. Evolution *17*: 388-404.

Hamilton, T. H. and I. Rubinoff. 1964. On models predicting abundance of species and endemics for the Darwin Finches in the Galápagos Archipelago. Evolution *18*: 339-342.

Heimberger, C. C. 1934. Forest-type studies in the Adirondack region. Cornell Univ. Agr. Exp. Sta. Memoir 165. Ithaca, N.Y.

Hermann, F. J. 1969. The bryophytes of Glacier National Park, Montana. The Bryologist *72*: 350-376.

Hill, M. O. 1973. Diversity and evenness: a unifying notation and its consequences. Ecology *54*: 427-432.

Hoffman, G. R. 1971. An ecological study of epiphytic bryophytes and lichens on *Pseudotsuga menziesii* on the Olympic Peninsula, Washington. II. Diversity of the vegetation. The Bryologist *74*: 413-427.

Hoffman, G. R. and R. G. Kazmierski. 1969. An ecologic study of epiphytic bryophytes and lichens *Pseudotsuga menziesii* on the Olympie Peninsula, Washington. The Bryologist *72*: 1-18.

Holway, J. G., J. T. Scott and S. Nicholson. 1969. Vegetation of the Whiteface Mountain Region of the Adirondacks, Publ. No. 92. Atmos. Sci. Res. Center, SUNY, Albany, N.Y., 1-43.

Holzinger, K. J. and Harman, H. H. 1941. Factor analysis. Univ. of Chicago Press, Chicago.

Hosokawa, T., N. Odani and H. Tagawa. 1964. Causality of the distribution of corticolous species in forests with special reference to the physioecological approach. The Bryologist *67*: 396-411.

Hurlbert, H. 1971. The nonconcept of species diversity: a critique and alternate parameters. Ecology *52*: 576-586.

Hutchinson, G. E. 1957. Concluding remarks. Cold Spring Harbor Symp. Quan. Biol. *XXII*. 415-427.

Hutchinson, G. E. 1959. Homage to Santa Rosalia or why are there so many kinds of animals: Amer. Nat. *93*: 145-159.

Hutchinson, G. E. 1961. The paradox of the plankton. Amer. Natur. *95*: 137-145.

Hutchinson, G. E. 1964. The lacustrine microcosm reconsidered. Amer. Sci. *52*: 334-341.

Hutchinson, G. E. 1965. The niche: an abstractly inhabited hypervolume. pp. 26-78. *In* The ecological theatre and the evolutionary play, Yale University Press.

Iwatsuki, A. 1960. The epiphytic bryophyte communities in Japan. Jour. Hattori Bot. Lab. *22*: 159-352.

Jaccard, P. 1912. The distribution of the flora in the alpine zone. New Phytol. *11*: 37-50.

Janzen, D. H. 1970. Herbivores and the number of tree species in tropical forest. Amer. Natur. *104*: 501-528.

Janzen, D. H. 1973. Sweep samples of tropical foliage insects: effects of seasons, vegetation types, elevation, time of day, and insularity. Ecology *54*: 687-708.

Johnson, M., L. Mason and P. Raven. 1968. Ecological parameters and plant species diversity. Amer. Natur. *102*: 297-306.

Johnson, M. and P. Raven. 1970. Natural regulation of plant species diversity. pp. 127-162. *In* Evolutionary biology, Dobzhanski, Hecht, and Steere (eds.). *4*: 127-162.

Karr, J. R. 1971. Structure of avian communities in selected Panama and Illinois habitats. Ecol. Monogr. *41*: 207-233.

Karr, J. R. and R. R. Roth. 1971. Vegetation structure and avian diversity in several new world areas. Amer. Natur. *105*: 423-435.

Ketchledge, E. H. 1957. Checklist of the mosses of New York State. New York State Museum Bulletin 363. Albany, N.Y.

Khanna, K. K. 1964. Differential evolutionary activity in bryophytes. Evolution *18*: 652-670.

Kontkanen, P. 1950. Quantitative and seasonal studies on the leafhopper fauna of the field stratum on open areas in North Karelia. Soc. Zool. Bot. Fenn. Vanamo Ann. Zool. *13*: 1-91.

Kricher, J. C. 1972. Bird species diversity: the effect of species richness and equitability on the diversity index. Ecology *53*: 278-282.

Kuc, M. 1973. Additions to the arctic moss flora VII. Altitudinal differentiation of the moss cover at Purchase Bay, Melville Is. NWT. Rev. Bryol. Lichenol. *39*: 339-553.

Lack, D. 1947. Darwin's Finches. Cambridge Univ. Press, Cambridge, England.

LeBlanc, F. 1961. Influence de l,atmosphère polluée des grandes agglomérations urbaines sur les épiphytes corticoles. Rev. Canad. Biol. *20*: 823-827.

LeBlanc, F. and J. de Sloover. 1970. Relation between industrialization and the distribution and growth of epiphytic lichens and mosses in Montreal. Can. Jour. Bot. *48*: 1485-1496.

Levin, S. 1970. Community equilibria and stability, and an extension of the competitive exclusion principle. Amer. Natur. *104*: 413-420.

Levy, D. J. 1919. Preliminary list of mosses collected in the neighborhood of Hulett's Landing, Lake George, N.Y. The Bryologist 22: 23-26.

Lloyd, M. and R. J. Ghelardi. 1964. A table for calculating the equitability component of species diversity. J. Anim. Ecol. *33*: 217-226.

Lloyd, M., R. F. Inger and F. W. King 1968. On the diversity of reptile and amphibian species in a Bornean rain forest. Amer. Natur. *102*: 497-515.

Longton, R. E. 1974. Microclimate and biomass in communities of the *Bryum* associations on Ross Island, continental Antarctica. The Bryologist *77*: 109-127.

Longton, R. E. and S. W. Greene. 1969. The growth and reproductive cycle of *Pleurozium schreberi* (Brid.) Mitt. Ann. Bot. *33*: 83-101.

Loucks, O. L. 1970. Evolution of diversity, efficiency, and community stability. Am. Zoologist *10*: 17-25.

MacArthur, R. H. 1960. On the relative abundance of species. Amer. Natur. *94*: 25-36.

MacArthur, R. H. 1964. Environmental factors affecting bird species diversity. Amer. Natur. *98*: 378-397.

MacArthur, R. H. 1965. Patterns of species diversity. Biol. Rev. *40*: 510-533.

MacArthur, R. H. 1969. Patterns of communities in the Tropics. Biol. J. Linn. Soc. *1*: 19-30.

MacArthur, R. H. and J. W. MacArthur. 1961. On bird species diversity. Ecology *42*: 594-598.

MacArthur, R. H., H. Recher and M. Cody. 1966. On the relation between habitat selection and species diversity. Amer. Natur. *100*: 319-325.

MacArthur, R. H. and E. O. Wilson. 1967. The theory of island biogeography. Princeton, N.J.

Margalef, R. 1957. La teoria de la información en ecologia. Memorias de la real Academia de ciences y artes (Barcelona) *33*: 373-449.

Margalef, R. 1958. Information theory in ecology. Gen. Syst. 3: 36-71 (Translation of the above.)

Margalef, R. 1963. On certain unifying principles in ecology. Amer. Natur. 97: 357-374.

Margalef, R. 1968. Perspectives in ecological theory. Univ. of Chicago Press, Chicago, Ill.

McIntosh, R. 1967. An index of diversity and the relation to certain concepts of diversity. Ecology *48*: 392-404.

Menhinick, E. F. 1964. A comparison of some species-individuals diversity indices applied to samples of field insects. Ecology *45*: 859-861.

Monk, C. D. 1967. Tree species diversity in the eastern deciduous forest with particular reference to north central Florida. Amer. Natur. *101*: 173-187.

Monk, C. D., G. I. Child and S. A. Nicholson. 1969. Species diversity of a stratified oak-hickory community. Ecology *50*: 468-470.

Mühle, H. and F. LeBlanc. 1975. Bryophyte and lichen succession of decaying logs. I. Analysis along an evaporational gradient in eastern Canada. Jour. Hattori Bot. Lab. *39*: 1-33.

Murdock, W. W., C. E. Francis and C. H. Peterson. 1972. Diversity and pattern in plants and insects. Ecology *53*: 819-829.

Nash, T. H. 1972. Simplification of the Blue Mt. lichen communities near a zinc factory. The Bryologist *75*: 315-324.

Neal, M. W. and K. A. Kershaw. 1973. Studies on lichen-dominated systems. III. Phytosociology of a raised beach system near Cape Henrietta Maria, Northern Ontario. Can. Jour. Bot. *51*: 1115-1125.

Nicholson, S. A., J. F. Holway and J. R. Scott. 1969. A floristic comparison of undisturbed spruce-fir forests of the Adirondacks with four other regions. Publ. No. 92. Atmos. Sci. Res. Center, SUNY, Albany, N.Y., 136-145.

Nicholson, S. A. and C. D. Monk. 1974. Plant species diversity in old-field succession on the Georgia piedmont. Ecology *55*: 1075-1085.

Nicholson, S. A. and J. T. Scott. 1969. Slope-aspect variation in the vascular plant species composition in the treeless community near the summit of Whiteface Mountain, N.Y. Publ. No. 92. Atmos. Sci. Res. Center, SUNY, Albany, N.Y., 146-160.

Norris, D. 1964. Bryoecology of the Appalachian spruce-fir zone. PhD Thesis. Univ. of Tennessee, Knoxville. (unpublished)

Paine, R. T. 1969. A note on trophic complexity and community stability. Amer. Natur. *103*: 91-93.

Patrick, R. 1967. The effect of invasion rate, species pool and size of area on the structure of diatom communities. Proc. Nat. Acad. Sci. *58(4)*: 1335-1342.

Patrick, R. 1968. The structure of diatom communities in similar ecological conditions. Amer. Natur. *102*: 173-183.

Patten, B. C. 1962. Species diversity in net phytoplankton of Raritan Bay, J. Marine Res. *20*: 57-75.

Phillips, E. A. 1951. The associations of bark-inhabiting bryophytes in Michigan. Ecol. Monogr. *21*: 301-316.

Pianka, E. R. 1971. Lizard species density in the Kalahari Desert. Ecology *52*: 1024-1029.

Pielou, E. C. 1966a. Species-diversity and pattern-diversity in the study of ecological succession. J. Theor. Biol. *10*: 370-383.

Pielou, E. C. 1966b. Shannon's formula as a measure of species diversity; its use and misuse. Amer. Natur. *100*: 463-465.

Pielou, E. C 1966c. The measure of diversity in different types of biological collections. J. Theor. Biol. *13*: 131-144.

Pielou, E. C. 1969. An introduction to mathematical ecology. Wiley-Interscienee, New York.

Pike, L. H., W. C. Denison, D. M. Tracy, M. A. Sherwood and F. M. Rhoades. 1975. Floristic survey of epiphytic lichens and bryophytes growing on old-growth conifers in western Oregon. The Bryologist *78*: 389-402.

Porter, J. W. 1972. Patterns of species diversity in Caribbean reef corals. Ecology *53*: 744-748.

Poulson, T. L. and D. C. Culver. 1969. Diversity in terrestrial cave communities. Ecology *50*: 133-138.

Preston, F. W. 1948. The commonness and rarity of species. Ecology *29*: 254-283.

Preston, F. W. 1962. The canonical distribution of commonness and rarity. Ecology *43*: I 185-215, II 410-432.

Quarterman, E. 1949. Ecology of cedar glades. III. Corticolous bryophytes. The Bryologist *52*: 153-165.

Raabe, F. W. 1952. Uber den 'Affinitätwert' in der Planzensoziologie. Vegetatio, Haag, *4*: 53-68.

Rastorfer, J. R. 1970. Effects of light intensity and temperature on photosynthesis and respiration of two east Antarctic mosses, *Bryum argenteum* and *Bryum antarcticum*. The Bryologist *73*: 544-556.

Recher, H. 1969. Bird species diversity and habitat diversity in Australia and North America. Amer. Natur. *103*: 75-80.

Reilly, R. W. 1964. A general ecological study of the moss flora on Whiteface Mountain. pp. 21-83. *In* Whiteface Mountain Summer Program, 1963, Publ. No. 21. Atmos. Sci. Res. Center, SUNY, Albany, N.Y.

Reiners, W. A., I. A. Worley and D. B. Lawrence. 1971. Plant diversity in a chronosequence at Glacier Bay, Alaska. Ecology *52*: 55-69.

Reiners, W. A. 1972. Structure and energetics of three Minnesota forests. Ecol. Monogr. *42*: 71-94.

Richards, P. W. 1969. Speciation in the tropical rain forest and the concept of the niche. Biol. J. Linn. Soc. *1*: 149-153.

Risser, P. G. and E. L. Rice. 1971. Diversity in tree species in Oklahoma upland forests. Ecology *52*: 876-880.

Rosenzweig, M. S. and Winakur. 1969. Population ecology of desert rodent communities: habitat and environmental complexity. Ecology *50*: 558-572.

Sager, P. E. and A. D. Hasler. 1969. Speeies diversity in lacustrine phytoplankton: the components of the index of diversity from Shannon's formula. Amer. Natur. *103*: 51-59.

Schofield, W. B. 1972. Bryology in Arctic and boreal North America and Greenland. Can. Jour. Bot. *50*: 1111-1133.

Schuster, R. M. 1953. Boreal Hepaticae. A manual of the liverworts of Minnesota and adjacent regions. Univ. of Notre Dame Press, Notre Dame.

Schuster, R. M. 1957. Boreal Hepaticae, a manual of the liverworts of Minnesota and adjacent regions II. Ecology. Amer. Midl. Natur. *57*: 203-299.

Schuster, R. M. 1966. The Hepaticae and Anthocerotae of North America. Vol. I. Columbia Univ. Press, New York.

Scott, J. T. and J. G. Holway. 1969. Comparison of topographic and vegetation gradients in forests of Whiteface Mountain, New York. Publ. No. 92. Atmos. Sci. Res. Center, SUNY, Albany, N.Y., 44-48.

Scott, J. R. and S. A. Nicholson. 1969. Some characteristics of the vegetation of Whiteface Mt. and implications concerning their use in studies of microclimate. Atmos. Sci. Res. Report No. 33. 190-231.

Shafti, M. I. and G. A. Yarranton. 1973. Diversity, floristic richness and species evenness during a secondary (post-fire) succession. Ecology *54*: 896-902.

Shannon, C. E. and W. Weaver. 1948. The mathematical theory of communication. Univ. of Illinois Press. Urbana.

Sharp, M. A., R. Parks and P. R. Ehrlich. 1974. Plant resources and butterfly habitat selection. Ecology *55*: 870-875.

Siccama, T. G. 1974. Vegetation, soil, and climate on the Green Mountains of Vermont. Ecol. Monogr. *44*: 325-349.

Simberloff, D. 1970. Taxonomic diversity of island biotas. Evolution *24*: 22-47.

Simpson, E. H. 1949. Measurement of diversity. Nature *163*: 688.

Simpson, G. G. 1964. Species density of North American reeent mammals. Syst. Zool. *13*: 57-73.

Slack, N. G. 1971. Species diversity and community structure in bryophytes. PhD Thesis. SUNY, Albany, N.Y.

Slack, N. G. 1976. Host specificity of bryophytic epiphytes in eastern North America. Journ. Hattori Bot. Lab. *41*: 107-132.

Slobodkin, L. B. 1961. Growth and regulation of animal populations. Holt, Rinehart and Winston, New York. 1961.

Søprensen, T. 1948. A method of establishing groups of equal amplitude in plant sociology based on sililarity of species content and its application to analyses of the vegetation on Danish commons. Biol. Skr. (K. danske vidensk. Selsk. N.S.) 5: 1-34.

Southwood, T. R. 1966. Ecological methods. Methuen and Co., Ltd., London.

Steere, W. C. 1945. Robers Statham Williams (1859-1945). The Bryologist *48*: 93-99.

Steere, W. C. 1951. Bryophyta of Arctic America. IV. The mosses of Cornwallis Island. The Bryologist *54*: 181-202.

Steere, W. C. and B. M. Murray. 1974. Geographical distribution of *Bryum wrightii* in Arctic and boreal North America. The Bryologist *77*: 172-178.

Stout, N. J. 1956. Atlas of forestry of New York State. SUNY College of Forestry, Syracuse, N.Y.

Stringer, P. W. and G. H. LaRoi. 1970. The Douglas-fir forests of Banff and Jasper National Parks, Canada. Can. Jour. Bot. *48*: 1703-1726.

Stringer, P. W. and M. H. L. Stringer. 1973. Studies on the bryophytes of S. Manitoba VII. Distribution of terrestrial bryophytes in a black spruce bog in Bird's Hill Provincial Park. The Bryologist *76*: 252-259.

Tomoff, C. S. 1974. Avian species diversity in desert scrub. Ecology *55*: 396-403.

Tramer, E. J. 1969. Bird species diversity: components of Shannon's formula. Ecology *50*: 927-929.

Verdoorn, F. (ed.) 1932. Manual of bryology. M. Nijhoff. The Hague.

Vitt, D. H., M. Ostafichuk and I. M. Brodo. 1973. Folicolous bryophytes and lichens of *Thuja plicata* in western British Columbia. Can. Jour. Bot. *51*: 571-580.

Vitt, D. H. and N. S. Slack. 1975. An analysis of the vegetation of *Sphagnum*-dominated kettle-hole bots in relation to environmental gradients. Can. Jour. Bot. *53*: 332-359.

Vuilleumier, F. 1970. Insular biogeography in continental regions. The northern Andes of South America. Amer. Natur. *104*: 373-388.

Wake, D. B. 1970. The abundance and diversity of tropical salamanders. Amer. Natur. *104*: 211-213.

Watson, M. A. Annual periodicity of incremental growth in the moss, *Polytrichum commune*. The Bryologist *78*: 414-422.

Whitmire, R. S. 1965. Ecological observation of *Splachnum ampullaceum*. The Bryologist *68*: 342-343.

Whittaker, R. H. 1956. The vegetation of the Great Smoky Mountains. Ecol. Monogr. *26*: 1-80.

Whittaker, R. H. 1965. Dominance and diversity in land plant communities. Science *147*: 250-260.

Whittaker, R. H. 1966. Forest dimensions and production in the Great Smoky Mountains. Ecology *47*: 103-121.

Whittaker, R. H. 1967. Gradient analysis of vegetation. Biol. Rev. *49*: 207-264.

Whittaker, R. H. 1970. The population structure of vegetation. pp. 39-62. *In* Gesellschaftsmorphologie (Strukturforschung). R. Tuxen, (ed.), Verlag Dr. W. Junk. The Hague.

Whittaker, R. H. and C. W. Fairbanks. 1958. A study of plankton copepod communities in the Columbia River basin, southeastern Washington. Ecology *39*: 46-65.

Whittaker, R. H. and W. A. Niering. 1965. Vegetation of the Santa Catalina Mountains, Arizona: a gradient analysis of the south slope. Ecology *46*: 429-452.

Whittaker, R. H. and G. M. Woodwell. 1969. Structure, production and diversity of oak-pine forest at Brookhaven, N.Y. J. Ecol. *57*: 155-174.

Wihlm, J. L. 1968. Use of biomass units in Shannon's formula. Ecology *49*: 153-155.

Williams, C. B. 1966. A natural hybrid in the genus *Weissia*. The Bryologist *69*: 361-365.

Willis, J. C. 1922. Age and area. Cambridge Univ. Press, Cambridge, England.

Witty, J. W. 1968. Classification and distribution of soils on Whiteface Mountain. Essex County, New York PhD Dissertation. Cornell Univ. Ithaca, N.Y.

Woodwell, G. M. and R. H. Whittaker. 1968. Primary production in terrestrial ecosystems. Am. Zoologist *8*: 19-30.

Yarranton, G. A. 1967. Principal component analysis data from saxicolous bryophyte vegetation at Steps Bridge, Devon. I. A quantitative assessment of variation in the vegetation. Can. Jour. Bot. *45*: 93-115.

Yarranton, G. A. 1970. Toward a mathematical model of limestone pavement vegetation. III. Estimation of the determinants of species frequencies. Can. Jour. Bot. *48*: 1387-1404.

APPENDIX A

Bryophytes Found in Adirondack Quadrats (Whiteface and Ampersand Mts.)

Mosses

Amblystegium juratzkanum Schimp.
Amblystegium serpens (Hedw.) B.S.G.
Amblystegium varium (Hedw.) Lindb.
Andreaea rupestris Hedw.
Anomodon rugellii (C. Müll.) Keissl.
Atrichum angustatum (Brid.) B.S.G.
Atrichum undulatum (Hedw.) P. Beauv.
Brachythecium acuminatum (Hedw.) Aust.
Brachythecium curtum (Lindb.) Limpr.
Brachythecium oxycladon (Brid.) Jaeg. and Sauerb.
Brachythecium populeum (Hedw.) B.S.G.
Brachythecium reflexum (Starke *ex* Web. and Mohr.) B.S.G.
Brachythecium rutabulum (Hedw.) B.S.G.
Brachythecium salebrosum (Web. and Mohr.) B.S.G.
Brachythecium velutinum (Hedw.) B.S.G.
Brotherella recurvans (Michx.) Fleisch.
Bryum capillare Hedw.
Callicladium haldanianum (Grev.) Crum
Campylium chrysophyllum (Brid.) J. Lange
Campylium hispidulum (Brid.) Mitt.
Dicranella heteromalla (Hedw.) Schimp.
Dicranum flagellare Hedw.
Dicranum fulvum Hook.
Dicranum fuscescens Turn.
Dicranum montanum Hedw.
Dicranum polysetum Sw.
Dicranum scoparium Hedw.
Dicranum undulatum Brid.
Dicranum viride (Sull. and Lesq. *ex* Sull.) Lindb.
Drepanocladus uncinatus (Hedw.) Warnst.
Encalypta procera Bruch.
Eurhynchium pulchellum (Hedw.) Jenn.
Fissidens osmundoides Hedw.
Grimmia affinis Hornsch.
Grimmia apocarpa Hedw.
Grimmia donniana Smith
Hedwigia ciliata (Hedw.)
Herzogiella striatella (Brid.) Iwats.
Herzogiella turfacea (Lindb.) Iwats.
Hylocomium splendens (Hedw.) B.S.G.
Hypnum imponens Hedw.
Hypnum lindbergii Mitt.
Hypnum pallescens (Hedw.) P. Beauv.
Isopterygium distichaceum (Mitt.) Jaeg. and Sauerb.
Leucobryum glaucum (Hedw.) Angstr. *ex* Fr.
Mnium ciliare (C. Muell.) Schimp.
Mnium hymenophyloides Heub.
Mnium punctatum Hedw.
Mnium spinulosum B.S.G.
Neckera pennata Hedw.
Oncophorus wahlenbergii Brid.
Paraleucobryum longifolium (Hedw.) Loeske
Plagiothecium denticulatum Hedw. B.S.G.
Plagiothecium laetum B.S.G.
Platydictya subtile (Hedw.) Crum
Platygytium repens (Brid.) Mitt.
Pleurozium schreberi (Brid.) Mitt.
Pogonatum alpinium (Hedw.) Roehl.
Pogonatum dentatum (Brid.) Brid.
Pohlia elongata Hedw.
Pohlia nutans (Hedw.) Lindb.
Polytrichum juniperinum Hedw.
Polytrichum ohioense Ren. and Card.
Polytrichum piliferum Hedw.
Polytrichum strictum Brid.
Ptilium crista-castrensis (Hedw.) De Not.
Rhacomitrium fasciculare (Hedw.) Brid.
Rhacomitrium heterostrichum (Hedw.) v. sudeticum (Funck) Dix. *ex* Bauer
Rhodobryum roseum (Hedw.) Limpr.
Rhynchostegium serrulatum (Hedw.) Jaeg. and Sauerb.
Sphagnum capillaceum (Weiss.) Schrank
Sphagnum girgensohnii Russ.
Sphagnum quinquefarium (Lindb. *ex* Braighw.) Warnst.
Taxiphyllum deplanatum (Bruch and Schimp. *ex* Sull.)
Tetraphis pellucida Hedw.
Thuidium delicatulum (Hedw.) B.S.G.
Thuidium recognitum (Hedw.) Lindb.
Tortella humilis Hedw. Jenn.
Tortella tortuosa (Hedw.) Limpr.
Ulota crispa (Hedw.) Brid.
Ulota hutchinsiae (Sm.) Hamm.
Ulota coarctata (P.-Beauv.) Hamm.

Liverworts

Anastrophyllum michauxii (Huds.) Buch
Anastrophyllum minutum (Cr.) Schuster
Barbilophozia barbata (Schmid.) Dumort.
Bazzania trilobata (L.) Gray
Blepharostoma trichophyllum (L.) Dumort.
Calopogeia fissa (L.) Raddi
Calopogeia muelleriana (Schiffn.) K. Muller
Cephalozia bicuspidata (L.) Dumort.
Cephalozia laciniata (Jack) Spruce
Cephalozia media Lindb.
Cephaloziella hampiana (Nees) Schiffn.

Frullania asagrayana Mont.
Frullania eboracensis Gottsche
Gymnocolea inflata (Huds.) Dumort.
Jamesoniella autumnalis (D.C.) Steph.
Lepidozia reptans (L.) Dumort.
Lophocolea heterophylla (Schrod.) Dumort.
Lophozia attenuata (Mart.) Dumort.
Lophozia ventricosa (Dicks.) Dumort.
Marsupella emarginata (Ehr.) Dumort.
Mylia taylori (Hook.) Gray
Nowellia curvifolia (Dicks.) Mitt.
Pellia epiphylla (L.) Corda
Ptilidium ciliare (L.) Nees
Ptilidium pulcherrimum (Web.) Hampe
Radula complanata Dumort.
Radula obconica Sull.
Scapania nemorosa (L.) Dumort.
Tritomaria exectiformis (Breidl.) Schiffn.

APPENDIX B

Bryophytes Found in Quadrats at Kenrose Preserve

Mosses

Amblystegium serpens (Hedw.) B.S.G.
Amblystegium varium (Hedw.) B.S.G.
Anomodon attenuatus (Hedw.) Hueb.
Atrichum undulatum (Hedw.) P.-Beauv.
Brachythecium acuminatum (Hedw.) Aust.
Brachythecium oxycladon (Brid.) Jaeg. and Sauerb.
Brachythecium populeum (Hedw.) B.S.G.
Brachythecium reflexum (Starke *ex* Web. and Mohr.) B.S.G.
Brachythecium salebrosum (Web. and Mohr.) B.S.G.
Brachythecium velutinum (Hedw.) B.S.G.
Brotherella recurvans (Michx.) Fleisch.
Bryum capillare Hedw.
Callicladium haldanianum (Grev.) Crum
Campylium chrysophyllum (Brid.) J. Lange
Campylium hispidulum (Brid.) Mitt.
Climacium americanum Brid.
Dicranella heteromalla (Hedw.) Schimp.
Dicranum flagellare Hedw.
Dicranum fulvum Hook.
Dicranum fuscescens Turn.
Dicranum montanum Hedw.
Dicranum scoparium Hedw.
Dicranum viride (Sill. and Lesq. *ex* Sull.) Lindb.
Ditrichum pallidum (Hedw.) Hampe
Eurhynchium hians (Hedw.) Sande Lac.
Eurhynchium pulchellum (Hedw.) Jenn.
Fissidens osmundoides Hedw.
Fissidens taxifolius Hedw.
Fissidens viridulus (Sw.) Wahlenb.
Grimmia apocarpa Hedw.
Haplocladium virginianum (Brid.) Broth.
Hedwigia ciliata (Hedw.) P.-Beauv.
Homomallium adnatum (Hedw.) Broth.
Hypnum cupressiforme Hedw.
Hypnum imponens Hedw.
Hypnum lindbergii Mitt.
Hypnum pallescens (Hedw.) Broth.
Leskeela nervosa (Brid.) Loeske
Leucobryum glaucum (Hedw.) Angstr. *ex* Fr.
Mnium ciliare (C. Muell.) Schimp.
Mnium cuspidatum Hedw.
Mnium punctatum Hedw.
Physcomitrium pyriforme (Hedw.) Hampe
Plagiothecium denticulatum (Hedw.) B.S.G.
Plagiothecium laetum B.S.G.
Platydictya confervoides (Brid.) Crum
Platygyrium repens (Brid.) B.S.G.
Pleurozium schreberi (Brid.) Mitt.
Pohlia nutans (Hedw.) Lindb.
Polytrichum commune Hedw.
Polytrichum juniperinum Hedw.
Polytrichum ohioense Ren. and Card.
Polytrichum piliferum Hedw.
Rhacomitrium heterostichum Hedw.
Rhynchostegium serrulatum (Hedw.) Jaeg. and Sauerb.
Rhytidiadelphis triquetris (Hedw.) Lindb.
Tetraphis pellucida Hedw.
Thuidium delicatulum (Hedw.) B.S.G.
Thuidium recognitum (Hedw.) Lindb.
Ulota crispa (Hedw.) Brid.
Weissia controversa Hedw.

Liverworts

Bazzania trilobata (L.) Gray
Cephalozia bicuspidata (L.) Dumort.
Cololejeunia biddlecomiae (Aust.) Evs.
Jamesoniella automnalis (D.C.) Steph.
Lophocolea heterophylla (Schrad.) Dumort.
Pellia epiphylla (L.) Corda
Plagiochila asplenioides (L.) Dumort.
Ptilidium pulcherrimum (Web.) Hampe
Radula complanata (L.) Dumort.

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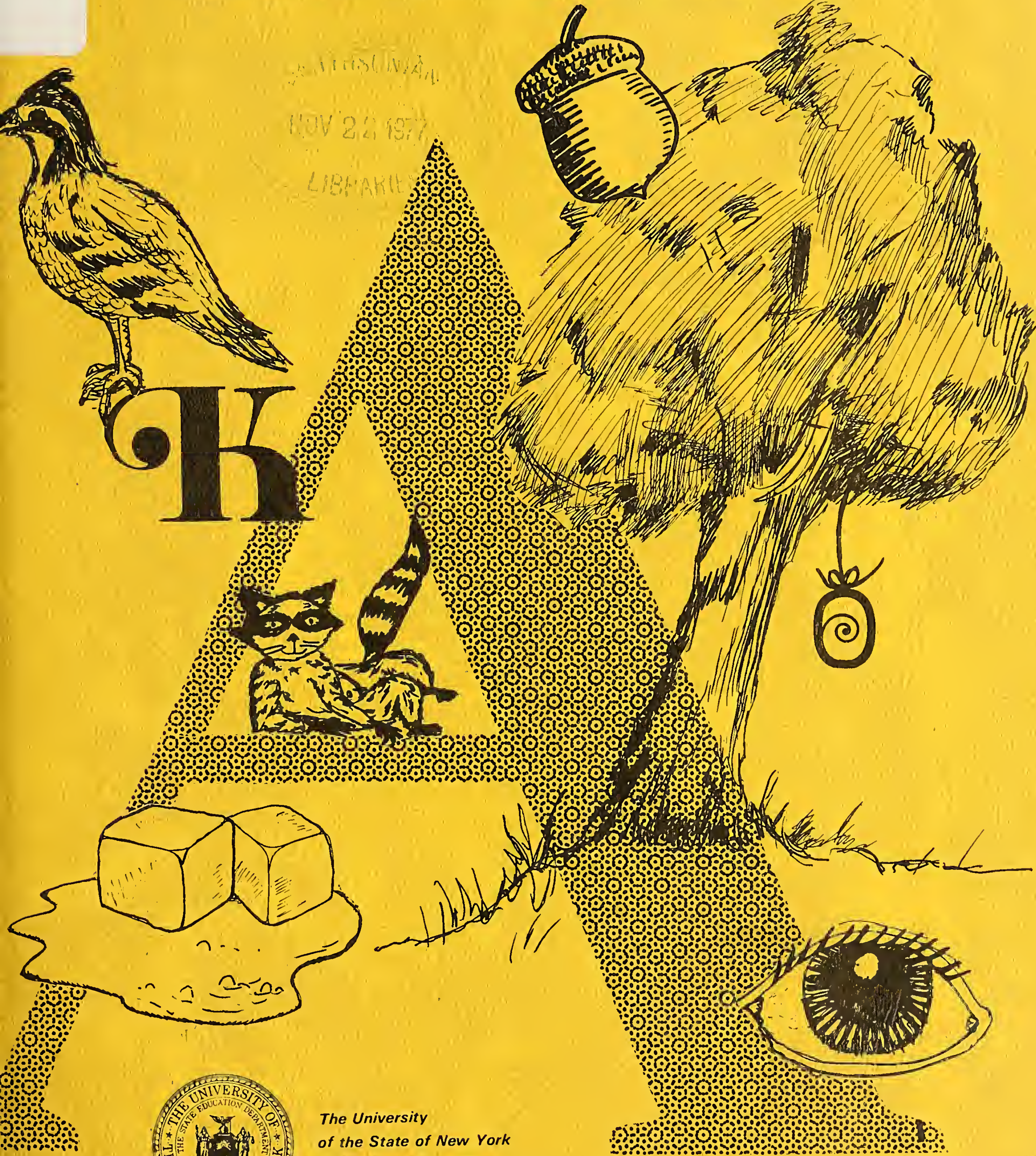
IONTENWENNAWEIENSTAHKHWA'

Mohawk Spelling Dictionary



The University
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IONTENWENNAWEIENSTAHKHWA'

Mohawk Spelling Dictionary

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THE UNIVERSITY OF THE STATE OF NEW YORK

PREFACE

While working with the Mohawk Language teachers on the Ahkwesahsne Reservation several years ago, one of the goals we set for ourselves was to produce relevant Mohawk language materials for use in the schools. After overcoming some major hurdles, significant progress was made after agreement was reached on a basic standardized spelling system. This Mohawk Spelling Dictionary is a result of the efforts of those teachers to build their program upon a firm foundation.

The drawings for this edition were created by Brad Bonaparte, Mark Light, Arthur Tarbell and Ricky White, four young students in the Language program. The layout and cover were designed by Frances Johansson.

This publication was made possible through grants to the Salmon River Central School Bilingual/Bicultural program under the director of Ms. Barbara Barnes from the U.S. Office of Education, Office of Indian Education, Title IV Part A (PL 92-318) and ESEA Title IV Part C. The points of view or opinions expressed in this book do not, therefore, necessarily represent official Office of Education position or policy.

Philip H. Tarbell
Specialist in Indian Culture

INTRODUCTION

This volume is the result of a desire among Mohawk teachers, aides, and curriculum planners at Ahkwesahsne for a practical and uniform way of recording their language. It is hoped that it will serve two purposes: one, as a spelling guide to teachers and others writing the language, and two, as a source of new vocabulary for those just now learning to speak.

The entries in the dictionary were chosen, translated, and arranged by Ann Barnes, Louise Cook, Jean Herne, Rita Jacobs, Louise Jock, Harriett LaFrance, Winnie Sinclair, and Elizabeth Tarbell. Grammatical information was then added and the spellings regularized by Mary McDonald and Marianne Mithun-Williams.

In any active language community, dialect differences can be easily found. Different people have different, but equally correct, ways of saying things. Furthermore, any native speaker of a language has a rich assortment of terms for expressing nearly any concept, each with its own subtle flavor. The Mohawk words comprising this dictionary are not meant to represent the only correct equivalents of their English translations. Rather, they are offered as an incentive to others to add to this list and eventually develop a rich record of Mohawk vocabulary.

The spelling system used here is based on the various traditional Mohawk writing systems. A few refinements have been added to make it fit the language better. The need for these refinements has become especially clear as, more and more, children are learning Mohawk as a second language instead of a mother tongue. Native speakers can often get along with an awkward writing system. As they read, they can supply missing sounds in a text from their mental dictionaries. Learners can only learn to pronounce what is written. The few new symbols in this spelling system represent sound which, although unnecessary in English, are crucial to the correct pronunciation of Mohawk.

The Mohawk spelling system is quite simple. It consists of only 8 consonents:

t, k, s, n, r, w, h, ' ,

6 vowels:

a, e, i, o, en, on,

and stress and length marks:

´, `, : .

The sounds represented by each letter are described below. For anyone just learning the language, of course, the best way to develop correct pronunciation is to work with a native speaker.

Consonants

	Approximate English Equivalent	Example
t	d before vowels	ti 'tea' (Dee)
	t everywhere else	thi 'there' (tea)

	Approximate English Equivalent	Example
k	g before vowels k everywhere else	ki 'this' (geese)
s	sh between h and i	ohsì:ta' 'foot' (o she da)
	s next to consonants	skáthne 'together' (scott neigh)
	z everywhere else	só:ra 'duck' (zola)
n	n	ne 'the' (neigh)
r	l or r	orá:ta' 'heel' (o la da)
w	w	wisk 'five' (wisk)
i	y before vowels	iah 'no' (yeah)
h	h	oháha' 'road' (oh ha ha)
'	the catch in the middle of oh oh (a mistake)	í:'i 'I'

Because it is not used in English spelling, the glottal stop (') has often been left out of Mohawk writing. This sound is just as important in Mohawk as a t or k, however. It sounds something like the t in English 'about three', when this is said rapidly.

English speakers are not used to hearing h before consonants, because it does not occur there in English. The h in this position can make a lot of difference in Mohawk, however.

Notice the puff of air in the second word below:

tóka' 'if'

tóhka' 'several'.

The h also makes a big difference after a consonant. The air resulting from an h can be felt by placing the fingers before the mouth of a native speaker pronouncing words like the second in each pair below:

tí 'tea'

thí 'there'

tó ní:kon 'How much?'

thó ník:on 'that much'

The combination of letters tsi is pronounced at Ahkwesahsne like 'gee' in 'gee whiz'. This can be heard in:

tsi'ks 'fly'

otsì:tsia' 'flower'

The combination of wh or w' sounds something like an English f. Examples of this are:

o'wháhsa' 'skirt'

ohwharà:ne 'caterpillar'.

Vowels

	Approximate English Equivalent	Example
a	a as in box	áhta 'shoe' (ahda)
e	ai before: as in bait	né 'the' (neigh)
	e as in bet otherwise	nek 'but' (neck)
i	ee as in beet	thi 'there' (tea)
o	o as in boat	tho 'there, that' (toe)
en	something like um (pause) or the vowel in umpire	en 'yes' (un-)
on	something like noon	ón:wa 'today' (oon wa)

In every Mohawk word, one syllable is louder than the rest. This syllable is marked with an accent symbol. If the tone on this syllable is high or rising, this is shown by the accent ´. If it is falling, it is shown by `. Compare the words below:

oká:ra' 'story'

okà:ra' 'eye'

onón:ta' 'hill'

onòn:ta' 'milk'

If the vowel in a stressed syllable is held longer than the others in the word, it has a length mark, : . Listen to the difference between these words:

tóka' 'if'

tó:ka' 'I don't know'.

This spelling system is very much like that now used at Caughnawaga. Differences in spelling reflect differences between the Caughnawaga and Ahkwesahsne Mohawk dialects. Some of these differences can be seen in the words below.

	Ahkwesahsne Spelling	Caughnawaga Spelling
'nine'	kióhton (gyohtoon')	tióhton (johtoon)
'flower'	otsì:tsia' (ojeeja')	otsì:tsa' (odzeedza')

The pronunciation and spelling differences are generally so small that anyone who learns to read one dialect can read the other very easily.

Every language has many regular rules for forming words and sentences. These can be learned from a grammar book. An example of such a rule in English is plural formation. To make a noun plural, speakers usually add -s.

cat   cats
sock   socks.

There are some words, however, which do not seem to behave according to the rules. Look at the plurals of words like:

deer	deer
ox	oxen.

These plurals simply have to be learned with the word. It is these idiosyncracies of words or irregularities which belong in a dictionary.

Mohawk verbs are quite complex. Hundreds of different verbs may be formed from a single verb root by changing the subject or object, the tense, or many other things. If a speaker knows the four principle parts of a verb, however, he can then predict all other forms of the verb by applying the regular grammatical rules. These four principle parts are not completely regular, however. They must be memorized with each new verb. For this reason, the parts are provided with each verb entry in the dictionary. They are always presented in the same order:

command	satekhwá:ko	'bite it'
first person serial	katekhwákwas	'I bite it'
indefiniate punctual	aiontekhwá:ko'	'she might bite it'
masculine perfective	rotekhwákwen	'he has bitten it'

Notice that each form provides an example of a different pronoun. Some verbs require human objects. Examples of these verbs will always contain human objective pronouns.

command	shè:nonk	'call someone'
first person serial	khè:nonks	'I call someone'
indefinite punctual	aiontatì:nonke'	'she might call someone'

masculine perfective	shakohnon:kon	'he has called someone'

Some verbs refer to states rather than actions, so they lack some of the principle parts. Examples of these verbs are provided with various different pronouns.

happy, be	wakatshenón:ni'	'I am happy'
	satshenón:ni'	'you are happy'
	iakotshenón:ni'	'she is happy'
	rotshenón:ni'	'he is happy'

These are only a few of the many pronouns found in Mohawk verbs, but all other forms can be predicted automatically from these four, once the general rules are learned.

Many thanks are due those who so generously provided assistance, especially Betty Kruger, who typed the entire manuscript.

It is hoped that this small volume will not only serve as an aid to teachers and students, but will also spur on others to go further, supplying additions and corrections, so that one day Mohawk children may have a rich record of the language spoken by their ancestors.

Marianne Mithun-Williams
Editor

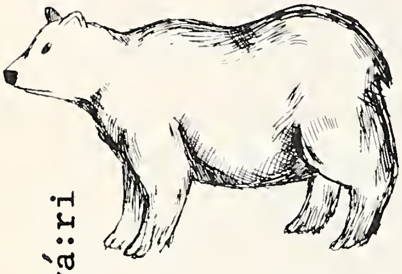
Abraham	Aplám
accomplishment	karihwaierì:ton
acorn	karíhton ohsò:kwa'
Adam's apple	onià:kwa'
on my Adam's apple	kenia'kwà:ke
add, to	taseró:rok tkeró:roks taieró:roke' tehoró:ron
Africa	Ratihon'tsíhne
agent	roteríhonte'
Agnes	Ánies
air	ówera
airplane	teká:tens
alcoholic beverage	iakononhwarahtòn:- tha' ohné:ka'
Alexis	Aríksas
Alexander	Areksént
alienate someone, to	sheia'tohtáhrho kheia'tohtáhrhos aiontakia'tohtáhrho' shakoia'tohtáhrhon
align it, to	tstó:kenht tektó:kenhs taietó:kenhte' tehotokénhton

karíhton ohsò:kwa'

all	akwé:kon
all night	ahsonthakwé:kon
allure, an	tek'nikonhratóhtshera
alligator	teka'nón:ton/ tekwa'nikahtón:ta
along	
along the shore	atsiaktónkie'
along the wall	ahsohtaktónkie'
always	kiótkon
Andrew	Athré
Angus	Aniá:s
animal, domestic	katshé:nen
animal, wild	kontírio
ankle	ohsinekò:ta'
on my ankle	khsineko'tà:ke
Ann	Á:nen
another person	akó:ren
answer, an	tekarihwa'serákwen
ants	tsiki'nhontstókhi
ape	katsi'nonhtakskó:wa
apple tree	sewahió:wane' ó:kwire'
apron	ateniión:ta'

arch of the foot	kahiakwatá:kwen
arm	onéntsha'
on my arm	kenentshà:ke
arrow	kaién:kwire'
as it is	tsi ní:ioht
ask, to	seri'wanón:ton keri'wanón:tons aieri'wanón:ton' rori'wanón:ton
assigned	karíhonte'
assume, to	(ísehre) í:kehre' á:ienhre' rawè:ron
attached, mixed	ia'tekaiéston
attention	atokénhtshera
auction	tehotihenréhtha'
autumn	kahnenna'kè:ne
axe	ató:ken'

B



ohkwá:ri

Baxter Hill	tsi iowenohkwakará:te
bay, in the	ohshà:rakon
beads	otsi'néhtara'
bead work	tekatsi'nehtará:ron
beans	osahè:ta'
beans, baked	watshahè:tonte'
bean soup	osahè:ta' onón:tara'
bean, red kidney	onekwénhtara nikasahe'- tò:ten
beans, string, wax, green	o'rhótsheri
bear	ohkwá:ri
bear, polar	ohkwari'tara:ken
beard	okohstón:ha
beat, to	senonhwáre'k kenonhwáre'ks aienonhwáre'ke' rononhwáre'
bed	kanákta'
bedbug	katsi'nonwákeras
bedroom	tsi ienonhwétsha'
bedsheets	ioni'tskarónhkhwa'

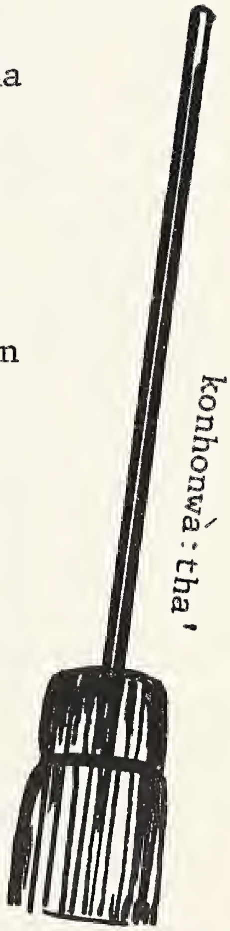
bed spread	iontenaktaróksta'
bee	otsi'nahkonhtahkwá:ne
beechnut	otskèn:ra'
beer	onen'tákeri
beets	onekwénhtara nikatsihkò:ten
begging	atsheri'táhtshera
beg, to	tesatshá:ri't tekatshá:ri'ts taiontshá:ri'te' tehotsharì:ton
behind	ohná:ken
bell	iehwista'ékstha'
belly button	onerì:tsta' keneri'tstà:ke
belt	akia'táhna/akia'táhnha
belongs to them	aoná:wen
belongs to her	akó:wen
bend it, to	tetshà:ket tekshà:kets taieshà:kete' tehoshà:kton
berry	káhi
bicycle	tékeni tekakahkwèn:tote'

billfold	iehwistaráhkhwa'
billiard ball	otsíhkwa'
bird	otsi'tén:'a
bite it, to	satekhwá:ko katekhwákwas aiontekhwá:ko' rotekhwákwen
black	kahòn:tsi
black ash	ierontáia'ks/ éhsa
blackberries	shà:ies
blackbird	tsió:kwaris
black caps	teiotenharà:kton
Black Lake	Otsihkwà:ke tsi aniatarahòn:tsi
blanket	áhsire'
block, to	tesenehtháhrhok tekenehtháhrhoks taienehtháhrohoke' tehonehtháhrhon
blood in my blood	onekwénhsa' akenekwenhsà:ke
blood vessel in my blood vessel	otsinonhiáhton ktsinonhiahtà:ke
blouse	oià:kara'

blue	oròn:ia'
blueberries	kahrata'kéha'
bluejay	terí:teri
boat	kahonwé;ia'
bobcat	tako'skó:wa
bobalink	kwa'kória
body	oià:ta'
on my body	kia'tà:ke
body, dead	oierón:ta'
body, inside	oià:takon
body, lower	orèn:ta'
boil (on skin)	okwahrò:ta'
boil (I have a)	wakatkwahro'takwá:-ronte'
boil it	teshnekónkieht tekhnekónkiehtha' taiehnekónkiehte' tehohnekónkiehton
bone	óhskien
bonnet, baby	okwirá:'a anòn:warore'
on the bottom (of the stairs)	ehtà:ke
boundary	karihstatákie'

bow	a'én:na'
boy	raksá:'a
bracelet	atenentsháhnha'
braids	oratskèn:ta'
brain	o'nikòn:ra'
Brashar Falls	Kiohrionhó:ken'
Brashar iron works	tsi Karihstonníhahkwe'
bread	kanà:taro
bread, fried	kana'tarakerì:ta'
bread, native	kana'tarokhón:we
bread, yeast	ka'shehrha'tkénhton
break it, to	téshriht tekhríhtha' taiè:rihte' tehohríhton
break in two, to	tétsia'k tékia'ks taié:ia'ke' tehoià:kon
breast on my breast	awentskwè:na kentskwe'nà:ke
breeze	iówerare'
bridge, platform	áhskwa'

bring it here	táshaw tékhas taiéhawe' thóha
brooch	athniotáhkhwa'/ athnió:ta
broom	konhonwà:tha'
broth	ohnekákeri
brother (my older)	raktsí'a
brothers address (my older)	tsiatenò:sen
brother reference (my older)	iakiateno'sénha
brown	athéhsa
buckle	athniáhskari
buffalo	tsistikerià:kon
bug bug-hard shell	otsi'nón:wa' o'nó:wa'
build, to	són:ni kón:nis aión:ni' raón:ni
bull	teró
bullet	onén:ia'
bullfrog	mararám



bullhead	rabahbót
burdock	ohwhohrte'kó:wa
bury (a body), to	tsia'táta' kia'táta's aieia'táta' roia'táten
butter	owihstóhsera
butterfly	tsi'ktsinén:nawen
buttermilk	kanon'tí:sa
butternut	tiehwá:ta
button	otsíhkwa'
buy, to	shní:non khní:nons aiehní:non' rohní:non

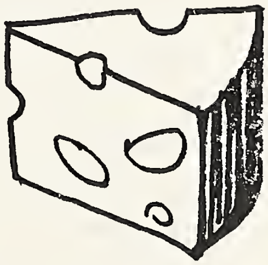
C

ó:nenhste'

cabbage	onéhsio
call someone, to	shè:nonk khè:nonks aiontatì:nonke' shakohnón:kon
call someone's name, to	shenà:ton khenà:tons aiontatenà:ton' shokonà:ton
call on the telephone, to	satenwennáta iekatenwennátas iaiontenwennáta' iohotenwennáten
Canada	Koráhne
cancer	í:waks
candy, sugar	otsikhè:ta'
canoe	kahonwé:ia'
birch canoe	oná:ket
cantaloupe	wahiá:ri's
cake	teiona'taratsikhè:tare'
cap	ionekwèn:tote'
cape	teionteweiahráhkhwa'
careful, to be	se'nikòn:rarak ke'nikòn:rara' aionte'nikòn:rara' wakate' nikonhrarà:ton
carrot	otsì:nekwar nikatsihkò:ten

carry away, to	iahá:sha iékhas ieiéhawe' iehóha
casket	iakenheion'taráhkhwa'
cat	takò:s
caterpillar	ohwharà:ne
catfish	onòn:kwe'
cause, to	serihón:ni takarihón:ni aierihón:ni' rorihón:ni
cause someone dis- tress, to	sheiakié:saht kheiokiesáhtha' aiontakié:sahte' kheiakiesáhton
caviar	onè:tara'
cedar	onen'takwenhtèn:tshera'
ceiling	tsi kentskaráhere'
celebration	watonhnáhere'
cellar	ohontsió:kon
center	ahsén:non
chair on the chair	ani'tskwà:ra ani'tskwahráhne
chair with woven seat	tewa'á:raton ani'tskwà:- ra

chase something, to	ítsher íkshere's aiéhshere' róhsheron
Chateauquay	Ohsahré:'on
cheat, to	se'nikónhrha't ke'nikohrà:tha' aie'nikónhrha'te' ro'nikonhrhà:ton
cheek on my cheek	ohnò:kwa'/ohnóskwa' kehno'kwà:ke/kehno - skwà:ke
cheese	tsís
cheetah	tako'skó:wa
cherry	ori'kó:wa
chest on my chest	aontskwè:na' kentskwe'nà:ke
chest of drawers	karón:to
chestnut	kohsá:tens aotihsò:kwa'
chewing gum	ohnéhta'
chicken	kítkit
chief	roiá:ner
chill something, to	sewístoht kewistóhtha' aiewístohte' rowistóhton



tsís

chimney	o'tá:ra'
standing chimney	ken'tá:rote'
Chinese people	Tehotikahro'thí:io
chipmunk	ohriò:ken
Chippewa or Creek	Kioherí́shon
chokecherry	teiakonia'tawé́n:'eks
choose, to	será:ko kerákwas aierá:ko' rorákwen
Christmas Day	Rotó́n:ni wenhniserá:te'
Christmas time	tsi nihatonniá:ne nikahá:wi
church	ononhsatoké́nhti
clam	takwaré:re/takwaré:ron
clans	o'tara'shó́n:'a
I am of the Bear Clan	wakhskaré:waken
he	rohskaré:waken
she	iakohskaré:waken
I am of the Eel Clan	wakeneniothró:non'
he	roneniothró:non'
she	iakoneniothró:non'
I am of the snipe clan	wake'nehsí:io
he	ro'nehsí:io
she	iako'nehsí:io

ononhsatoké́nhti

I am of the turtle clan	wakeniáhton
he	roniáhton
she	iakoniáhton
I am of the small field turtle clan	wakhsennakéhte'
he	rohsennakéhte'
she	iakohsennakéhte'
I am of the wolf clan	wakkwáho
he	rokwáho
she	iakokwáho
clan mother	ka'nisténhsera
clean somthing, to	tesohtáhrho tekohtáhrhos taiakohtáhrho' tehaohtáhrhon
climb in, to	satíta' katíta's aiontíta' rotíten
climb out, to	satitáhko katitáhkwas aiontitáhko' rotitáhkwen
clock	karahkwakaiòn:tha'
close something, to	sehnó:ton/sehnhó:ton kehnó:tons aiehnó:ton' rohnó:ton

closet	ionkia'tawi'tsheraráhkhwa'
cloth	onia'tará:'a
clothes	atsherónnia'
clothes pin	ie'wahstotáhkhwa'
coal	o'swèn:ta'/ohswèn:ta'
coal stove	iontenonhsa'tariha'-táhkhwa'
coat, dress	akià:tawi
heavy coat	akia'tawi'tkó:wa
raincoat	kahnehtahrhon akià:-tawi
coconut	katsi'nónhtaks ohsò:-kwa'
cold, it is	iothó:re'
collar	tekahnia'sáhere'
color	ohsóhkwa'
What color is it?	Oh niwahsohkò:ten?
comb, a	atkerothí:ia
comb, rooster	raonráhsa
come, to	ká:ts tá:ke' tá:ien' thawé:non

come in, to	tasatáweia't tkataweià:tha' taiontáweia'te' thotaweià:ton
come on!	hánio
connect things, to	tesahsónteren tekahsontérha' taionhsónteren' tehohsónteren
it is connected	tewahsón:tere'
cook, to	sekhón:ni kekhón:nis aiekhón:ni' rokhón:ni
cook	íseriht keríhtha' aié:rihte' roríhton
cookhouse, kitchen	tsi iekhonnià:tha'
cookie	karé:t
copy, to (produce exact duplicates as a Xerox)	teshnen'netáhko tekhnen'netáhkwas taiehnen'netáhko' tehohnen'netáhkwen
copy, to (imitate)	tontasate'nién:tenhst tetkate'nienténhstha' tontaionte'nién:tenhste' tethote'nienténhston

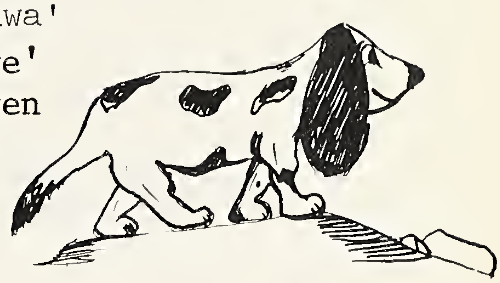
corn	ó:nenhste'
cornbread	kana'tarokhón:we
fresh corn	okahserò:ten
dried corn	ionenhstáthen
corn silk	okè:ra'
on the cornsilk	okehrà:ke
ear of corn	skanonhkwén:'en
corn husk	aó:ra'
kernal of corn	skanénhstak
corn meal	ó:nenhste' kathè:ton
popcorn	watenenhstatákwas ioni'tsonhkontáhkhwa'
corn soup	onénhsto
cornstalk	óhere'
sweetcorn	teionenhstatsikhè:tare'
corn tassel	iotenheráhere'
white corn	onenhakén:ra
white corn flour	onenhakén:ra othè:sera
white corn grits	kane'ón:ni
hominy porridge	onenhakén:ra kahséhrho
yellow corn	otsì:nekwar ó:nenhste'
big yellow corn	otsi'nekwahrkó:wa ó:nenhste'
Cornwall Island	Kawehnó:ke/Kawehnohkowanén:-ne'
couch	ionrátsha'
couch cover (or sheets)	iontenaktoróktha'
cougar	tako'skó:wa
councilor	ratitsiénhaiens
count, to	sáhshet kahshé:tas aiónhshete' rohshé:ton

cover, to	senón:tek kenón:teks aienón:teke' rononté:kon
cover something, to	se'rhó:rok ke'rhó:roke' aie'rhó:roke' ro'rhó:ron
cow	kiohnhónhskwaront
cow barn	kiohnhonhskwarontke
crab	tsi'eróhten/otsi'eróhten
crabapple	sewahiowane'ón:we
crackers	teiokare'tsheráthen/ teiokare'tsherahió:tsis
cradleboard	káhrhon
cranberries	tó:kwenhre'
crane	ohà:kwaron
cream	kawistohseró́kwen
crib	owirá:'a ionrátsha'
cricket	taráktarak
crispy	o'skòn:wa'
crock	o'tà:ra'
cross	kaiáhsa

cross, to	tetsià:ia'k tekià:ia'ks taieià:ia'ke' tehoiahià:kon
crow	tsiò:ka'we'
crust	ona'watsísten'
cry, weep, to	tesahsénhtho tekahsénthos taionhsénhtho' tehohsenthó:hon
cucumber	tikokón/kanon'onserákeras
cup	teionthnekontáhkhwa'
cupboard	ieksahráhkhwa'
curds	okaiè:ta'
cushion	atkòn:sera
cut, to	íshre'n khrè:nas aiè:re'ne' rohrè:nen
cut through something, to (sever)	ítsia'k íkia'ks aié:ia'ke' roià:kon
cut, to (gouge)	skwè:taron kkwè:tarons aiekwè:taron' rokwè:taron
cut up finely, to	tesahríhton tekahríhton taiakohríhton' tehohríhton

D

dance, a	kanónnia
dance, to	tesenónniahkw tekennoniáhkhwa' taienónniahkwe' tehononniáhkwen
dandruff	awéhara
danger	iótteron
dark, in the	ahshà:takon
daughter, my	kheièn:'a
day	awenhnísera
decide, to	tetsia'tó:reht tekia'toréhtha' taieia' tó:rehte' tehoia'toréhton
deep (like a dish) or high (like a cliff)	teióhshes
deer	ohskenón:ton
Deer River	Oiekarónthne
defend, to	taséhne takéhne'/tkéhne's aontaiéhne' thohné:'on
Deseronto	Tekaientané:ken
diabetes	teionekwenhshatsikhè:-tare
diaper	athwawen'éktha'



é:rhar

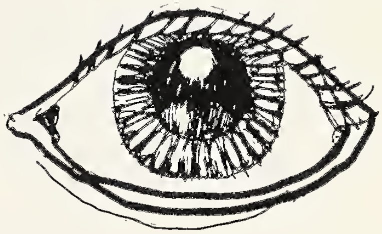
different	tekia'tíhen/ó:ia ní:ioht
dig, to	só'kwat kó'kwats aiakó'kwate' rao'kwá:ton
dining area, (restaurant)	teiontska'hónhkhwa'
dirty	teió'tsion
dirty, to	tesí'tsionhst teki'tsiónhstha' taié'tsionhste' teho'tsiónhston
disappear	sáhton káhtons aiónhton' róhton
disease	kánhra'
dish	akè:ra
on the dish	akehrà:ke
ditch	teionkià:kon/tekahronión:-ni
along the ditch	teiohronwatákie'
do, to	tho ná:tsier nikakiérha' naión:kiere' nihié:ren
do it right, to	tasateweièn:ton tkateweièn:tons aontaionteweièn:ton' thoteweièn:ton

do it right, to	tatsié:ri't tkié:ri'ts; aontaieié:ri'te' thoierì:ton
doctor	
female	watétsien'ts
male	ratétsien'ts
dog	é:rhar
dogfish	tsia'onharé:ni
dollar, one	skanekè:ta/skahnekè:ta/ skahwísta'
two	tekahnekè:take/ tekahwístake
donkey	tewahónhtes
door	kahnhóha/kahnóha
dough	kashe'rhón:ni
dove	orì:te'
down feathers	ohstó:seri
drag, to	sè:ser kè:sere' aiè:sere' rò:seron
dress up, to	sakia'tahserón:ni kakia'tahserón:ni aionkia'tahserón:ni' rokia'toherón:ni

get dressed up, to	satsherón:ni katsherón:nis aiontsherón:ni' rotsherón:ni
drink, to	shnekì:ra khnekíhrha' aiehnekì:ra' rohnekì:ren
drive, to	sató:ri katórie's aiontó:ri' rotórion
drop something, to	sà:senht ka'sénhtha' aiòn:senhte' ro'sénhton
dry, to be	iohstáthen
dry, to	sstátha't kstathà:tha' aiestátha'te' rostathà:ton
duck	só:ra
duck, wild	shónhatsi
dull (not sharp)	teiothiò:kton
dull (boring)	ioterihón:ko
dumpling	onen'óntsta'

E

eagle	à:kweks
ear	ohónhta'
earring	ate'wáhshare'
eat a meal, to	tesatskà:hon tekatskà:hons taiontskà:hon' tehotskà:hon
eat something, to	í:sek í:keks á:ieke' rawé:kon
eel	kiawerón:ko
egg	o'nhónhsa'
egg beater	teie'nhonhsawenrie'- táhkhwa'
egg shell	o'nhónhsa' ona'watsísta'
elbow	ohióhsa'
elephant	o'no'tsta'kó:wa
Elizabeth	Arísawa
elm tree	oká:ratsi
elm, slippery	okòn:ra
enamel	kaneniáhrhon
England	Kiohren'shakà:ke
Englishman	Kiohren'shá:ka



okà:ra'

epidemic	kahnratarí:ne's
erase	sera:kehw kerakè:was aierá:kehwe' rorakè:wen
eraser	ierakehwáhtha'
ermine	onón:kwet
escape	se'niá:ken'n ke'niá:ken's aie'niá:ken'ne' ro'niakén:'en
esophagus	ionhnehkwenà:tha'
Europe	Ohontsiakaiòn:ne/ Ohwentsiakaiòn:ne
evening	o'karahsnéha'
everything	orihwakwé:kon
exaggerate, to	teserihwanòn:ianiht tekerihwanonhianíhtha' taierihwanòn:ianihte' tehorihwanonhianíhton
exchange, to	tesatá:ton tekatá:tons taiontá:ton tehotá:ton
eye	okà:ra'
on my eye	kkahrà:ke

eyebrow	ona'wá:sa'
on my eyebrow	kena'wasà:ke
eyelash	okahréhta'
on my eyelash	kkahrehtà:ke
eyeglasses	atkahráhna/atkahráhnha

F

face	okónhsa'
fall (autumn)	kahnenna'ke:ne
fall, to (living thing)	kia'kié:nen's aieia'kié:nen'ne' roia'kienén:'en
fall, to (object)	kio'sén:'en
fan	kaweraráhtha'
fast	io'shátste'
fat (human) (animal)	o'tónsera oia'takón:ha
father, my	rake'níha
fault, your my	sarì:wa' akerì:wa'
fawn	ohskenón:ton owí:ra'/ iotsitohkwaronión:'a
fear, to you I he she	sahterón:ni wakhterón:ni rohterón:ni iakohterón:ni
feather	ohstó:seri
female (animal) (person)	o'nhéhkien iothonwí:sen
fence inside the fence on the fence	aten'èn:ra' aten'èn:rakon aten'enhrà:ke
fever	iako'tonhkwáhros

fibber, liar	atshó:ken
fiddle	o'nó:wa'
fight, a	ateriióhtshera
fight, to	saterí:io katerí:ios aionterí:io' roterí:io
fill something, to	táshraht tekhráhtha' aontaiè:rahte' thohráhton
find, to	setshén:ri ketshénrie's aietshén:ri' rotshénrion
finger	ohsnónhsa'
fingernail on my	otsi'é:ra' ktsi'erà:ke
finish it, to	ítsha íkhshas aiéhsha' róhshon
fireman	ra'swáhtha'
fire truck	wa'swáhtha'
fish fish eggs	kéntsion onè:tara'
fish hook	à:ria

fish hawk	ohà:kwaron
white fish	skentstakén:ra
fish worm	otsinowenhnè:ta'
fist, my	waktsihkwakwe'nón:ni
fix it, to	skwatá:ko kkwatákwas aiekwatá:ko' rokwatákwen
flame	o'tónhkwa'
flea (dog)	atá:we
(human)	otsì:non
floor	ohson'karà:ke
flour	ohthè:sera
flower	otsì:tsia'
flowerbed	tsi katsi'tsiaiéntho
fly house	tsi'ks
horse	onerón:ta
black	onen'ón:ra
dragon fly	tsikenon'warísta'
fly, to	tetsí:ten tekí:tens taié:ten tehó:ten
foam	ohwà:tsta'

fold something, to	shwe'nón:ni khwe'nón:nis aiehwe'rón:ni' rohwe'nón:ni
food	kákhwa'
food (groceries)	atenà:tshera
food, cooked left-over	iókhwari iotekhwatatèn:ron
foot on my foot	ohsì:ta' kahsi'tà:ke
footprint	tehaianón:ni
force something, to	tasanónhton tkanónhtons aontaienónhton thononhtón:'on
forever	tsi nén:we
forget, to	sa'nikónhrhen wake'nikónhrhens aiako'nikónhrhen' ro'nikónhrhén:'en
fork	tsiao'estáhkhwa'
Fort Covington	Kentsia'kowáhne
forward	ohèn:ton
fox	tsítso
France	o'seronni'onwè:ne

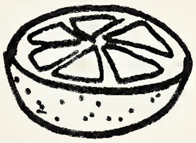
Frenchman	o'serón:ni
freeze something, to	senenniò:kwenohst kenenio'kwenóhstha' aieneniò:kwenohste' ronenio'kwenóhston
Friday	Wískhaton/ Ronwaiatanontákton
friendship my female friend my male friend	aterò:sera onkiátshi onkiatén:ro
frightful	iótteron
fringe	teiiohseriè:tote'
frog	otskwà:rhe'
Frogtown	Otskwa'rhéhne
frozen frozen water	ioneniò:kwano iowíseren
fruit preserves	káhi watahiateweièn:ton
fry, to	stakerì:ta ktakerì:tas aietakerì:tahwe' rotakerì:ton
full to the brim	kanà:non
full	tetkáhere'

G

gall	ótshahte'
gamble, to	tétsien tékiens taié:ien tehó:ien
gang	kanèn:ra
garbage	watekhwakéntston
garters	ahtshíhna'
gather, to	seròːrok keròːroks aieròːroke' roròːron
get, to go	iahá:sko iékhwas iaié:ko' iohókwen
get married, to	sániak (wakéniaks) aiakwéniake' roniá:kon
get up, to	satkétsko katkétskwas aiontkétsko' rotkétskwen
girl	ieksá:'a
give to me, to	tá:kon taká:wis aión:kon raká:wi

glass	ó:wise'
glove	a'nià:nawen
glutton	ani'tshého
gnats	o'kén:ro otsi'nón:wa'
go, to	wá:s wà:ke' á:ion' rawé:non
go away, to	sahtén:ti kahténkie's aionhtén:ti' rohténkion
go around, to	tasahkwatá:se' tkahkwatá:se's aiontaionhkwatá:se' thohkwatá:se
go back, to	sasáhket skáhkets aonsiónhkete' shóhkton
go get, to	skóha kkóhas aiekóha' rokóhon
go look for, to	sesákha kesákhe's aiéhsake' rawesá:kon

go out, to	tsiá:ken kiá:ken's aieiá:ken'ne' roiakén:'en
goalie	tehatenia'tarenónhnha'
goat	kaia'tákeras
gold	ohwistanó:ron
goose	tewénnia'ke'
gooseberry	ohkwá:ri raonáhi
gossip	karihwakaténhtshera
grasp, to	tsié:na kié:nas aieié:na' roié:na
grandfather, my	raksótha
grandmother, my	akhsótha
grape	onénhare'
grapefruit	iohiatská:ra
grasshopper	tsistá:rare'
Grass Lake	Ohsa'kentà:ke
grate, to	ísket íkkets aié:kete' roké:ton



gravel	o'néhtara'
gravy	ohshé:rha/rasós
green	óhonte'
grey	ta'kenhróhkhwa'
ground hog	anonhwaráweron
group	kenkióhkwa'
guinea hen	tekahson'kária'ks
gums	oiénhta'

H

hair	onónhkwis
curly	teiónhkeri
she has curly hair	teiakonónhkeri
hairdo	kako'tsiahserón:ni
combed hair	kokerothí:hen

ohtsià:na

half, middle, center	ahsén:non
hamburger	teka'wahraríhton
hammer	iene'konhréstha'
hammer, to	sene'kòn:rek
	kene'kòn:reks
	aiene'kòn:reke'
	rone'kòn:re'
hand	ohtsià:na
handkerchief	iontsi'nonhkerà:tha'
handle, a	onekerehétshen
hang, to	seniión:ten
	keniión:tha'
	aieniión:ten'
	roní:ionte'
happy, I	wakatshenón:ni'
you	satshenón:ni'
she	iakotshenón:ni'
he	rotshenón:ni'
hard (solid)	iohní:ron
hard water	iohnekaní:ron
harvest	kaienthókwen

harvest, to	tsienthó:ko kienthókwas aieienthó:ko' roienthókwen
hat	anòn:warore'
hat with brim	teiotà:ronte'
hat band	tewatenon'warahnáktha'
hate, to	(ítshon) íkhshons aiéhshon rohshón:'on
have one's way, to	tasanónhton takanónhtons aontakanónhton thononhtón:'on
hay	onékeri
head	onón:tsi
on my head	kenontsì:ne
in my head	kenontsístakon
headband	tewatenon'warahnáktha'
headdress	kahstówa
heart	awé:ri
on my heart	akwerià:ne
heater	iontenonhsa'tariha'táhkhwa'
heel	orá:ta' keratà:ke
Helena	Ohiakarónhtne

hell	onéhson
hello	shé:kon kwé kwé
help, to	takshié:non katatshnié:nons aionkhsnié:non' rakhsnié:non
hem	tekakwáthon
hemlock	onen'ta'ón:we
her (emphatic)	akáonha
here	kén:'en
here, right	kén:tho
hickory tree	onennóhkara'
hide something, to	sáhseht kahséhtha' aiónhsehte' rohséhton
hide oneself, to	satáhseht katahséhtha' aiontáhsehte' rotahséhton
him (emphatic)	ráonha
hip	oneskwà:rha
on my	keneskwa'rhà:ke
hippopotamus	kwéskwes kanonwakón:ha

hire something, to	saténhna' katénhna's a'onténhna'ne' rotenhná:'on
hoe, a	atshò:kten'
Hogansburg	Tekahson'karó:rens
hole	iokà:ronte' iohson:waien
hoof	otsinarèn:ta'
hook	kahniò:kwa'
hook, to	sehnio'kwa'tsherotáhrhok kehnio'kwa'tsherotáhrhoks aiehnio'kwa'tsherotáhrhoke' rohnio'tsherotáhrhon
hopefully	aiá:wen's
horn (antler)	onà:kara'
horse stable	kohsá:tens kohsaténhsne
hose (socks)	ká:ris
house log house	kanónhsa' tekaronta'serónnion'
hummingbird	ráonraon
hungry, to be I you she he	katonhkária'ks satonhkária'ks iontonhkária'ks ratonhkária'ks

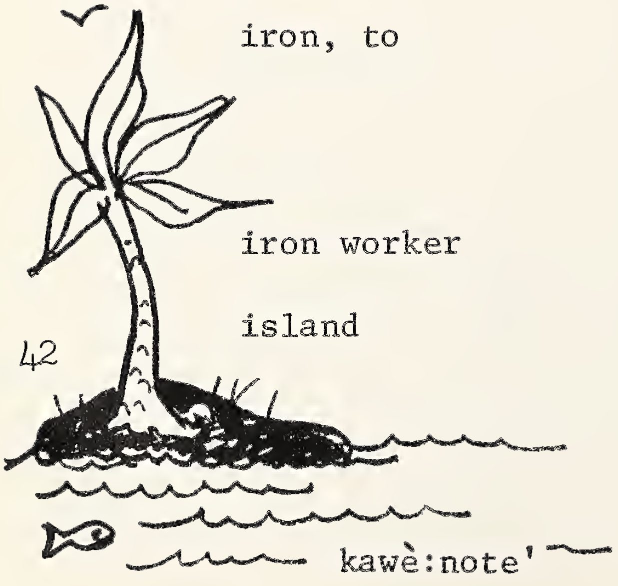
hunt, to	sató:rat

hunt, to	sató:rat kató:rats aiontó:rate' rotorá:ton
hurry up!	óksa
hurry, to	tesasteríhen tewaksteríhens taiakosteríhen' tehosteríhen

ráonraon

I

I (emphatic)	í:'i
ice	ó:wise'
under the ice	owisó:kon
ice hockey	tehontsihkwá'eks owisà:ke
if	tóka' shí:ken
immeidately	kwah ó:nenk
inch	tsioweiónhkara'
Indian	onkwehón:we
Indian lg or ways	onkwehonwehnéha'
Ahkwesahsne dialect	Ahkwesahsnéha'
insult, an	kahsenhtáhtsheron
insult someone, to	shéhshenht khehshénhtha' aiontatathshénhten' shakonshénhton
intestines	okahróhsta'
iron	karíhstatsi
iron, to	serihstáhrho kerihstáhrhos aierihstáhrho' rorihstáhrhon
iron worker	rarihsta'kehró:non'
island	kawè:note'



isn't it?	wáhe'
Italy	Tariiénhne
Italian	Tariién

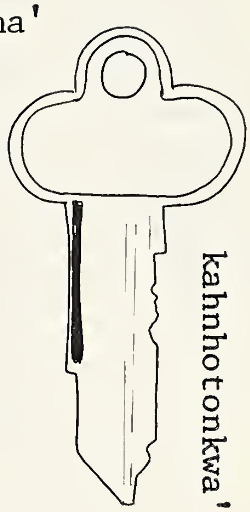
J

wahstéhton

jacket	oneró:kwa'
jam, jelly	wahstéhton
Japanese	Tehotikahro'thí:io
jaw	o'rhiótsha' ke'rhiotshà:ke
jewelry	ohwistanoron'shón:'a
joint human	teiohstón:tere' ohstonterì:tshera'
judge, a	tehaia'toréhtha'
judge, to	tetsia'tó:reht tekia'toréhtha' taieia'tó:rehte' tehoia'toréhton
juice	kahnekinekénhon
just a while ago	kwahòn:wa'k

K

kangaroo	iohna'táhtsheronte'
keep it	saterá:ko katerákwas aionterá:ko' roterákwen
kerchief	teiontenon'warahnáktha'
kerosene	thahseróhkhwa'
key	kahnhotonkwa'
kidney	otskiéhseri
kill something, to	sério kérios aiério' rório
Kingston	Ka'taróhkwi'
kitchen	teiontska'nhónhkhwa'
knee	okwítsha' kkwitshà:ke
kneel, to	tesatatshó:ten tekatatshótha' taiontatshó:ten' tehotatshó:ten
knife	à:share'
knock, to	sehnhoháia'k kehnhoháia'ks aiehnhoháia'ke' rohnhohaià:kon
know, to	saterièn:tare aiakoterièn:tarake' rokaterièn:tare'



kahnhotonkwa'

L

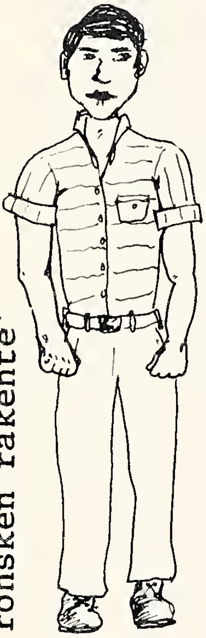
lace	á:'are'
Lacrosse & hockey	tehona'tsi'kwá:'eks
ladder	kanekó:ta'
lady	aikón:kwe
ladybug	iakón:kwe otsi'nón:wa
lamp	oháhshera
lantern	koháhshera
later	wá'tsi'k
laugh, to	saiéshon
	aiakoiéshon wakiéshon
lawn	kahentà:ke
leaf	ónerahte'
learn, to	satáweienhst kataweiénhstha' aiontáweienhste' rotaweiénhston
least, at	arà:ne
leather	óhna'
leech	tsirakwarón:ne
leg	ohsí:na' khsinà:ke

legging	iontshinenko'tohróktha'
lemon	teiohiahiò:tsis
lend to someone, to	shé:ni khé:nis aiontáteni' shakoníhen
leopard	tako'skó:wa
let someone, to	sheríhon kheríhons aiontateríhon shakoríhon
let something go, to	sátka'w katkà:was aióntka'we' rotkà:wen
lettuce	onerahtekáhte'
let's	hánio
lice	otsì:non
lie, a	onò:wen
lie down, to	sá:rat ká:rats aión:rate' rorá:ton
light	oháhshera
light, to	saté:ka't katekà:tha' aionté:ka'te' rotekà:ton

lightning	tewa'tsiraríkhons/ tewani'nekará:was
linoleum	ionthnehtakwenhtahrohstha'
lion	kèn:riks
lip on my lip	óhsa'/orì:tsa' keri'tsà:ke
liquid	ohné:ka'
liquor	iohnekahnì:ron
listen, to	satahónhsatat katahónhsatats aiontahónhsatate' rotahónhsatate'
little (small)	niwá:'a
little (no much)	ken' nikon:ha
little, a	ohstón:ha
live (to be alive)	kónhne' sónhne' iakónhne' rónhne'
liver on my liver	othwénhsa' kethwenhsà:ke
living room	tsi kanonhsí:io
lobster	otsi'eróhta'
lock, a	o'nó:wa

lock it, to	seniethálhrhok keniethahrhoks aieniethahrhoke roniethahrhon
lollipop	ka'nhióhare'
look, to	satkáhtho katkáhthos aiontkáhtho' rotkáhthon
lumber	ohsòn:kare'
lumber camp	shetíhne
lump	iotakwá:ronte'
lung	otsinà:kwa' ktsina'kwà:ke

M



rohsken'rakéhte'

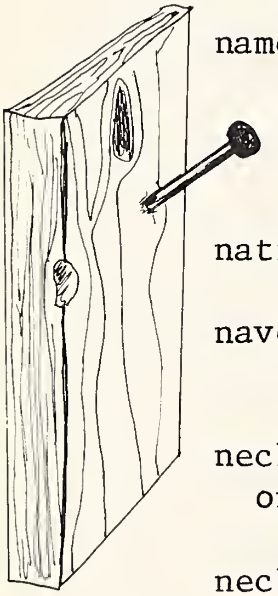
make, to	són:ni kón:nis aiakón:ni' raón:ni
make it even, to	sha'téstat sha'téktate' sha'taié:tate' sha'tehotá:ton
male person animal	rohsken'rakéhte' rá:tsin
Malone	Tekanatà:ronhwe'
maple, hard sugar	wáhta'
maple, soft	ohwisto'kéha'
marriage	kaniákon
martin	aseranó:ha
mask	iontkonwaroróktha'
Massena	Kentsià:ke
mat	ionrahsi'tokewáhtha'
mattress	kéntskare'
maybe	tóka' nón:wa
meadow	kahentà:ke
meadowlark	teiothwistáhere'
meat smoked meat	o'wà:ron kaien'kwararíhton

meat pie	tka'wà:ra'
medicine	onónhkwa'
meet someone, to	tetsiatátken teiakiatátkens taiontátken' tehonatátken
meeting	watkennníson
melon	wahiá:ris
melted	iowistanawén:'en
they (masc. emphatic)	ronónha
mercy	atenniteráhtshera
mesh	á:'are'
midnight	ahsónthen
milk	onòn:ta'
mind, the on my mind	o'nikòn:ra' ke'nikonhrà:ke
mink	aió:ha
minnow	kanión:ta
mirrow	atátken
miss, to	sesáte'waht skate'wáhtha' saiónte'wahte' shote'wáhton
mittens	a'nià:nawen

mix, to	tesawénrie' tekawénrie's taionwénrie' tehowénrie'
Mohawk	Kanien'kehá:ka
Moira	shakorontakehtstátske'
molasses	kahsehstahòn:tsi
mole	otsi'nión:kara'
Monday	wententawén'kie'
money	ohwísta'
monkey	katsi'nónhtaks
month	enhnì:ta'
Montreal	Kiohkià:ke
moon	karáhkwa
moose	ska'niónhsa'
map	iontenonhsohare'táhkhwa'
more	é:son
morning	ohrhon'kè:ne
morning, this	ohrón'ke
mosquito	okariahtà:ne'
mother! my mother	istá ake'nisténha

mountain	ionón:te'
mouse	otsinó:wen
moustache	okonhstón:rha'
mouth	tsitshakà:ronte'
move over, to	sátkwi't katkwì:tha' aióntkwi'te' rotkwì:ron
movie	teióia'ks
much	é:so
very much	kwáh í:ken tsi é:so
mullet	skentstakén:ri
red finned mullet	onekwénhtara nihatorò:ten
mush	kashé:rho
music	karén:na'
musical instrument	waterennótha'
muskalonge	kanò:tsot
muskrat	anò:kien

N



kanón:ware'

nail	kanón:ware'
name	kahsén:na'
name someone, to	shehsén:non khehsén:nons aiontatshén:non' shakohsenná:wi
nationality (your)	tsi nihsonhontsò:ten
navel	onerì:tsta' keneri'tstà:ke
neck on my	oniá:ra' keniarà:ke
necklace	ohstaró:kwa
need, to	tewakatonhontsió:ni tesatonhontsió:ni teiakotonhontsió:ni tehotonhontsió:ni
needle	ie'nikhónhkhwa' kanón:-ware'
Negro man woman	 rahòn:tsi iehòn:tsi
nest	otsi'nháhkhwa'
net	á:'are'
new	á:se'
newspaper	tekonrénie's

New York City	Kanón:no
New Year	ohserá:se'
night time	ahsonhthèn:ne
nipple	okónhkwara'
on my nipple	kkonhkwarà:ke
no	iáh
Norfork	Kanatasé:ke
notice, to	sáttok
	kattó:kas
	aiónttoke'
	rottó:ken
nose	o'niónhsa'
on my nose	ke'nionhsà:ke
not yet	iáh arok
now	ó:nenk
nun	iakoia'tatokénhti
nut	ohsò:kwa'
hazel nut	teiotitá:ronte'
hickory nut	onenóhkara'

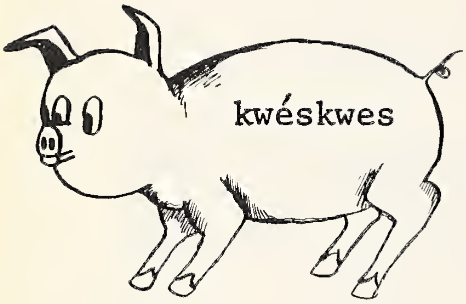
O

oká:we'

oak	otokénha
oar	oká:we'
oath	aierihwaní:rate'
of course	ne' ki' wahe'
off (peeled or hanging)	iotera'nontáhsion
often	iotká:te
Ogdensburg	Sewé:katsi
oil	kén:ie'
Oka	Kanenhsatà:ke
onion	o'niónkseri/à:non
onion sets	ie'nionkserótha'
only	nek ié:ken
Ontario, Lake	Kaniatarí:io
open, to (door)	sehnhotón:ko kehnhotónkwas aiehnhotón:ko' rohnhotónkwen
orange	okiarèn:ta'
oriole	okiaren'ta'kó:wa
ostracize someone, to	sheia'tohtáhrho khia'tohtáhrhos aiontakia'tohtáhrho' rowaia'tohtáhrhon

other side, on the	íse' nenkwá:ti
otter	tawí:ne
out	átste'
out house	átste' tsi - ientáhkhwa'/koráhne
over here	kén nonkwá:ti
owl, small	kwararó:ha
owl, white	tsistékeri
oyster	takwaré:re

P



package	oneró́tshera'
page	iora'wíhstote'
pail	ón:ta
paint	okóntshera
paint, to	skontsheráhrho kkontsheráhrhos aiekontsheráhrho' rokontsheráhrho'
pair	tsioiá:na
pale	ohskenená:ta'
palm	óhsia'
on my palm	khsià:ke
pancakes	ora'wíhsta'
pants	atháhsteren
paper	kahiatónhsera
parallel	teionathaharákie'
paralysis	kaia'takenheiónhtshera'
parrot	tekáhskia'ks
partridge	ohkwé:sen
pass, to	satóhetst katohétsha' aiontóhetste' rotohétste'/ rotohétston

patch	kenhnennentákton
patchwork	tekahnakhánion'
patients	rotinonhwaktanión:ni
patient, to be	sate'nikonhrí:iohst kate'nikonhriióhstha' aionte'nikonhrí:iohste' rote'nikonhriióhston
pea	onékwa'
pod	onó:ra'
peapod	onékwa' ono:ra'
peaches	tekakonhkwará:ron
peacock	skanaiehkó:wa
peal (a bell)	iohwístakahre'
peel, to	sera'wihstóhthsion kero'wihstóhthsions aiera'wihstóhthsion rora'wihstóhthsion
peelings	ora'wíhsta'
peg	nika'wahstésha
pencil	ohiatónhkhwa'
people, crowd of	ionkwè:ne
people, large crowd of	kenenhrowá:nen
pepper	kiohnonhkwà:tsheros

perch	oiahè:ta'
person, one	tsionkwè:ta
pheasant	ohkwé:sen'
pick, to (as for fruit)	ísko íkkwas aié:ko' rókwen
pick up, to	té:sehkw tekéhkhwa' tá:iehkwe' tehawéhkwen
pick axe	otsiweiòn:ta'
pickerel	tsikónhses
pigeon	orì:te'
pigeon-toed	teshá:kwaion
pie, fruit	tewà:ia
pig sty	kwéskwes kweskwéshne
pike (northern) wall-eyed	tsikónhses skakahráksen
pillow	atkòn:sera
pin, safety	tewatotáhrhoks
pin, straight	tsio'níhsto
pine	ohnéhta'

pill	onékwa'
pink	wahshèn:ra
pipe (smoking)	kanèn:nawen
pity someone, to	shé:tenhr khé:tenhre' aiontatí:tenhre' shakotèn:ron
plant, to	tsiéntho kiénthos aieiéntho' roiénthon
plate	akè:ra'
play, to	sátswa't katswà:tha' aióntswa'te rotswà:ton
pneumonia	iakotsina'kwennóhston
pocket	iohna'táhtsheronte'
Polish	Tharontatihénthos
poolstick	teietsihkhwaientáhkhwa' kà:nhien'
poplar	onerahtón:ta'
porch, on the	ahskwen'nà:ke
porcupine	anèn:taks
possible	wà:tons

potato	ohnennà:ta'
sweet	teiohnenna'tatsikhè:tare'
potato bug	rahnenna'takárias
Potsdam	tsi Tewa'tentararénie's
pottery	o'tá:ra'
pour, to	tasáweron tkáwerons aiontaión:ron' thóweron
pray, to	saterén:naien katerén:naiens aionterén:naien' roterén:naien
prepare, to	skwatá:ko kkwatákwas aiekwatá:ko' rokwatákwen
propeller	okawè:tshera
prove, to	serihwahní:rat kerihwahní:rats aierihwahní:rate' rorihwhnirá:ton
pull, to	tasatihéntho tkatihénthos aiontaiontihéntho' thotihénthon
pulley	tewatkahraténie's o'nó:wa
pulse	teiawenriáhkhwa'

pumpkin	onon'onsera'kó:wa
punish someone, to	shehré:waht khehrewáhtha' aiontathré:wahte' shakohrewáhton
purple	arihwawa'konhnéha'
purse	kahná:ta'
pus, rotten	iótken
push, to	iahà:shrek iékhreks iaiè:reke' iohohré:kon
put something away, to	sataweièn:ton kataweièn:tons aionteweièn:ton roteweièn:ton
put something down, to	ítsien íkiens aié:ien' ró:ien
put one's coat on, to	sakià:tawi't kakia'tawì:tha' aionkià:tawi'te' rokia'tawì:ton

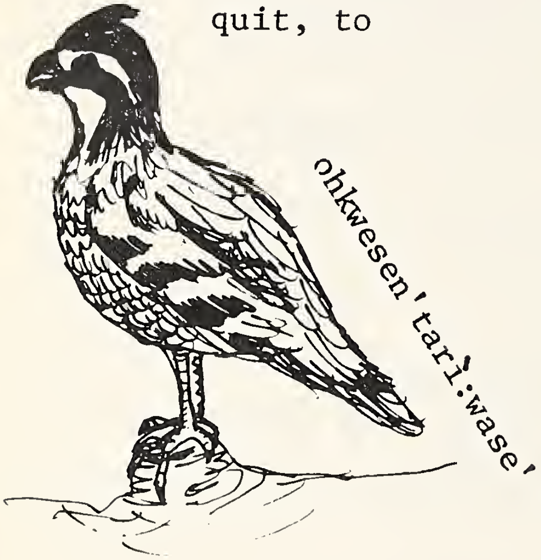
o'tá:ra'

Q

quail — ohkwesen'tarì:wase'

Quebec — Tekianontarì:kon

quit, to — sateríshen
kateríshens
aionteríshen'
roteríshen



R

rabbit	kwa'ién:/tehahonhtané:ken
jackrabbit	tehahonhtanekenhkó:wa
raccoon	atì:ron
race, to	tesaré:ron tekaré:rons taionré:ron' tehoré:ron
race, a	teware:ron
Racquette	Ahnawà:te'
Racquette River	Nihahnawà:te'
radish	oitsihkwatská:ra' otsihkwakáhte'
raft	ennísera
rafters	watenenhstahéhrha'
railroad tracks	karihstatákie'
raining, to be	iokanó:ron
raise something, to	shará:tat khará:tats aiehará:tate' roharatá:ton
raisin	o'nénhare'
rash, a	ata'keráhkhwa'
I have a rash	wakata'kerahkwén:ni
She	iakota'kerahkwén:ni
he	rota'kerahkwén:ni
raspberry	skanekwen'tará:ni

atì:ron

rat	otsinowenhkó:wa
Raymondville	tsi Iakokiéhtha'
ready, to get	satateweienén:ta' katateweienén:ta's aiontateweienén:ta'ne' rotateweienentá:'on
reason, a	orì:wa'
receive, to	tsié:na kié:nas aieié:na' roié:nen
red	onekwénhtara'
redwinged blackbird	watahiáhnes
reins	áhshara/ahshá:ra'
remember, to	sehià:rak kehià:ra's aiehià:ra'ne' rawehiahrá:'on
repeat, to	tontasathna'néta' tetkathna'néta's taiontaionthna'néta' tethothna'néton
rest, to	satoríshen katoríshens aionteríshen' roteríshen
restaurant	teiontska'nhónhkhwa'

relax, rest, to	tetasaterà:karon tetkaterà:karons taionterà:karon' tethoterà:karon
receive something, to	tontasáhket tetkáhkets taiontaiónhkete' tethóhkton
rhubarb	ohstawì:na
rib	ona'áhta'
on my rib	kena'ahtà:ke
ribbon	kà:nhes
rice	onatsiakén:ra'
ride, straddle, to	sahsá:ten wakhsá:tens aiakohsá:ten' rohsatén'en
right away	ó:nenk
ring, a	anihsnónhsawi
rip something, to	serátsion kerátsions aierátsion rorátsion
road	oháha'/owáha'
roast, a	watè:skonte'

roast, to	sate'skón:ten kate'skóntha' aion'skón:ten' rotè:skonte'
robin	tsiskò:ko
rock	onién:ia'
rock, flat on a flat rock	otstèn:ra' otstenhrà:ke
root on a root	ohtè:ra' ohtehrà:ke
rub, to	seránie' keránie's aieránie' roránie'
run, to	tesaráhtat tekaráhtats taionráhtate' teharáhtats
run away, to (escape)	se'niá:ken'n ke'niá:ken's aie'niá:ken'ne' ro'niakén:'en
runner (as on sleigh)	oiá:na'
rust	ohskèn:rha
rusty	iohskèn:rhare'

S

sack	ká:iare'
sad, crying, to be	sa'nikonhráksen wake'nikonhráksens aiako'nikonhráksen ro'nikonhraksén:'en
St. Regis	Ahkwesáhsne
sailor	rahonweia'kehró:non'
salary	kakarià:ktshera'
saliva	ótskeri
Salmon River	Kentsia'kowáhne
salt	kiohiò:tsis
salty	teiohiò:tsis
salt pork	teio'wahrahiò:tsis
Saturday	Wentákta'/ Ià:ia'khaton
save, to	sataweièn:ton kataweièn:tons aiontaweièn:ton rotaweièn:ton
say, to	tsì:ron kì:rons iè:rons rá:wen'
scalp on my scalp	onon'òn:ra' kenon'onhrà:ke

scales, fish	iótstare'
scales,weighing	iekontsheriharáhkhwa'
scar	owì:ra'
scare someone, to	tashieaton'nékten tekheiaton'nektén:nis aontaionkiaton'nékten tehshakoton'nektén:ni
scared, to get	setshà:ni'k ketshà:nis aietshà:ni'ke' rotshahnì:kon
start, to (be start ed)	tasatón'nek tkatón'neks aontaiontón'neke' thoton'nékon
scarf	teiontenia'tarakstáhkhwa'/ teiontenia'tarahnástha'
scarlet fever	iako'tonhkwahroskó:wa
school	ionteweienhstáhkhwa'
scissors	tewata'sharí:sas
Scottish	Ken'táhere'
scrape, to	ísket íkkets aié:kete' roké:ton
screw, a	tekahsonwatá:se' kanón:ware'

screw, to twist	shwatá:se' khwatá:se's aiehwatá:se' rohwatá:son
seal, a (animal)	otsí:io
seal, a (gum)	kahnehtárhro
seal something, to	sehnehtárhro khnehtárhros aiehnehtárhro' rohnehtárhron
seal, to close	senón:tek kenón:teks aienón:teke' rononté:kon
secure, to to tie	shwénnerenk khwénnerenks aiehwénnerenke' rohwénneren
see, to	satkáhtho katkáhthos aiontkáhtho' rotkáhthon
seed, a	ká:nen
sell, to	satenhní:non katenhní:nons aiontenhní:non' rotenhní:non
send something away, to	ia'saténieht iekateniéhtho' iaionténiehte' iohoteniéhton

set down, to	ítsien íkiens aié:ien ró:ien
sew, to	se'níkhon ke'níkhons aie'níkhon ro'níkhon
shake something, to	sá:wak ká:waks aión:wake' rowá:kon
sharp, it is	iohio'thí:ion
shawl	teionteweiahráhkhwa'
she (emphatic)	akáonha
sheep	teiotina'karatón:'a
shin	onién:ta' kenientà:ke
shirt	oià:kara'
shiver, to	saia'tíshonhkw wakia'tishónhkhwa' aiakoia'tíshonhkwe' roia'tishónhkwen
shoe	áhta
shoot, to	sarón:tat karón:tats aiorón:tate' rorontáton

shore, along	atsià:kta'
shoulder	ohnénhsa' khnenhsà:ke
show, a (movie)	teióia'ks
show something to someone, to	shena'tón:ha's khena'tón:ha's aiontatena'tónha'se' shakona'tón:ni
shrink, to	satò:rok katò:roks aiontò:roke' rotò:ron
shrink something, to	satò:rokst katohrókstha' aiontò:rokste' rotohrókston
shut something, to	sehnhó:ton kehnhó:tons aiehnhó:ton' rohnhó:ton
side-by-side	tekiatera'nè:ken
silk	kà:nhes
silk ribbon	o'nhéksa'
silver	kahwistará:ken
sing, to	saterennó:ten katerennótha'/katerennó:-ten's aionterennó:ten' roterén:note'/roterennó:-ten

sister, my elder	aktsí'a
sit down, to	sákien kákiens aiónkien' rókien
skin, a	óhna'
skip, to	tesate'khahón:ti tekate'khahónkie's taionte'khahón:ti' tehote'khahónkion
skirt	o'wháhsa'
skunk	anì:ta's
slacks	atháhsteren
slam a door, to	sehnhóhaienht kehnhohaiénhtha' aiehnhóhaienhte' rohnhohaiénhton

sleep, to	sén:ta'w wakí:ta's aiakó:ta'we' rotá:'on
slip, a	kà:khare'
slippers	ionahsi'tókstha'
smell, a bad	a'ónsera
smell something, to	satéhswaht katehswáhtha' aiontéhswahte' rotehswáhton

smoke	satshó:ko katshókwas aiontshó:ko' rotshókwen
snake	ò:niare'
snap, a	tekatsí'toks
snipe	tawístawis
snow	óniehte'
snowing, it's	io'kerén:'en
snowflake	ò:kera
snowshoe	ohwèn:kara'
snowbird	iotiwíhsto
Snye	Tsi Snáihne
soap	ononhwarè:tha'
sock, stocking	ká:ris
soft drink	wathnekatákwas/ teiohnekatsikhè:tare'
soldier	sotár
sole my sole	ohsi'tò:kon kahsi'tò:kon
sometimes	shewaké:ren
some other	ókia'ke
soon	iohsnó:re'

soul	atónhnhets
soup	onòn:tara'
sparrow	tsítha
speak, to	satá:ti katá:tis aiontá:ti' rotatí'on
spear	áhsikwe'
spice	wenserákon onhshsón:'a
spider	takwa'áhson
spin around, to	satshinonhwaténia't katshinonhwatenià:tha' aiontshinonhwaténiahte' rotshinonhwaténion
splash, to	tesatstarókwaht tekatstarokwáhtha' taionstarókwahte' tehotstarokwáhton
splint	o'nón:na'
splinter	ohsáhtara'
split, it is	teió:ren
split something, to	tesó:ren tekó:rens taiakó:ren tehaó:ren
spoon	atókwa

spoon for stirring	ahserawénrie'
spring	kakwitè:ne/kenkwitè:ne
sprinkle, to	tesatstarókwaht tekatstarokwáhtha' taiontstarókwahte' tehotsterokwáhton
sprout, a	ohnióhkwa'
spruce	o'sò:ra'
squash, a	kioneri'tstakè:tote'
squeeze something, to	tesahtò:rarak tekahtò:raraks taionhtò:rarake' tehohtohrará:kon
squirrel	aró:sen
squirrel, grey	onkwe'tá:kon
stand, to	tésta'n tékta's taié:ta'ne' tehotá:'on
stand or put things together, to	tesera'né:ken tekera'né:kens taiera'né:ken tehora'né:ken
star	otsísto
start, to	tasatáhsawen tkatahsáwha' aontaiontáhsawen' thotahsá:'on

starvation	atonhkarià:ktshera
State Road	Sahtsherá:ti
stay home, to	tsi'terón:tak ki'terón:taks/kì:terons aie'terón:take' rèn:teron
steal, to	senénhsko kenénhskwas aienénhsko' ronénhskwen
stepladder	kanekó:ta'
step, to take a	tesate'kháhahk tekate'khaháhkhwa' taionte'kháhahkwe' tehote'khaháhkwen
stiff, to be	iota'tíhen
stomach (belly) on my stomach	onekwèn:ta' kenekwen'tà:ke
stomach (intestine)	ohsiehón:ta
stone	onén:ia'
story	aká:ra'/oká:ra'
straighten, to	stakwaríhsion ktakwaríhsions aietakwaríhsion rotakwaríhsion
strange	thiká:te'
strawberry	niiohontésha'

stretch, to	tesatirón:ten tekatirón:ten taiontirón:ten thotí:ronte'
string, to	sa'tanihá:ron ka'taníhara's aion'tanihá:ren' ro'taníharon
stroke	kaia'takenheiónhtshera'
study, to learn	satóweienhst katoweiénhstha' aiontóweienhste' rotoweiénhston
sturgeon	teiokién:tare'
suck, to	senon'ké:ra kenon'ké:ras aienon'ké:ra' ronon'ké:ren
suffer, to	tsié:sa kié:sas aieié:sa' roié:son
sugar	otsikhè:ta'
suit	atahkwénia
summer	akenhnhà:ke
summer resort	iontewistohtáhkhwa'
sun	karáhkwa
Sunday	Tsiatákhaton/ Aiawentatokénhti

sunfish	atenà:tara
sunshine	ioráhkote'
suspenders	ionthnenhsotahrókstha'
swallow	ken'tarakonhá:'a
swear, to	saterihwakà:tenhst katerihwakaténhstha' aionterhwakà:tenhste' rorihwakà:te'
sweet	teiotsikhè:tare'
sweeten, to	testsikhe'táhrho tekatsikhe'táhrhos taietsikhe'táhrho' tehotsikhe'táhrho'
sweetflag	onennó:ron
sweet grass	wenserákon óhonte'
swim, to	satá:wen katá:wens aiontá:wen' rotá:wen
swing, a	iontonwiharáhkhwa'
swollen	iò:to
swollen glands	iakotenià:ko
sword	a'share'kó:wa
syrup	óhshes

T

table	atekhwà:ra
tail	otáhsa'
big tail	kentahsa'kó:wa
long tail	kentáhses
take, to	iahà:sha iékhas iaiéhawe' iehóha
take apart, to	serihsión:ko kerihsiónkwas aierihsión:ko' rorinsiónkwen
take out, to	tsiá:kenhw kiá:kens aieiá:kenhwe' roiakénhon
take an oath, to	serihwahní:rat kerihwahní:rats aierihwahní:rate' rorihwahnirá:ton
talk	satá:ti katá:tis aiontá:ti' rotá:ti
tamarack	kanèn:ten's
tea	tí
loose tea	teiotitsherahrí:'on
teach someone, to	sherihónnien kherihónniens aiontaterihónnien' shakorihonnién:ni

kéhrhite'/karón:ta'

teacher	iakorihonnién:ni
tear, to	serátion kerátions aierátion rorátion
tear drop, a	okáhsera
tears	okáhseri
telephone	teietharáhkhwa'
tell, to	sathró:ri kathró:ris aionthró:ri' rothró:ri
tell a story, to	ská:raton kká:ratons aieká:raton' roká:raton
tent	a'tóhsera
thank you	niá:wen
that	ne thí:ken
that is so	tó:ske tho ní:ioht
the way it is	tsi ní:ioht
then	eh thó ne sók
there	íse'
right there	eh tho nón:we
over there	ise' nonkwá:ti
way over there	ha'é:ren

therefore	ase'kén
thief	ranénhskwas
think, to	sanonhtenión:ko kanonhteniónkwas aienonhtenión:ko' rononhteniónkwen
this this one	kí:ken né kí:ken
this far	ken' niió:re'
this side	ka' nekwá:ti
thistle	ohnión:wara'
Thomas	Atón:wa
thorn tree	ohì:kta'
thread, rope, twine, line	ahserí:ie
throat (inside)	tsi iakonia'takà:ronte'
throat (neck)	onià:kwa' kenia'kwà:ke
other than the one you thought	akorén'stsi
throw, to (away)	ia'sá:ti iewakákie's iaiakókion' iehókion
thumb	otsiweiónhkara'

ohnión:wara'

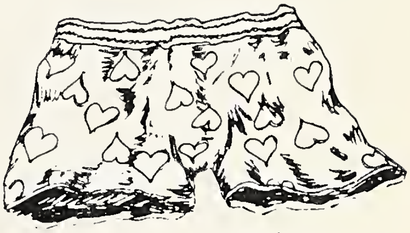
Thursday	Kaieríhaton/ Okaristiiáhne
tie, a	iontenia'taranákstha'
tie, to	skwánerenk khwánerenks aiehwánerenke' rohwáneren
tiger	tako'skó:wa
tighten, to	shní:rat khní:rats aiehní:rate' rohnirá:ton
time	tsi nikahá:wi
at that time	shontakahá:wi
a long time ago	wahón:nise
tip something, to	skarèn:rat kkarèn:rats aiekarèn:rate' rokarenhrá:ton
tired, to be	tewakhwisenhé:ion tesahwisenhé:ion teiakohwisenhé:ion tehohwisenhé:ion
tobacco	oièn:kwa'
today	wenhniserá:te/ón:wa
toe	ohiakwí:ra' kahiakwirà:ke
toenail	otsi'é:ra
on my toenail	ktsi'erà:ke

tomato	taméto
tomorrow	enióhren'ne'
tongue	awen'náhsa'
on my tongue	ken'nahsà:ke
too	ó:ni
tooth	onawí:ra
on my tooth	kenawirà:ke
top	è:neken
top (toy)	katsiskaiennì:ta'
torso	oià:ta'
on my torso	kia'tà:ke
tortoise	a'nón:wara
torture someone, to	sheié:saht kheiesáhtha' aiontakié:sahte' shakoiesáhton
touch, to	ai'tsié:na iekié:nas aieié:na' roié:nen
towel	iontkonhsekowáhtha'
train	otiio'kéha'
travel, to	tesatstikáhwha tekatstikáhwhas taiontstikáhwha' tehotstikáhwhon
tree	kéhrhite'/karón:ta'

tripe	onekerèn:ta
trouble, to cause	tese'nikonhrhá:ren teke'nikónhrhare' taie'nikonhrhá:ren teho'nikonhrhá:ren
trout	tsiokià:kton
true, it is	tó:ske'
try, to	sate'nién:ten kate'nién:tens aionte'nién:ten' rote'nién:ten
try harder, to	sakhwísron kakhwísrons aionkhwísron' rokhwísron
tuberculosis	kahnhrakaiónhtshera
Tuesday	Tekeníhaton/Ratironhia'- kehronón:ke
Tupper Lake	Tsiskaniatare'skó:wa
turkey	skawiró:wane'
turn, to	skahrátho kkahráthos aiekahrátho' rokahráthon
turnip	otsihkwa'kó:wa
turtle	a'nó:wara
type, to	teserihstò:rarak tekerihstò:raraks taierihstò:rarake' tehorihstohrará:kon

U

ugly	kahétken
unable,	iah teiotón:'on
unadvised	iah tekahtará:ni
unbuckle, to	teshniáhskarik tekhniáhskariks taiehniáhskarike' tehohiahskarí:kon
unbutton, to	stsihkotá:ko ktsihkotákwas aietsihkotá:ko' rotsihkotákwen
uncommunicative, be	iah teiontá:ti
uncooked	iah tekaríhton/ iokáhte'
underground, be	ohontsiokónhson
underneath	nà:kon
undernourished, be	kiakotekhwakoktá:ni
understand, to	sa'nikonhraién:ta'n wake'nikonhraién:ta's aiako'nikonhraién:ta'ne' ro'nikonhraientá:'on
underwear	nà:kon kióntsha'/ nà:kon kié:iens
undo, to	taseríhsi tkeríhsions aieríhsion' thoríhsion



nà:kon kióntsha'/
nà:kon kié:iens

unfortunate, be	karihwanó:ron
unharness, to	sahkweniahrá:ko kahkweniahrákwas aionhkweniahrá:ko' rohkweniahrákwen
unlock, to	seniethará:ko kenietharákwas aieniethará:ko' ronietharákwen
untangle, to	tesani'tonniáhsi tekani'tonniáhsions taion'tonniáhsion' tehoni'tonniáhsion
up	è:neken
upside down	kakahráthon
upstairs	kanonhsoharà:ke
urine	ohnenha/ohnenhohsa
use something, to	í:sats kátstha' á:iontste' rótston
uterus, womb	atewirarà:tha'

V

vagabond	tehatonhwentsiatá:se's
vase	ietsi'tsiaráhkhwa'
vegetables	ase'shón:'a
vehicle	kà:sere
veil	ionta'arohróktha'
vein	otsinonhiáhton
venereal disease	kahnhráksen
vinegar	teiohnekahiò:tsis
visit, to	senatà:ra kenatà:re's aienatà:ra' ronatà:ron
voice	owén:na'

kà:sere

W

okwáho

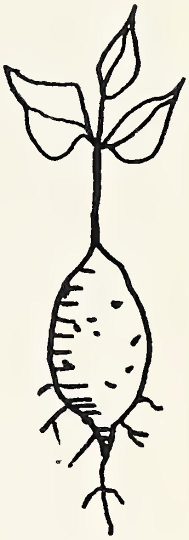
waist	ohsià:kara'
on my waist	khsia'karà:ke
wait, to	satehrá:rat
	katehrá:rats
	aiontehrá:rate'
	rotehrará:ton
wake up, to	satkétsko
	katkétskwas
	aiontkétskon
	rotkétskon
walk, to	tesatekháhahkw
	tekatekhaháhkhwa'
	taiontekháhahkwe'
	tehotekhaháhkwen
wall	ahsónhten
on the wall	ahsonhtà:ke
want, to	í:kehre'
	íhsehre'
	á:iehre'
	à:renhre'
warm, be	io'taríhen
warrior	raterí:ios
wart	ohnè:ta'
wash, to	senóhare
	kenóhares
	aienóhare'
	ronóhare'
wasp	ratenawatstanentáktha'

waste, to	sakié:saht kakiesáhtha' aionkié:sahte' rokiesáhton
watch	karáhkwa kaiòn:tha'
watch, to (look at)	saterò:rok katerò:roks aionterò:roke' roterò:ron
water hard water rainwater salt water	ohné:kanos iohnekahní:ron ohsterákeri kiohio'tsistákeri
watermelon	onon'onserakáhte'
wave, to	tesanentshateníhon tekanentshateníhons taionentshateníhon tehonentshateníhon
waves	taietierónhsere'
weasel	onón:kwet
Wednesday	Ahsénhaton/Soséhne
week, one	tsiahià:kshera
weight	okónhtshera
wet, be	ionà:nawen
whale	tsionhnó:wane'
what?	oh nahò:ten

wheat	onátsia'
when?	kátke
where?	ka' nón:we
which	ka' niká:ien
while	tsi nikarì:wes
whip	ó:kwire'
white	kará:ken
white ash	kanéhron/o'nòn:na
White people English speaking	Ratinenrá:ken Kiohrensha:ka
who?	ónhka'
wolf	okwáho
word	owén:na
work (noun)	kaio'ténhtshera
work, to	saió'te' wakió'te' aiiakoió'ten' roió'ten'
write, to	shiá:ton khiá:tons aiehiá:ton' rohiá:ton

Y

yams	teiohnenna'tatsikhè:tare'
yank, to	senèn:renht kenenhrénhtha' aienè:renhte' ronenhrénhton
yard	kahentà:ke
yardstick	sewatáhtshera
yarn	ieriserenionià:tha'
year, one	tsióhsera
yeast	ieshe'rhenhtáhkhwa'
yell, to	tesahén:reht tewakhenréhtha' taiakohén:rehte' tehohenréhton
yellow	otsì:nekwar
Yellow Lake	Katsèn:nekwar
yes	hén
yesterday	thetén:re'
yogurt	okaiéhta'
you (emphatic)	í:se'
yourself	sonhá:'ak



teiohnenna'tatsikhè:tare'