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ARBOR DAY NUMBER.

The Educational Review.

Devoted to Advanced Methods of Education and General Culture.

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EDITORIAL NOTES.

THE early issue of our Arbor day number, its many suggestions and practical articles will give an impetus to the observance of the day throughout the Atlantic Provinces, and make, we hope, the first year of the last decade of the 19th century, a red letter one in *successful* tree planting.

THE observance of Arbor Day began in Nebraska in 1872. On the 10th of April of that year more than one million trees were planted. Between 1872 and 1888 nearly two thousand seven hundred and fifty million trees were planted throughout that State.

ARBOR DAY should be celebrated wherever there is a school. Its specific objects—the encouragement of forest culture and preservation, improving and beautifying the surroundings of school and dwelling houses—should be inculcated. It should be a district holiday.

IF the members of the agricultural and horticultural societies, where founded, would encourage and assist the schools on Arbor Day, it would create an interest among the rising generation in the objects of these useful organizations.

ARBOR DAY in Inspector Carter's district—St. John, Charlotte and part of Kings—will probably be on Friday, May 15th.

THE Summer School of Science for the Atlantic Provinces meets in July next at Antigonish, N. S. Fuller announcements will be given in May REVIEW.

READERS of the REVIEW will join us in acknowledgments to Prof. Lawson, Ph. D., of Dalhousie University, W. F. Ganong, A. M., of Harvard University, and Mr. J. Vroom, St. Stephen, N. B., for interesting and valuable contributions to this number.

Do not be discouraged if some persons try to throw cold water on your efforts to create an interest in Arbor Day. "What's the use?" will be heard from many. If you become discouraged and give up, it is a question whether you are capable of succeeding in any undertaking that requires tact and energy.

THE teacher that by intelligent and conscientious work arouses activity and directs thought leaves an impress on the minds of the community for all time. If a taste for order and beauty be implanted, the ornamented grounds and houses will always be a monument to that teacher's taste and intelligence.

LET the programme for Arbor Day exercises be arranged with a definite object in view—that object being to carry out the spirit and letter of the requirements of the school law. If only a programme of speeches, dialogues, recitations, be carried out without reference to carefully planned and systematic work on the school grounds, it is a sham.

BY all means secure the active co-operation of the boys and girls in tree-planting and other improvement. Those teachers who have secured and intelligently directed this in past years know its value. Those who have not should begin at once to awaken an interest among the boys and girls. That will arouse the district.

AT a recent meeting of the executive of the St. John County Teachers' Institute it was decided to engage for the next meeting, in December next, the services of Inspector Metcalfe, an eminent educationist of Boston. Mr. John Brittain, of the Provincial normal school will also be asked to address the teachers. The Institute promises to be a very instructive one, and, coming when it does, will, no doubt, be attended by teachers from other sections

of the Province, as the date of its meetings are such as to permit it.

SIXTEEN out of a graduating class of forty-eight who received the degree of M. D., C. M., at the McGill University, Montreal, in March, were from the Atlantic Provinces.

FUTURE school houses should be built with due regard to light, ventilation, ornamentation and playgrounds.

WE HAVE received the past year's report of the Chief Superintendent of Education for New Brunswick. Compared with the corresponding term in the previous year, there was a gain in the first term of 17 schools, 48 teachers, and 2,286 pupils. In the second term there was a gain, computed on the same basis, of 12 schools and 20 teachers.

The details of this and other educational reports received will be dealt with in future numbers of the REVIEW.

FROM the New Glasgow High School *Monthly* we learn that the New Glasgow School Board proposes to erect a high school, to cost from $10,000 to $20,000.

THE teachers of Newfoundland have organized an association called the "Newfoundland Teachers' Association." Mr. Bancroft, of Bay Roberts, is president, and his efforts are spoken of in the highest terms of praise. We hope that this will be the impulse which will lead to greater things. The history of education in other countries outlines a glorious career for such efforts; but it will require much patience and intelligent hard work.

A BRILLIANT meteor, comparable, from the reports, to the one described in the REVIEW October, 1887, passed northwardly over the eastern extremity of Newfoundland on Saturday, 28th March, at about 10:30 p. m., St. John's, Nfld., time. The meteor appears to have exploded towards the end of its course with a magnificent shower of fragments. Its altitude and course, as seen from more than one point, and its size as compared with the moon, would be necessary to estimate its real size and distance. The sound made could not be expected to be heard until several minutes after it had passed. If the time were noted it would tend to rectify observations of altitude.

EX-INSPECTOR OAKES, now Principal of Horton Collegiate Seminary, may be regarded as the founder of Arbor Day in New Brunswick. In the two years, 1865 and 1866, before Arbor Day was adopted by regulation, there were planted in his inspectorate, chiefly through his exertions, nearly two thousand trees. In 1884 there were probably not twenty-five school grounds in the province ornamented with transplanted trees. Of these the St. Stephen High School and the Marysville school were good examples. Not one of the grammar school grounds had any trees. Some town and city grounds were shaded by trees outside the school limits. Up to the present year there have been planted at least 27,000 trees, or an average of about eighteen to each school district in the Province.

MR. J. FRANK OWENS, A. B., of Chatham, has been appointed to the principalship of St. Dunstan's School, Fredericton, made vacant by the death of J. Meagher.

RECENT numbers of *Garden and Forest*, New York, contain many fine articles on forest trees, ornamentation of grounds, etc. These are well worth the attention and study of those interested, especially at this season of the year.

ATTENTION is directed to the advertisement of the Arbor Day Manual on another page.

MISS CARMAN, teacher at Pennfield Ridge, Charlotte County, by means of a concert, has been able to procure some needed school apparatus and a school flag, which, it is proposed, to use for the first time on Arbor Day.

MISS KERR and Miss Erb, of Beaver Harbor, have aspirations in the same direction. This idea of Arbor Day celebration is a good one, and is worthy of imitation.

THE reports of the New Brunswick school inspectors for the last year should be carefully read. They speak of success and of failure. Where failure has occurred once it need not occur again. Sluggishness and lack of intelligent interest are the chief drawbacks. These can be overcome. The successful work of the last and previous years should be a strong incentive to a greatly increased effort this year.

ARBOR DAY IN ONTARIO. — The Minister of Education in Ontario in his report says:

"Arbor Day has now become one of the most interesting and profitable holidays in the year. In 1885, 38,940; in 1886, 34,087; in 1888, 25,714; and in 1889, 21,281 trees were planted. In a very few years every rural school in the the Province will have its pleasant, shady bower, where the pupils can find shelter from the scorching sun during the summer months, and where their taste for the beautiful in nature will find some gratification."

May we be able to say the same for our own Provinces.

HOW TO DO IT.

Inspector Mersereau says in his last report that, "The success or failure of Arbor Day proceedings depends entirely on the teacher in charge of the school." This is true. On the part of many teachers the observance of the day is a merest farce, and it is only done at all to secure a half holiday. They make no secret of their object, do not strive to interest pupils or parents, have no fixed plan of observance laid out, set out a twig or two under the windows that may live or be there at least till the next visit of the Inspector, after which it is no matter until next year. Such a teacher is useless any way, and may as well squander the time of the children by such a performance as in any other way.

The teacher who meets with the most success, first interests the children, who bring it to the notice of the parents. After the pupils are inoculated and the parents partially so, the teacher calls upon the latter, and, at least, secures the promise of their attendance, and may, perhaps, arrange with some of them to have some particular work done that is needed. The main thing, however, is to get all to come.

ORIGIN OF SOME CULTIVATED PLANTS.

Mr. John Brittain, instructor of Natural Science in the Normal School, Fredericton, makes a valuable suggestion to the readers of the REVIEW, the object of which is to illustrate the mode of growth and how to study the origin of some of our cultivated plants: "Little interest is taken by most of our young people in cultivated plants." For instance many have never noticed that carrots blossom, and that the cereals are grasses. A bed might be sown containing parallel strips of timothy, wheat, rye, barley. The growth of the plants could then be watched. The pupils would find out that they are all monocotyledons, are endogens, have jointed stems, flowers, with stamens, that their fruits are grains. They would then understand why they are all included in one family — the great grass family. Another bed might be planted with biennials — the seeds being sown in one row, and some of last year's plants in the adjacent row — carrots, turnips, cabbages, beets, parsnips. They could be led to observe that the large amount of material stored up during the first season is used up during the second. An analysis of the flowers on the plants of the second year would show that these useful plants are closely related to wild ones growing about the fields. The cabbage and turnip belonging to the Cress Family, and closely related to wild mustard; the carrot and parsnip to the Umbelliferæ, the same order as the poisonous cowbane and caraway; the beet to the same family as the common pigweed. The children would then be prepared to believe that these vegetables were once wild plants like their relatives, and the changes effected by long cultivation could be studied.

Native Trees and Shrubs.

The following list embraces the native trees and principal shrubs found in New Brunswick and Nova Scotia, with a small added list of those most generally cultivated. The larger shrubs are marked thus (*); the smaller thus (†). The latter is by no means a complete list, but embraces chiefly such shrubs as the writer thinks would be suitable for planting in corners of the school grounds, or for hedges. To the scientific name of the tree or shrub there is added, in parenthesis, the common name or names.

G. U. H.

St. John, N. B.

1. **Tilia Americana.** (American Linden. Basswood. Lime-tree. White-wood. Pumpkin-wood.)
2. **Ilex verticillata.**† (Holly. Black alder. Winterberry.)
3. **Nemopanthes fascicularis.**† (Mountain Holly. Canadian Holly.)
4. **Acer Pennsylvanicum.** (Striped Maple. Whistlewood. Striped Dog-wood. Moose-wood.)
5. **Acer spicatum.*** (Mountain Maple.)
6. **Acer saccharinum.** (Sugar or Rock Maple.)
7. **Acer dasycarpum.** (White or Silver Maple.)
8. **Acer rubrum.** (Red or Swamp Maple.)
9. **Rhus typhina.** (Stag-horn Sumach.)
10. **Prunus Pennsylvanica.** (Wild Red Cherry.)
11. **Prunus Virginiana.*** (Choke Cherry.)
12. **Prunus serotina.** (Wild Black Cherry.)
13. **Rosa Carolina.**† (Swamp Wild Rose.)
14. **Rosa lucida**† (Common Wild Rose.)
15. **Pyrus Americana.** (Mountain Ash. Rowan Tree.)
16. **Cratægus coccinea.*** (Crimson-fruited White Thorn.)
17. **Amelanchier Canadensis.** (Shad-bush. Service-berry. June-berry. Local names,—May-pear, Bilberry.)
18. var. **oblongifolia.*** (*Smaller -- leaves white woolly underneath when young.*)
19. var. **oligocarpa.**† (*Smaller than No. 2.*)
20. **Hamamelis Virginiana.*** (Witch-Hazel.)
21. **Cornus circinata.*** (Round-leaved Cornel or Dog-wood.)
22. **Cornus stolonifera.**† (Red-osier Dog-wood.)
23. **Cornus paniculata.*** (Panicled Cornel.) *Only in N. S.*
24. **Cornus alternifolia.*** (Alternate-leaved Dog-wood.)
25. **Sambucus Canadensis.**† (Common Elder.)
26. **Sambucus racemosa.**† (Panicled Elder. Scarlet-berried elder.)
27. **Viburnum lantanoides.**† (Hobble-bush. Wayfaring Tree.
28. **Viburnum Opulus.*** (Cranberry-tree. High Cranberry-bush.)
29. **Viburnum dentatum.*** (Arrow-wood.)
30. **Viburnum cassinoides.*** (White-rod.)
31. **Viburnum Lentago.** (Sweet Viburnum. Sheep-berry.)
32. **Viburnum pauciflorum.**† (Small flowered Viburnum.)
33. **Fraxinus Americana.** (White Ash.)
34. **Fraxinus pubescens.** (Red Ash.)
35. **Fraxinus sambucifolia.** (Black Ash.)
36. **Dirca palustris.**† (Leatherwood. Moose-wood.)
37. **Shepherdia Canadensis.**† (Canadian Shepherdia.)
38. **Ulmus Americana.** (American or White Elm.)
39. **Juglans cinerea.** (Butternut. White Walnut.)
40. **Myrica Gale.**† (Sweet Gale. Dutch Myrtle.)
41. **Myrica cerifera**† (Bay-berry. Wax Myrtle.)
42. **Myrica asplenifolia.**† (Sweet Fern.)
43. **Betula lenta.** (Cherry Birch. Sweet or Black Birch.)
44. **Betula lutea.** (Yellow or Grey Birch.)
45. **Betula populifolia.** (Poplar-leaved Birch. White Birch.)

46. Betula papyrifera. (Paper or Canoe Birch.)
47. Betula pumila.* (Low Birch. Dwarf Birch.)
48. Alnus viridis.* (Green or Mountain Alder.)
49. Alnus incana.* (Speckled or Hoary Alder.)
50. Corylus rostrata.* (Hazel Nut.)
51. Ostrya Virginica.* (Hop hornbeam. Leverwood.)
52. Quercus rubra. (Red Oak.)
53. Quercus macrocarpa. (Bur Oak.)
54. Quercus coccinea. (Scarlet Oak.)
55. Fagus ferruginea. (Beech.)
56. Salix humilis.* (Prairie Willow.)
57. Salix discolor.* (Glaucous or Bog Willow.)
58. Salix petiolaris.* (Petioled Willow.)
59. Salix cordata.* (Heart leaved Willow.)
60. Salix rostrata.* (Long beaked Willow.)
61. Salix lucida.* (Shining Willow.)
62. Salix nigra. (Black Willow.)
63. Salix myrtilloides.*
64. Salix balsamifera.*
65. Populus tremuloides. (American Aspen.)
66. Populus grandidentata. (Large toothed Aspen.)
67. Populus balsamifera. (Balsam Poplar.)

CONIFERS.

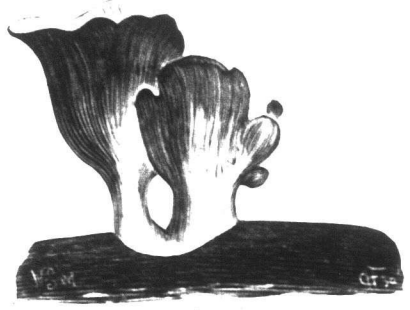
68. Pinus Strobus. (White Pine.)
69. Pinus rigida. (Pitch Pine.)
69. Pinus Banksiana. (Grey or Northern Scrub Pine.)
70. Pinus resinosa. (Red Pine.)
71. Picea nigra. (Black Spruce.)
72. Picea alba. (White Spruce.)
73. Tsuga Canadensis. (Hemlock.)
74. Abies balsamea. (Fir. Balsam Fir.)
75. Larix Americana. (American or Black Larch. Tamarack. Hackmatack.)
76. Thuja occidentalis. (Arbor Vitæ. White Cedar.)
77. Juniperus communis. (Common Juniper.)
78. Juniperus Sabina, var. procumbens* (Shrubby Red Cedar.)
79. Taxus Canadensis.* (American Yew. Ground Hemlock.)

CULTIVATED TREES AND SHRUBS.

Tilia Europæa. (European Lime or Linden.)
Berberis vulgaris.* (Common Barberry.)
Robinia Pseudacacia. (Common Locust or False Acacia.)
Robinia viscosa. (Clammy Locust Tree.)
Rosa rubiginosa.* (Sweet Brier. Eglantine.)
Æsculus Hippocastanum. (Horse Chestnut.)
Crataegus Oxyacantha.* (English Hawthorn.)
Symphoricarpus racemosus.* (Snow berry.)
Rhododendron Catawbiense. (Catawba Rhododendron.)
Quercus sessiliflora. (English Oak.)
Fraxinus Excelsior. (English Ash.)
Salix Viminalis.* (Osier or Basket Willow.)
Salix fragilis. (Crack Willow.)
Salix Babylonica. (Weeping Willow.)
Populus balsamifera var. candicans. (Balm of Gilead.)
Populus dilatata. (Lombardy Poplar.)
Pinus Sylvestris. (Scotch Pine.)

Agaricus (Pleurotus) Coldwelli (?) New Species.

The whale's bone, figured more fully in the March number of the REVIEW, was picked up on the Yarmouth beach and sent to the museum of Acadia College, Wolfville, 8th September, 1889. It remained in Professor Coldwell's lecture room until May, 1890, when it was transferred to the museum. The fungus was first noticed in February, 1891, when it appeared as in our sketch growing from a little hollow on the upper side of the bone. Since then it appears to have grown a little more and to have changed its shape and resembles "an old fashioned three cornered hat with its edges considerably incurved." The height of the principal frond is about 2½ inches, and the breadth of pileus 3½ inches at present, March 31st. From the extreme firmness of its substance it might be considered a species of *Panus;* but in all other respects it appears to belong to the sub-genus *pleurotus.* Not being able to find a specific description of it among British or American *Agaracini*, we transmitted the portion of the specimen sent us to the leading American authority, Professor Peck, the State Botanist of New York. We gave his letter below, and provisionally name the species after the Science Professor, Curator of the museum, who took the interest in the matter to bring it fully to our notice.



Dr. Fungus.

STATE HALL, ALBANY, N. Y.,
March 19th 1891.

My Dear Mr. MacKay:

The fungus specimen that grew on the bone of a whale reached me this morning. The habitat is certainly a curious one and one on which I should not expect such a fungus would grow. But these plants, like others, have the power to adapt themselves to some extent to circumstances. As to the species, the specimen does not agree rigidly with any description known to me, but is apparently closely allied to *P. [illegible] petaloides*, Fr. and *P. petaloides*, Fr. Its spores are of the same size and characters as the spores of these species. But for its cæspitose habit and downy stem I should unhesitatingly refer it to *P. petaloides*. The downy stem may be accidental, for I find this same white down developed in patches on the pileus in such a way as to make me think it is not normal there at least. *P. petaloides* has similar spores and a villose stem, and in one variety is cæspitose; but its stem is radicating and the pileus, more or less flaccid, so that I would sooner think your plant an unusual cæspitose form of *P. petaloides*, or possibly an undescribed species. If more plants develop, it might be well to note whether the velvety white down or tomentum is constant on the stem. The shape of the pileus in this specimen is strongly suggestive of the pileus of *P. petaloides*; but it is evidently modified by having grown in a clump, and the appearance in the figure is different; but the shape is also modified by place of growth, so that I cannot rely on this. Should other specimens develop, I would be glad to know of it, and especially if the downy stem and cæspitose habit should be modified. Very truly yours,

CHAS. H. PECK.

BOOK REVIEWS, answers to questions and other matter, crowded out will appear next number.

Astronomical Notes.

THE PLANETS IN APRIL.

The May moon will be eighteen hours old at sunset on the 8th. Then you may have a chance to see a moon on the very day of its birth.

As mentioned in last month's Notes, *Mercury* will be at his best as evening star during the first half of April. But there should be little difficulty in seeing him for some time after the middle of the month, say until about the 25th. His evening star season will end with his inferior conjunction on May 9. But instead of Mercury above or below the sun, as is his usual custom at inferior conjuction, he will this time pass right across the sun's face, and we shall have a *transit of Mercury*. This is a much more common occurrence than a transit of Venus, but it is a much less important one, and also a much less interesting one. The last four transits of Venus — 1762, 1769, 1874, 1882 — have been very important astronomical events, because of the attempts made to determine the sun's parallax by means of them. A transit of Mercury is of no use for this purpose. Then, in point of interest at a transit of Venus, the black back of the planet can be seen on the sun's face without any other instrument than a piece of smoked glass. Probably some of you saw it so on the afternoon of Wednesday Dec. 6, 1882. There won't be another opportunity until Tuesday June 8, 2004. Mercury is far too small to be so seen. The black spot that he will make on the sun on May 9 will be less than one-twenty-fifth of the size of the spot that Venus made in 1882. Small as this is, it will take five minutes to get the whole of itself on to the sun's face, and as much more to get off again. The whole transit will occupy five hours, but the show won't begin until after the sun sets here; so we shall see none of it. However, there will be another one on November 10, 1894. That one will be visible here, and as the day is a Saturday, we can look at it all that afternoon.

* * * * * *

Venus and *Jupiter* are morning stars, and just at present a sight of them is well worth the trouble of getting up a little earlier than usual. An hour, or even half an hour, before sunrise is early enough, and the earlier in the month the better. Venus is moving in towards the sun, Jupiter is moving out. They will pass each other on the 7th, and the morning of that day and of the next will be the best times to see them. On these mornings they will be only about half a degree apart — a moonbreadth. The distance between them will increase about a degree a day after this; on the 15th it will be seven degrees, at the end of the month twenty-five degrees. Neither of the planets is at its best — Venus has less than half her greatest brilliancy, and Jupiter has just about half of his — but, even so, they are the brightest objects in the heavens next after the sun and moon, and it is a very pretty sight to see them as close together as they will be during the first half of April. Which is Venus and which Jupiter you will probably be able to settle for yourselves. Try also to settle these things: (1) What is the color of each? (2) How many times as bright as the other is the brighter one? Put your answers — especially the answer to (2) — on a post card, and address as below.

Star-gazers who object to early rising may take a look at these planets during the forenoon, Venus with the eye and Jupiter with a opera-glass. In a clear sky Venus is not at all hard to find any time up to noon, just now; and when Jupiter is so near her as he is at present a good glass should pick him up without much trouble. As a general rule the best time for getting a daylight peep at them is when they are on or near the meridian. In the middle of April Jupiter will be on the meridian at 9 a. m. meantime, and about thirty-five degrees above the horizon in this latitude. At the end of the month the meridian passage will happen three-quarters of hour earlier, and the altitude will be a degree higher. From the middle to the end of the month Venus will pass the meridian about 9:40 a. m. at an altitude of from forty to forty-five degrees.

* * * * * *

Mars is very far from being the glorious object he was last year, but he is worth looking at just to mark the difference between his splendor then and his insignificance now. Then he was so big and bright that even Antares looked mean beside him. You can't compare him with Antares now, but there is Aldebaran, with about the same brillancy as Antares, and much the same color. Which is the brighter now, Aldebaran or that red dot to the right? That is Mars. He is moving up between the Hyades and the Pleiades; about the 25th he will be directly between Aldebaran and the Pleiades. Try in the early evening which of the two — Mars or Aldebaran — you can pick up first. At the end of the month your glass will show Mars passing very close to a couple of pretty pairs — the Kappas and Upsilons of Taurus.

In the the summer of 1892 Mars will be much brighter than he was even last year.

* * * * * *

Although Mercury, Mars, Neptune and Uranus are all evening stars in April, *Saturn* has the best claim to be called the evening star for the month. He is above the horizon the whole evening, from sunset to midnight, and he is one of the four or five brightest objects in sight. That's him, up there to the left of the Sickle — that yellowish star. No one near him as bright as he is — a steady old chap, too, scarce a twinkle to be got out of him. Those stars near him belong to the constellation Leo.

This is one of the very poorest years for seeing Saturn's Ring. It is closing up fast. The south side of it, which has been turned towards us for the last twelve years, will disappear at the end of September, and the north side will begin to come in sight at the end of October.

* * * * * *

Uranus can be easily found with an opera-glass between Spica and Kappa Virginis. Having found it, lay down your glass and try your eye. If you are not sure which of two objects in that space is the planet, watch them both from night to night until you see which one is the wanderer.

A. CAMERON.

Yarmouth, N. S., March 25, 1891.

The *Normal Light* is the name of a neat and apparently well-conducted paper published by the students of the Normal School, Fredericton.

On the Early History of New Brunswick.

BY MOSES H. PERLEY.

[illegible]

In 1772 all the country below the Oromocto, on the west side of the River, was burnt over, quite down to the Coast. This fire raged with great fury, in consequence of most of the forest trees having been blown down 14 years before in the great hurricane of 1758. The Nerepis Road still bears marks of this Fire, as does all the country to the westward of us between this and the Magaguadavic. On the 4th May 1770 Wm. Owen, Plato Denny and Wm. Sherwood were appointed the first Justices of the Peace in the County of Sunbury and the boundries of the County were then defined. The County began at the St. Croix, thence along the Bay of Fundy to 20 miles above Cape Mispec, and thence extending back due north, the same breadth, to the southern boundry of Canada. All the eastern part of this Province, at that time appears to have been considered part of the County of Cumberland in Nova Scotia.

Three years afterwards, in 1773, James White, James Simonds and Samuel Peabody were also appointed Justices of the Peace in the County of Sunbury.

At this time hostilities were going on between Great Britain and her revolted Colonies, now the United States, and the inhabitants in this quarter were much pressed, & solicited to join the confederacy. But they stood firm in their faith to the British flag, and thereby incurred the displeasure of their western neighbours.*

In August, 1775, the rebels from Machias landed at this place, burned the fort & Barracks at Fort Frederick; and captured a brig laden with oxen and sheep for the British Army then at Boston.

The following year the Vulture, Sloop of war, was stationed in this Bay, between Annapolis and St. John, for the protection of both places; but one Sloop of war was not sufficient, for the rebels, visited and plundered the Inhabitants several times in that year. In consequence of disturbances in Cumberland 50 men were sent from Halifax to keep order in that d street. In Novr. a number of disaffected persons, with a number of rebels from New England, appeared before the Fort at Cumberland; they failed in their attempt upon it, and then made their way across to the Gulf Shore. Arriving suddenly at Pictou, they seized a valuable armed merchant ship, which was loading for Scotland; & with her, they made preparations for plundering St. John's Island.* Lieut. Keppel was sent in persuit of them—he recaptured the vessel and carried her into Charlotte Town.

On the 4th July 1776, the day on which the Americans declared their independence, Mr. Michael Franklin, the agent for Indian affairs, concluded a treaty of peace with the Indians on this River, and induced them to deliver up to him an agreement they had entered into with an agent of the rebels, to furnish them with 600 fighting men. For some time after, however, the Indians were kept in a state of ferment, by emmisaries from the rebels, who were sent among them, to endeavor to excite hostilities agt the English. The Settlers were in a state of constant alarm and uneasiness. Mr. White was appointed the Deputy of Mr. Franklin the Indian Agent, in this quarter—and to his exertions, and the great popularity he enjoyed among the Indians, may be attributed the preservation of peace with them. They called him familiarly "Bedooi," and he felt such confidence in their good feeling towards him, that he would at any time, venture alone among them; and he invariably succeeded in appeasing them, and preventing any outbreak.

In 1777 a rebel privateer visited this harbor and plundered the Inhabitants of every thing of value. From Mr. White's store alone, they carried off 21 boat loads of British merchandize. When these predatory visits, the inhabitants fled to the woods, where they remained until the plunderers departed. This last visit almost beggared them, and then, upon their urgent representation, a party of soldiers was sent from Halifax, in a transport, Dec. 1777. They were convoyed by a Sloop of war (which remained in the Harbour until the following spring) and they brought with them a Block House, ready to be put up. This they erected on the top of the high hill in Portland, which they named Fort Howe,—& thereafter a garrison was always kept there. In 1778, the Indians were incited by a Colonel Allen, who resided among and had great influence over the Penobscot Indians to make an attack upon the Settlers on this harbour

[illegible] (the Prince Edward Island)

* It is well known that in 1776, a month prior to the Declaration of Independence, the Many-minded Settlers, at a public meeting, declared themselves in sympathy with the revolted colonists. This has been made a reproach to these people, but unjustly. It must be remembered that the hardships and many sacrifices of the last seven years, from their old homes and friends in New England, would rather strengthen than weaken their best sentiments towards the mother and their sympathy for the wrongs of the colonies. We have reason to not condemn their action. Afterwards [illegible] to Britain.

This is the place to say, that some of the descendants of Israel Perley and perhaps others, have been told by the old people and tradition, that this action of the settlers in 1776 was not inspired by hostility to Great Britain, but was primarily an act of policy to secure for the brief [illegible] homes security from the attacks of the Indians, who, they well knew the colonies would endeavor to incite against every settler and every thing British. That such an effort was made is shown a little further on in this lecture. *W. F. G.*

& also upon Fort Howe. A party of the Penobscots came thro' under their chief AU-WAH-WES to join the Milicetes under PIERRE THOMA, in the proposed attack.

A very strong force was thus assembled, at *Ock-pa-haaq*, four miles above Fredn. where there was an Indian village*—(*Ock-pa-haaq* signifies "the beginning of the swift water"—the early settlers generally pronounced it *Oak Park*.) This force proceed down the river in ninety canoes. Mr. White hearing of their coming, set off, in a four oared barge, unarmed, to meet them. He found them halted at the head of the Reach, opposite Wordens, and there held a long conference with the Chiefs.

Pierre Thoma, who had the Chief command was inclined to listen to *Wabeit*, but the other Chiefs were not. At length "the talk" was broken up, by *Thoma* saying that before giving a final answer he would consult his God—He then retired apart from the rest, and threw himself flat upon his face, on the soft sand beach of the river. He there lay motionless nearly an hour; then rising, he again assembled the chiefs around the Council Fire. Then he informed that he had consulted his God, who had told him, that he had always reed. good treatment from King George's men; that King George had never injured him, but had given him many presents. That he knew nothing of Washington or his men, and he had determined to keep peace with King George & his people, and should return with his followers to *Ock-pa-haaq*. This gave great dissatisfaction to the Penobscots, but they were forced to give in & *Au-wah-wes* & his party accompanied Mr. White to St. John, while Tomah returned to the village. This was a bold stroke of policy, and Mr. White ran a risk which few men would willingly have encountered. His exertions on this occasion were so effectual, that there was never afterwards even a threat of hostilities from the Indians, and all has remained in quiet ever since.

In 1779 Mr. White, by order of Govt. erected a building at Indian Town for the accomodation of the Indians when they came to trade.

And now Ladies and Gentlemen we come to a point of great interest in our history.

On the 16th December 1782, the governor of Nova Scotia received a letter from General Carleton, dated at New York, stating that many families, determined on maintaining their allegiance to the British Crown, would come to Nova Scotia, and settle on the ungranted lands, within its extensive limits. "If the revolted Colonists were proud of their declaration of independence, well may the loyal Refugees exult with honest becoming pride in their Declaration of fidelity, fidelity proved to the uttermost."

The praises of their unflinching loyalty & devoted patriotism should sound in their aged ears, whilst yet they can hear, from the mouths of their sons & daughters; those praises should be reiterated & perpetuated at our public festivals & anniversaries as the noblest epitaphs which can hallow the acts & principles of the worthy dead, and do honor to the cause for which they endured and suffered—for which they bled and fell—that of their Sovereign and their country. In May 1783 the first fleet, with a large number of these brave spirits, who had abandoned all to maintain their loyalty, arrived in this Harbour. The point of land on which this City stands had been previously laid out in Town lots, by Paul Bedell (the Father of J. L. Bedell Esq) and had been named *Parr Town*, after Gov. Parr of Nova Scotia.

(To be continued.)

* At Spring Hill.

Euclid. Book II.

I.

(Continued.)

SUMMARY OF EUCLID II., 1 TO 10.

1. Let a, b, c be segments of a line and x another line. Then

$$(a+b+c)x=ax+bx+cx.$$

(To be proven geometrically by the diagrammatic method as in Euclid—the only case in which this method is necessary).

2. Let a and b be the segments of a line.

Then $(a+b)^2=(a+b)(a+b.$ (Def. of Sq.)
$=(a+b)a+(a+b)b.$ (Euc. II, 1.)
Q. E. D.

3. Let a and b be the segments of a line.

Then $(a+b)a=aa+ab.$ (Euc. II, 1.)
$=a^2+ab.$ (Def. of Sq.)
Q. E. D.

4. Let a and b be the segments of a line.

Then $(a+b)^2=(a+b)a+(a+b)b.$ (Euc. II, 2.)
$=a^2+ab+ab+b^2.$ (Euc. II, 3.)
$=a^2+b^2+2$ ab. (Ax.)
Q. E. D.

5 and 6. Let x be the mean distance of the point of unequal section of a line, and a be the half of the line.

Then $(a+x)$ and $(a-x)$ are the two segments.

And $(a+x)(a-x)=(a+x)a-(a+x)x.$ (Euc. II, 1.)
$=a^2+ax-ax+x^2.$ (Euc. II, 3.)
$=a^2-x^2.$ (Ax.)

[$(a-x)$=difference between a and x—the greater to be taken from the less.]

7. Let a be a Line, b one segment, then a—b will be the other segment.

Then

$a^2+b^2=(a-b)^2+2b(a-b)+b^2+b^2$, (Euc. II. 4.)

$=(a-b)^2+2ab-2b^2+b^2+b^2$, (Euc. II. 1.)

$=(a-b)^2+2ab$. (Ax.)

Q. E. D.

(Or, $a^2+b^2-2ab=(a-b)^2$, (Ax.—equal parts taken from equals.)

8. Let a and b be the segments of a line, then (a—b) will be their difference.

Then $(a+b)^2=a^2+b^2+2ab$, (Euc. II. 4.)

$=(a-b)^2+2ab+2ab$. (Euc. II. 7.)

$=(a-b)^2+4ab$. (Ax.)

Q. E. D.

9 and 10. Same hypothesis as in 5 and 6.

Then

$$(a+x)^2+(a-x)^2=\begin{matrix}2(a^2+x^2+ax.)\\2(a^2+x^2-ax.)\end{matrix}\ \text{(Euc. II. 4.)}\ \text{(Euc. II. 7. Cor.)}$$

$2a^2+2x^2$. (Ax.)

Q. E. D.

Note.—By the algebraic transposition of the terms of the equation, which constitutes the proposition forms called corollaries are obtained, algebraic transposition is the short method of applying one or other or both of the two axioms. "If equals be added to equals the wholes are equal, and if equals be taken from equals the remainders are equal."

Nature's Temple.

Talk not of temples—there is one built without hands to mankind given.
Its lamps are the meridian sun and all the stars of heaven.
Its walls are the cerulean sky, its floors the earth, serene and fair.
The dome is vast immensity—all Nature worships there.

The Alps arrayed in stainless snow, the Andean ranges yet untrod,
At sunrise and at sunset glow like altar fires to God.
A thousand fierce volcanoes blaze as if with hallowed victims rare:
And thunder lifts its voice in praise—all Nature worships there.

The cedar and the mountain pine, the will'w on the fountains brim,
The tulip and the eglantine, in reverence bend to Him.
The song-birds pour their sweetest lays, from tower and tree and middle air,
The rushing river murmurs praise—all Nature worships there.

—*Arthur Dee, Missouri.*

That compulsory education in Illinois is a success is attested by the fact that ten thousand children were taken from the streets of Chicago and placed in the schools.

Trees in School Grounds.

There are two school-houses not far apart in a little town in Maine. One is a fine structure, built upon a low hill, with its outlines rising stiff against the sky; the other, now old, and never handsome, is surrounded and almost hidden from the road by a thick growth of white spruce. Glimpses of children playing about the door leave little question as to which of the two is furnishing the men and women of the future with the pleasantest memories of school days. In the one case, beauty had been sought, at very considerable expense, in the way of architectural displays; in the other, beauty had been secured, whether intentionally or not, by building the house among the trees.

The absence of trees is a defect which is easily remedied, and their presence will do much to make the meanest school house attractive and picturesque. Where well grown trees have been left standing in the school ground, it should be a part of the work of Arbor Day to give them any care and protection they may need. A fine old white pine, or a handsome yellow birch, where such a thing exists, should be regarded as the chief ornament of the place. Every effort should be made to bring out all its beauties, and nothing done that will tend to lessen its effect.

But often the only thing done for the school ground has been to "clear it up" by cutting away everything that grew. In such cases it will be necessary to begin anew.

When the planting is only for ornament, the choice of trees of the same sort, or at least of similar growth, is preferable to a great variety, especially if but little space can be allotted to them. Those who distrust their own taste and judgment in the arrangement can find useful hints on page 94 of the Manual of School Law. With the instructions there given, there is not much danger of going astray. In general, short lived trees are to be avoided, and only those planted that with proper care will be sure to live and grow. The original forest, if some portions of it remain in the vicinity, will be the most trustworthy guide in this matter. Making due allowance for difference of soil and situation, the trees there found may be planted with some certainty of success.

Elms and maples appear to be the favorite trees in New Brunswick, and there are few school sites in the province where one or other of them would not seem in place. Grown as a single tree, on flat alluvial soil, the elm is without a rival. No lesser trees or shrubs should be allowed near it. The bole must rise clear from the grass, as much of the beauty of this tree is found in its straight, symmetrical shaft. An avenue

of stately elms is grand, especially if it be very long and very straight; but maples are more suitable for the modest pathway that leads to a village school. Whether in clumps, in rows, or as single trees, the maples are beautiful; and equally so on rounded hill tops, on gentle slopes, or on the level ground. They are easily transplanted, they grow quickly, and the grass will flourish under their shade. The red maple, prized for its rich coloring, both in spring and fall, will succeed in any soil that is neither very wet or very dry; the rock maple, scarcely inferior in form and color, likes the dry and shallow soil of the hillside; while the silver maple, the most graceful of the three, prefers the rich flat land of river bottoms.

The beech is seldom seen transplanted; perhaps because it is so hard to manage. It is certainly not lacking in beauty. White, of Selborne, speaks of it as the most lovely of all forest trees. And who does not know the delights of a beech grove in early spring, with the fresh odor of the bursting buds, or in autumn days, when the warm sunshine pours through the transparent yellow of the leaves and makes a richer sunlight in its shade. No grass grows under a beech tree. For this reason, and because it needs no great depth of soil, the beach is best adapted for planting in rocky places where few other trees would thrive.

In damp, rich soils, either the black or the white ash will make a handsome tree. Their chief fault is that they are slow to put forth their leaves in the spring and lose them early in autumn; but their rapid growth, and the rich, dark green of their foliage, are strong points in their favor.

Some of the birches do well in a shallow soil; though the most desirable of them, the yellow birch and the black or cherry birch, need a deep, cool soil for their best development. The black birch grows very fast, and is particulary noted for the beauty of its leaves. The yellow birch throws out its branches regularly, forming a magnificent head, and, like the oak or the butternut, should be grown singly and where it will have plenty of space.

Most of our native conifers can be used to advantage in some places. The white spruce and cedar are best for hedges and screens. A young fir is pretty when standing alone, in the form of a slender cone, with its lower branches resting on the ground. The pines are very desirable, but rather difficult to grow. The hacmatac has received more favor than its straggling growth and scanty foliage would seem to merit; and now that it is attacked by the larvæ of the larch saw-fly, it must cease to be regarded as an ornamental tree.

Among introduced trees, the lime, the horse chestnut, the English ash, the locust and the laburnum are valuable as single specimens. The poplars generally are rapid growers, but do not live long. The Balm of Gilead and the English white poplar throw up suckers from the root. The same objection applies to the clammy locust, and to such shrubs as barberry, spiræa and the hardy roses.

There is one thing which needs to be insisted upon, even at the risk of seeming to overstate it. Next to the cutting away of trees, the worst vandalism is what is called trimming them up. Regarded as an object of ornament in the landscape, the main point of beauty in a tree is at its base. In a thick forest growth, the lower branches perish from natural causes, but it does not follow that a naked trunk and spreading top is the perfect form of a tree. And, if it were, the eye demands not that the tree should be perfect in itself, though that is always desirable, but that it should add an element of beauty to the place in which it stands. The ardent lover of trees will watch their growing tops, observe their changing greens in light and shade, and admire their graceful forms against the sky. So seen they have a beauty all their own. Yet they are not, like the clouds, a separate picture, but belong to the ground and must be connected with it. Where trees surround an open space, or where the edge of the forest comes up to the school grounds, encourage the growth of shrubs, and under shrubs to form from grass to tree tops a solid wall of green. Without much encroaching upon the open space, this connecting strip of leafage between grass and trees may be made a feature of special interest. It would be a suitable place for all the spring and summer flowering shrubs, from the May-pear to the meadow-sweet, to be followed by the tallest of the golden rods and the best of the native asters, so that every week from May to September will furnish something new. The only care needed would be to keep out unsightly and weedy plants, and to see that the stronger trees and bushes did not crowd out the others, or spread beyond their bounds. It is best, of course, to select shrubs that do not "run" and are easily kept in shape. Such are the lilacs and syringas, among hardy cultivated shrubs, with thorns and shadbush and wild cherries from the woods, and the viburnums, witch-hazel and mountain ash.

If there is a fence between the school ground and the road, make the best of it. It must not, of course, be a shelter for thistles and other noxious weeds. Whether it be a rough stone wall, a pole fence, or something more artificial and more expensive, the best way to treat it is to cover it up with green. Shrubbery may be set on both sides of the fence,

giving the preference to native shrubs, but avoiding such as the alder and the elder, which are subject to the attacks of insects. Unless there is a public spirit which can be trusted, it is wise also to reject those which, like the May-pear and wild cherry, are likely to be broken for their flowers or their fruit. Low shrubs are the best, in most situations, so that the grounds and buildings may not be hidden from the road; but let it be shrubs of low growth and not those kept low by cutting back.

If on wet or clayey soil, the ground-nut, wild clematis and wild convolvulus may be planted, to cover fence and hedge-row with their drapery. In a drier situation, settings of Virginia creeper can be used. The Virginia creeper is a rapid grower, and is often used alone for covering a fence. It may be clipped like a hedge, where a straight line effect is required; but this can only be where there is an imposing building with terraced grounds and straight bordered walks, and even then the question is one which must be left to the architect, for possibly the wayward growth of the creeper may be just what is needed to connect the symmetry within the enclosure and the irregularity without.

In conclusion, then, the architecture of a grand edifice may require a formal treatment of the surroundings; but, with this limitation, it may be laid down as a canon of taste that we should never clip or mutilate a tree, either at top or bottom, nor try to confine a growing plant within unnatural lines; and nowhere can this general rule have greater force than in school grounds. There, for educational reasons, the most appropriate ornaments are indigenous trees and plants in their natural forms; for the love of nature is the best introduction to the love of art.

J. VROOM.

St. Stephen, N. B.

WHAT IS OUR DUTY.

"What is our duty here? To tend
From good to better — thence to best:
Grateful to drink life's cup — then bend
Unmurmuring to our bed of rest:
To pluck the flowers that round us blow,
Scattering our fragrance as we go.

And so to live that when the sun
Of our existence sinks in night,
Memorials sweet of mercies done
May shrine our names in memories' light,
And the blest seeds we scattered bloom
An hundred fold in days to come."

— *Arbor Day Manual.*

For the Review

Our Native and Our City Trees — How we May all Know Them.*

Of all plants, trees are the most conspicuous, on account of their size and beauty. Every one of us has an instinctive, if not a nurtured, love for them. We seek their cooling summer shade, and their shelter from the stormy blast; even our domestic herds and flocks, and the wild animals do the same. With pleasure we reach up to the ripening fruit which those that we call fruit trees offer. People, even the most incurious, who have not been trained to observe the operations of nature, cannot help noticing, with some measure of delight, the budding forth of the trees in springtime; the profusion of blossoms with which they lighten up the early summer woods; the fresh livery of green, in many shades, that they put on when the fine weather comes; the gay colors which they flaunt to the autumn breeze in the bright sunshine of the declining days. And if any there be who are callous to all this beneficent beauty, even such can appreciate the luscious fruits, whose plump cheeks and glowing hues seem to bathe the trees in grateful wreathed smiles, as they bring their last tribute of the year to the honest husbandman. He has planted, and fed, and watered, and pruned, and defended them, as if they were flesh and blood children of his own. Let no boy be so ignorant as to imagine that if he assaults an apple tree, held so dear, he will meet with mercy from its owner.

The number of *different kinds* of trees in a temperate country like ours is not great. Compared with the grasses, or the rushes and sedges, or the daisy-flowered plants, the species of trees are really comparatively few, and, then, the differences we see in trees are usually well marked, needing no magnifier; for the trees belong to widely different natural orders, or what we may call, in accordance with the language of our time, evolutional categories. For these reasons any pupil of a school can soon be taught to know all the important TREES of his or her native Province.

The trees may be set apart into two distinct armies that have very little in common, except that they are trees:

1st. The broad-leaved trees, whose leaves have a conspicuous mid-rib, with side veins proceeding from it at nearly regular intervals of space, and a network between; (all this may be clearly seen by holding up the leaf between the eye and the light.)

2nd. The needle-leaved trees, whose leaves are long,

* Written for pupils whose minds have not been disturbed by botanical terms. In case some scientific student may venture to read this school-boy's paper, I apologize to him in advance for the liberties taken with Her Majesty's English as she is penned in "the botanies."—G. L.

slender, more like prickles than leaves, with no room for veins.

The broad-leaved trees vary in their flowers and fruit, in the different species that are not related to each other, but these parts are not always accessible. The leaves we can always examine; even in winter, if the snow is not too deep, we can find the fallen ones in the hollows. The elm of interval lands is a noble tree, with a tall naked stem, which branches out at top into a gigantic plume. Its leaves are arranged in an alternate manner along the shoot; each has a mid-rib and closely-set, straight, parallel side veins, which end at the margin in angular teeth like those of a saw. Instead a succulent fruit or a nut, the elm produces something like a tiny, flat, oval-shaped paper bag, with a thicker kernel in the centre.

The beech has leaves with a mid-rib and straight side veins somewhat like those of the elm, but they have a smooth appearance; the fruit is very different, consisting of triangular nuts, usually two together in a small pouch or case, rough outside, which opens at top as the nuts ripen by the spreading apart of four lips.

The aspen is known by the long, slender leaf stalks, which are flattened in a way not seen in any other tree, so that the leaves are constantly trembling. One species, closely related to it, has much larger leaves, which are covered *when young* with dense white wool, making the foliage of the woods look pale in spring-time. It is called popple in Nova Scotia. The Lombardy poplar, a tall, very slender tree, like a leafy-post, was planted by the early French settlers in many places. The balsam poplar is known by its very large leaves, and its habit of running shoots under ground, from which new trees grow up.

The oak is known by its leaf appearing to be divided or cut into a few large lobes, each with a vein in its centre proceeding from the mid-rib, and the fruit is in form of a smooth, shining nut sitting in a rough cup; such a fruit is called an acorn.

The birch has smaller and thinner, papery leaves, with sterile flowers in long, slender pendents, which appear in early spring and soon drop off. There are other spikes much shorter, which remain and contain the seeds. There are several species of birch which differ in the size and shape of the leaves, whether rounded or angular, and the color of the bark. The sweet, or black birch, has dark-brown bark and straight veined leaves; the yellow birch also has straight veined leaves, but its bark is yellow. In the American white birch (as it is called), the leaves are somewhat triangular, and taper-pointed, trembling on their slender stalks, the bark chalky white and separable into thin sheets like paper. This last character is more fully seen in the true paper or canoe birch, which has egg-shaped, not triangular, pointed leaves.

The ash trees have what are called pinnate leaves; that is, the leaf consists, not of one piece, but of a number of blades (each with a very short stalk) arranged feather-like along a stalk which terminates in a similar blade or leaflet. These pinnate leaves come out two together from the shoot on opposite sides, where there is usually a swelling of the shoot, and a bud for each leaf. The fruit is dry and husky, hanging in little clusters or tassels, each fading away into a thin papery membrane. The white ash has bare leaf-stalks, and the leaflets are pale beneath. In the red ash they are hairy or velvety; the green ash has them bare, but the leaves are green on both surfaces. The black ash is known from all the rest by having no stalks to its leaflets. In this it resembles the European ash, which is grown as a shade tree in cities; its leaflets do not have the long, slender tips of the black ash.

The European lime is the best shade tree in the city of Halifax; it has egg-shaped pointed leaves, but one side of the leaf at the stalk end is larger than the other,—the leaf is lop-sided. The stalks that bear the clusters of odorous flowers and small fruit balls, hang from the middle of odd-looking, flat, straw-colored strips of tape or ribbon or bass-mat material that do not look like stalks or leaves or flowers or any thing else that one looks for in a tree.

The horse chestnut is also a foreign tree, and may be known by its nuts, or by the leaves, which consist of a number of very large leaflets spread out from the top of the stalk as fingers from a hand.

There are a number of native trees that do not grow to any great size. The mountain ash (often called stinking ash, from the smell of its broken shoots) has *compound* leaves, that is, leaves consisting of a great number of small blades arranged on two sides of a stalk as in the ash; this is why it is called ash, which is a misnomer. It has showy *flat* clusters of white flowers, which are succeeded by bright red berries, bigger and harder than currants.

The hawthorn is a small branchy, thorny tree, with lobed leaves, white blossoms, and clustered fruits that look like berries but are soft only outside, with hard stones within.

The Indian pear, shad bush, or amelanchier, has ovate or oblong simple leaves, sharply serrated, and racemes of white flowers, with long narrow petals. Boys eat the small sweet fruit.

Our native willows are shrubs rather than trees. The leaves are long and narrow, tapering with short stalks or sessile. The sterile spikelets are borne on

one bush or tree and drop off early; the fertile catkins on other. The white willow, which grows to the size of an immense tree, has similar long, narrow leaves, and the sterile tree is known from the fertile one by the early dopping of the tender spikelets, that then lie in the grass like hairy caterpillars. This tree was planted extensively by the early settlers from Europe.

The needle-leaved trees usually bear cones as their peculiar form of fruit; the scales of these open and allow the seeds to fall out.

The white pine is the most valuable of all American trees for its lumber. The needle-leaves are clustered *five* in a sheath.

The pitch pine has only *three* leaves in a sheath, and are from three to five inches long.

The scrub pine has its leaves in *twos*, but only one inch long. The red pine also has its leaves in *twos*, but they are *five* or *six* inches long.

The spruces have their leaves singly all around the branch or shoot, and the cones hang down. There are three kinds, the black, white and red spruce.

The hemlock leaves are short, and look as if arranged along two sides of the shoot, making a flat frond. The cones are very small with thin scales. The long, slender tips of the young branches always hang down gracefully, instead of standing up erect, or straight out, like those of a spruce.

The balsam fir has much larger, flat needles, arranged as in the hemlock, so that the shoots are like nothing more than a double-toothed comb. The cones are long, cylindrical, and stand *erect* on the branches like candles, the balsam running down their sides, and when the cone ripens, its scales fall off, leaving a bare, straight, erect peg like a short wire, or as if the candle-wick remained. GEORGE LAWSON.

Halifax, 29th March, 1881.

For the REVIEW.

The Physiology of a Tree.

The higher plants and the higher animals are so manifestly and strikingly unlike each other in externals, that to those who look no deeper, they seem to have but little in common. Yet under all their elaborate diversity they have this fundamental and all-important connection, that both live. Both therefore must obey all the laws which control living matter: and these laws are the same for both. Hence it is that plants have a "Physiology"; and like animals, including ourselves, Trees must eat, drink, digest, breathe, grow and reproduce, and they must have organs to carry on these functions. It is our present purpose briefly to examine both organs and their functions.

THE PHYSIOLOGICAL ORGANS OF A TREE. Nearly everybody knows that all vegetable structures are made up entirely of *cells*. A typical plant cell is in size too minute to be seen by the naked eye; in form, it is a sphere bounded by a thin transparent elastic wall. Just inside of this wall comes a lining of the living matter, Protoplasm, a jelly-like substance in which reside all the vital properties and powers of the plant. And filling the remainder of the hollow of the sphere are various contents, as sap, sugar, starch, crystals, etc. These are the simplest cells; but in order to perform special duties, they may become altered greatly in size, shape, thickness and composition of the walls, nature of the contents, etc.; but out of them, however modified, the entire tree is built up.

An attempt to classify the varieties of cells soon shows that they fall naturally into three systems, each of which has its own particular work to do. These are

(1) *The Epidermal system*, which consists of a thin tough sheet of flat transparent cells, thoroughly waterproofed by the presence in their walls of the same substance which makes ordinary cork waterproof. The cells may grow out into hairs or scales wherever the plant has use for such structures. The epidermis forms a complete coating over all parts of the plant, perfect except that its waterproofing diminishes on the youngest roots, and unbroken except for tiny openings in the green parts, (called stomata) guarded by special cells having the power to close them. In old trees, the epidermis on the stem is replaced by the tougher corky bark, which even better serves the same purposes. The use of this system is to prevent the evaporation of the precious water, and to protect all the interior tissues.

(2) *The Fibro-vascular system*, consists of long tough fibres, each a cell, for strengthening and supporting the tree-structure, and of water-passages or ducts, made by the removal of the contact-walls of long chains of cells, for conveying liquids. These mingled together form all the mass of the wood of the tree, the fibrous part of the inner bark, and extend out into the leaves as the veins. The cells in it are variously thickened and stiffened to make the whole structure firm.

(3) *The Parenchyma system*, is made up of cells little altered from the typical simple form described above. It includes the pith, the green part of the bark, the cambium or growing-layer, the medullary rays or "silver-grain," all young growing roots and buds and all the green parts of young stems and leaves. Its uses are varied, as will presently be seen.

It will greatly assist our readers in understanding what follows, if they will try to form a vivid mental picture of the tree as made up of these tissues as we

have described them. It is to be noticed that in the plant there are far fewer forms of "tissues," fewer distinct physiological organs, than in the animal. This is because specialization or division of labor in plants is much less perfect than in animals; and one structure has to perform several duties.

How and what the Tree eats and drinks. Botanists and chemists have joined forces for this study, and they have found that the tree, like all other plants, uses as its food these four substances, carbonic acid gas, water, nitrogen and some common mineral salts. Out of these, and these only, does the tree build up not only its own structure, but also all of the immense variety of products which it yields us.

The carbonic acid gas (CO_2 of the chemists) exists in a very dilute form, about one twenty-fifth of one per cent, in the atmosphere. From this it is taken into the digestive organs, i. e. the leaves, of a Tree directly through the epidermis, which is so constituted as to stop the passage of water vapor, while allowing other gases to pass freely. The water (H_2O) on the other hand, is taken in entirely from the soil through the tiny hair-like outgrowths of the epidermis of very young roots. These hairs can extract, by the physical process of osmosis, even the smallest quantities of moisture from the soil. The water is then conveyed up to the leaves as "sap," through the younger wood, the force which raises it being a combination of capillarity and a certain little-understood property of the living-matter, or protoplasm, contained in the medullary rays or "silver-grain."

Nitrogen (N) is of very great importance to the tree, as it is an essential constituent of the protoplasm. It is nearly all obtained from the soil in some soluble compound dissolved in the water taken up by the roots, and with the water it is taken to the leaves. It gets into the soil in three ways; either from the decomposition of animal or vegetable matter containing it; or from rain-water in which it falls dissolved in the form of nitrous acid formed in the air by electrical action; and lastly from nitrates formed in the soil by the agency of Bacteria or germs.

The mineral salts are without exception taken in with the water in solution through the roots and with the water carried to the leaves. To effect the solution of mineral salts, an acid is formed by the young roots.

How the Tree digests or assimilates these substances. The leaf is the digestive organ of the tree, and the raw food substances being within it, digestion will begin provided there is green matter present and sunlight or its equivalent,—but these two latter conditions are absolutely requisite. The green matter, or chlorophyll, occurs in the protoplasm of the leaf-cells in the form of granules, but nothing whatever is known as to the cause of its peculiar properties. We simply know that without it, assimilation and therefore vegetable and animal life would be impossible. This is perhaps a new view to many of our readers as to the use of the green color of vegetation.

The process of digestion consists primarily in the decomposition of the CO_2 and H_2O, and the formation from their elements of a new substance. That substance is first recognizable as *starch,* ordinary laundry starch. In this process, all the carbon and hydrogen are needed to form the starch, but there is a large quantity of oxygen left over, which is given out again by the plant. The process may be illustrated simply by the following formula which our chemical and perhaps all our readers will understand.

$$6\ (CO_2) + 5\ (H_2O) = C_6H_{10}O_5 + 6\ (O_2).$$

In other words, by the decomposition of six molecules of carbonic acid gas and five of water, there are produced one molecule of starch and six of free oxygen. It is thus that plants purify the air for animals, absorbing the carbonic acid gas, retaining carbon and giving back to the air the pure oxygen.

The atoms of the molecules CO_2 have an exceedingly strong affinity for each other, so much so that a tremendous force is required to pull them apart. That force is supplied by the energy of the sun's rays, which explains the need for sunlight in the process of assimilation. But though forced apart, the atoms still retain their affinity, the carbon of the starch and the oxygen of the air, and they will eagerly re-unite if allowed to do so.

But what of the nitrogen in this process? It takes no part in the formation of starch, but this once formed, a union of some of its constituents with the nitrogen gives us the albuminoid or protoplasmic substances which are of such vital importance. This union for the most part takes place in the stem away from the leaves. All food substances whatever, formed by the tree, pass through stage equivalent to this, that is, they are formed from the starch.

The mineral salts are of subordinate importance.

How the Tree stores up food. It is evident on a moment's thought, that if plants produced only so much starch as they individually need, there would be none for animals, and animal life would be impossible. Plants do more; they store up materials to give them a start in the spring, and to give their seeds a start in life. It is of this store that animals rob them. The insoluble starch formed in the leaves wood, bark, buds, or roots, after being re-converted is converted into scluble sugar and carried back in

solution into the stem, where it is stored in the pith, into insoluble starch. Nitrogenous substances are stored in a similar way. The need of withdrawing them from the leaves is evident; were it not done they would be lost when the leaves fall.

How the Tree Grows and Breathes. The material for new growth used by the tree, is some of the very starch and protoplasm which it has formed by assimiliation. These are made soluble, transferred to where there are needed and there employed to build up new cells — for all growth is but the formation of new cells. But in addition to food, there is needed in all growth a certain amount of energy or force. Growth is a form of work, and just as certainly requires force to accomplish it as does the lifting of a weight by a man. The source of this force is the energy which is set free when the oxygen of the air is allowed to combine with the carbon of the starch. We have already noticed the very strong affinity of these elements for each other, and that a great force is required to tear them apart. When they are allowed to re-unite, they will give out an amount of force equivalent to that which was required to separate them. The process may be compared with what takes place in a storage-battery, in which a current of electricity tears apart certain atoms which have a strong affinity: as long as these are kept apart, no force is exerted—it is stored. When they are allowed to re-unite there is given out again a current of electricity, which, as everybody knows, can do work. The same thing is shown when the oxygen and hydrogen of water are forced apart: when allowed to re-unite, as they do in the oxy-hydrogen blow-pipe, great heat, a form of force, is given out. And again, when we allow the carbon of coal to re-unite with the oxygen from which it was separated by the power of the sun's rays long ages ago, heat is given out which we can utilize in various ways. The oxidation of starchy materials, therefore, is the source of the energy required by the plant for its growth: and precisely the same thing is the case with animals. Both absorb oxygen and both give off oxidized carbon or carbonic acid gas — in other words, both breathe.

At first sight it appears that this process is not consistent with what we said of assimiliation,— the latter requiring the absorption of CO_2 and elimination of oxygen. But both processes do occur in every plant. Growth and respiration, however, are most active at night or in darkness (whence the unhealthiness of plants in sleeping-rooms), while assimiliation can only occur in sunlight. And, moreover, in the latter process far more CO_2 is absorbed and O given off, than are given off and absorbed respectively by the former. Hence plants *do* purify the air for animals. Where both processes are going on together they doubtless use, to a certain extent, each other's products.

How the Tree transpires. This process has no counterpart in the animal world. It consists in the giving off of pure water from the leaves, carefully regulated by the cells which have the power of opening and closing the stomata or (improperly called) breathing-pores. Its purpose is to concentrate and make more available, the very dilute nitrogenous and mineral substances taken in by the roots. The amount of water thus transpired is often very great—so great in some trees (as the Australian Encalyptus) as to make them good drainers of marshy soils.

How the Tree gets rid of waste matters. These are of three sorts — gases, liquids and solids. Of the gases, oxygen is a waste product in assimiliation and carbonic acid gas in respiration; these are given off directly through the epidermis. Of liquids, water is a waste product in transpiration; it is given off as vapor through the stomata. Of the solids, nearly all are crystalline; some are useless matters taken in with water through the roots with needed substances, and some are secondary products of needed chemical changes within the plant. These are either stored up as crystals in little-used cells of the stem, when the trees cannot really get rid of them of course, or else they are carried to the leaves, which drop in the fall and thus remove them from the plant. Probably this is one reason why the leaves of our trees periodically are shed. All useful matters are, however, withdrawn into the stem from the leaf before it falls.

How the Tree heals injuries. When the tree is injured from without, a host of moulds, germs and other organisms are ready to attack it through its wounds. As a protection against this invasion most trees, especially those with brittle wood, secrete a resin which they can pour out at once as a balm or salve over the injury. This is but temporary however, and the plant heals the scar permanently by covering it even in young parts, with layers of cork, which begin to form at the margins of the hurt and gradually extend in to cover it completely.

How the Tree reproduces itself. The life of the individual being limited, to perpetuate the race there must be some agency which will reproduce an individual like the parent. This is done by the flower. All trees have flowers though in some they are very small and inconspicuous. The essential parts of the flower are the pollen grain and the ovule. By a proper contact of the two, each being preferably taken from a distinct individual, there is formed a tiny single cell in the ovule which contains protoplasmic matter derived from both pollen and ovule, in other words, from two distinct parents; which is exactly

the case also in the animal kingdom. This cell soon grows into the embryo which lies in the seed, and when the seed is planted, the embyro grows into the adult tree. Since the tree thus contains living matter derived from both parents, it is not like either of them alone, but shows characters of both. Nature has, so to speak, two sets of characters to choose from, and acting as usual optimistically, she selects the best, so that the offspring can be a little better than either of its parents. The tree can also be reproduced by slips or cuttings; but here there is living matter in the offspring from only one parent, which it must therefore closely resemble, varying neither for better nor worse.

How the Tree moves. The adult tree cannot change its place, but if the same were true of its offspring, overcrowding would soon injure all. To provide against this, every tree at a certain stage is adapted, not to move itself, it is true, but to be moved by some natural agency. This stage is that of the embryo as it lies in the seed. The seeds of all trees are so formed as to secure wide scattering by means of the wind, currents of water and animals; and the study of the adaptation of seeds to this end is one of the most interesting in Natural History.

Such is an outline of the Physiology of the Tree. It will serve to show how much more Trees have in common with us than externals would suggest.

W. F. Ganong.

Cambridge Mass

Forestry.

In European countries especially forestry is one of the important public concerns of the government. We will ere long be pushed to take an interest in it. But if we wait until we begin to suffer poignantly, we turn our attention to the matter too late. We lose advantages which would cost millions to restore. Our people have no conception of the great importance attached to this department in Germany, France, or even Norway. Our legislators are content to scheme as to how they can best secure their places of emolument; and for that purpose they watch the people and grant them what they appear to be most urgent in demanding. But they do not attempt to study the drift of undirected individual labor to make provision for the future. A prophet must arise from among the people and show them the future. Then the people shall ask, and, we presume, our needy legislating parasites will grant it rather than be carried off.

First and most important, we would suggest that all otherwise uncultivable land should be left in the forest and properly treated or replanted if already denuded. Advantages: A regulated supply of timber more valuable a few years later than now; a climate improved by collecting and storing more of our rainfalls and modifying the action of winds and extreme heat; and making the country beautiful by its forming more or less a combined park and natural history garden every here and there. All barren hill tops which, although fertile after their first cultivation, have now their elements of fertility washed away, should be covered with groves. Secondly, long expanses of plains should be broken up by narrow groves of trees running athwart the lines of the severest prevalent winds. And thirdly, road sides should be lined with trees for ornamental effect as well as for general climatic influence. Just about the time Europeans commenced coming to America on their crusade of destroying trees, at home they began to protect and replant them. It is high time now that the hand of the destroyer in America should be directed by the dearly gained experience of older lands, so that the useful and necessary destruction of our forests may not be converted into useless and mischievous waste. The school-master must take the matter in hand.

Forests and Floods.

During this season of the year news of the sad havoc of floods come to us from many parts of the world; and even our own provinces, with their small river basins, often have their tales to tell of bridges borne down and property destroyed. But the floods, causeless, do not come. They form one of the scourges for the sin of our present civilization in neglecting the scientific study of our environment and the direction of selfish or unthinking individual effort. The effect of a heavy rainfall now, as compared with the one before our forests were cut down, can be seen from such a consideration as this. A four inch rainfall in a few hours then would be absorbed by the moss and vegetable debris of the forest, from which it would filter into streamlets, then into brooks, and lastly into the river. The river would rise gradually for a few days, then as gradually decrease. To a river basin fifty by twenty miles, such a rainfall would contribute over 50,000,000,000 gallons of water. The action of the forest surface would let that amount pass off in, say, five days. Thus the lower channel of the river would have to distribute only 10,000,000,000 gallons per day approximately. But when the land is cleared, the rain falls on the hard sod and rapidly runs off. It sweeps plowed fields and the dust and dirt of farm yards, roads, etc. into the streams, whose volume causes them to channel out the solid earth and hurl the valuable superficies of agricultural soil into the

central turbid torrents within the space of twenty-four hours. The river channel has now to do duty for about 50,000,000,000 gallons in one day. So valuable property is overflowed and swept away, and the great hydraulic pressure tears up embankments and rolls Titan rocks before the flood. What might produce merely a clear swollen stream for a week in the olden time, now causes frantic, earthladen tornadoes of water which scrape down the hills and wash the plains into the sea. In round numbers, we can say that the annual rainfall in these Atlantic Provinces is about four feet, which is about 100,000,000,000 cubic feet; or about 600,000,000 gallons per square mile. The heavier the rain shower, of course, the greater are our present conditions against the proper utilization of the precipitation.

In the United States and in European countries, where large river basins are denuded of the forest, bridges have been built to withstand freshets unknown in the olden time; while during the most of the year the streams may be much lower and even altogether dry. For the mosses, etc., of the forest, as vast sponges, keep the rainwater on the surface of the soil sufficiently long to allow of the saturation of the earth from which innumerable springs arise to feed the streams during the whole year. But our civilization causes the valuable rains of heaven to be instantly precipitated into the salt sea, carrying with it violently the best of our agricultural soil to knead it into a greater rock cake for the making of future fields for agriculturists who may class our remains exhumed therefrom as the successors of the Mesozoic monsters. And thus our summer springs dry up, and our streams vanish, and drought withers our crops. So Sicily, once the granary of Rome, ran the race before us. So the agricultural environment of ancient Carthage, and the glories of the Orient faded in the trial of the tree destroying Turk. First the flood, then the famine.

Forests and Fish.

When our rivers and brooks ran through the primeval forest they abounded in fish. For age after age, before the tree felling animal intruded into these solitudes, these finny fairies disported themselves in the limpid moss filtered waters which rose and sank gently with the humidity of the changing season. But now at times the waters rage with unwonted fury, and the turgid wave is poisoned with mud and the washings of cultivated fields. This is a new condition of things which the gills of the sylvan fish were not accustomed to, and very probably were not very well adapted to. Then, when the flood was spent, the drought of summer dried up pools which formerly gave free sporting room for the hugest salmon in the driest season of the year. This is why our rivers have to be restocked. It is not the sportsman so much as the change in the fish's environment which is causing his disappearance. When the forests are cleared away the far famed Margaree of Cape Breton, the romantic Metapedia, and the prolific Fraser River, of British Columbia, will have their fish stories retailed only as legends.

It is very doubtful if man, with his schemes of close seasons and restockings, can offset the changed conditions of the country. We can try. But we must also prevent as much as possible stream pollution of every kind; and for other and weightier reasons try to moderate the floods and foster the hillside springs and the rain absorbing qualities of the earth.

A. H. M.

Halifax

Selections and Material for Arbor Day Programme.

RESPONSIVE READINGS from passages in the Bible, selected and arranged beforehand. (See Gen. I. 11, 12, 29, 30; Gen. II. 8, 9; Ezekiel XXXI. 3-10; Job XIV. 7-10; Psalm 1; Psalm XC.; Hosea XIV.)

PRAYER.

RECITE IN CONCERT.

Children, thank God for these great trees,
That fan the land with every breeze,
Whose drooping branches form cool bowers,
Where you can spend the summer hours,
For these thank God.

Reading of Inspector's notice setting apart the day; also requirements of school law.

SONG.

(To "Maryland, My Maryland")

Again we come this day to greet,
Arbor Day! sweet Arbor Day!
With willing hands and nimble feet,
Arbor Day! sweet Arbor Day!
No sweeter theme our time can claim,
No grander deed points us to fame,
No day more proud than this we name,
Arbor Day! sweet Arbor Day!

Bring forth the trees! Prepare the earth
For Arbor Day! sweet Arbor Day!
With song we celebrate the birth
Of Arbor Day! sweet Arbor Day!
And when our joyful task is done,
And we our meed of praise have won,
The glorious work is just begun
For Arbor Day, dear Arbor Day!

Seymour S. Short.

Recitations and readings.

RECITATION.

A boy strolled through a dusty road:
"What can I do?" said he.
"What little errand for the world?
I know — I'll plant a tree."

The elm's vast shadow far and cool
Fell o'er the dusty way,
Blessing the toilers at their rest,
The children at their play.

And panting horses felt the air
Grow sudden full of balm;
Great oxen with their weary loads
Caught there a sudden calm.

So little acts of kindliness
Spread every branch and root,
And never guesses he who plants,
The wonders of the fruit.

I often think if blessed eyes
The old home scenes can see,
That heaven's joy is heightened by
The planting of a tree. —*F. M. Butts.*

Selections from Tennyson, Wordsworth, Bryant and others.

RECITATION ARBOR DAY.

What do we plant when we plant the tree?
We plant the ship which will cross the sea.
We plant the mast to carry the sails:
We plant the planks to withstand the gales—
The keel, the keelson, and beam and knee:
We plant the ship when we plant the tree.

What do we plant when we plant the tree?
We plant the houses for you and me.
We plant the rafters, the shingles, the floors,
We plant the studding, the lath, the doors,
The beams and siding, all parts that be:
We plant the house when we plant the tree.

What do we plant when we plant the tree?
A thousand things that we daily see;
We plant the spire that out-towers the crag,
We plant the staff for our country's flag;
We plant the shade, from the hot sun free;
We plant all these when we plant the tree.

Henry Abbey.

A recitation for nine little girls, four each to recite a long paragraph, and the short paragraph to be recited in concert by the other five.

THE DANDELION.

First girl recites:

There's a dandy little fellow,
Who dresses all in yellow,—
In yellow with an overcoat of green;
With his hair all crisp and curly,
In the spring time bright and early,
Tripping o'er the meadow he is seen.

Second girl

Through all the bright June weather,
Like a jolly little tramp
He wanders o'er the hill-side down the road;
Around his yellow feather
The gypsy fire-flies camp;
His companions are the woodlark and the toad.

Five recite in concert:

Spick and Spandy, little dandy;
Golden dancer in the dell!
Green and yellow, happy fellow,
All the children love him well.

Third girl:

But at last this little fellow,
Doffs his dandy coat of yellow,
And very feebly totters o'er the green.
For he very old is growing,
And with hair all white and flowing
Nodding in the sunlight he is seen.

Fourth girl:

The little winds of morning
Come flying through the grass,
And clap their hands around him in their glee;
They shake him without warning—
His wig falls off, alas!
A little bald head dandy now is he.

Five recite in concert:

O poor dandy! once so spandy,
Golden dancer on the lea.
Older growing, white hair flowing,
Bald head dandy now is he.

ESSAYS from subjects treated in this number of the REVIEW, and elsewhere.

VOTE — What tree shall be named and planted by those graduating or leaving the school this year.

VOTE — On a flower for the Province — Rose, Mayflower, blue violet, aster, golden-rod or other.

ADDRESS — By clergyman or some one appointed for the occasion.

TREE PLANTING.

Now a strong, fair shoot from the forest bring,
Gently the roots in the soft earth lay;
God bless with His sunshine, and wind and rain,
The tree we are planting on Arbor Day.

So may our life be an upward growth,
In wisdom's soil every rootlet lay;
May every tree bear some precious fruit,
Like the tree we plant on Arbor Day.

— *Arbor Day Manual.*

AT THE TREE.

Arriving at the place for the planting of a tree, everything should be found in readiness by previous preparation, so there may be no delay. By arrangement the tree should be dedicated to some particular person as decided upon beforehand. It would be well to have printed or painted on tin or wood and attached to the tree, the name of the person to whom it is dedicated, with date.

Place the tree carefully in position, as nearly as possible as that when found growing in its native place. Put in the earth carefully. See that finely pulverized earth is placed about the rootlets.

Teachers of District No 10.

I wish you to notice the following proposed changes for next summer. By permission of the C. P. I. it is my intention to spend the term in meeting you at convenient centres, in Teachers Institutes, for the purpose of studying more practically the rudiments of Natural Science as laid down in the C. S. Board, and generally, best methods of teaching all subjects. The Institutes will be carried on somewhat after the model of the Summer School of Science. Where an instructor can be found, lessons will be given in the Tonic Sol Fa method. Circulars naming the different stations and giving full information will be sent to teachers about May 1st. To facilitate my plan, you will oblige me, by sending along with your winter returns, the fullest information possible as to what section you are removing, your successor's name, and names of teachers in surrounding schools. As this work will occupy the greater part of the summer, my visitation of schools will be confined to those whose teachers do not attend the Institutes.

Our appeal to the teachers of Cumberland and West Colchester, on behalf of the "Children's Relief Fund," in the March REVIEW, has met with a very generous, if not general response. Many teachers, because their schools can give only a small sum, are deterred from sending it. I trust that such a condition of things will not hinder their co-operation. The principle of the giving, in the largest and smallest sum, is the same. If each school averages but one dollar, we will have a respectable fund.

Principal Freeman and Staff, Amherst,		$45 00
" Riggles "	Acadia Mines,	25 00
" McKenna "	Oxford,	30 00
Miss Corbett, Amherst Pt. S. Section,		6 50
" Lee, Wentworth Stn.	"	3 10
" Chapman, Little River,	"	1 00
" Harrison, Salem,	"	3 50
" Fulton, DeBert, No. 19,	"	22 00
" Harvey, Brooklyn, Hants,		7 50
" Wallace, Ryan's Creek, Hants,		2 50
" Richardson, East Advocate,		2 40
" Trenholm, Lower Linden,		3 00
Mr Arthur Cox, Newton's Mills, Hants,		3 00
Miss Sadie Fulton, DeBert (additional),		2 00
" Johnstone, Advanced Depart. Joggins School,		2 32
" Ryan, Primary " " "		2 00
" Gloanie, Lower Wentworth,		1 60
" McKay, North Shore, Wallace,		4 75
" Doyle, Lower Shinimicas		2 65
" Dunn, Shinimicas Bridge,		4 00
" Corbett, Lakelands, Parrsboro,		10 00

Two of above contributions were raised before this fund was proposed. With these exceptions, Acadia Mines was the first received. I have to thank the teachers in Hants who are helping us. Will not every school in my District earn the pleasure of saying that it did something for the orphan children of Springhill?

Yours, E. J. LAY.

Amherst, March [illegible]