ANNALS

OF THE

BOTANICAL SOCIETY OF CANADA.

VOL. I. PART III.

From 12*th April*, 1861, *to* 14*th February*, 1862.

All Communications are to be sent to the Secretary, PROFESSOR LAWSON, Kingston, C. W.
Remittances to ANDREW DRUMMOND, Esq., Montreal Bank, Kingston, C. W.

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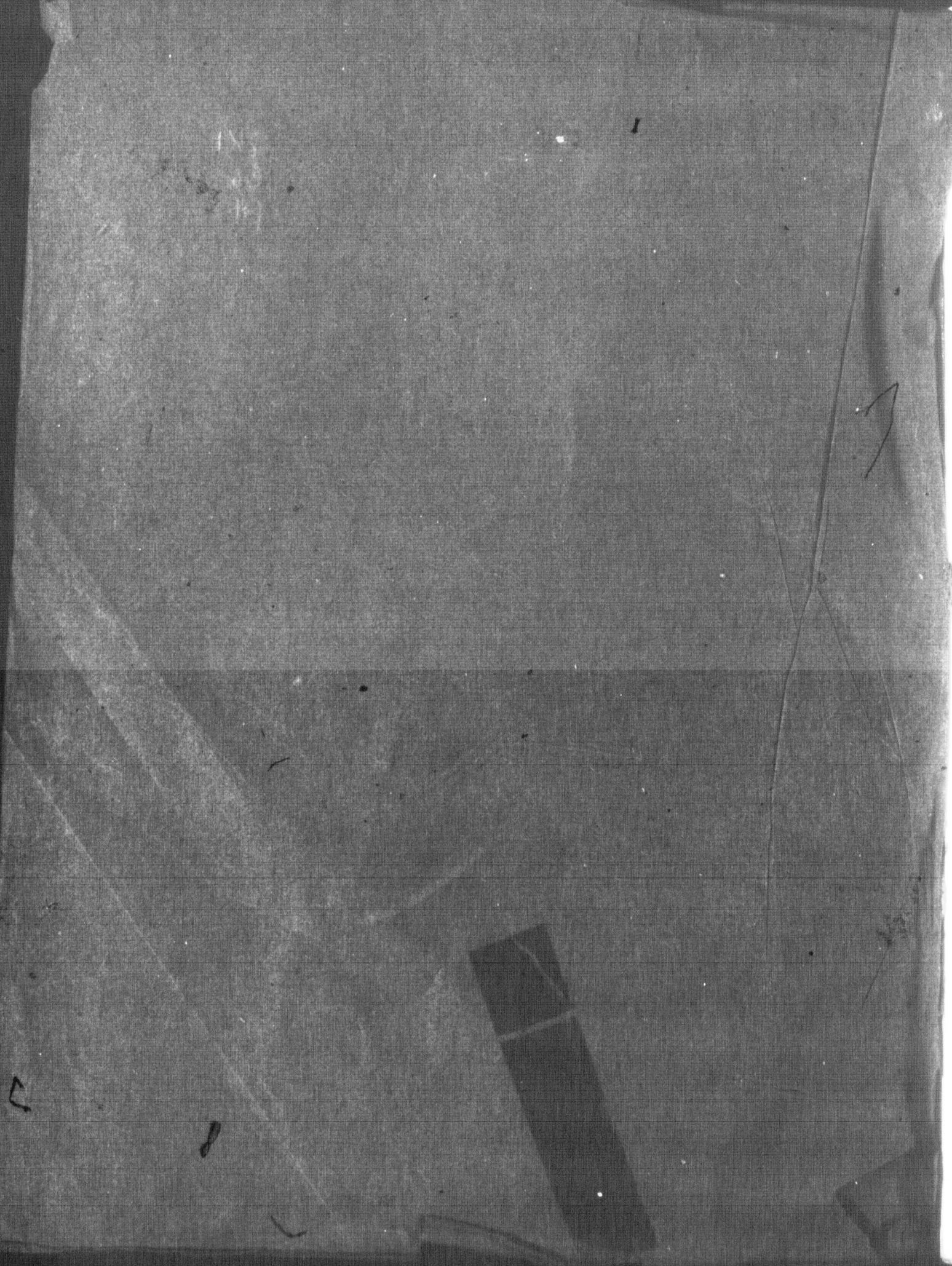

The following papers were also read :—

1. On the History, Properties and Cultivation of Cotton. By F. R. STANTON. Communicated by DR HORATIO YATES, Professor of Medicine.

2. List of Plants observed in the neighborhood of Prescott, C. W., chiefly in 1860. By B. BILLINGS, JR., F. B. S. C.

3. On the Sugar Maple, and the Preparation of Sugar and Saccharine Solutions from Maple Sap. By JOHN MAY, A. M.

4. Notices of the destructive effects of Frost on Vegetation in Britain during , Edinburgh, DR. JOHN LAWSON.

861.

DONATIONS TO THE BOTANIC GARDEN.

JOHN WATKINS, ESQ., - - - - -	$60.
J. CARRUTHERS, ESQ., - - - - -	25.

he Chair.

elected Fellows of the
mead, Drummondville,
West.

Members :—John Rich-
ing's College, London,
Lynn.

gh, and John T. Syme,
Members.

cultivated Plants made
ıber of interesting spe-
us copallina, Nicandra
iens Balsamina, Vexill-
ygonum orientale, Convolvulus Batatas, Capsicum annuum, Salvia obovata, &c.

Dr. J. R. Dickson, Professor of Surgery, exhibited an interesting series of specimens collected by Dr. W. E. G. C. Dickson, many years ago, during the Excursions of the University Botanical Class around Edinburgh, and including specimens of Oxytropus campestris and other Clova plants from Prof. Balfour. Attention was directed to a frond of Polypodium vulgare, from Kinnordy, which was referable to the rather rare variety *auritum* of Moore.

The following donations to the Society's Library were announced, viz:— McGillivray's Lives of Eminent Zoologists, from Mr. Stanton. Prof. Lawson's pamphlet on Botrydium granulatum, from the Author. The Secretary announced the presentation to the Society by one of the Fellows, Mr. B. Billings, Jr., Prescott,

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3. On the Sugar Maple, and the Preparation of Sugar and Saccharine Solutions from Maple Sap. By John May, A. M.

4. Notices of the destructive effects of Frost on Vegetation in Britain during the present winter, from Letters of Professor Balfour, Edinburgh, Dr. John Lowe, King's Lynn, and other correspondents. By Prof. Lawson.

Sixth Meeting.

FRIDAY EVENING, 12th APRIL, 1861.

The Very Rev. Principal Leitch, D. D., President, in the Chair.

The following Candidates were balloted for, and duly elected Fellows of the Society, viz :—Hon. William Sheppard, D. C. L., of Fairymead, Drummondville, Lower Canada. J. Bruce, Nurseryman, Hamilton, Canada West.

The following gentlemen were elected Corresponding Members :—John Richardson, Geological Survey, Montreal. P. L. Simmonds, King's College, London, England. John Lowe, M. D., M. R. C. S., England, King's Lynn.

Letters were read from R. K. Greville, L L. D., Edinburgh, and John T. Syme, F. L. S., London, acknowledging their election as Honorary Members.

Professor Lawson exhibited a collection of native and cultivated Plants made in South Carolina by Mrs. Noel, Kingston, containing a number of interesting species, such as Cassia nictitans, Gossypium herbaceum, Rhus copallina, Nicandra physaloides, Spigelia Marilandica, Nicotiana Tabacum, Impatiens Balsamina, Vexillaria Virginiana, Phytolacca decandra, Œnothera biennis, Polygonum orientale, Convolvulus Batatas, Capsicum annuum, Salvia obovata, &c.

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of a large and very valuable collection of plants, chiefly from the neighborhood of Prescott. The Society's thanks were specially voted to Mr. Billings for his valuable donation.

Mr. A. T. Drummond, B. A., exhibited a number of Dyes prepared from native Canadian Lichens. Mr. T. Sullivan presented a peculiar pilose Polyporus.

Blank Schedules for recording the leafing, flowering, and other periodical phenomena of plants, were distributed to the Members.

The following papers were read, viz:—

1. Remarks on the Silk obtained from Lettuce-fed Silk Worms. By Miss Gildersleeve.

2. Further observations on Silk Culture. By Mrs. Lawson.

3. Extracts from Letters relative to Silk and the native fibre-yielding Insects of Canada. By John Duff.

4. On Fungi, their relation to Disease. By John Lowe, M. D., M. R. C. S., Eng., F. B. S. E., Surgeon to the West Norfolk and Lynn Hospital. This paper has since been published in the British American Journal of Medical and Physical Science, for May, 1861, (vol. ii, p. 193).

5. On the Secretion of Saccharine Matter in the Floral Organs of Plants, and on the Economy of Bees; with the results of investigations on the Sexual Development of Bees. By the Very Rev. Principal Leitch, President.

Seventh Meeting.

FRIDAY EVENING, 14TH JUNE, 1861.

Rev. Professor Mowat, A. M., afterwards Rev. Prof. Williamson, L L. D., Vice-President, in the Chair.

The following were admitted as subscribers:—Miss Fisher, Newmarket; Rev. H. E. Plees, Carrying Place; Rev. Mr. Borthwick, A. M., Ottawa; John G. Giles, M. D., Farmersville; W. Carter Deans, M. D., Trenton; W. Weir, M. D.; H. D. Lord, Ladlowville, Tompkins Co., New York; Edward C. Fox, of Baliol College, Oxford, Trenton, C. W.; Samuel H. Fee, Kingston.

Donations of seeds were announced from Mr. Haage, Erfurt, and Mr. Bruce, Hamilton; donations of specimens of lichens from Mr. B. Billings, Jr., Brockville; and donations to the Library as follows:—Fragmenta Phytographiæ Australiæ, Vol. I., from the Author, F. Mueller, Ph. D., Botanist to the Colony of Victoria, Hon. M. B. S. C. From Principal Dawson, Montreal, Hon. M. B. S. C., his Memoir on the Pre-carboniferous Flora of New Brunswick, Maine and Eastern Canada.—From F. Stanton, of the 1st Royals, F. B. S. C., several interesting volumes on botanical subjects.

Printed notices of several projected publications were laid on the table, including Prospectus of a new Botanical Journal by John T. Syme, Hon. M. B. S. C., and of a new edition of the Entomological Writings of Harris, by W. Sharswood, M. B. S. C.

Professor Lawson exhibited, under the microscope, several species of Spirogyra in a beautiful state of conjugation, Chætophora elegans, and other Algæ, from the pond in Queen's College grounds.

The following papers were read :—

1. On the Geographical Distribution of the Coniferæ in Canada. By the Hon. William Sheppard, D. C. L., of Fairymead, Drummondville, Lower Canada, F. B. S. C. This paper has since been published in the Edinburgh New Philosophical Journal for October, 1861, (new series, No. 28, vol. xiv, p. 206).

2. Description of the Curculio, its mode of destroying Fruit, and the various means employed to check its progress. By Thomas Briggs, Jr., F. B. S. C.

3. Remarks on the species of Oak, their history, habits and uses. By Miss Crooks, Hamilton, C. W., Mem. B. S. C.

4. On the Lichens of the neighborhood of Prescott, C. W. By B. Billings, Jr., F. B. S. C. With specimens.

REGULATIONS FOR THE EXCHANGE OF SPECIMENS.

The Laws of the Society provide for the formation of a public herbarium and the extension and improvement of private herbaria. In order to accomplish these important objects, arrangements have been made for receiving from members contributions of dried specimens of plants, and for supplying in return the desiderata of such members. The following Regulations have been framed for regulating the exchange of specimens.

1. The distribution of specimens shall be conducted by the Curators, and shall commence on the 15th November annually, before which time all contributions of specimens must be sent in by members who desire to participate in the distribution.

2. To entitle a Fellow or Subscriber to a share of the Society's duplicate specimens at any of the annual distributions, he shall have transmitted to the Society, before the 15th November, not less than 50 species of plants, with as many duplicate specimens of the rarer ones as possible.

3. All specimens contributed to the Society must be carefully prepared, by being pressed between sheets of paper in the usual manner, but not fastened down to paper in any way. Each specimen is to be accompanied by a label containing the name of the plant, together with the locality where collected, the date of collection, and the collector's name.

4. Universities and scientific societies forming herbaria and corresponding with the Botanical Society, will be permitted to take precedence of the members in the annual distributions. The Society's public herbarium will be invariably supplied with such specimens as may be required before any distributions take place.

5. Members are required to send, along with annual contributions of specimens, a list of those species which they desire to receive in return, or otherwise to specify, in sufficiently explicit terms, the nature of the plants wished for.

DESCRIPTION OF THE CURCULIO, ITS MODE OF DESTROYING FRUIT, AND THE VARIOUS MEANS EMPLOYED TO CHECK ITS PROGRESS.

By Thomas Briggs, Jr., F. B. S. C.,
President of the Horticultural Society of Kingston.

Read 14th June, 1861.

The Curculio, or Plum Weevil, for the last few years has been very destructive to the fruit crop, more particularly the Plum, and as the season it makes its appearance is fast advancing, it may not be out of place at this meeting to give a brief description of the insect, its mode of destroying the fruit, and the various means which have been taken to check its progress. The Curculio is about one-fifth of an inch in length, very hard, of a dark brown color, varied with spots of lighter shades, behind its wings is a band of ochre yellow, thorax uneven and rough; it has a long curved throat with two fine pointed mandibles at the end of its snout with which it makes the crescent shaped ⌒ mark upon the plum or fruit, as shown by the accompanying drawing, it does not, however, confine itself to the Plum, but attacks the cherry, apple, pear and other fruits.

It makes its appearance in this locality in the latter part of May or early in June, and commences its work on the Plum about ten days after the blossoms have fallen or as soon as the fruit is set, and if allowed to continue its destruction in the fruit garden without interruption, will scarcely leave a Plum unmarked on any one tree: in the crescent shaped mark it deposits an egg, and in a few days after a worm or maggot appears therein, working its way into the core of the fruit; the effect caused by this worm or maggot in the Plum, is the dropping of the same before ripe, after which it passes into the ground, where it completes its transformation and is supposed by many to remain in the soil until the following Spring; others are of opinion that it brings forth two broods in one season, that is, the larva in the early fallen fruit soon becomes perfected, returns out of the soil and commences its destruction on apples, pears and other fruits. My own observations have satisfied me such is the case. During the early part of last summer I placed a Plum and a Curculio

under a glass; the second day the Curculio was allowed to pass out, first having marked the Plum in its usual way, the Plum was preserved under the glass: and in a few weeks a perfect Curculio made its appearance; the short period required from the time the egg is deposited in the fruit to the insect making its appearance in a proper state, affords ample time to produce two broods during the summer.

By cutting open some of the early fallen Plums in June or July, the larva of the Curculio will be found therein, in others it will have already passed from the fruit into the ground, where it completes its transformation in about three weeks. It is advisable, indeed, I may say necessary, in order to check the increase, and assist as far as possible the entire destruction of the insect, to cause all the fallen fruit to be picked up and destroyed by burning or some other sure mode of destruction, for such precautions, tend to lessen their appearance the following season, and might in time so far diminish their numbers as to prevent them from doing any material injury. If the fruit is allowed to remain on the ground the insect passes therefrom and continues to increase.

Various and numerous are the measures which have been tried to check the ravages of this fruit destroyer, some of which I may mention, as, by placing coops of chickens under or near the trees, so that they may eat the worms or grubs as they pass from the fruit, syringing the trees with tobacco water, soap suds, copperas water, lye, lime water, dusting the trees at the time they are in bloom, and when the fruit is forming, with ashes, lime, plaster, salt, sulphur, &c., &c.; paving under the trees with brick or stone, turning pigs into the enclosure to eat the fruit which drops from the trees, tying cotton coated with tar round the trunk of the trees so as to prevent the Curculio from passing up.

Many persons are of opinion it does not fly but crawls up the tree, this, however, is a mistaken idea. There is no doubt it flies, but not so readily as many other winged insects; about four years ago I tried the last mentioned means by having strips of cloth tied round all my Plum trees about one foot from the ground, a thick coat of tar put thereon, so as to prevent the Curculio or any other insect from passing over it; in addition to this, the trees were dusted with air slacked lime during the time they were in bloom, and repeated after every shower of rain until the fruit was set; this, however, did not prevent the Curculio from making its usual destruction; as it could not possibly pass the tarred cloth, I became convinced it was quite capable of using its wings; from this and other observations, I believe the Curculio is both migratory and gregarious.

I have tried all the foregoing means, except that of turning pigs into my premises, which are not adapted for such a trial. There is no doubt where pigs and poultry can be allowed to run the fruit garden, it would have a tendency to check the increase of the Curculio, in consequence of their eating all the fallen fruit containing the larva of the insect.

After my trial with the tar bands, without success, I visited the extensive nurseries of Messrs. Ellwanger & Barry, at Rochester, N. Y., where I witnessed their Plum trees heavily laden with fruit. Mr. Barry informed me they could only succeed in checking the ravages of the Curculio, and secure a sure crop of fruit, by jarring the trees daily, sweeping up and destroying all the Curculio and punctured fruit that might fall upon the ground.

The following season I adopted the same plan, the result was in securing a full crop of Plums. From two of my trees twenty-five bushels of ripe Plums were gathered, and all the others were equally full. I have since continued the same course yearly, with success, and believe it to be the only satisfactory remedy yet discovered; all others prove of little or no effect.

The proper time to commence jarring the trees is so soon as the blossoms have fallen and the fruit set, or there is evidence of the Curculio being at work by the crescent shape mark being visible upon the fruit; the plan is to spread sheets beneath the trees as far as the branches extend, take a slat about two feet long and four inches wide, wind round one end a few thicknesses of carpet or coarse cloth, so as to avoid injuring the bark, hold this against the body of the tree or a stump from which a limb has been cut, and strike it sharply with a heavy wooden mallet two or three times, which will cause the Curculio to drop upon the sheet, when it may be discovered; this requires to be done every morning for about two weeks, or until no Curculio's are to be found. Merely shaking the tree with the hand will not answer, it requires a quick sudden jar with the mallet to cause it to drop.

There are many things relative to the habits of this insect I have necessarily excluded, as I fear I have already trespassed upon your valuable time.

Kingston, C. W., April, 1861.

LIST OF PLANTS OBSERVED GROWING PRINCIPALLY WITHIN FOUR MILES OF PRESCOTT, C. W., AND FOR THE MOST PART IN 1860.

By B. Billings, Jr., F. B. S. C.

Read 28th March, 1861.

The particular localities of rare plants and those not found within the limits indicated, are given below, but this was considered unnecessary with those represented as common. The list contains nearly all the species to be found here, from Ranunculaceæ to Lycopodiaceæ inclusive, but to enumerate the species of the remaining families, both time and attention will be required.

RANUNCULACEÆ.

Clematis Virginiana, L. Two miles from Prescott, near Ottawa and Prescott Railway. Abundant and rare in thickets northward to Chelsea.

Anemone Virginiana, L. Rocky wood-lands, near Brockville; thickets on Stewar property. Prescott, northward to Ottawa, rather rare.

Anemone Pennsylvanica, L. Common over the country.

Hepatica triloba, Chaix. Rocky wood-lands West of Brockville, not rare. Ottawa, Lot O., rare.

Hepatica acutiloba, DC. Common in woods.

Thalictrum dioicum, L. Common.

Thalictrum Cornuti, L. Common.

Ranunculus aquatilis, L., var. divaricatus. Conway's Creek, a mile West of Prescott and Railway Bay. Common.

Ranunculus Purshii, Richards. Conway's Creek.

Ranunculus Flammula, L., var. reptans. Dried up ponds near Fort Wellington, Prescott. Banks of St. Lawrence, west of Brockville, rare.

Ranunculus abortivus, L. Common.

Ranunculus recurvatus, Poir. Woods. Common.

Ranunculus Pennsylvanicus, L. Wastes. Common.

Ranunculus repens, L. Conway's Creek.

Ranunculus acris, L. Common.

Caltha palustris, L. Common.

Coptis trifolia, Salisb. Common.

Aquilegia Canadensis, L. Common.

Delphinium Consolida, L. Banks of the St. Lawrence, west of Prescott.

Hydrastis Canadensis, L. Mirivin's Woods, a mile west of Prescott; rare.

Actæa spicata, *Linn. var. rubra* as well as *alba* is very common in thickets.

MENISPERMACEÆ.

Menispermum Canadense, L. Common in woods; abundant near Ottawa.

BERBERIDACEÆ.

Caulophyllum thalictroides, Michx. Common in woods.

Podophyllum peltatum, L. Mirivin's Woods; rather rare.

NYMPHÆACEÆ.

Nymphæa odorata, Ait. Conway's Creek; common in rivers, &c., inland.

Nuphar advena, Ait. Conway's Creek, and with the last; common.

Nuphar Kalmiana, Pursh. Nation River, at the crossing of the Ottawa and Prescott Railway, nine miles from Prescott.

SARRACENIACEÆ.

Sarracenia purpurea, L. Marsh near Ottawa and Prescott Railway, four miles from Prescott. Heck's Mills, Augusta and northward; common.

PAPAVERACEÆ.

Chelidonium majus, L. DeSett's Woods, near Prescott.
Sanguinaria Canadensis, Rich Woods and northward ; common.

FUMARIACEÆ.

Dicentra Cucullaria, DC. Mirivin's Woods and northward to Ottawa ; common.
Dicentra Canadensis, DC. Mirivin's Woods, &c., and evidently more abundant than the last.
Corydalis glauca, Pursh. Exposed rocks, Brockville. Chelsea, C. E.

CRUCIFERÆ.

Nasturtium palustre, DC., var. hispidum. Common in moist places.
Dentaria diphylla, L. Rich woods ; abundant.
Cardamine pratensis, L. Near Ottawa and Prescott Railway, two miles from Prescott Station ; Dow's Swamp, three miles South of Ottawa.
Cardamine hirsuta, L. Very common in swamps.
Turritis stricta, Graham. Grand Trunk Railway Track near Prescott ; rare.
Erysimum cheiranthoides, L. Near Prescott Junction ; rare.
Sisymbrium officinale, Scop. Road sides common.
Sisymbrium Sophia, L. East Street, Prescott ; rare.
Sinapis arvensis, L. Extremely abundant in cultivated fields.
Camelina sativa, Crantz. Grank Trunk Railway Track.
Lepidium Virginicum, L. Wastes ; common.
Capsella Bursa-pastoris, Mœnch. Everywhere ; common.
Thlaspi arvense, L. West end of Dibble Street, in a field ; rare.

VIOLACEÆ.

Viola blanda, Willd. Very common.
Viola cucullata, Ait. Very common.
Viola rostrata, Pursh. Rather rare.
Viola Muhlenbergii, Torr. Common.
Viola Canadensis, L. Common.
Viola pubescens. Common.

CISTACEÆ.

Lechea minor, Lam. Rocky woodlands west of Brockville.

DROSERACEÆ.

Drosera rotundifolia, L. Marshes near Prescott Junction ; rare.

HYPERICACEÆ.

Hypericum perforatum, L. Very common.
Hypericum corymbosum, Muhl. Common.
Hypericum mutilum, L. Common.
Hypericum Canadense, L. Common.
Elodea Virginica, Nutt. Common in Swamps.

CARYOPHYLLACEÆ.

Silene inflata, Smith. Sandy field two miles west of Prescott ; rare.
Silene antirrhina, L. Grand Trunk Railway, two miles west of Prescott ; rare.
Silene noctiflora, L. Very common.
Agrostemma Githago, L. Common in grain fields throughout.
Arenaria serpyllifolia, L. Woods, fields and gardens ; common. (Ottawa).
Stellaria media, Smith. Very common.
Stellaria longifolia, Muhl. About Prescott Junction ; somewhat rare. Common. towards Ottawa.
Cerastium viscosum, L. Everywhere common.

PORTULACCACEÆ.

Claytonia Caroliniana, L. Mirivin's Road and elsewhere ; common.

MALVACEÆ.

Malva rotundifolia, L. Road sides and waste places in abundance.
Malva sylvestris, L. Road sides ; rare.

TILIACEÆ.

Tilia Americana, L. Common.

LINACEÆ.

Linum usitatissimum, L. Grand Trunk Railway Track ; rare.

OXALIDACEÆ.

Oxalis stricta, L. Common.

GERANIACEÆ.

Geranium maculatum, L. Thickets about the Junction ; rather common.
Geranium Robertianum, L. Bank of Conway's Creek, a mile from Prescott.
Geranium Carolinianum, L.

BALSAMINACEÆ.

Impatiens fulva, Nutt. Common.

RUTACEÆ.

Zanthoxylum, Americanum, Mill. Near Maitland, rare ; Ottawa, common.

ANACARDIACEÆ.

Rhus typhina, L. Common.
Rhus Toxicodendron, L. Common.

VITACEÆ.

Vitis cordifolia, Michx. Common.
Ampelopsis quinquefolia, Michx. Common.

RHAMNACEÆ.

Rhamnus alnifolius, L'Her. Common in Swamps near Prescott Junction and northward.
Ceanothus Americanus, L. Extremely abundant in thickets near Grand Trunk Gravel Pit, three miles west of Prescott.

CELASTRACEÆ.

Celastrus scandens, L. Banks of Conway's Creek and in thickets; common.

SAPINDACEÆ.

Staphylea trifolia, L. Thicket near Grand Trunk Gravel Pit, west of Prescott.
Acer Pennsylvanicum, L. Common.
Acer spicatum, Lam. Common.
Acer saccharinum, Wang. Common. A few trees of var. *nigrum*, are growing in Mirivin's Woods.
Acer rubrum, L. Common.

LEGUMINOSÆ.

Trifolium arvense, L. West slope of Conway's Creek, near Brockville Road.
Trifolium pratense, L. In cultivation and elsewhere; common.
Trifolium repens, L. Common everywhere.
Trifolium procumbens, L. Waste places; common.
Melilotus alba, Lam. Bank of the St. Lawrence, two miles from Prescott.
Astragalus Canadensis, L. Bank of the St. Lawrence, a mile west from Prescott. (Brockville in thickets westward.)
Desmodium nudiflorum, DC. Rare.
Desmodium acuminatum, DC. Common.
Desmodium pauciflorum, DC. Rare.
These three species grow in Mirivin's Woods.
Desmodium Canadense, DC. Rocky woodlands near Brockville; common.
Lespedeza hirta, Ell.
Lespedeza capitata, Michx. With the last, near Grand Trunk Gravel Pit, west of Prescott, and westward along the banks of the St. Lawrence.
Vicia sativa, L. Clay banks east of Prescott.
Vicia Cracca, L. Fields and wastes; common.
Lathyrus palustris, L. Common in marshes.
Apios tuberosa, Mœnch. Marsh near Blue Church, west of Prescott.
Amphicarpæa monoica, Nutt. Woods and thickets; very common.

ROSACEÆ.

Prunus Americana, Marsh. In thickets; everywhere, common.
Prunus Pennsylvanica, L. Common.
Prunus Virginiana, L. Common.
Prunus serotina, Ehrhart. Common.
Spiræa salicifolia, L. Common.
Spiræa tomentosa, L. Common.
Agrimonia Eupatoria, L. Common.
Geum album, Gmelin. Common.
Geum strictum, Ait. Common.

Geum rivale, L. Dr. Jessup's Swamp ; abundant, but not often met with.
Waldsteinia fragarioides, Tratt. Common.
Potentilla Norvegica, L. Fields and road sides. Common.
Potentilla Canadensis, L. Banks of Conway's Creek, near Grand Trunk Railway.
Potentilla anserina, L. Everywhere common.
Potentilla palustris, L. Marshes north of Junction.
Fragaria Virginiana, Ehrhart. Common.
Fragaria vesca, L. Mirivin's Woods. Common.
Rubus odoratus, L. Common.
Rubus triflorus, Richardson. Common.
Rubus strigosus, Michx. Common.
Rubus occidentalis, L. Common.
Rubus villosus, Ait. Common.
Rubus hispidus, L. Woods north of Prescott Junction ; rare.
Rosa lucida, Ehrhart. Thicket south of Junction.
Rosa blanda, Ait. Very common.
Cratægus Oxycantha, L. Near the bank of the St. Lawrence, two miles west of Brockville.
Cratægus coccinea, L.
Cratægus tomentosa, L. Growing with the last near the Pine Grove N. of Prescott.
Pyrus arbutifolia, L. By the side of Grand Trunk Railway near Junction Switch.
Pyrus Americana, DC. In a swamp four miles north of Prescott near Ottawa and Prescott Railway. (Near Heck's Mills, Augusta). (Blue Swamp Nepeon), &c.
Amelanchier Canadensis, Torr. and Gr. Very common, northward to Ottawa.

LYTHRACEÆ.

Nesæa verticillata, H. B. K. In a marshy little bay on the banks of the St. Lawrence, a mile west of Brockville. Banks of the Rideau, near Ottawa.

ONAGRACEÆ.

Epilobium angustifolium, L. Common in moist grounds.
Epilobium palustre, L. var. lineare. In swamps about Prescott and northward ; common.
Epilobium coloratum, Muhl. Common.
Œnothera biennis, L.
Ludwigia palustris, Ell. Conway's Creek, abundant, and elsewhere in Swamps, common.
Circœa Lutetiana, L. Mirivin's Woods ; common.
Circœa alpina, L. Moist woods and fields ; extremely abundant.
Proserpinaca palustris, L. Marshy bank of the Nation River at the crossing of the Ottawa and Prescott Railway.

Myriophyllum spicatum, L. St. Lawrence River; common.
Hippuris vulgaris, L. Marshy Bank of the St. Lawrence, three miles east of Prescott; abundant.

GROSSULACEÆ.

Ribes Cynosbati, L. Common.
Ribes rotundifolium, Michx. Common.
Ribes lacustre, Poir. Common.
Ribes prostratum, L'Her. Rocks west of Brockville. (Chelsea, C. E).
Ribes floridum, L. Common.

CRASSULACEÆ.

Sedum acre, L. Rocks near First Toll Gate west of Prescott; and abundant upon rocks a mile west of Brockville, near the River.
Penthorum sedoides, L. Common.

SAXIFRAGACEÆ.

Saxifraga Virginiensis, Michx. Wind Mill Point west of Prescott; and abundant in rocky wood-lands near Brockville.
Mitella diphylla, L. Common in woods.
Mitella nuda, L. Rather rare in moist woods, and occasionally met with in open situations.
Tiarella cordifolia, L. Woods; common.
Chrysosplenium Americanum, Schwein. Bottoms of wood-land rills and wet places in swamps.

HAMAMELACEÆ.

Hamamelis Virginica, L. Thickets around Prescott Junction.

UMBELLIFERÆ.

Hydrocotyle Americana, L. Moist woods; common.
Sanicula Marylandica, L. Woods and thickets; common.
Daucus Carota, L. Wastes around Grand Trunk Gravel Pit.
Heracleum lanatum, Michx. A mile west of Brockville, on the Bank of the St. Lawrence.
Pastinaca sativa, L. Road sides and along fences; common.
Thaspium aureum, Nutt. Banks of Conway's Creek; rare.
Zizia integerrima, DC. East Bank of Conway's Creek, a mile from Prescott.
Cicuta maculata, L. Swamps; common.
Cicuta bulbifera, L. Swamps; common.
Sium lineare, Michx. Swamps; common.
Cryptotœnia Canadensis, DC. Mirivin's Wood; not rare.
Osmorrhiza longistylis, L. Fence-row, Wind Mill Point.
Osmorrhiza brevistylis, DC. Common in woods.

ARALIACEÆ.

Aralia racemosa, L. Common in rich woods.
Aralia hispida, Michx. Sand-banks north-west of Prescott.
Aralia nudicaulis, L. Very common in rich woods.
Aralia quinquefolia. Mirwin's woods; rare.
Aralia trifolia. Woods and thickets; very common.

CORNACEÆ.

Cornus Canadensis, L. Very common.
Cornus circinata, L'Her. Thickets around Grand Trunk Gravel Pit.
Cornus stolonifera, Michx. Conway's Creek, banks of streams inland and swamps; very common.
Cornus paniculata, Michx. Thickets near Grand Trunk Gravel Pit; not rare.
Cornus alternifolia, L. Thickets near the Junction; not common.

CAPRIFOLIACEÆ.

Linnæa borealis, Gronov. Swamps; very common.
Symphoricarpus racemosus, Michx. Abundant in thickets near Grand Trunk Gravel Pit.
Lonicera parviflora, Lam. Hedgerows; rare.
Lonicera ciliata, Muhl. Woods; common.
Lonicera oblongifolia, Muhl. Bay near Heck's Mills.
Diervilla trifida, Mœnch. Thickets around Grand Trunk Railway Gravel Pit; abundant. Ottawa. Chelsea, C. E.
Triosteum perfoliatum, L. Thickets two miles west of Prescott. Chelsea, C. E.
Sambucus Canadensis, L. Common and abundant northward.
Sambucus pubens, Michx. Everywhere common.
Viburnum nudum, L. Thickets around Prescott Junction and moist woods; not common.
Viburnum Lentago, L. Thickets near the Junction. Banks of streams inland and northward; common.
Viburnum dentatum, L. Woods north of Junction; rather rare.
Viburnum pubescens, Pursh. Thickets, Grand Trunk Railway Gravel Pit.
Viburnum acerifolium, L. Mirwin's woods; common.
Viburnum Opulus, L. Banks of streams; common.
Viburnum lantanoides, Michx. Thickets and woods near Prescott Junction.

RUBIACEÆ.

Galium asprellum, Michx. Thickets north of Junction; not common.
Galium trifidum, L. Very common in swamps.
Galium triflorum, Michx. Mirwin's woods.
Galium circæzans, Michx. Mirwin's woods.
Galium lanceolatum, Torr. Mirwin's woods.

Galium boreale, L. Rocky wood-lands near Brockville; rare.
Cephalanthus occidentalis, L. Marsh south of Prescott Junction, northward to Ottawa, in swamps.
Mitchella repens, L. Common.

DIPSACEÆ.

Scabiosa atropurpurea, L. Grassy bank of Railroad, bay east of Prescott.

COMPOSITÆ.

Eupaterium purpureum, L. Marshy wet places around the Junction and northward, very common.
Eupatorium perfoliatum, L. Swamps; common.
Eupatorium ageratoides, L. Woods; common.
Aster macrophyllus, L. Abundant in thickets.
Aster cordifolius, L. Abundant in thickets.
Aster miser, L. Everywhere; common.
Aster tenuifolius, L. Swamps; common.
Aster puniceus, L. Swamps; common.
Aster Novæ-Angliæ, L. Thickets around Prescott Junction; rare.
Aster acuminatus, Michx. Woods and thickets west of Junction; rather rare.
Erigeron Canadense, L. Borders of woods; common.
Erigeron Philadelphicum, L. Swamps and moist grounds; common.
Erigeron annuum, Pers. Fields; very common.
Erigeron strigosum, Muhl. Fields; very common.
Diplopappus umbellatus, Torr & Gr. Thickets west of Brockville a mile.
Solidago squarrosa, Muhl. Rocky wood-lands near Brockville.
Solidago bicolor, L. Thickets east and west of Prescott.
Solidago latifolia, L. Rich woods two miles west of Prescott; abundant.
Solidago cæsia, L. Mirwin's woods; abundant.
Solidago arguta, Ait. Marsh four miles north of Prescott, near Ottawa and Prescott Railway? Oswegatchie, near Ogdensburgh! and Chelsea, C. E.!
Solidago altissima, L. Very common.
Solidago nemoralis, Ait. Field near Fort Wellington.
Solidago Canadensis, L. Very common.
Solidago serotina, Ait. Rather rare.
Solidago lanceolata, L. Common in moist places along the Grand Trunk Railway.
Inula Helenium, L. Dr. Jessup's swamp, northward; common. At Heck's corners, Township of Mountain, covering several acres of ground.
Ambrosia artemisiæfolia, L. South end of East Street, not seen elsewhere.
Xanthium Strumarium, L. Mirwin's side road, a mile from toll gate.
Rudbeckia laciniata, L. Wet ground near Blue Church, and thickets west of Brockville; rare.

Helianthus divaricatus, L. Thickets near Grand Trunk Railway Gravel Pit, and northward to Chelsea, C. E.

Helianthus decapetalus, L. Grows with the last, and both common.

Bidens frondosa, L. Waste places; common.

Bidens connata, Muhl. Wet grounds; common.

Bidens cernua, L. Wet grounds; common.

Bidens Beckii, Torr. Railway Bay near Prescott. Doxey's Bay, Rideau River, 4 miles from Ottawa, abundant.

Maruta Cotula, DC. Waste places, very common.

Achillea Millefolium, L. Everywhere, common.

Tanacetum vulgare, L. Roadsides; common.

Artemisia vulgaris, L. Grand Trunk Station, Prescott. Gilmour's Mills near Chelsea, C. E.

Gnaphalium decurrens, Ives. Common.

Gnaphalium uliginosum, L. Common.

Antennaria margaritacea, R. Brown. Very common.

Antennaria plantagtnifolia, Hook. Common.

Erechthites hieracifolia, Raf. Common.

Centaurea cyanus, L. Cultivated grounds and roadsides; common.

Cirsium lanceolatum, Scop. Common.

Cirsium discolor, Spreng. Bank of the St. Lawrence River, three miles west of Prescott.

Cirsium arvense, Scop. Very common.

Lappa major, Gærtn. Common.

Hieracium Canadense, Michx.

Hieracium scabrum, Michx. Both species in thickets around Prescott.

Nabalus albus, Hook. Banks of Conway's Creek and wastes around Grand Trunk Railway Gravel Pit, west of Prescott.

Nabalus altissimus, Hook. Moist woods; common.

Taraxacum Dens-leonis, Desf. Very common.

Lactuca elongata, Muhl. Common.

Sonchus oleraceus, L. Common.

Sonchus asper, Vill. Common.

LOBELIACEÆ.

Lobelia cardinalis, L. Conway's Creek, northward to Ottawa.

Lobelia syphilitica, L. Moist grounds east of Prescott, and abundant a mile west of Brockville, on the bank of the St. Lawrence.

Lobelia inflata, L. Very common.

Lobelia Kalmii, L. Moist grounds on the sides of the road to Brockville, two miles from Prescott.

CAMPANULACEÆ.

Campanula aparinoides, Pursh. Common in swamps.

ERICACEÆ.

Gaylussacia resinosa, Torr & Gr. Rocky wood-lands west of Brockville, upon an out-crop of Potsdam sandstone, township of Oxford and northward.

Vaccinium macrocarpum, Ait. Marsh near Prescott Station, and common in bogs over the country.

Vaccinium Pennsylvanicum, Lam. Common in woods and thickets.

Vaccinium Canadense, Kalm. Moist thickets near the Junction; rather rare.

Vaccinium corymbosum, L. Swamps; common.

Chiogenes hispidula, Torr & Gr. In bogs; common.

Arctostaphylos Uva-ursi, Spreng. Rocky banks of the St. Lawrence west of Brockville; rare.

Gaultheria procumbens, L. Common.

Cassandra calyculata, Don. Swamp near Heck's Mills, Augusta.

Kalmia glauca, Ait. Same locality as last.

Kalmia angustifolia, L. West Augusta. (Collected by Mr. P. Byrne.)

Ledum latifolium, Ait. Swamp near Junction, and common in bogs towards Ottawa.

Pyrola rotundifolia, L. In woods; rather rare.

Pyrola elliptica, Nutt. Woods; common.

Pyrola chlorantha, Swartz. Woods; rare.

Pyrola secunda, L. Woods; common.

Moneses uniflora, Woods; not common. Mirwin's woods, and Pine Grove near the Junction.

Chimaphila umbellata, Nutt. Hemlock woods around Prescott; common.

Monotropa uniflora, L. Mirwin's woods, &c.; common.

AQUIFOLIACEÆ.

Ilex verticillata, Gray. Moist thickets near Prescott Junction, and in swamps; common.

Nemopanthes Canadensis, DC. Moist grounds near the Junction; rare.

PLANTAGINACEÆ.

Plantago major, L. Common.

Plantago lanceolata, L. Rare.

PRIMULACEÆ.

Trientalis Americana, Pursh. Woods and thickets; common.

Lysimachia stricta, Ait. Swampy places; common.

Lysimachia ciliata, L. Swampy places; common.

Naumburgia thyrsiflora, Reichenb. Moist grounds near the Junction.

LENTIBULACEÆ.

Utricularia vulgaris, L. Conway's Creek.

OROBANCHACEÆ.

Epiphegus Virginiana, Bart. Mirwin's woods; common.

Conopholis Americana, Wallroth. Thicket north of Grand Trunk Gravel Pit; rare.

SCROPHULARIACEÆ.

Verbascum Thapsus, L. Common.

Verbascum Lychnites, L. West Augusta. (Mr. P. Byrne.)

Linaria vulgaris, Mill; road-sides; common.

Chelone glabra, L. Swamps; common.

Mimulus ringens, L. Wet places; common.

Ilysanthes gratioloides, Benth. Marsh near the Junction. Ottawa.

Veronica Anagallis, L. Wet places; common.

Veronica Americana, Sweinitz. Wet places; common.

Veronica scutellata, L. Wet places; common.

Veronica serpyllifolia, L. Everywhere common.

Veronica peregrina, L. Sides of ditches on Grand Trunk Railway a mile west of Prescott; rare.

Veronica arvensis, L. Mirwin's wood; rare.

Pedicularis Canadensis, L. Extremely abundant in wood-lands north of Grand Trunk Railway.

Melampyrum Americanum, Michx. Same locality as last, common.

Scrophularia nodosa, L. Common.

VERBENACEÆ.

Verbena hastata, L. Common.

Verbena urticæfolia, L. Less common than the last.

Phryma Leptostachya, L. Mirwin's woods; common.

LABIATÆ.

Teucrium Canadense, L. Conway's creek at the crossing of the Brockville road.

Mentha Canadensis, L. Abundant along Conway's Creek, and common elsewhere; the var. glabrata of this species is most frequent.

Lycopus Europæus, L. Moist thickets; common.

Hedeoma pulegioides, Pers. Road-side two miles from Mirwin's, north-west.

Monarda fistulosa, L. Bank of the St. Lawrence River half a mile west from Prescott, and over the country; rather rare.

Nepeta Cataria, L. Common.

Prunella vulgaris, L. Everywhere common.

Scutellaria galericulata, L. Swampy places; common.

Scutellaria lateriflora, L. Swampy places; common.

Galeopsis Tetrahit, L. Everywhere common.

Stachys palustris, L. Banks of Conway's creek, and adjoining fields; somewhat rare.

Leonurus Cardiaca, L. Common.
Lamium amplexicaule, L. Shelving clay banks of the St. Lawrence, a mile west of Prescott.

BORAGINACEÆ.

Echium vulgare, L. Road-sides; common and abundant upon sandbanks a few miles north-west from Prescott.
Lithospermum arvense, L. Cultivated fields; rare.
Lithospermum officinale, L. Waste places; common.
Echinospermum Lappula, L. Common.
Cynoglossum officinale, L. Common.
Cynoglossum Morisonii, DC. Mirwin's woods, and in thickets; rather rare.

HYDROPHYLLACEÆ.

Hydrophyllum Virginicum, L. Mirwin's woods; not common.

POLEMONIACEÆ.

Phlox divaricata, L. Rocky wood-lands west of Brockville; abundant.

CONVOLVULACEÆ.

Convolvulus arvensis, L. Bank of the St. Lawrence a mile west of Prescott.
Calystegia sepium, R. Br. Clay bank near Prescott, Ottawa and Prescott Railway Depot. Bank of Rideau River three miles from Ottawa.
Calystegia spithamæa, Pursh. Grand Trunk Gravel Pit west of Prescott.

SOLANACEÆ.

Solanum Dulcamara, L. Road-sides; rare, northward to Ottawa.
Solanum nigrum, L. Common.
Nicandra physaloides, Gærtn. Occasionally met with in cultivated grounds.
Hyoscyamus niger, L. Road-sides; common.
Datura Stramonium, L. Road-sides; common.

GENTIANACEÆ.

Gentiana Andrewsii, Griseb. Low banks of the Nation River at the crossing of the Railway. Banks of the Rideau near Kemptville.
Menyanthes trifoliata, L. Bay west of the Junction and northward; common.

APOCYNACEÆ.

Apocynum androsæmifolium, L. Common.
Apocynum cannabinum, L.

ASCLEPIADACEÆ.

Asclepias Cornuti, Decaisne. Common.
Asclepias phytolaccoides, Pursh. Rather rare.
Asclepias incarnata, L. Conway's Creek; common.

OLEACEÆ.

Fraxinus Americana, L. Woods; not common.
Fraxinus pubescens, Lam. Woods; not common.

Fraxinus sambucifolia, Lam. Common upon low land.

ARISTOLOCHIACEÆ.

Asarum Canadense, L. Common in rich woods.

PHYTOLACCACEÆ.

Phytolacca decandra, L. Hulbert's lot west of Prescott, (Dr. Easton). Brockville; rare.

CHENOPODIACEÆ.

Chenopodium hybridum, L. Common.

Chenopodium album, L. Everywhere common.

Chenopodium Botrys, L. Grand Trunk Station, Prescott.

Blitum capitatum, L. Waste places; common.

AMARANTACEÆ.

Amarantus hybridus, L. Very common.

Amarantus albus, L. Road-sides; rather rare.

POLYGONACEÆ.

Polygonum amphibium, L., var. terrestre. Moist grounds north of Junction freight house, and var. aquaticum, abundant in the Nation River at the Railway crossing.

Polygonum nodosum, Pers. var. incarnatum. Waste places; common.

Polygonum Pennsylvanicum, L. Common.

Polygonum Persicaria, L. Common.

Polygonum Hydropiper, L. Very common.

Polygonum acre, H. B. K. Abundant along Conway's Creek.

Polygonum hydropiperoides, Michx. Marshy banks of the Nation at Railway crossing.

Polygonum aviculare, L. Everywhere; common.

Polygonum tenue, Michx. Rocky bank of the St. Lawrence two miles west of Brockville.

Polygonum sagittatum, L. Woods east of Junction freight house. Low grounds west of Brockville; rare.

Polygonum Convolvulus, L. Very common.

Polygonum cilinode, Michx. Pine grove south of Junction. Abundant climbing among rocks, west of Brockville; common northward.

Fayopyrum esculentum, Mœnch. Borders of woods, thickets, &c.; common.

Rumex verticillatus, L. Along the banks of streams inland and northward; Common.

Rumex Hydrolapathum, Hudson, var. ? *Americanum*. Conway's Creek, and wet places; rare.

Rumex crispus, L. Everywhere common.

Rumex Acetosella, L. Very common.

THYMELEACEÆ.

Dirca palustris, L. Woods and thickets; common.

ELÆAGNACEÆ.

Shepherdia Canadensis, Nutt. Rocky banks of the St. Lawrence, west of Brockville.

SANTALACEÆ.

Comandra umbellata, Nutt. Pine Grove south of Junction, and abundant in thickets around Grand Trunk Gravel Pit.

CERATOPHYLLACEÆ.

Ceratophyllum demersum, L. St. Lawrence; common.

CALLITRICHACEÆ.

Callitriche verna, L. Conway's Creek; common.
Callitriche autumnalis, L.? Railroad Bay.

EUPHORBIACEÆ.

Euphorbia maculata, L. Hard soil; common.
Euphorbia Helioscopia, L. Road-sides; common.
Euphorbia obtusata, Pursh. Road-sides; common.
Acalypha Virginica, L. Road-sides; rare.

URTICACEÆ.

Ulmus fulva, Michx. Woods and thickets; common.
Ulmus Americana, L. Very common.
Ulmus racemosa, L. Woods; somewhat rare.
Celtis occidentalis, L. Occurs northward upon the tributaries of the Ottawa, but not seen here.
Urtica gracilis, Ait. Common.
Laportea Canadensis, Gaudich. Common.
Pilea pumila. Common.
Bœhmeria cylindrica, Willd. Common.
Cannabis sativa, L. Common.

JUGLANDACEÆ.

Juglans cinerea, L. Everywhere common.
Carya alba, Nutt. Common, but not inland.
Carya amara, Nutt. Common over the country.

CUPULIFERÆ.

Quercus macrocarpa, Michx. Common.
Quercus alba, L. Less common than the last.
Quercus rubra, L. Common.
Fagus ferruginea, Ait. Very common.
Corylus rostrata, Ait. Common.
Carpinus Americana, Michx. Common.
Ostrya Virginica, Willd. Common.

MYRICACEÆ.

Myrica Gale, L. Banks of the St. Lawrence west of Brockville. Banks of the Gatineau near Chelsea, C. E.

Comptonia asplenifolia, Ait. Thickets around Grand Trunk Gravel Pit.

BETULACEÆ.

Betula papyracea, Ait. Common.

Betula excelsa, Ait. Common.

Betula pumila, L. Swamp near Heck's Mills, Augusta.

Alnus incana, Willd. Common.

SALICACEÆ.

Salix candida, Willd. Marsh near the Junction.

Salix discolor, Muhl. Very common.

Salix petiolaris, Smith? Very common.

Salix cordata, Muhl. Banks of streams inland; rather rare.

Salix rostrata, Richardson. Common.

Salix nigra, Marshall. Common.

Salix lucida, Muhl. Common.

Salix pedicellaris, Pursh. Marsh near Prescott Junction.

Populus tremuloides, Michx. Common.

Populus grandidentata, Michx. Common.

Populus balsamifera, L. Common.

CONIFERÆ.

Pinus resinosa, Ait. Rocky banks of the St. Lawrence west of Brockville.

Pinus Strobus, L. Everywhere common.

Abies balsamea, Marshall. Common.

Abies Canadensis, Michx. Common.

Abies alba, Michx. Rather rare, but more common towards the Ottawa.

Larix Americana, Michx. Very common.

Thuja occidentalis, L. Very common.

Juniperus communis, L. Extremely abundant, growing upon rocks west of Brockville, and northward sparingly.

Taxus baccata, L., var Canadensis. Common.

ARACEÆ.

Arisæma triphyllum, Torr. Very common.

Calla palustris, L. Very common.

Acorus Calamus, L. Conway's Creek, and margin of St. Lawrence River; common.

TYPHACEÆ.

Typha latifolia, L. Very common.

Sparganium ramosum, Hudson. Moist grounds near the Junction; common elsewhere.

Sparganium simplex, Hudson. Conway's creek, &c.; common.

LEMNACEÆ.

Lemna trisulca, L. Conway's creek, &c.; common.
Lemna minor, L. Conway's creek, &c.; common.
Lemna polyrrhiza, L. Conway's creek, &c.; common.

NAIADACEÆ.

Potamogeton pectinatus, L. St. Lawrence River, Conway's creek, &c.; common in streams inland.
Potamogeton pusillus, L. Conway's creek, &c.; common in streams inland.
Potamogeton compressus, L. St. Lawrence River, &c.; common.
Potamogeton lucens, L. St. Lawrence; common.
Potamogeton natans, L. Railroad Bay.
Potamogeton heterophyllus, Schreber. Nation River.

ALISMACEÆ.

Scheuchzeria palustris, L. Marsh near the Junction; rare.
Alisma Plantago, L., var. Americanum. Common.
Sagittaria variabilis, Engelm. Very common.

HYDROCHARIDACEÆ.

Anacharis Canadensis, Planchon. St. Lawrence, and everywhere common in streams inland and northward.
Vallisneria spiralis, L. Same localities as last, but less common.

ORCHIDACEÆ.

Orchis spectabilis, L. Mirwin's woods and elsewhere; common.
Platanthera Hookeri, Lindl. Moist thickets west of Prescott Junction; rare.
Platanthera bracteata, Torr. Same locality; rare.
Platanthera hyperborea, Lindl. Same locality; rare.
Platanthera psycodes, Gray. Common.
Goodyeria pubescens, R. Brown. Woods north of Prescott Junction; rare.
Spiranthes gracilis, Bigelow. Rocky wood-lands west of Brockville; rare.
Spiranthes cernua, Richard. Moist grounds west of Prescott; common.
Calopogon pulchellus, R. Brown. Bay west of the Junction; rare.
Corallorhiza innata, R. Brown. Woods east of Junction; rare.
Corallorhiza multiflora, Nutt. Woods; common.
Aplectrum hyemale, Nutt. Mirwin's woods.
Cypripedium parviflorum, Salisb. Cedar swamp north-west of Prescott; rare.
Cypripedium spectabile, Swartz. Swamp near Heck's Mills, Augusta, and common in bogs northward.
Cypripedium acaule, Ait. Swamp near Heck's Mills.

IRIDACEÆ.

Iris versicolor, L. Very common.

Sisyrinchium Bermudiana, L. Moist grassy places; common.

SMILACEÆ.

Smilax herbacea, L. Thickets around Prescott and northward; common.
Trillium erectum, L. Common.
Trillium grandiflorum, Salisb. Very common.
Trillium erythrocarpum, Michx. Somewhat rare.
Medeola Virginica, L. Woods; common.

LILIACEÆ.

Polygonatum biflorum, Ell. Common.
Smilacina racemosa, Desf. Common.
Smilacina stellata, Desf. Rare.
Smilacina bifolia, Ker. Common.
Smilacina trifolia, Desf. Swamp north of Prescott.
Clintonia borealis, Raf. Somewhat common.
Allium tricoccum, Ait. Common.
Lilium Philadelphicum, L. Thickets near Grand Trunk Gravel Pit.
Erythronium Americanum, Smith. Common.

MELANTHACEÆ.

Uvularia perfoliata, L. Mirwin's woods, and elsewhere; common.
Uvularia sessilifolia, L. Mirwin's woods.
Streptopus roseus, Michx. Common.

JUNCACEÆ.

Luzula pilosa, Willd. Thicket a mile west of Prescott.
Luzula campestris, DC. Same place.
Juncus effusus, L. Very common.
Juncus Balticus, Willd. Rare.
Juncus articulatus, L. Common.
Juncus nodosus, L. Common.
Juncus tenuis, Willd. Very common.
Juncus bufonius, L. Very common.

PONTEDERIACEÆ.

Pontederia cordata, L. In streams inland and northward; very common.

CYPERACEÆ.

Cyperus diandrus, Torr. Common.
Cyperus strigosus, L. In a little marsh on the banks of the St. Lawrence, a mile west of Brockville.
Dulichium spathaceum, Pers. Common in swampy grounds.
Eleocharis obtusa Schultes. Common.
Eleocharis palustris, R. Brown. Common.
Eleocharis compressa, Sullivant. Barren fields north of Fort Wellington.

Eleocharis acicularis, R. Brown. Common.
Scirpus pungens, Vahl. Bank of St. Lawrence three miles west of Prescott. Banks of Rideau River near Ottawa.
Scirpus lacustris, L. Common.
Scirpus sylvaticus, L. Common.
Scirpus Eriophorum, Michx. Common.
Eriophorum Virginicum, L. Marsh west of Prescott Junction, &c.
Eriophorum polystachon, L. Dr. Jessup's swamp, and common northward.
Eriophorum gracile, L. Grows with the last.
Carex polytrichoides, Muhl. Low grounds; common.
" *Backii*, Boott. Mirwin's woods; rare.
" *bromoides*, Schk. Common in swamps.
" *siccata*, Dew. Grand Trunk Gravel Pit. Rocky wood-lands west of Brockville.
" *teretiuscula*, Good. Common.
" *vulpinoidea*, Michx. Common.
" *stipata*, Muhl. Common.
" *sparganioides*, Muhl. Mirwin's woods, and in fields; not common.
" *rosea*, Schk. Common.
" *trisperma*, Dew. Common.
" *chordorhiza*, Ehrh. Marsh near the Junction.
" *canescens*, L. Common.
" *Deweyana*, Schw. Common.
" *stellulata*, Good. Very common.
" *sychnocephala*, Carey. Near freight house, Prescott Junction.
" *scoparia*, Schk. Common.
" *lagopodioides*, Schk. Common.
" *festucacea*, Schk., var. mirabilis; common.
" *stricta*, Lam. Common.
" *crinita*, Lam. Common.
" *irrigua*, Smith. Swamp near Heck's Mills.
" *aurea*, Nutt. Field near Fort Wellington.
" *Crawei*, Dew. Field near Fort Wellington.
" *granularis*, Muhl. Everywhere common.
" *gracillima*, Schw. Common.
" *plantaginea*, Lam. Mirwin's woods, &c.; common.
" *laxiflora*, Lam. Common.
" *pedunculata*, Muhl. Mirwin's woods.
" *Novæ-Angliæ*, Schw. Rocky wood-lands west of Brockville.
" *Pennsylvanica*, Lam. Common.

Carex varia, Muhl. Common.
" *pubescens*, Muhl. Rather rare.
" *Œderi*, Ehrh. Near Fort Wellington.
" *filiformis*, L. Marsh west of Junction.
" *lanuginosa*, Michx. Wet grounds near Junction.
" *aristata*, R. Brown. Wet grounds near the Ottawa and Prescott Railway, north of Junction.
" *comosa*, Boott. Wet grounds; common.
" *Pseudo-Cyperus*, L. Wet grounds around the Junction.
" *hystricina*, Willd. Very common.
" *intumescens*, Rudge. Woods; common.
" *lupulina*, Muhl. Very common.
" *retrorsa*, Schw. Very common.
" *ampullacea*, Good. Conway's creek; abundant.
" *cylindrica*, Schw. Wet grounds; not rare.

GRAMINEÆ.

Leersia oryzoides, Swartz. Conway's creek, &c.: common.
Alopecurus geniculatus, L. Common.
Phleum pratense, L. Everywhere common.
Agrostis scabra, Willd. Common.
Agrostis alba, L. Common.
Cinna arundinacea, L. Banks of Nation River, near Railway crossing, and northward; rare.
Muhlenbergia glomerata, Trin. Marsh near the Junction. Chelsea, C. E.
Muhlenbergia Mexicana, Trin. Near Prescott Junction, also near Ottawa.
Brachyelytrum aristatum, Beauv. Woods west of Prescott. Chelsea, C. E.
Calamagrostis Canadensis, Beauv. Swamps north-west of Prescott Junction; rare.
Oryzopsis melanocarpa, Muhl. Mirwin's woods, &c.; common.
Oryzopsis asperifolia, Michx. Mirwin's woods, &c.; common.
Oryzopsis Canadensis, Torr. Rocky wood-lands west of Brockville; rare.
Eatonia Pennsylvanica. Wastes near Grand Trunk Gravel Pit; rare.
Glyceria Canadensis, Trin. Wet grounds near Prescott Junction. Chelsea, C. E.
Glyceria nervata, Trin. Common.
Glyceria aquatica, Smith. Ravine near Fort Wellington; not frequent.
Glyceria fluitans, R. Brown. Wet grounds around Prescott Junction; common.
Poa annua, L. Common.
Poa debilis, Torr. Mirwin's woods; rare.
Poa serotina, Ehrhart. Common.
Poa pratensis, L. Everywhere common.
Poa compressa, L. Common.

Festuca nutans, Willd. Mirwin's woods; rare.
Bromus secalinus, L. Common.
Bromus Kalmii. Rocky wood-lands west of Brockville.
Bromus ciliatus, L. Bank of St. Lawrence a mile west of Brockville; rare.
Phragmites communis, Trin. On the side of Ottawa and Prescott Railway, four miles from Prescott. Railway bridge, Ottawa.
Triticum repens, L. Common.
Gymnostichum Hystrix, Schreb. Common.
Aira flexuosa, L. Pine grove two miles west of Prescott.
Danthonia spicata, Beauv. With the last and elsewhere; common.
Avena striata, Michx. Mirwin's woods; rather rare.
Phalaris arundinacea, L. Swamps; common.
Phalaris Canariensis, L. Waste places near the town; rare.
Milium effusum, L. Woods; common.
Panicum glabrum, Gaudin. Bed of Railway track two miles west of Prescott, and sandy fields; rare.
Panicum capillare, L. Common.
Panicum latifolium, L. Wastes around Grand Trunk Gravel Pit, abundant, and elsewhere, not frequent.
Panicum xanthophysum, Gray. Grows with the last; not common.
Panicum dichotomum, L. Thickets; not common.
Panicum depauperatum, Muhl. Common in waste places around Grand Trunk Gravel Pit.
Panicum Crus-galli, L. Very common.
Setaria glauca, Beauv. Very common.
Setaria viridis, Beauv. Very common.
Andropogon furcatus, Muhl. Rocky wood-lands west of Brockville.
Sorghum nutans. Same locality as last.

EQUISETACEÆ.

Equisetum arvense, L. Common.
Equisetum sylvaticum, L. Common.
Equisetum limosum, L. Conway's creek, &c.; rather rare.
Equisetum hyemale, L. Mirwin's woods, &c.; common.
Equisetum scirpoides, Michx. Common.

FILICES.

Polypodium vulgare, L. Rocks west of Brockville. Out-crop of Potsdam sandstone, Oxford. Hull Mountains near Chelsea, C. E.
Polypodium Phegopteris, L. Damp woods; not common. Osgoode Station, Ottawa and Prescott Railway. Gloucester. Chelsea.
Polypodium hexagonopterum, Michx. Mirwin's woods; rare.

Polypodium Dryopteris, L. Common.
Struthipteris Germanica, Willd. Common; abundant around Ottawa.
Pteris aquilina, L. Common.
Adiantum pedatum, L. Common.
Woodwardia Virginica, Willd. Swamp near Heck's Mills, Augusta.
Camptosorus rhizophyllus, Link. Rocky woods a mile north-west of Oxford Station, Ottawa and Prescott Railway, and not properly coming within the limits of this neighborhood.
Asplenium Trichomanes, L. Rocky wood-lands west of Brockville; rare.
Asplenium thelypteroides, Michx. Mirwin's woods, &c.; not common.
Asplenium Filix-femina, R. Brown. Very common.
Dicksonia punctilobula, Hook. Dr. Jessup's moist pasture land.
Woodsia Ilvensis, R. Brown. Rocks west of Brockville, and Chelsea, C. E.
Cystopteris bulbifera, Bernh. Mirwin's woods; common.
Cystopteris fragilis, Bernh. Mirwin's woods; common.
Aspidium Thelypteris, Swartz. Common.
Aspidium Noveboracense, Willd. Common.
Aspidium spinulosum, Swartz. Very common.
Aspidium cristatum, Swartz. Common.
Aspidium marginale, Swartz. Common.
Aspidium acrostichoides, Swartz. Common.
Onoclea sensibilis, L. Common.
Osmunda regalis, L. Common.
Osmunda Claytoniana, L. Common.
Osmunda cinnamomea, L. Common.
Botrychium lunarioides, Swartz. Waste places near Prescott Junction; rare.
Botrychium Virginicum, Swartz. Woods; common.

LYCOPODIACEÆ.

Lycopodium lucidulum, Michx. Common.
Lycopodium annotinum, L. Common.
Lycopodium dendroideum, Michx. Common.
Lycopodium clavatum, L. Common.
Lycopodium complanatum, L. Pine grove near Blue Church Cemetery, and wood-lands west of Brockville; not common.
Selaginella rupestris, Spreng. Rocks in pine grove two miles west of Prescott, near the river, and rocks west of Brockville; not common.

MUSCI.

Sphagnum cymbifolium, Dill. Common in bogs.
Sphagnum acutifolium, Ehrh. Common in wet grounds.
Leucobryum glaucum, Hampe. Rocks west of Brockville.

Dicranum varium, Hedw. Common.
Dicranum heteromallum, Hedw. Common.
Dicranum longifolium, Hedw. Boulders in woods west of Prescott; rare.
Dicranum Scoparium, L. Common.
Dicranum undulatum, Turner. Oak wood-land north of Grand Trunk Gravel Pit; rare.
Campylopus leucotrichus, Sulliv. & Lesq. On metamorphic rocks, bank of St. Lawrence, west of Brockville.
Ceratodon purpureus, Brid. Very common.
Fissidens polypodioides, Hedw. Rocks in Mirwin's woods; rare.
Barbula unguiculata, Hedw. Common.
Tetraphis pellucida, Hedw. Common.
Orthotrichum strangulatum, Beauv. Common.
Orthotrichum affine, Schrad. Common.
Orthotrichum Ludwigii, Schwægr. Trees and decaying wood; not common.
Orthotrichum Huchinsiæ, Smith. Gneiss rocks west of Brockville, near the St. Lawrence; rare.
Orthotrichum crispum, Hedw. Very common.
Schistidium apocarpum, Br. & Sch. Common.
Hedwigia ciliata, Ehrh. Common.
Buxbaumia aphylla, Haller. Thickets near Grand Trunk Gravel Pit on the ground; rare.
Atrichum angustatum, Beauv. Common.
Polytrichum commune, L. Common.
Polytrichum juniperinum, Hedw. Common.
Timmia megapolitana, Hedw. Common.
Bryum pyriforme, Hedw. Common.
Bryum argenteum, Linn. Common.
Mnium affine, Bland. Common.
Mnium stellare, Hedw. Woods, Prescott; common.
Mnium cuspidatum, Hedw. Common.
Mnium punctatum, Hedw. Woods, Prescott; common.
Funaria hygrometrica, Hedw. Very common.
Bartramia pomiformis, Hedw. Wood-lands west of Brockville.
Leptodon trichomitrion, Mohr. Trees on low land at the crossing of the Ottawa and Prescott Railway, Nation River; rare.
Anomodon obtusifolius, Br. & Sch. Trees; common.
Anomodon attenuatus, Hub. Common.
Leskea rostrata, Hedw. Common.
Thelia hirtella. Hedw., Sulliv. Mirwin's woods; rare.

Pylaisœa intricata, Bryol. Europ. Very common.
Neckera pennata, Hedw. Very common.
Climacium dendroides, Web & Mohr. Common.
Hypnum tamariscinum, Hedw. Common.
" *scitum*, Beauv. Common.
" *triquetrum*, L. Common.
" *splendens*, Hedw. Somewhat rare.
" *strigosum*, Hoffm. Common,
" *deplanatum*, W. P. Sch. Rare.
" *recurvans*, Schwægr. Common.
" *albulum*, C. Mull.? Common.
" *eugyrium*, Bryol. Europ. Common.
" *Schreberi*, Willd. Very common.
" *cordifolium*, Hedw. Very common.
" *uncinatum*, Hedw.? Common.
" *fluitans*, L. Common.
" *aduncum*, Hedw. Common.
" *Crista-Castrensis*, L. Common.
" *imponens*, Hedw. Very common.
" *curvifolium*, Hedw. Rare.
" *salebrosum*, Hoffm. Common.

HEPATICÆ.

Marchantia polymorpha, L. Very common.
Fegatella conica, Corda. Common.
Sphagnœcetis communis, Nees. Common.
Scapania nemorosa, Nees. Common.
Frullania Grayana, Montagne. Swamp near Doyle's station.
Frullania Virginica, Lehm. Very common.
Madotheca platyphylla, Dumort. Very common.
Radula complanata, Dumortier. Somewhat rare.
Ptilidium ciliare, Nees. Common.
Trichocolea Tomentella, Nees. Woods and thickets west of the Junction; rare.
Mastigobryum trilobatum, Nees. Same locality as last, and somewhat common.

LICHENES.

The following is a Catalogue of Lichens lately collected (except No. 19) near Prescott, and among the Laurentian rocks west of Brockville. The habitats and numbers which appear below, refer to the specimens forwarded to the Society.

1. *Usnea barbata*, Fr. From a cedar.
2. *Usnea angulata*, Ach. Tamerack.
3. *Evernia jubata*, Fr. Cedar rail.

4. *Evernia furfuracea*, Mann. Perhaps a form of Ramalina calicaris, but the apothecia are colored.
5, 6, 7, 8. *Ramalina calicaris*, Fr. Several varieties from Balsam Fir, cedar rail, &c.
9. *Cetraria ciliaris*, Ach. Branch of Pinus Strobus.
10. " *lacunosa*, Ach. Dead branch of Tamerack.
11. " *lacunosa*, Ach. Gneiss rock.
12. " *aurescens*, Tuckerm. Branch of Tamerack.
13. *Nephroma resupinatum*, Ach. Gneiss rock in woods.
14. " *Helveticum*, Ach. Gneiss rock in woods.
15. " *Helveticum*, Ach. Br. of Balsam Fir.
16. *Peltigera apthosa*, Hoffm. On the earth.
17. *Peltigera canina*, Hoffm. Mossy rock.
18. *Peltigera polydactyla*, Hoffm., var. Rock.
19. *Sticta crocata*, Ach. Perpendicular face of Gneiss rocks. Chelsea.
20. " *glomerulifera*, Delis.
21. " *pulmonaria*, Ach.
22. *Parmelia perlata*, Ach. Gneiss rock.
22 a. & 22 b. *Parmelia perlata*. Dead branches.
23. *Parmelia saxatilis*, Ach. White pine.
24. " *aleurites*, Ach. Branch of cedar.
25. " *lævigata*, Ach. White pine.
26. " *terebrata*, Mart. Balsam Fir.
27. " *physodes*, Ach. Dead branch of Tamerack.
28. " *colpodes*, Ach. Bark of Rock Maple.
29. " *olivacea*, Ach. Trunk of white pine.
30. " *caperata*, Ach.
31. " *conspersa*, Ach.
32. " *parietina*, Fr.
33. " *ciliaris*, Ach. Trunk of Balsam Fir.
34. " *ciliaris*, Ach? From a rock.
35. " *detonsa* Fr. Branch of Balsam Fir.
36. " *detonsa*, Fr. Gneiss rocks.
37. " *pulverulenta*, Fr. Bark of white elm.
38. " *hypoleuca*, Muhl. Bark of white elm.
39. " *speciosa*, Ach. Dead branch of Balsam Fir.
40. " *speciosa*, Ach. Bark of white elm.
41. " *stellaris*, Wallr.
42. " *obscura*, Fr. Two specimens, sp. and var.
43. " *sorediata*, Tuckerm.? Bark of *Pinus Strobus*.

44. *Parmelia rubiginosa*, Ach. Dead branch of Balsam Fir.
44 A. " *triptophylla*, Tr. Gneiss rock in woods.
45, 46, 47, 48, 49. *Parmelia pallescens*, Fr.
50, 51, 52. *Parmelia subfusca*, Fr.
53. *Parmelia sophodis*, Ach.
54. " *varia*, Fr.
94. " *scruposa*, Sommerf.?
93. " *sp.* Appears to be a form of P. speciosa. Common on cedars, &c., in swamps.
55. *Stereocaulon tomentosum*, Fr. Rocks.
56. *Stereocaulon denudatum*, Flœrk. Exposed rocks west of Brockville, on the ground.
57. *Cladonia pyxidata*, Fr. On the ground.
58. " *gracilis*, Fr., var. verticillata. On the ground.
59. " " " cervicornis. No. 69 appears also to be a variety of this species.
60. " *degenerans*, Floerk ?
61. " *parasitica*, Schær.
62, 63. " *furcata*, Floerk.
64. " *rangiferina*, Hoffm.
65. " *cornucopioides*, Fr. Rocks west of Brockville.
66. " *Floerkiana*, Fr.
67. " *macilenta*, Hoffm.
68. " *deformis*, Hoffm.

70. *Lecidea parasema*, Fr.
71. " *enteroleuca*, Fr.
72. " *melancheima*, Tuckerman.
73. *Umbilicaria pustulata*, Hoffm. Laurentian rocks west of Brockville.
74. " *Muhlenbergii*, Ach. Laurentian rocks west of Brockville.
75. " *Dillenii*, var. Laurentian rocks west of Brockville.
76. " *hirsuta*. Laurentian rocks west of Brockville.
77. " *polyphylla*, Hoffm., var. deusta. Laurentian rocks west of Brockville.
78. *Endocarpon miniatum*, Ach. Calciferous sand rock.
79. *Opegrapha atra*, Pers. Duf.
80. *Opegrapha scripta*, Ach. Schær.
81. *Calicium trachelinum*, Ach. Decaying Hemlock.
82. *Pertusaria pertusa*, Ach.
83. *Verrucaria nitida*, Schrad.

84. *Verrucaria alba*, Schrad.
85. *Collema palmatum*, Ach.
86. *Collema nigrescens*, Ach.?
87. *Leptogium tremelloides*, Fr.
88. *Parmelia cerina.*
D. " *pallescens.*
E. " *elegans*, Tuck.
F. " *parietina.* Apparently an abnormal state.

CHARACEÆ.

Chara vulgaris, L. St. Lawrence River, and streams inland; very common.

ON FUNGI, THEIR RELATION TO DISEASE.

By John Lowe, M.D., M.R.C.S., Eng., Fel. Bot. Soc., Edin., Cor. Mem. Bot. Soc. Ca., Surgeon to the West Norfolk and Lynn Hospital.

Read 12*th April*, 1861.

It is now more than twenty years since it was first discovered that vegetable growths could exist upon the human body. From the earliest age diseases of the skin were known and described: the symptoms and appearances they presented were matters of ordinary observation, and rules of an empirical character were laid down for their treatment.

During all this time, it is probable, nay almost certain, that in some forms of the disease fungi were constantly present, but it was not until the year 1839 that this fact was demonstrated. To M. Schœnlein, of Berlin, we are indebted for this most important discovery, which, but for the rapid advance that has been made in scientific knowledge during the present century, and above all in the proper use of the microscope, would, like many other wondrous things, be still one of nature's own secrets. Even now, strange to say, there are those who regard the growth described by Schœnlein as an abnormal production of the body, anddeny its vegetable origin; but a vast amount of accumulated evidence leaves no room for doubt upon this point, to any one who is at all conversant with the character, structure and behaviour of the humblest individuals of the plant world, the Fungi.

Regarding it then, as an established fact, with botanists and the medical profession generally, that a fungous growth is really present in the majority of skin diseases, I shall abstain from entering on the discussion of the reasons for upholding this opinion and leave the facts, to be presently mentioned, to speak for themselves,—suffice it to say here, that men of the greatest eminence as botanists and physiologists entertain no doubt on the subject.

We have, however, another and a larger class of observers, who, while they admit the presence of the fungus, disclaim for it any title to be considered as an originator of disease, but regard it rather, as a foreign and accidental visitor, engendered and fostered by the products of a pre-existing malady. Upon this more important dogma, which has, in this country, been the subject of much argument, I propose to speak at greater length, inasmuch as it is a question of considerable interest, in a medical and hygienic point of view.

Before doing so, however, let me point out some of the various forms of fungi which have been noted, as occurring upon animal organisms, in order that I may put before you the salient points which are worthy of interest and attention. The whole of these lower fungi are ascribed by botanists to a subdivision of the family, which has received the name of *Hypomycetous*. They are minute microscopic plants, consisting in their perfect state of a mycelium, that is, a net-work of fine capillary tubes or filaments, from which springs an upright, hair-like stalk bearing at its extremity a collection of spores or sporules—the seeds of the plant. These have a diameter of about $\frac{1}{3000}$ of an inch, and from their extreme lightness are capable of floating about in the atmosphere and are wafted by the air to every quarter in incalculable myriads.

Whenever they alight upon objects favorable to their growth, as upon decomposing organic matter of any description, they readily germinate, provided there be sufficiency of warmth and moisture, both of which are essential to their well-doing.

Let us follow one of these spores, thus located, and watch its development; we shall then have the key to the behaviour of the rest. When first given off from the fruitstalk it is a spherical cell, consisting of a cell-wall filled with homogeneous molecular plasma, but without a nucleus; on the application of warmth and moisture the cell assumes, in the first instance, an oval form; the cell-contents become granular, the granules ultimately coalescing to form one or more nuclei. In its next stage, it becomes elongated, until its length exceeds its breadth by two or three times, and now we observe small eminences arise from its extremities; these are buds, which in their turn, become elongated cells and then give off other buds or shoots, each in succession acquiring additional length, until finally, we find them as filaments or thread-like cells, crossing each other in all directions, and forming a network which is termed the mycelium.

At a more advanced stage, these filaments are seen to contain numerous nuclei and granules, and now, several slender threads are pushed perpendicularly upwards; these are the fruit-stalks, the terminal cell of which undergoes budding or segmentation, until a large number of spores is formed into a capitulum or head. These like the original cells we started with are spherical, and their arrangement varies in different genera, for example being collected into a round head or glomerulus

as in *Mucor ;* or into a brush-like one as in *Aspergillus*, so named from a fancied resemblance to the brush used for sprinkling holy-water in Roman Catholic Churches.

Such is, briefly, the mode of development of these minute plants under favorable conditions. But there are occasional deviations to be met with, which are deserving of attention as throwing a clearer light upon certain forms which are to be mentioned presently This will be manifest when I state that from the results of numerous experiments I have made, the plant may be caused to remain in any one of its different stages of growth by supplying it with food suitable for that purpose. The bearing of this statement will be seen in the subsequent remarks upon the identity of the parasitic fungi. A familiar illustration of the power above mentioned is to be observed in common yeast, which presents itself as a collection of spherical cells containing nuclei and capable of endless multiplication in two ways, viz:—by the formation of buds, or by the bursting of the cells and the liberation of nuclei which become cells. Yeast is derived from the aerial spores of one or more common species of mould. This I have proved by experiment; and I have recently obtained additional proof of the correctness of this view from the examination of spontaneous yeast of the tan-pits kindly forwarded to me from Kingston, Canada, by Professor Lawson. This in no way differs from brewers' yeast which has been long kept. The favorite food of the yeast-cell is sugar, upon which it acts in such a manner as to disturb the feeble combination of its chemical elements. This process, which is termed *catalysis* by chemists, causes decomposition of the sugar and a new arrangement of its particles, giving rise to carbonic acid and alcohol. Sugar is essential to the maintenance of yeast in its integrity. As soon as its requirements in this respect fail to be supplied, the plant turns for its prey upon the new element it has evoked, the alcohol, which is at once converted, by a similar process, into vinegar. Here the cell becomes changed in form. It is now oval, and this condition, which has received the name of *Torula*, it may be made to retain indefinitely; but under ordinary circumstances, it proceeds to convert the acid into other compounds, and its development goes on rapidly until it has assumed the form of a filamentous mycelium. In this stage, again, it can be retained at will, as the vinegar plant, or as it is popularly termed the "*mother*" of vinegar, which possesses the power of at once converting saccharine matter into acid apparently without the intermediate alcoholic fermentation. If now exposed to the air it completes its growth by producing spores which in their turn go through the same cycle.

With this slight sketch of the natural history of one of these minute beings, we will now notice some of the more important effects which they are reputed to produce. And, first, let us glance at their influence on the higher forms of vegetables.

It appears certain that before any great damage can be done by these para-

sites there must pre-exist in the objects of their attack an unhealthy condition of structure, resulting partly from being deprived of some chemical element essential to healthy growth, and partly to atmospheric changes which tend to foster a too rapid formation of cellular tissue, at the same time that they favor the rapid development of the parasite. The result of these changes in the plant is a lowered vitality, rendering it prone to the attacks of the fungus, which, once having found a habitat, spreads with prodigious rapidity, and by setting in motion chemical changes similar to those already spoken of, soon involves the whole plant in decay. Examples of this will be familiar to you, as in the case of the potato disease, which not many years ago brought England to the verge of famine, and in Ireland, which depends almost solely on this crop, was the cause of untold misery and destitution.

The failure of the vine crops in Spain and Portugal was owing to the ravages of another species, the *Oidium Tuckeri;* and in some seasons the wheat crops in this country are to a great extent damaged or destroyed by another of these minute pests, which, under the name of mildew, often in the course of a single night, converts whole fields of waving corn into black useless rubbish. Dry-rot in timber is another example of the destructive power of this group. Nor are these the only commercial interests which thus suffer. The production of silk is often a complete failure, owing to the silkworm being infested by a minute fungus, the *Botrytis Bassiana*, which, entering, probably by the spiracles or breathing apertures, insinuates itself into the blood-vessels and destroys the insect. Damp and want of cleanliness are found to be the causes of the attack. Other species again have been found in flies, beetles, eggs, in the air sacs of birds, on fishes, reptiles, and animals, the mention of which would encroach too much upon your time. A great part of those which have received distinct names, as well as nearly the whole of those from the human subject, I have proved to be mere initial or imperfect forms of one or two common species of mould which occur everywhere upon decaying organic matter, as cheese, apples, oranges, &c. The number of plants thus degraded from the rank of species is about thirty-four, and I doubt not that many others might be placed in the same category.

The first discovery of a vegetable parasite on man was, as I have said, made by M. Schœnlein, of Berlin, while examining the crusts from the head of a person affected with favus (Porrigo lupinosa or scald head). The plant has been since known under the name of *Oidium Schœnleinii.* Another parasite was subsequently discovered in the hairs of persons affected with the disease termed *plica polonica*—also a similar one in ulcer was found by Mr. Robin.

Others have been found in Tinea, Porrigo, Pityriasis, Lichen and Sycosis, &c., &c. Others again in the lungs and on the mucous surfaces of the body. Now the whole of these are referable to a common origin; the characters which have caused them to be raised to the rank of species being due to the plant having been *retained*

in a state of immaturity. So singular is this power of being so retained, that we might almost reduce it to a formula. Giving a certain quantity of sustenance we might predicate the form which the parasite would exhibit, and thus we find no difficulty in accounting for the great variety which is met with on the human subject alone; difference in density and chemical constitution of textures, in degrees of warmth and moisture, in greater or less facility of access to external air, will readily account for these differences in form, and will render it no matter for surprise that microscopists should have given distinct specific names to upwards of thirty plants which are in truth referable to one or two.

There remains one very peculiar variety to be mentioned. This consists of minute square-shaped cells arranged in fours. It was discovered by Professor Goodsir, in a disease of the stomach, and was named by him *Sarcina ventriculi*. A similar one has been observed by Dr. Gardner and others, from the kidney. There is now good reason to believe that both these are merely varieties of the common fungi of which we have been speaking, Penicillium and Aspergillus, for identical growths have been found by Mr. Stephens, on bones from South America; by Dr. Fox on the human subject, in a case of skin disease; and by myself in a phial containing crystals of cholesterine.

Let us now enquire into the power which fungi have of generating disease. Their influence upon plants has never been doubted—Firstly, because their ravages are too well known, and too serious, to admit of dispute; and secondly, because their malific agency upon structures of a low organization, allows of more easy demonstration, than when highly organized and sensitive tissues are the seat of their operation, and when more various forces and conditions are to be considered.

It is no difficult matter to show that dry-rot as it is termed, would be a comparatively slow process, were it not that the fungus is present, to insinuate itself amongst the fibres of the wood, to give admission to air, and to yield oxygen, which hastens the already commenced decomposition; while at the same time the living cells abstract chemical elements from the woody fibre, and fan into activity the eremacausis or slow combustion of the decaying tissue. Equally obvious is the fact that without yeast, wort would undergo but little fermentation, and that if all vegetable organisms were excluded, no proper fermentation would result; for even in the case of wine which is conducted without the artificial aid of yeast, I have found that this is really the source of the fermentation.

We may assume then, as a fact, which few will deny, that a living vegetable parasite upon other vegetable cells, must excite in them a chemical action, equivalent to fermentation, for it cannot grow without so doing; and that even supposing the cells themselves were able to resist this action, the juices of the plant, not possessed of the same vital resistance, must succumb to its influence. Whether this alone be the real secret of its power, affects not the question. If the juices are de-

composed the cells must suffer, and the morbific agency is at once apparent. But there is another point in which their action is not unimportant, viz., the power which fungi have of inserting themselves amongst the cells and tissues. Physiologists, and especially medical writers, overlook this fact, that a cell confined in a limited space, and at the same time undergoing development, must expand in some direction, and the force thus generated is almost incredible. Many of you have no doubt seen a strong wall pushed down by the growth of a tree; that is, by the expansion of soft and otherwise yielding cells. But perhaps a more impressive fact is, that simple cellular fungi, growing under large stones, have raised them from their beds to the height of some inches, even when the stones were several hundred pounds in weight; and yet so soft is the structure of the plant that it might be crushed between the finger and thumb. Here is a power not to be ignored when discussing the influence of parasites. Let us see how it applies to the production of disease in animal tissues. Each individual cell, it must be borne in mind, possesses the same motor power; it is only their combined action which yields great results such as the above. Suppose then a single tube inserted into the skin and impinging upon a nerve filament, would you not expect that nerve to resent the intrusion? Would it not do so if any other foreign body of the same size were introduced? How much more then, if in addition to mere mechanical irritation, the cell proceeds to abstract or decompose the fluids. That it does this, which is indeed the essential function as a scavenger, we see in favus and ringworm, where, especially in the former, the odour produced by it is intolerably fetid and irritating. It is clear that what with the actual pressure of the outspreading fungus, and the irritating products which it engenders, there are strong *prima facie* grounds for believing that the fungus does actually produce disease.

Then again if proof were wanting, observe the peculiar character of *lichen annulatus*, fairy-rings in miniature, presenting all the characters that fairy-rings do, and showing clearly enough that the fungus and rings of inflammation proceed *pari passu*.

The form of the disease will be determined by several minor conditions affecting the growth of the parasite; these we have before mentioned as warmth and moisture, suitability of food and density of tissue, all of which influence the development of the plant; thus we find in *Lichen*, one form; in *Pityriasis*, another; in *Favus*, a third, and so on; the spread of the disease being co-equal with that of the plant, and the degree of passive resistance which the tissues offer to its inroads.

It must be admitted here, as in the case of plants, that an unhealthy condition of the structures and fluids is necessary to the development of a parasite, for without these it would be incapable of establishing itself. The first attack would in a healthy body be at once resented, and the intruder repelled.

I would remark before concluding, that those diseases which are probably

considered as of a parasitic origin, have recently been shown by clinical observation to be identical, and capable of merging one into another by imperceptible gradations; thus establishing the fact which I had asserted from experimental enquiry and the development of the parasites.

In conclusion, a word or two as to the treatment of this class of diseases may not be out of place.

The primary consideration will at once suggest itself, that since the fungi can only attack an enfeebled system, it is essential for the cure of the disease that the general health be restored by treatment appropriate for that purpose; for we cannot expect a successful result while this important cause is still in operation.

The remedies which have attained celebrity as specifics, have little claim to be so considered, since if we except arsenic, which by the way is only useful when it is pushed to a dangerous extreme, they are all of but little value.

Of the topical applications I may observe, that my own experience of them is, that they are either inefficient or dirty, or both. The one to which I trust almost solely, has this to recommend it, that it is neither.

Its action is founded on what ought to be our guiding principle in the treatment of these cases, viz., the destruction of the parasite; and this, from extended observation, I believe to be effected by the Tincture of Iodine, far better than by any mineral or other agent we can employ, at the same time its application is unattended by any inconvenience.

It is simply an alcoholic solution of Iodine, thus: Take of Iodine, 1 drachm; Iodide of Potassium, half a drachm; Alcohol, one ounce; solve. Paint the diseased parts every day or on alternate days; omitting it for a day or two if the skin becomes sore, then resume it, and continue the application until the disease has disappeared.

As yet I have met with no case which has resisted steady treatment of this kind, neither do I believe that I am likely to do so.

King's Lynn, Norfolk, England, Feb 1861.

ON THE SEXUAL DEVELOPMENT AND ECONOMY OF BEES,

And on the Saccharine Matter of Plants, viewed in relation thereto.

By the Very Rev. Principal Leitch, President.

Read 8th March, 1861.

My experiments were chiefly directed to the determination of some unsolved problems in bee life. Huber had done much to remove the doubts that existed in

reference to the development of queens; but he left others still unsolved. The subject has recently acquired new importance from the discoveries as to parthenogenesis and alternate generation. It appeared not improbable, that the unexplained facts in the development of the honey bee might throw light on these subjects, and in turn receive elucidation. In the course of investigation, new difficulties presented themselves, aud it was several years before I arrived at any definite results. During all this time a Silesian clergyman, Pastor Dziersen, was engaged in similar investigation, and met with the same difficulties. At the last meeting of the British Association at Glasgow, I gave the results of my observations up to that time. They were, however, incomplete, and there were still some points that required confirmation before the theory I was disposed to adopt could be established. I had the benefit of the discussion and hints of some of the most distinguished physiologists, and, among the rest, Professor Kolliker, whose profound histological researches enabled him to give suggestions of great value in prosecuting the enquiry. The points were to be determined by nice microscopic observations on the ova of the bee; but the ova of this family of insects present peculiar difficulties, difficulties so great indeed, that Leuckart was baffled in all his attempts to determine the character of the micropylar apparatus. The opaque nature of the integuments presents great difficulty in investigating the contents, and marking the embryological development. While engaged in these enquiries, the book of Siebold, professor of physiology at Munich, appeared. In this work there is an account of the reasearches of Pastor Dziersen, who was arrested in his researches by the want of microscopic apparatus of sufficient power to determine the points of difficulty that presented themselves to him. Siebold had heard of his observations, and paid him a visit with a view of solving the difficulties by means of his microscope. He saw that the determination of the points in question would throw a flood of light on more general physiological problems. After making a few observations he came to the very startling conclusions which have been pretty generally accepted. In these conclusions I do not concur, and I have subsequently directed my researches to such crucial experiments as might finally settle the question.

One of the most startling facts in the history of the honey bee, is, that when the queen dies there is the power of converting a neuter bee into a queen. The neuter must be taken while yet a worm, and by proper care and nursnig, the plebeian offspring becomes a portly queen. When this fact was first discovered by Shirach, it was received with incredulity by the greatest physologists of the time. It was held that such a power would be miraculous, and could not, therefore, for a moment be entertained. Many competent observers refused to look at the fact, and it was therefore long before it was received into science as an undoubted truth. Huber has the merit of putting it beyond all doubt.

This power, however, was considered an abnormal one, and rarely brought

into action. It was thought that a regular queen had always a royal descent from the very commencement. The old queen or mother was supposed to lay three different kinds of eggs in three different kinds of cells. On opening a hive, it will be observed that the great mass of cells are of the same size. In these, the eggs are laid which produce common working bees. In looking more narrowly, it will be seen that there are a few hundred cells of a larger size, but of exactly the same shape. In these the drones, or males, are brought up; and lastly, there will be observed three or four cells altogether different, of a pear shape, and with the small open end looking towards the bottom of the hive. In these, the young queens are nursed and brought to maturity. Now, it was thought that the normal plan was for the queen to lay a royal egg in a royal cell, and that from this, as a rule, the future queen sprung. In the exceptional plan, the method was supposed to be quite different. When a queen perishes, and another must be provided, the worm of a common cell is taken, a royal cell is built at the mouth of the former, and the fortunate larva is launched into this more capacious room to enjoy royal luxuries and attention.

My first enquiry was to determine this point: was it really the case that there were two distinct methods by which a queen was produced? There were two facts by which my enquiries were directed. The first was that one method seemed quite adequate for the social economy of the hive; and the second, that the interval between the first and second swarms of a hive corresponded to the time required to bring forth a queen in the supposed abnormal way. But to see the point of this it is necessary to advert to the various stages of bee existence. The egg is hatched three days after being layed. The worm that issues from the egg continues five days in its grub state. It is then covered up in its cell, and continues in this state for other eleven days, when it comes forth as a perfect bee; the whole time from the laying of the egg being nineteen days. This, however, applies only to the worker bee. In the case of the queen, the whole time is fifteen days, and that of the drone twenty-five days. When a queen is required to be developed in the abnormal way, the community select a common worker worm, three days old from its emergence from the egg, and, by proper treatment, a perfect queen is hatched in nine days, so that the swarm wants a head only for this short time. It appeared to me a coincidence, which ought not to be overlooked, that the interval between the first and second swarm was ordinarily nine days, corresponding with the above period. This at once led to the suspicion that when a queen left a hive with the swarm, the desertion was equivalent to the death of a sovereign, and that the same method was adopted to supply her place. The usual belief was that before the old queen left the hive with a swarm, she saw her successor fairly in possession of the throne, or at least ready to be crowned. This on examination, was found not to be the case. On opening the hive immediately after the queen has left, it will be found that

there is no young queen in the hive. But, immediately on her departure, steps are taken to supply her place. Sometimes queen's cells are found with ova deposited in them, but, more frequently, this is not the case. When there is no such cell, a neuter larva, three days old, receives the proper treatment; and in nine days it comes forth a perfect queen, and may at once lead off a second swarm. The bees, however, are not satisfied with one queen. They generally make three or four, with one or two days interval between them. This is obviously to secure the succession, and give leaders to more swarms than one, should the year be propitious. If the supernumerary queens are not required, they are slain. It was thus proved by numerous observations that there is probably only one method of producing queens; that they all spring from plebeian worms, and are made queens by special treatment. Still it is certain, that in some cases ova are deposited in queen's cells before the first swarm leaves, and the circumstances that determine this departure from the general rule, are yet open to enquiry.

The marvel of this metamorphosis was greatly removed by the minute dissections of Miss Jurine, who proved that the workers, or neuters, are really undeveloped females or queens. The production of the queen is thus only the carrying out of the process of evolution a step further.

Another point of enquiry in connection with this subject was the nature of the treatment by which a neuter was transformed into a queen. Huber thought all depended on the food, and that there was a royal jelly, quite different from the food supplied to neuter bees. The only test of the quality of the food was its taste. He thought it more pungent than the ordinary food of bees. This, however, is a deceptive criterion, as the taste of the syrup or jelly depends on the age of the worm. I applied chemical and microscopic tests, but could find no difference in the food. The composition of it is, however, not well understood. The bees disgorge it from their stomachs into the cell, at the bottom of which the worm is coiled up. It is, no doubt, a compound of honey and pollen, but seems to have undergone a digestive process, for the taste of the honey is gone, and all trace of the pollen cells is lost. Finding no clue to the development of the queens in the kind of food supplied, I next enquired if heat could have anything to do with it. This was suggested by the position of the royal cell. The queen-worm, as we have seen, is removed from its original cell and placed in a new one, in an isolated position; or, rather, the worm gradually slides into the new receptacle constructed at the mouth of the former. If food is the secret of the development, there is no obvious reason why the worm should not be fed in its original cell; but if temperature is one of the agents, then the isolation of the cell has an unmistakeable meaning. In its isolated position, a special heat may be communicated, different from that of the other cells, as the bees can cluster all round it and hatch on every side. In the original position, there could be no differential hatching, as only the end of the

cell would be exposed to the special heat. The heat is kept up by the respiration of the bees, and they have a wonderful power of raising the temperature when required. They can thus localize the heat, and apply a special temperature. To put this to the test, I applied a delicate thermometer to the queen's cell, while others for comparison were placed in different parts of the hive. This at once revealed the fact, that an elevated temperature was constantly employed in hatching the queen. While the experiment is not decisive as to temperature being the sole cause, it at least indicates it as one of the efficient causes, if there be more than one. This furnishes one of the most striking illustrations of calculation and adaptation in the whole range of natural science.*

It is plain that queens may be produced, at pleasure, simply by removing the reigning monarch. In a few hours her loss is detected, and three or four queen-cells are seen to be in the process of construction. By repeating the experiment, I found that not only were queens produced from neuter worms, but that a few drones were also developed. The drones, hatched and developed in the small cells of neuters, were much smaller than ordinary drones, being only about half the size of the latter. This was a far more startling fact than the production of queens from neuters. In the latter case the sex is the same, and the question is one merely of degree of development. In the case of the development of the drone from the neuter, there is a transformation of sex. On repeating the experiment, the results were invariable. When a hive was supplied only with neuter larvæ, both males and females, or drones and queens, were developed.

The next experiment was to determine whether a queen might be developed from a drone larvæ. To test this, the reigning queen was removed, and also all the neuter brood, so that nothing was left but drone brood. To my great satisfaction I saw the commencement of a queen's cell, and the process went on as far as the chrysalis state; but I was not fortunate enough to bring out a perfect queen. In such experiments there is great danger of failing, unless the hive be very strong; and, generally, every such experiment implies the loss of the hive, so that only small hives of little value are usually employed. But when the numbers are not kept up by a fertile queen, the population rapidly dwindles, and the hatching power is lost. The larva, when the hatching process ceased, was not old enough to have its sex distinguished; but the great probability is that the instinct of the bees could not have so far failed them as to lead them to go on with the development of a

*It appears from the report of the Entomological Society of England, held 4th Nov., 1861, that the observations of Mr. Tegetmeier, have confirmed the above conclusions. "Mr. Tegetmeier called attention to a statement regarding the development of queen bees lately published by Professor Leitch, who asserts that the production of the perfect queen is due, not as has been supposed, to the larva being fed on a peculiar food, but to increased temperature, and that the isolated position of the royal cell enables the worker bees to cluster around, and by their rapid and increased respiration to produce the degree of heat necessary. Mr. Tegetmeier considered his own observations fully supported this theory."

grub in the queen's cell which was not ultimately to become a queen. Supposing the experiment quite decisive, what would be the necessary deduction? It would be this: that eggs, as laid by the queen, had the elements of both sexes, and that it depended on future treatment which of the two sexes should predominate.

On *a priori* grounds it is obvious that the production of drones from neuter larvæ, is a corollary to the similar production of the queen. The object of this remarkable power is the continuance of the vitality of the hive; but the object is not gained, merely by the production of the queen, for she cannot be fertilized without the existence of males. It is only during a small part of the year that drones are found in the hive, so that if the queen should die at any other time, there would be no object served by the production of a new queen, unless drones were produced at the same time.

Unless we accept the above bisexual hypothesis, there is no alternative but to adopt another, which gives the queen the power of determining at pleasure the sex of the egg which she is about to lay. When you look into a glass single-comb hive in the breeding season, you see the queen constantly depositing eggs in cells. All the eggs she deposits in small cells become neuters; all deposited in large cells become drones. Huber thought that the ova of the different sexes were disposed in regular order in the ovaries of the queen, so that the order of deposition in the cells must follow the pre-arranged order in the ovaries. According to this idea, the queen laid neuter eggs for months together, and when drone eggs came, she deposited them in continuous order in the larger cells. This, however, is not the case. In watching the movements of the queen across the comb, you see her depositing an egg in a neuter cell, and when she comes to a drone cell, she deposits one there also, and the product is always a male or a female, according as the cell is a large or small one. Take a queen from a compartment of a hive, when she is laying only neuter eggs, and place her where there are only drone cells, and she will immediately deposit eggs which will become drones. We are, therefore, shut up to one of two hypotheses; the first is that there is no difference of sex in the eggs as laid, and that the subsequent sexual difference is due to size of cell, temperature, &c.; or that the queen has the power of determining the sex at the moment of laying. The latter is the hypothesis of Siebold; the former is the one to which my experiments would lead. Siebold's hyyothesis is that the queen when depositing an egg in a small cell, at the same time, by an act of volition, inserts into it one or more spermatozoa; when depositing an egg in a large cell, she omits this process and a spermatozoon is not inserted. The former egg becomes a neuter; the latter a drone. Leuckart, the greatest authority on the ova of insects, tried in vain to detect the spermatozoa in the eggs of bees. In the insect ova there is an aperture, or series of apertures, at one extremity, called the micropyle, through which the spermatozoa penetrate and fertilize the egg; and frequently, after deposition,

these bodies may be detected finding their way into the interior of the egg. When the membranes of the egg are very transparent they may be detected in the interior. Leuckart, however, failed in all his attempts to discover them in the eggs of bees. Siebold next applied himself to the task. He found the state of things to be such as exactly to suit his theory. He found spermatozoa in neuter's eggs, but none in drone's eggs; and were the observations completely established, they would be decisive of the question. The egg of the bee is confessedly one of the most difficult microscopic objects, and the observations would require the confirmation of other observers, especially as Siebold had only once an opportunity of examining new laid eggs, when on a visit to Pastor Dzierzien in Silesia. I have examined hundreds of eggs, many of them submitted to the microscope the moment after deposition, but have never detected the filaments in question, though adopting the precise method suggested by Siebold. Objects exceedingly like spermatozoa were detected, but they were easily shown to be folds of the enveloping membrane. The optical power employed seemed to be superior to that of Siebold, as I could clearly make out the micropylar apparatus which baffled all his attempts.

It has also been attempted to settle the matter by a cross between our own and the Italian bee, which has very distinct characters. If Siebold's theory be correct, all the neuters might show the character of the males, but the drones should have only the character of the queen. The result was against this theory, as some drones were found with the character of the parent drone, and a single case would be sufficient to overthrow the theory.

An obvious plan of determining whether the ova of the bee are sexually distinct from the moment of their being deposited, is to interchange them—that is, to put an ovum, deposited in a drone's cell, into a neuter cell, and vice versa. If no interchange was made, all the ova in the drone cells would become drones, and those in the neuter cells would become neuter bees. Should it be found, however, that this held even when the ova were interchanged, the necessary conclusion would be, that the ova are not *ab initio* distinct, and that the differentiation of sex depends on the treatment they receive after being deposited. The experiment of interchanging was made with all care. By means of a camel's hair pencil the ovum was removed from one cell and deposited in another. But in all cases, and hundreds of trials were made, the ova were removed as foreign matter and destroyed, the bees greedily devouring the ova. In the above cases, the ovum was laid loose in the cell instead of being attached at one end, so as to stand perpendicularly, as in the case when deposited by the queen. Thinking that this might possibly be the cause of the failure, I imitated nature as closely as possible, and with gum got the ova to stand erect. This experiment also failed; the ova were all removed and destroyed. I made still another attempt to get the ova hatched in other than their appropriate cells. This was to cut out the bottom of the cell, so as not to disturb

the attachment of the ovum, and to insert this piece of wax in the other cell. Still, all was of no avail ; the ova were invariably expelled.

Being now baffled in all my attempts with the ova, I next tried the worms or larvæ. I carefully interchanged them when very young—putting the drone into the cradle of the neuter, and the neuter into the cradle of the drone. But the bee at once discovered the changelings and expelled them. Very numerous trials were made to obviate accidental causes. The question now arose—Do these experiments conclusively prove that the ova are originally different, and is this the true cause of the expulsion? There was still a crucial experiment by which it might be determined whether the expulsion was due to the essential difference in the ova and larvæ. The experiment was simply to interchange neuter and drone eggs, not with one another, but among themselves—that is, to remove the ova in small cells to other small cells, and to treat the ova of drones in the same way. On trying this experiment, I found that the same result followed: that the removed ova were always expelled. This proved decisively that the ejection of the ova was simply on the ground of the removal, and that the experiment told neither for nor against the theory of the identity of the ova. This left the question entirely open, and I was obliged to resort to some other means. The next experiment was to remove the queen from the hive, and also all the neuter brood, leaving only drone brood. The object of this experiment was to ascertain whether a queen could be developed from the larva of a drone—that is, whether a perfect female could be developed from a larva, which, by ordinary treatment, would certainly become a male. The bees were forced either to make no attempt to replace the queen or to develope one from the larva of a drone. To my great satisfaction, I found that the usual plan was adopted for replacing the queen. The cell was elongated and isolated from the other cells. It was in due time closed, and the hatching went on as usual. Unfortunately, however, the cell was broken by the incautious opening of the window of the hive, and the hatching was suspended. The chrysalis was not sufficiently matured to determine the sex. The experiment was again repeated, and the construction of queen's cells for drone brood was proceeded with, but I have not yet succeeded in obtaining a perfect queen. The cause of failure seemed to be the want of hatching power. In such experiments, the loss of the hive is usually involved, and there is an unwillingness to sacrifice a valuable hive. But unless the hive be strong, the number of bees is apt to dwindle down so much that they cannot keep up the requisite temperature for hatching. Although this experiment be not absolutely conclusive, still there is the presumption that the instinct of the bees would not so far err as to lead them to attempt to develope a queen from a drone larva, if this, in the nature of things, was not possible. The point can be fully determined only by further experiment.

The above experiments were not made with the view of establishing a conver-

sion of sex. The theory to which they lead is either that the ova, when deposited, are sexless, and that it is the subsequent treatment that determines the sex, or that each ovum is bisexual, and that the subsequent treatment merely determines which sex is to predominate. This latter is the more probable view, as it is countenanced by the phenomena of hermaphroditism. The facts are such as to compel us to resort to some such theory. If you scattered a handful of ova at random over the empty cells of a comb, and if you found that all that fell into large cells became drones, and all that fell into small became neuters, you would naturally conclude that the cells had something to do with the differentiation of sex. Now, it is quite ascertained that the queen deposits her ova in this apparently random method. If removed from drone cells, when she is busy laying, to neuter cells, she will continue her laying, and the cells will produce their appropriate sexes.

The only other hypothesis by which the failures are attempted to be explained, is that of Siebold, who holds that all the ova are originally male, but that, at the moment of deposition, the queen can, at will, convert the male ovum into a female one. This is supposed to be done by the action of voluntary muscles, which inject spermatozoa into the ovum through the micropyle. The queen is provided with a spermatheca, and she can, at will, fertilize or not the ova as they pass. When depositing an ovum in a large cell, she does not fertilize, and the ovum produces a drone. When depositing in small cells, she fertilizes, and the result is female or neuter bees. This theory implies the conversion of sex, for according to it, all ova are originally male, and the conversion is effected by the presence of spermatozoa. Siebold thinks that his microscopic observations have established this theory. He says that he clearly detected spermatozoa in the neuter ova, while none could be discovered in those of the drone. We have repeated his experiments in many hundred cases, but could find no corroboration. We have found what appeared to be spermatozoa ; but, on more careful examination, we discovered that they were merely folds in the membrane of the ova, and these folds are very like the threadlike spermatozoa of insects. In the case of all the ova we have examined, they were taken immediately after being deposited by the queen. This is essential, for if the interval was great, there would be little hope of finding them, even though visible at an earlier stage. We do not by any means think that the problem is solved by the few imperfect observations of Siebold. Evidence has still to be accumulated, and a most interesting field is still open for the investigations of the naturalist.

ON THE HISTORY, PROPERTIES, AND CULTIVATION OF COTTON.

By Lieut. F. R. Stanton, F. B S. C.

Read by Prof. H. Yates, M.D., 28th March, 1861.

From the great benefits which the human family derive from the cotton plant, it is held in the very highest estimation, and consequently, to treat it either as a botanical, or as an historical subject, must surely prove interesting to all readers. Its cultivation is a source of great national wealth to one nation, while its manufacture enriches another. Its medical virtues are much in vogue, and its history is extremely ancient.

In order that we may be more clearly understood, the subject will be divided into the following heads,—under the first, I will treat of the cotton plant in a botanical point of view—under the second, as regards its medical properties—under the third, in an historical aspect—and under the fourth and last head, attempt to describe its cultivation. In all its lights the subject is alike pleasing, and I trust may be found both novel and instructive.

Description of the Cotton Plant in a Botanical point of view.

The cotton plants belong to the genus *Gossypium*, of which there are many species all growing in warm climates. They belong to the *Malvaceæ*, or mallow order, which contains—"herbs, shrubs, and trees, with alternate stipulate, "palmately divided leaves, often stellate hairs, and showy involucrate flowers on "axillary peduncles, sepals five, rarely three or four, united at the base, valvate, "often having an epicalyx. Petals of the same number as the sepals, twisted. "Stamens ∞, monadelphous, united to the claws of the petals; anthers one-celled, "reniform, introrse, opening transversely; pollen hispid. Ovary many-celled, with "placentas in the axis; or several ovaries, separate or separable when ripe; styles "equal in number to the carpels, distinct or united. Fruit composed of several "monospermal or polyspermal carpels, either combined or separate. Seeds with "little albumen; embryo curved with folded cotyledons. The plants abound in "tropical regions, and in the hotter parts of the temperate zone. The properties "of the mallow-worts are mucilaginous and demulcent, they supply various kinds "of fibres. *Althœa officinalis*, marsh mallow, is used medicinally to supply mucil-"age. Various species of *Gossypium* furnish cotton, which consists of the hairs "attached to the seeds. The inner bark of *Hibiscus cannabinus*, furnishes a kind of "sun-hemp in India."

Botanists have ever experienced the greatest difficulty in determining which are to be held merely as varieties, and which as abstract species, owing to the constant changes produced in the plants of this genus by means of cultivation. De-Candolle describes thirteen species in his Prodromus, and mentions six others, but all of them he considers uncertain. Royle described eight; but according to Swartz, they are all referable to one original species.

From Linnæus and DeCandolle, we learn that the *Gossypium herbaceum*, or common herbaceous cotton plant, which is the species most generally cultivated, is a biennial or triennial plant, with a branching stem from two to six feet high, and palmate, hoary leaves, the lobes of which are somewhat lanceolate and acute, the flowers are pretty with yellow petals, and near the claw have a purple spot. The leaves of the involucel or outer calyx are serrate. The capsule opens when ripe, and displays a loose white tuft of long slender filaments, which surround the seeds and adhere firmly to the outer coating. This species is a native of Persia, and is the same which is grown so largely in the Southern States of America, in Sicily, and in Malta. There is another species of herbaceous cotton, which forms a shrub of from four to six feet high.

The *Gossypium arboreum*, or tree cotton, is of a much larger growth. If left to luxuriate to its full height it has sometimes attained to fifteen or twenty feet. The leaves grow upon long hairy foot-stalks, and are divided into five deep spear-shaped lobes. The tree cotton grows in India, Arabia, Egypt, China, the western coast of Africa, and in some parts of America. According to Humboldt this species of the cotton plant requires a mean annual temperature of 68 ° Fahrenheit; but the shrubby kind may be cultivated with success under a mean temperature of 60 ° to 64 °.

Another species is distinguished by the name of *Gossypium religiosum*. Linnæus gives no reason for having bestowed upon it so singular a name. It is called in the Northern provinces of China, the "mie-wha," and is chiefly cultivated in a part of the Great Plain around Shanghae, where it is the staple summer crop. Nankeen, called after the city of Nankin, is produced from the material furnished by this plant. It is also cultivated in the Mauritius. There are two varieties of this species; in the one, the cotton is extremely white, in the other it is of a yellowish brown.

From the varieties which are familiar to the Southern States of America, an article for commerce is produced, that is divided into the technicalities, "short staple" and "long staple," which terms refer to the length of the fibres produced by the different plants. If ever any real difference in species existed between the plants producing these several staples, the speciality has been lost through constant assimilation.

The "short staple," or upland cotton, also called *bowed Georgia cotton*, from

an olden method of cleaning it, familiar to us in shirtings and sheetings, was procured originally from the West Indies, and is now cultivated with advantage in Florida, Alabama, Mississippi, Louisiana, Tennessee, Georgia, South Carolina, North Carolina, Arkansas and Texas.

The "long staple," or Sea-Island cotton, the finest in the world, is supposed to be a native of Persia. It commands in England double the price of any other imported cotton, and is of so silky a texture that the Cotton Manufacturers in Europe frequently combine sea-island cotton with silk, and so fine is the material, that it is rarely discovered. It is even and strong, and has a yellowish tinge, which in cotton, when natural, is a mark of extreme fineness. Its seeds are black, while most of the cotton of the Southern States is raised from the green seed variety. Having been found to thrive well on the low sandy islands lying along the coast between Charleston and Savannah, it thence derived its name of sea-island cotton.

The quantity as well as the quality of cotton which each plant yields, is variable. The average produce per English acre is reckoned as varying from one hundred and fifty to two hundred and seventy pounds of *picked* cotton.

The plant is propagated by seed.

The cotton shrub in general lasts, in the Islands of the West Indies, about two or three years; in India, Egypt and some other countries, from six to ten years. In the hottest countries it is perennial, and furnishes two crops a year; in cool climates it is annual. The shrub itself very much resembles a currant bush in appearance, and has one feature in common with the orange, namely, that of exhibiting on one stalk every possible stage of growth; so that it is a common sight to see the "blossoming," "forming" and "bolling," going forward at one and the same time.

Medical Properties of Cotton.

Eventually cotton wool will, it is supposed, supersede many, if not all, of the common remedies in the treatment of recent burns and scalds. It was first used with this intention in America. It relieves the pain, diminishes the inflammation, prevents vesication, and greatly hastens the cure. The part affected is reduced to an equable temperature, its effused liquids absorbed, and protection from the atmosphere afforded by the application of thin and successive layers of cotton wool, and also, when the skin is not too much inflamed, by a bandage. But it is found often to do much harm by becoming consolidated over a visicated surface, thus mischievously acting as a mechanical irritant. However, such a result may be prevented by first dressing, with a piece of fine linen spread with simple ointment, the part inflamed.

In erysipelas it is recommended, and also as a dressing for blisters. Applied

in a large batch, it has been found useful in rheumatism, more especially in that most crippling form—lumbago.

The root of the cotton plant has been employed by Dr. Bouchelle, of Mississippi, who considers it to be an excellent emmenagogue, having also similar specific physiological properties to the *secale cornutum* in its action upon the metra,—rivalling the ergot in promoting uterine contraction. He further observes, that the slaves of the Southern States use it habitually and effectually for producing ectrosis; and he considers that it acts in this way without serious injury to the general health.

It has also been asserted, that in parts of the Southern States, cotton seeds have been employed with great success in the treatment of intermittents; but this remains to be proved.

A fixed oil of the drying kind is yielded by the seeds by expression, and the cake produced in the process has been employed in feeding cattle, like linseed cake. Of late years this cake has given rise to accidents, the husks of the cotton seed forming large coherent indigestible masses in the stomachs of the animals. The root also has been supposed to possess medical properties, but it has not as yet been introduced into any officinal preparation.

Cotton is without taste or smell, insoluble in water, alcohol, ether, the oils, and vegetable acids; soluble in strong alkaline solutions, and decomposed by the concentrated mineral acids. In chemical character, it bears a close analogy to lignin. Gun cotton is produced by the operation of nitric acid on it. Collodion is an officinal preparation; and in the form of old rags, cotton is used in the manufacture of paper.

In India, and indeed in all warm countries, both Europeans and natives have found that after a profuse perspiration, linen cloth became damp and cold, first by absorption, and then by evaporation; when cotton cloth remedied these evils, as was soon discovered, its adoption became universal.

It is worthy of note, that gun cotton, or explosive cotton, was first made in America, by the late Professor Ellet, of the University of South Carolina, by the operation of nitre and sulphuric acid on cotton; but with characteristic modesty and ingenuousness, he disclaimed the idea as original, from having experimented upon the fact which had been communicated to him, that a German chemist had succeeded in making cotton explosive. He also yielded the idea of nitre as an agent in causing substances to explode, to Dumas, from whom a memoir had then recently appeared, which gave an account of the method of rendering bibulous paper explosive. However, Ellet's product being readily dissolved in ether—while other processes furnish a product which sometimes dissolves only partially—has displaced all other preparations in the making of collodion, which has itself

constituted not a little to the marvellous perfection now attained in the art of photography.

History of Cotton in the East.

Varieties of the cotton plant are produced in Africa, in the Levant, Egypt, the East Indies, North and South America, including of course the West Indies, thus showing that no plant has so wide a field adapted to its cultivation. Some assert, that by far the finest cotton grows in the Presidency of Bengal, and the Coromandel coast, East Indies, but owing to careless cultivation, the produce is greatly inferior to the American sample. In Africa and Asia more than sixty different varieties have been, it is said, discovered growing spontaneously. But though cotton seems to have been universally known from the earliest periods, yet it is only within the memory of man, that it has obtained its present important place in the commercial world.

Cotton was both cultivated and manufactured in India in the remotest antiquity. Herodotus, who wrote about B. C. 445, makes mention of the manufacture among the Indians, as if it were a well known branch of national industry. Nearchus, the Admiral to whom Alexander the Great intrusted (B. C. 327) the survey of the River Indus, confirmed all that Herodotus had observed. Arrian, an Egyptian Greek, living in the first or second century, also notices the export of cotton from India. And some authorities state, that even now at the present day, India produces annually more of the raw material than the Southern States of America. Cotton indeed seems to have been generally known and used by all the nations of the East, as far back as history informs the inquirer. Strabo states that cotton grew and cotton cloths were manufactured in Susiana, at the head of the Persian Gulf, in his day—about A. D. 20. Pliny, about fifty years later, described the plant (*Gossypium* or *Xylon*) and its products. And yet still we do not find that it occupied in ancient times a place of any real importance among the varied wants of man.

Hindoos, Arabs and Persians, therefore, have without doubt, from time immemorial, formed their clothing of cotton; but it is also certain that the making was confined to household hands, and excited no manufacture beyond the local demand. This custom of home production indeed still holds in the countries of the above mentioned nations, more particularly in India, where, even at the present day, almost every Hindoo—or rather Ryot—family, has an enclosure for cotton planting, from which is taken sufficient for the family's annual consumption; the surplus being allowed to go to decay, nourishing the exhausted land.

In China the cotton plant began to be cultivated for the first time, for general use, after the Tartar conquest. Great opposition was experienced from the wool

and silk fabricators, but at length it was overcome, and it is supposed that about the year 1368, the cultivation became general throughout the empire. Marco Polo makes frequent mention of both the cultivation and manufacture of cotton, in his account of his travels in China, Persia and Armenia. From Benin, on the Guinea coast, in 1590, cotton cloth of African manufacture, was brought to London. The cotton tree grows indeed plentifully on the borders of the Senegal, Gambia, and Niger Rivers, at Timbuctoo, Sierra Leone, in the Cape de Verde Islands, on the coast of Guinea, in Abyssinia, and throughout the interior of Africa.

Neither in the Bible, nor among any Hebrew writers, do we find one single instance wherein cotton is mentioned. The ancient Egyptians, although they were no doubt familiar with its uses from the commercial intercourse which they held with the surrounding nations, seem to have religiously proscribed it as an article of dress or of domestic use, for upon Egyptian tombs, particularly those of Thebes, where we find sculptured the active employments of the long embalmed dead, flax is common from which was obtained the linen spoken of in Scripture, but the cotton plant has never yet been found represented, among the monuments of this ancient people. In support of this theory, it may be pointed out, that the embalming of the dead has not only preserved the bodies of the ancient Egyptians, but also that millions of yards of cloth, such as was used daily by them in their households, have been exposed to the gaze of the curious and learned of modern times, for the cerements of the mummies in part are composed, so it has been ascertained, of the napkins and sheets that by contact with the dead body were polluted, and yet only the stuffs formed from the raw material furnished by the flax plant have been found.

About a century ago, a learned Frenchman asserted that cotton—or as the French call it *coton en laine Anglice*, cotton wool—formed the coverings of the mummies. Everything conspired to force him to this conclusion, for the fabric resembled cotton, and as he said, in no way did it differ from that material. But while the dispute raged, some men more practical than theoretical, applied the microscope to the several fibres of cotton and flax: the former they found was composed of transparent flat ribbon-like fibres, with thickened edges, and very much twisted; the latter was in the form of straight cylindrical tubes. The magnifying glass thus finally confirmed tradition and history in the opinion held conjointly, that the Egyptians used linen cloth alone, for the straight cylindrical tubes only were discovered. When the nationality of the ancient Egyptians was destroyed by foreign conquest, corruption as a sequence became prevalent, or we might with greater truth say, the fitness of things became more apparent, and knowledge overcame superstition, paving the way, and ere long cotton cloth was introduced into Egypt.

Although there are but few notices among either Greek or Latin writers, still

we know that cotton was used more or less generally throughout the whole Roman Empire, and therefore was not unknown to the then civilized world. By the ancients it was called "the wool of trees," from its great resemblance to sheep's wool.

During many succeeding centuries the use of cotton is seldom spoken of, although stuffs of woolen, linen and silk are often mentioned. But when Mohammed commenced agitating the East with his religious ambition, then cotton seems to have attracted much attention. The fierce followers of the Prophet were wearers of cotton, and some writers hold that there was a certain feeling of religion associated with the wearing of cotton apparel. Hence it became for the first time an important article of commerce. For as these Eastern warriors spread over Asia and a portion of Southern Europe, they speedily caused the necessity of a requisite supply.

In Spain.

At the period when the Moors, Saracens, or Arabs—as they were variously denominated—occupied Andalusia, or the Region of the West, as Spain was called by these children of the Desert, they were known as manufacturers of cotton cloths; and, wearing it themselves, it became almost a mark of the Moorish usurpers, which, without doubt, caused a species of religious prejudice that operated strongly against its more rapid introduction into the European world.

The Arabs of Spain made paper out of cotton long before native Europeans were acquainted with that most useful article. Spain has therefore the credit of having introduced the cotton manufacture into Europe about the tenth century. The plant itself flourished on the fertile plains of Valencia, where now it grows wild.

At the beginning of the fourteenth century, the manufacture of cotton was commenced at Venice, and afterwards at Milan. Syria and Asia Minor it is supposed supplied the cotton yarn, for in later years both Italy and France imported all that they required from those countries.

In America.

The great navigator and discoverer, Christopher Columbus, found, on his arrival in the New World, in 1492, cotton growing spontaneously upon many of the islands of the West Indies; and also, on the Continent of South America. Clavigero tells us that in Mexico and Peru, the natives, the aborigines of the country, universally made and wore cotton cloths, and formed also fishing nets of the same material. Fernando Cortez sent home to Spain, to his Sovereign, Charles the Fifth, after he

had completed the conquest (we had almost written the desolation) of Mexico, robes and mantles of native manufacture, which from having been really manufactured, made by the hand, were extremely fine and delicate; for it is a singular fact that the most perfect piece of machinery of the present day, cannot equal the workmanship of unaided semi-barbarous hands. For although some contend that cloth produced from a mill can be as perfect as that prepared by the hand, yet he must surely forget that the dust, oil and impure atmosphere of the milling process, are all escaped by the creation of the hand, which thus retains its natural gloss. This skill in weaving cotton into cloth, is still possessed by the otherwise degenerate descendants of the ancient Mexicans.

North America, it is said, really possesses greater native varieties of the cotton plant than any other portion of the world. The cotton of the Pinos of Texas is extraordinarily fine and long; while the Navajos living in the country bordering on New Mexico, have abundant cotton fields, and when their produce is examined in the manufactured piece of goods, the staple is found to possess both strength and fineness.

In Great Britain.

The cotton manufacture is supposed to have been introduced into England in the early part of the seventeenth century, some writers give 1641 as the date. Mr. Baines suggests that the art was brought from Flanders, when the Duke of Parma, in 1585, captured and ruined the City of Antwerp, and thus caused the Protestant artisans and workmen to fly to England, and there introduce their art.

England, at that period, obtained her trifling supply wholly from Smyrna and Cyprus, in the Levant. It appears, however, that on an average of the five years ending 1705, the quantity annually imported amounted only to 1,170,881 lbs. At the accession of George III., (1760), the entire value of all the cotton goods manufactured in Great Britain was estimated to amount to only £200,000 a year; and it was not till after the invention of the spinning-jenny by Hargreaves, in 1767, and the subsequent discoveries of the spinning-frame of Sir Richard Arkwright, in 1769, the mule-jenny of Mr. Crompton in 1779, and the power-loom of the Reverend Mr. Cartwright, that the manufacture began to advance with any degree of rapidity. But the imports of cotton wool, which in 1781 were 5,198,778, had increased in 1791 to 28,706,675 lbs.; in 1801, they were 56,004,305 lbs; in 1811, 91,576,635 lbs.; in 1821, 126,420,000 lbs.; and in 1830, 259,856,000 lbs. It is remarkable, that at present more than one-half of our cotton wool comes from the United States, whereas previously to 1790, North America did not supply us with a single pound weight of raw cotton. In fact, at the time (1784) when Egypt, and other portions of Africa, with Hindostan, failed to supply to England her increasing demand of

the staple, eight bags of cotton were seized at Liverpool on board of an American vessel, because it was supposed by the custom house officers that such an amount could not have been raised in North America.

Out of 19,900,000 lbs. of cotton wool imported in 1786, 5,800,000 lbs. came from the British West Indies, 5,500,000 lbs. from the French and Spanish Colonies, 1,600,000 lbs. from the Dutch Colonies, 2,000,000 lbs from the Portuguese Colonies, and 5,000,000 lbs. from Smyrna and Turkey; whilst out of 227,760,000 lbs., being the import of 1828, 151,652,000 lbs. were from the United States, 29,143,000 lbs. from Brazil, 32,187,000 lbs. from the East Indies, 6,454,000 lbs. from Egypt, 5,893,000 lbs. from the British West Indies, 726,000 lbs. from Columbia, and 471,000 lbs. from Turkey and Greece.

It is supposed that about two millions of persons are engaged directly, and about two millions more indirectly, in the manufacture of the raw material into cotton cloth in Great Britain alone.

Introduction into the United States.

In the Southern States, many of the planters, and other gentlemen residents, had for a long time been accustomed to small fields of cotton, but it had never become an export, and none conceived the important part which the cotton plant was about to play in the commercial prosperity of the Southern States—for its cultivation can only be carried on advantageously as far as Virginia, as it requires a certain duration of warm weather to perfect its seeds, and consequently any further tending to the northward ends in failure.

As the machinery for the proper manufacture of the raw material into cotton cloth became more improved, so did the demand for the production become greater, and the impulse having been once given, the small fields soon became plantations. But still, it was, although a rapidly increasing, yet by no means a considerable, article of commerce.

At length, however, Hargreaves, Arkwright, Crompton, Cartwright, and many others arose, and, aided by the steam-engine of Watt, so vastly improved the machinery for the production of cotton cloth, that the consumption far exceeded the supply. It was found then, that not without immense expense could the fibre be separated from the seed to which it was attached. But the necessity produced the man—the bane its antidote—a New Englander from Massachusetts on reaching Georgia, where he had determined to settle, at once perceived the difficulty, and his genius soon supplied the want, by the invention (1793) of the *saw-gin*, commonly called the *cotton-gin*—and that so perfectly, that Eli Whitney's invention has held to the present day without material improvement.

Cultivation of the Cotton Plant, more particularly in the Southern States of America.

The cotton plant flourishes in a dry sandy soil, and grows well where the land is too poor to produce any other valuable crop. The vicinity of the sea is favorable for its cultivation, as the salt clay mud acts as a manure, and the saline breezes as a stimulant. Wet seasons are found to be fatal to the plant. The preparations for planting cotton begin in January. The first care of the planter is to clear the fields, which are covered with the dry stalks of the crop of the preceding year. The field hands are accordingly called into requisition, and by breaking down the cotton stalks with heavy clubs, and pulling them up by the roots, the land is soon rendered arable. The stalks are then collected and burned.

About the middle of March, or the beginning of April, the plough begins its work. The "water furrows" about five or six feet apart, are made by a heavy plough, which brings the surface of the ground into ridges, in the centre of which is next run a light plough, making "the drill," as it is called, that is, the depository of the seed. Next comes the sower, who profusely scatters the cotton seed into the newly made "drill." And the harrow succeeding, finishes temporarily the various labors of planting.

From two to three bushels of seed are sufficient to plant an acre of ground—this is but a slight expense, as the quantity of seeds collected at the gin-house is enormous.

At the end of from six to ten days, if the weather prove favorable, the young plant makes its appearance, and what is termed "the scraping" of the crop, now begins. A light plough is first employed, which *throws the earth away from the plant.* The field hands then come with hoes and cut away weeds and superabundant shoots, and leave single plants on little hills at about two feet apart. "Scraping" the crop is an extremely delicate and difficult operation, when rightly performed.

Often many rows have to be re-planted from the operations of the "cut-worm," or *Agrotis xylina*, and other causes, many of which are unknown; but if all goes well in two weeks after "the scraping," the plough is again introduced, which *throws the furrow on to the roots* of the now rapidly growing plant, and the hoe perfects the field work, until the month of June, when the "water furrows" are deepened, and the plough and hoe are used for the last time.

In the month of July the sun makes the "cotton bloom" appear. This "bloom" is of a beautiful light, but warm cream colour. It is considered that the magnificent fabrics which astonished even the polished and powerful Court of Spain, retained much of the natural brilliance and fine gloss which cotton pure from the fields always exhibits.

The *cotton blossom* is born in the night, glows in the morn, but decays at the meridian. The day following its appearance, it has changed to a deep red, and, ere the sun goes down, its petals have fallen to the ground, leaving enclosed in the capacious calyx a scarcely perceptible *germ*. In its incipient and early stages, this germ is called "a form," and in its advanced and perfect state of existence "a boll."

The growing cotton is liable to many accidents, and "rust," "rot,' "the blight," generally caused by a species of borer or pith worm, the *Ægeria carbasina*, a species of gangrene, and wet seasons, often cause great injury. The "boll," more especially of the Upland cotton, is subject to the depredations of the *Heliothes Americana* or *boll-worm*. The *Phalena Gossypion* is the *boll-worm* usually found among the Sea Island Cotton.

The season of cotton picking, always performed in fine weather, after the morning dew has disappeared, commences in the latter part of July, and continues uninterruptedly to December. The work is not heavy, each field hand has a basket and a bag; the basket is left at the head of the "cotton rows", the bag is suspended from the "picker's" neck by a strap, and is used to hold the cotton as it is taken from the "boll." The usual method is to take away the seeds and cotton, leaving the empty husks. In the East the whole pod is gathered, but the husk being apt to break and mix with the cotton, this is found to be disadvantageous. When the bag is full it is emptied into the basket. Some negroes are able to exceed three hundred pounds of "seed cotton" a-day, but they are extraordinary. The "pickers" have to go over the same fields often, as the cotton does not all ripen at the same time. The cotton is carried from the field direct to the "packing-house" provided the weather is favorable, but generally, or at least very frequently, the cotton is spread out on scaffolds where it is left to dry, and all extraneous matter picked out when perceived.

The "packing-room" is immediately over the "gin-stand" in the loft of the "gin-house"; by this arrangement the cotton is conveniently moved down a causeway into the "gin-hopper."

Much of the comparative value of cotton depends upon the excellence of the "cotton-gin," for if the seeds be left in the wool it becomes oily and mouldy, and thus deteriorates in value. Some "gins" separate the staple from the seed far better than others, while all are dependent, more or less, for their excellence, upon the judicious manner in which they are used.

A "gin-stand" worked by the steam-engine has been brought into requisition upon large plantations, and found eminently serviceable, but if worked by four mules with constant attention from the persons in charge, it will make up four bales of four hundred and fifty pounds each a-day, but the average amount does not equal this.

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The "baling" of the cotton, which is accomplished generally by a single but powerful screw, ends the labor of its production on the plantation. The "baling" once completed, the cotton is ready for exportation.

One thousand pounds of "seed cotton" to the acre, which makes two-thirds of a bale of "ginned-cotton" of four hundred and fifty pounds, is considered a very large yield, but it is but seldom that any land remunerates so well the labor of the planter.

In the greater part of India, the use of machinery for the purpose of separating the cotton from the seeds, is unknown; and all the cotton is picked by hand. A man can scarcely by this method, separate more than one pound of cotton in a day. By this we see the great service which the "cotton gin" performs, for by its aid about three hundred weight of cotton may be cleaned in a day, not partially, but entirely, and although it injures to a certain extent the fibre of cotton, still all the cotton grown in the Southern States (the sea-island alone excepted), is cleaned by its means.

We have seen, in the foregoing pages, that the productions of the cotton plant have not acquired their present high standing without a long and an arduous struggle,—before history was the cotton plant flowered, and yet it was but very recently that cotton cloth became so necessary to human comfort, or even was known as an article of commerce.

How finely it illustrates the vast resources of the Divine power, which from an apparently useless shrub, gives employment to millions of beings, and sustains even nations by its cultivation and its produce.

In that portion of the subject which relates more especially to Great Britain, and in which is pointed out the rise and rapid progress of the manufacture into cloth of the raw material produced from the cotton plant, we have indulged in a few statistics in order that we might prove at once the rapidity with which the demand for the produce arose in England, and the equal progress of the cultivation of the plant in the Southern States of America. In one year Great Britain received no cotton wool at all from that source, but a few years elapsed and her chief reliance was on the South.

There are many who hold the opinion that the East Indies will yet be enabled to furnish the manufacturers of Great Britain with a sufficiency of the raw material, but ideas are often delusive, and the opinion, although gaining ground, remains to be proved.

In Africa also, the cultivation of the cotton plant is receiving more attention; and in far-off New South Wales, it is hoped that the plant may flourish, and become a great export and source of wealth to the Colony.

F. R. STANTON, *Queen's College.*

SECOND SESSION.

Eighth Meeting.

FRIDAY EVENING, 15TH NOVEMBER, 1861.

The Rev. Professor Williamson, LL. D., Vice-President, in the chair.

The chairman opened the proceedings by a short introductory address, in which he alluded to the recent origin of the Society, notwithstanding which, it had already struck its roots deeply into the soil, passed the period of youth, and grown up into a goodly tree, whose branches were spread far and wide. Already, he said, contributions and applications for membership were almost daily being received not only from various parts of Upper and Lower Canada and the adjoining States, but also from Britain, and France, and Italy, and Germany, and even our Australian colonies. And not only so. The Society, young as it was, had already acquired the maturity requisite to enable it to bring forth abundant fruit. Its contributions to science, recorded in the "Annals" of the Society, and in numerous scientific journals of Canada and Britain, were already well known. A Botanic Garden had also been established in Kingston, the first of the kind in Canada, and one that might be expected ere long not only to add to the range of scientific knowledge, but also to yield valuable economic results from the experiments that would be undertaken as to the plants suited to our climate. A public Herbarium was also in course of formation, to which, as in other countries, the student might repair to resolve his doubts in the determination of obscure species. At this season of the year, the plants which form the objects of the botanists study go to rest, so also the botanist himself withdraws from his pleasant and healthful researches in the fields and woods; but, as there is no real rest in the case of the plant, as the tissues go on developing, and the juices are being elaborated even beneath the snows of winter, so the botanist also does not now pass into a state of inactivity. Our winter meetings begin, the members come together, and an opportunity is afforded of elaborating and making known the results of the summer's work. The chairman concluded by alluding to the valuable aid that had been derived from Prof. Gray and Sir Wm. Logan in forwarding the objects of the Society, and expressed

a hope that our Provincial Government would view the labours of this Society in the same favorable light in which they were viewed by scientific men, and give to the Society that countenance and aid which the Governments of other countries did not fail to bestow upon similar institutions.

The following names were added to the list of subscribers:—Mrs. Macauley, King street; Rev. H. Mulkins, Portsmouth; Rev. John H. McKerras, M.A., Bowmanville; Alexander Bell, Perth; David Smart, President of the Horticultural Society, Port Hope.

The following were proposed and duly elected Corresponding Members:—Mrs. Traill, Westove, near Peterboro'; T. Sterry Hunt, F.R.S., Montreal; W. Mitton, A.L.S., Hurstpierpoint; Prof. Caspary, Konisberg; T. Caruel, Florence; Rene Lenormand, Vire; Aug. Todaro, Palermo; Dr. Fitch, Salem; W. Wilson, Warrington; Prof. Wood, Brooklyn; W. S. M. D'Urban, 14 Suthernhay, Exeter, Devonshire.

Extensive donations to the Botanic Garden were announced from Prof. Asa Gray, Harvard University; Mrs. Ferguson, Bellevue Terrace; Rev. Dr. Machar, Andrew Drummond, Esq., G. B. Kirkpatrick, Esq., Hugh Fraser, Esq., Miss Mason, George Baxter, Esq., Mr. Yeomans, M. Flanagan, Esq, Prof. Litchfield, Judge Logie, Hamilton; Prof. Williamson, Prof. Weir, Mr. A. T. Drummond, and others.

Donations of dried specimens of Canadian Plants were announced from Mr Billings, Prescott, Mr. Macoun, Belleville, Dr. McGillivray, Chelsea, C. E., Mr. T. F. Chamberlain, Farmersville.

Prof. Lawson read a letter from Sir William Logan, F. R. S., Director of the Geological Survey of Canada, announcing the presentation to the Society of the large collections of plants made by the officers of the Geological Survey on the following explorations, viz:—

From the Rouge country of Argenteuil and neighborhood, by W. S. M. D'Urban.

From Gaspe, Lake Superior and Lake Huron, by Robert Bell.

From Eastern Townships, Labrador and Newfoundland, by James Richardson.

Mr. R. V. Rogers, the Librarian, presented the following list of contributions made to the Society's Library since last meeting:—

From Edward Tuckerman, Professor of Botany in Amherst College, the following works by the donor:—Lichenes Americæ Septentrionalis Exsiccati Fascic, III & IV, V & VI, 2 vols; Lichenes from the Botany of Wilkes' Exploring Expedition; Observations on North American and other Lichenes; Synopsis of the Lichenes of New England, other Northern States and British North America; Enumeratio Methodica Caricum quarundam; New England's Rarities, discovered by John Josselyn, Gent., with introduction and notes by E. Tuckerman, M. A.

From Asa Fitch, M. D.—His First and Second Reports on the noxious, beneficial and other insects of the State of New York.

Proceedings of the American Philosophical Society—No. 65—from the Society.

Proceedings of the American Association for the Advancement of Science—14th meeting—from the Association.

From the Wilmington Institute—Catalogue of the Phænogamous and Filicoid Plants of Newcastle County, Delaware, by Edward Tatnall. Five copies.

From K. McIver, M. B. S. C.—Report upon the present condition and future prospects of tea cultivation in the N. W. provinces of India, with MS. notes.

From Dr. Balfour, Prof. of Medicine and Botany, University of Edinburgh, Hon. M. B. S C., the following paper by the donor:—Observations on Temperature in connection with Vegetation.

From Dr. Lauder Lindsay, F. R. S. E, &c., Hon. M. B. S. C., his paper on the Flora of Iceland.

From Prof. Lawson, Sec. B. S. C.—Bonplandia, a Botanical periodical published in Hanover, 15th May, 1861, containing an article on the B. S. of C.

From Prof. Cleghorn, Madras—Official Reports on the new Gutta Plants of India.

Also numerous Flower and Seed Lists from Vilmorin, Andrieux & Co., Paris; from Handasyde, McMillan & Co., Melbourne, and from Prince & Co., Long Island, N. Y.

Dr. Dickson, Prof. of Surgery, moved a vote of thanks to the various donors. He alluded to the valuable character of some of the donations, such as those of Professor Tuckerman, and especially of Sir William Logan and Professor Asa Gray of Harvard. Sir William had sent to the Society the various collections of plants that had been made at different times by the officers of the Geological Survey of Canada.—Many of these were from localities inaccessible to ordinary collectors, and were of great interest. Independent, however, of the intrinsic value of these very large collections, we must regard the compliment paid to us by Sir Wm. Logan in making us the custodiers, as an indication of his confidence in the ability of our Society to sustain the character of botanical science in the country. Professor Gray's invaluable donation from the Cambridge Garden could scarcely be overestimated, for it, along with the donations of our local horticulturists, had enabled us in a short time to form a Botanic Garden, and the force of our example in this respect was already beneficially felt by other cities in Canada. Coming at such a time, when the country is distracted by civil war, we must appreciate Professor Gray's donation as a special mark of favor, and accord our thanks with more than ordinary fervour.

Professor Lavell seconded the motion, and alluded particularly to the donations of trees, shrubs and plants that had been made by our local horticulturists. Thanks were cordially voted to all the donors.

Very large specimens of tobacco-leaf grown in Pittsburgh, were exhibited by Mr. E. G. Ferguson.

Large plants, in flower, of Richardia Æthiopica and Ricinus communis, were placed on the table by Mrs. Lawson and Dr. Fowler.

A head of Indian corn, infected with smut, was exhibited from the farm of Mr. Lucas.

Specimens of Anacharis Canadensis were exhibited from Judge Logie, Hamilton, who stated, in a note accompanying them, that the plant was abundant.

Professor Lawson, the Secretary, read communications from the following botanists, chiefly in reference to donations, the exchange of specimens, &c. :—Mrs. Traill, Lakefield; Dr. Muller, Melbourne; Dr. Auguste Le Jolis, Cherbourg; Mr. Rene Lenormand, Vire, (France); Prof. Kutzing, Nordhausen; Prof Tuckerman, Amherst; Prof. Asa Gray, Harvard; Dr. Fitch, Salem; Prof. Thurber, Lansing, Michigan; Asst.-Prof. Caruel, Florence; Mr. Todaro, Director of the Botanic Garden, Palermo; Sir William Logan, Director of the Geological Survey of Canada; Principal Dawson, Montreal; Rev. A. F. Kemp, Montreal.

A letter was read from J. Phayer, Jr., Esq., Secretary of the Montreal Agricultural and Horticultural Society, stating that the members of that Society were desirous of establishing a Botanic Garden in Montreal, and requesting any reports, documents and suggestions. The Secretary was authorised to send the "Annals," and other publications, to the Montreal Society, as published, and to afford any additional information that might be required.

The following papers were read:—

1. Report on the injurious effects of Insects and parasitic Fungi on the field crops in Canada during the past season. By Prof. Lawson, with specimens.

2. Remarks on a species of Acarus infesting the Concord Grape. By Octavius Yates, M. D. Specimens were exhibited, and a microscopical drawing of the Acarus.

3. Remarks on the Medicinal Plants of Harrowsmith, &c. By Thomas R. Dupuis, M. D., Odessa, with specimens.

4. On a new culinary vegetable, Chærophyllum bulbosum. By Mrs. Prof. Weir.

5. Returns of the periodical phenomena of vegetation during the season 1861. By John Macoun, Belleville; B. Billings, Prescott; A. T. Drummond, B. A., Kingston; T. Dupuis, M. D., Odessa; Judge Logie, and Miss Crooks, Hamilton.

Eighth Meeting.

THURSDAY EVENING, 19TH DECEMBER, 1861.

Very Rev. Principal Leitch, President, in the Chair.

The following candidates were balloted for and duly elected Fellows;—Dr. George Thurber, Professor in the State Agricultural College, Lansing, Michigan; E. J. Fox, Bath; Dr. McGillivray, M. D., Chelsea, C. E.; John K. McMorine, Almonte.

The following names were added to the List of Lady Members and Subscribers:—Mrs Prof. Dickson, Johnson Street; Mrs Prof. Mowat, Johnson Street; J. Phayer, Jr., Secretary of the Montreal Agricultural and Horticultural Society; Mr Murray, King Street; Josiah J. Bell, Carleton Place, C. W.

The following were elected Corresponding Members:—Archibald Hall, M.D., L. R. C. S. E., Professor of Obstetrics, University of McGill College, Montreal; Rev. A. F. Kemp, Montreal.

The Librarian presented the following contributions to the Society's Library:

Class Book of Botany. By Alphonse Wood, M. A. From the author.

Seed Lists from Vilmorin, Andrieux & Co., Paris, &c.

The President opened the proceedings by a short address, in which he alluded to the successful progress made by the Society, the standing which it had already assumed, and the interest with which its proceedings were regarded by scientific men in European countries.

The following papers were read:—

1. Account of a skiff expedition up the Gananoque River during the month of May, 1861. By John V. Noel.

2 A Summer Ramble in the Woods. By John May, A. M. Read by Prof. Litchfield, M. D.

3. On the Aquarium. By Prof. Litchfield, M. D. In illustration of this paper, a very interesting fresh water Aquarium, furnished with numerous living plants and animals, was exhibited.

4. On the Ferns of the Gatineau District. By D. McGillivray, M. D. Communicated by James C. Smith.

5. Letter from J. D. Trousdale, M. D., with particulars of a case of poisoning with Cicuta maculata. Read by Prof. Lawson.

At this and the preceding meeting numerous letters were read from members and others, desirous of entering into correspondence with the Society. The following is a selection from the correspondence:—

CHIARISSIMO SIGNORE, PALERMO, LI 11 LUGLIO, 1861.

Per mezzo del Bullettino della Societa Botanica della Græcia, sono venuto in conoscenza, che una Societa Botanica vi e stabilita al Canada, di cui ella ne e il Secretario. Io amerci di entrare nelle relazioni le pin intime e le piu frequenti colla conspicua Societa che vi e costituita, offrendole dal mio canto il cambio delle piante secche che nascono spontanee in Sicilia, non che i semi che il Giardino Botanico da me diretto mette in ogni anno in commercio. Per le piante secche io non le divizzo in Catalogo, potendo tanto la Societa, che i suoi membri avoalersi sia della Synopsis Floræ Siculæ del Gussone, sia delle Flore Italiane di Bertolone e Parlatore, posse dendo nell 'erbario, in una buona quantita di doppie, tutte quasi le piante sinora ritrovate in Sicilia. Per i semi le invio il catalogo dell 'anno corrente, sul quale suo Ella fare la sua scelta. In ricambio io accetterei qualsivoglia pianta dell' America anco la piu volgare, e semi e bulbi delle piante le pin ovvie nel Canada o di qualsivoglia ultra contrada. Per la rimessa dei semi, e delle piante secche che potrebbero rispettivamente farsi la cosa pin interezzante o'e di' stabilire i mezzi di communicazione. L'Orto Botanico di Palermo possiede agenti spedizionieri in tutti i porti principali del Mediterraneo, come in Marsiglia, Malta, Genova, Livorno, Napoli, e se abbisognasse si potrebbe anco interessare il Governo del Re d'Italia; quindi dovrebbe ella farmi conoscere in qual punto di Europa, ed a preferenza dei' Mediterranee le riesce pin facile di far pervenire gli oggetti che potrebbe inviarmi, e quale e la via pin facile per rimetterle cio che desidera di Sicilia.

Rilevera Ella di quale utile potrebbero essere le nostre relazione nell' utile della Scienza, e son sicuro che fera buon vizo alla mia offerta.

Riceva intanto gli attestati della mia divozione et mi creda

Suo div. e obl. serv.,

AGOSTINO TODARO,
Direttore del orto Botanico di Palermo.

Al Chiarissimo Signore Mr. Prof. LAWSON,
Secretario della Societa Botanica del Canada, Kingston.

[*Translation, by Professor Williamson.*]

PALERMO, 11TH JULY, 1861.

By means of the Bulletin of the Botanical Society of Greece, I have learnt that a Botanical Society has been established in Canada, of which you are the Secretary. I should like to enter into the most intimate and frequent communications with the eminent Society which has been formed there, offering to it on my part the exchange of the dried plants which are indigenous to Sicily, as well as the seeds which the Botanical Garden under my direction brings every year into the market. As to the dried plants, I do not arrange them in a Catalogue, the Society, as well as its members, having it in their power to avail themselves either of the *Synopsis Floræ Siculæ* of Gussone or of the *Flore Italiane* of Bertolone and Parlatore, having in the herbarium a large number of duplicates of almost all the plants hitherto found in Sicily. As to the seeds, I send the Catalogue of the current year, out of which you may make your choice. In exchange I would accept any American plants you please, even the most ordinary, and seeds and bulbs of the plants which are most common in Canada, or of any other country. As to the transmission of the seeds and dried plants, which I shall be able to send you in return, the most important thing is to establish the means of communication. The Botanical Garden of Palermo possesses expeditionary agents in all the principal ports of the Mediterranean, as in Marseilles, Malta, Genoa, Leghorn, Naples, and if it were necessary could also interest the Government of the King of Italy. You will therefore have to let me know to what point of Europe, and especially of the Mediterranean, it would be most convenient for you to transmit the articles you may be able to send me, and what is the most easy way of remitting to you what you want from Sicily.

Consider of how great utility our correspondence will be to the interests of the science, and I am sure you will look favorably on my offer.

Meanwhile receive the assurances of my devotion, and believe, &c.,

AGOSTINO TODARO,
Director of the Botanical Garden of Palermo.

CHERBOURG, 15TH AUGUST, 1861.

SIR,

I beg to acknowledge the receipt of Vol. I., Part I., of "Annals of the Botanical Society of Canada," in perusing which I got the information (p. 19) that I had been selected as a Corresponding Member of that learned Company. I request you will be so kind as to present to the Council and Fellows of the Canadian Society my warmest thanks for that honour, so unexpected, and assure them I shall be happy if I may be useful to the Society in contributing some plants for their herbarium. I shall be glad to know if such contributions might be acceptable, and in what manner or way I can forward them. If any of the learned Fellows of the Society were specially studying marine algæ, I should be glad to exchange the species of our coasts against a numerous set of samples of Canadian species.

I beg you will inform me whether the number of the "Annals" was intended for the Library of our Society of Cherbourg, or for my own library. In the latter case, I should solicit a second set of those publications for the Society, who shall send you in exchange their Memoirs.

I have the honor to inform you that the Society Imperial of Natural Sciences of Cherbourg, at their meeting of 9th inst., have, after my proposition, elected you their Corresponding Member.

I am, very respectfully, Sir, your very obedient servant,

AUGUSTE LE JOLIS, *Dr. Philos.*

DR. GEORGE LAWSON, Professor, &c., Kingston.

VEREHRTER HERR UND COLLEGE!

Yhr werthes Schreiben vom 29 August a. c. habe ich am 13 September a. c. erhaltenund ich danke Yhnen, so wie den geehrten Mitgliedern der Botanical Society of Canada, dass Sie mich als auswartiges Ehren Mitglied in Yhren Kreis aufgenommen haben.

Gegenwartig beschaftigt mit der Herausgabe des XII. Bandes meiner, Tabulæ Phycologicæ wird es mir erst, im nachsten Yahre moglich sein, Yhnen eine Anzahl Algen der niedern Ordnung aus meiner Sammlung auszusuchen und zu ubersenden. Wollen Sie mir inzwischen Suss Wasser Algen aus Yhrem Lande ubersenden, so werde ich gern die Untersuchung und Bestimmung derselben uber nehmen. Ich bitte dann aus die einzelnen Exemplare mit *nummern* zu bezeichnen.

Indem ich Ihnen und sammtlichen geerhrten Mitgliedern der Botanical Society of Canada meinen herzlichen Gruss darbringe zeichne ich mit vorzuglicher.

Hochachtung, Euer Hochwohlgeboren, gehorsamster,

DR. KUTZING, *Prof.*

AN HERRN PROFESSOR LAWSON, Kingston, Canada.

Nordhausen, d. 20 September, 1861.

FLORENCE, 10TH JULY, 1861.

SIR,

I have been informed that a Botanical Society, of which you are the Secretary, has been founded in your town with a view to further the interests of science, and that one of the means intended to be employed by the Society will be exchanges of plants. Although it is not stated expressly, I suppose foreign botanists will be admitted to partake of the advantages of these exchanges; and if such were really the case, I should beg leave to offer to the Canadian Society collections of Italian and especially Tuscan plants, for which I would thankfully take in return American plants, especially *Ranunculaceæ*, of which I intend working up a monograph. Perhaps the fact of my being the author of a Flora of Tuscany may give some additional value to my plants.

I should be very much obliged if you would favor me with an answer; begging you to believe me,

Yours sincerely,

T. CARUEL.

PROF. LAWSON, Secretary of the Botanical Society, at Kingston, Canada.

PARIS, 21ST NOV.

SIR,

In a number of the "Phytologist" I have lately read a very interesting advertisement, by which you make known that the Botanical Society of Kingston wishes to exchange plants with foreign botanists. Having myself long since the same intentions and purposes, and being very well connected for making such exchanges with several European and Algerine botanists, notwithstanding gathering a great quantity of plants in this country, I

inform you that I will be very glad to correspond for botanical specimens with the Kingston Society. As soon as you will have given a favorable answer to this letter, I will send you a large packet of specimens of this country; in return, you will very much gratify me by forwarding such interesting plants as *Onagrariæ, Cruciferæ, Calycanthaceæ*, of which many kinds and species are peculiar to North America.

I am, Sir, your most obedient,

DR. EUG. FOURNIER,
Vice-Secretary of the Botanical Society of France,
20, Rue Bonaparte a Paris.

To PROFESSOR LAWSON, Secretary of the Botanical Society, at Kingston, Canada.

COMMUNICATIONS FROM DR. BERTHOLD SEEMANN.

Professor Lawson read letters from Dr. Seemann, who had lately returned to Europe from an Exploration of the Fiji Islands. The letters were accompanied by a copy of the "Bonplandia," a botanical journal, ably edited by Dr. Seemann, and containing an article on the Botanical Society of Canada, of which the following translation has been prepared by Mr. John Machar, A. M., a Fellow of the Society:

THE BOTANICAL SOCIETY OF CANADA.—Were the Spanish adventurers, who, after a bootless quest for imagined treasure, cried out in their disappointment "Aqui nada," to visit Canada now, after the lapse of three hundred years, they would probably see cause to choose another exclamation than the one which, if tradition is to be believed, gave to a land of so great promise so unpropitious a name. In every direction signs of prosperity and progress meet the traveller's eye. Steamships of prodigious size and power maintain a regular and rapid communication with the ports of the old world. Railroads traverse the country in all directions. The white sails of countless vessels enliven the great inland waters, and what was erewhile regarded as the daring feat of a reckless Indian, to shoot the rapids of Lachine in his birch bark canoe, is now part of the daily route of Canadian steamboats. With the aid of the ever-increasing Teutonic element, surmounting the obstacles afforded by the early circumstances of the country, * * * Canada marches on with giant strides towards a prosperous future. Edifices, which can challenge Europe to surpass them, adorn the streets of new cities, arisen as if by magic from the soil. The bridges spanning the Niagara, the Ottawa, and the mighty stream of the St. Lawrence, are with reason counted among the wonders of the world. Science, now pioneer like, striding on in advance of the arts, now, singularly enough, straggling behind with halting step, has found here a congenial home—a hearty welcome. To this the rapidly rising universities, the well known school system, *the Institut Canadien*, containing in itself the germ of a national academy, the Natural History Society of Montreal, amply testify. And now to this noble array a new union has been added, under the name of the Botanical Society of Canada—a union to which we can extend a hearty welcome, not as botanists alone, but even as Germans.

Between the inhabited parts of North America and the inhospitable regions of the Arctic circle there lies a broad belt of land, which has hitherto been to the botanist almost a *terra incognita*. In Canada, therefore, a Botanical Society has for its operations a most extensive field, whereon many a (new) plant buds, blooms and withers unnamed, unknown—whereon many a species attains its northernmost limits, and awaits the hour when some savant shall record its discovery in the annals of the science.

Such facts as these, more even than that of 93 members having given in their adherence to the society on the very day of its foundation, encourage us to hope that in this new body we may expect something more than one of those ephemeral unions of local savans, who exhaust all their strength in the production of annals which are never read by the learned, whose perpetual contentions as to who shall fill their petty offices make them the laughing-stock of their fellow-citizens, and whose scientific investigations, because they do not come under the notice of the general public, are seldom conducted with the care exercised by those who know that their papers will not only be read beyond their own locality, but perused with interest by the learned of other lands. We in Europe will watch with interest the progress and the labors of the Canadian society, and we shall ever be curious to learn the result of each new expedition into the unknown region. The very circumstances of the infant society

afford a sufficient guarantee that it will never degenerate into a mere inert local club. Its mission is one in which the whole botanical world is interested, and all the gentlemen who met together on the 7th December, 1860, at Kingston, in particular the members of the faculty of Queen's College, deserve the cordial thanks of their scientific brethren, both in the old world and in the new, for having so heartily laid their hands to the work of freeing Canada from the reproach of indifference to the claims of botanical science. Besides the interest which we naturally feel as botanists merely in the birth of a new society, ready to go hand in hand with us in the accomplishment of our common great end, for us as Germans the investigation of Canadian botany possesses the peculiar interest that one of our own countrymen, the gifted Frederick Pursh, first conceived and strove to execute the very plan now proposed by the Botanical Society at Kingston. After Pursh had travelled through the (then) United States, and had written on his return a Flora of North America, he set out once more for the new world, this time turning his steps towards Canada. Limited as were the means at his command, he explored a considerable part of Eastern Canada, and had almost completed his very valuable collection when the fruits of so many months of weary toil fell a prey to the devouring flames. Other misfortunes befel him, and on the 11th day of July, 1820, he died at Montreal, in the 40th year of his age, so poor that the charity of a few friends defrayed the expenses of his funeral. We may imagine his manes may have looked on with rejoicing when on the 7th December, 1860, forty years after his death, the exploration of Canada was undertaken once more, and the sequel promised to justify his most sanguine anticipations.

The first meeting of the new society was held in Queen's College at Kingston. Dr. Leitch presided, and in a genial speech set forth the object and the necessity of such an association. Universities, he thought, discharge only one half of their functions when they restrict themselves to merely communicating the existing sum of acquired knowledge. They should incite to, nay, should themselves institute, original investigations. Referring to the numerous attendance at this first meeting, he remarked the difference between the auspices under which this society was ushered into the world, and the circumstances attending the foundation of the great European learned societies, with what difficulty a handful of faithful disciples of science were brought together, and how from that handful, by dint of their steadfastness, were developed those institutions which were now the pride of the old world. After Dr. Leitch a somewhat longer address was delivered by Dr. Lawson, in whom we recognise an old acquaintance and former active member of the Botanical Society of Edinburgh. The science of botany, he remarked, had been hitherto more neglected in Canada than in almost any other educated country. Up to the close of the 18th century but five Botanical Treatises had appeared throughout the length and breadth of the North American continent. Much improvement had since been made, but a Flora of Canada yet remained a *desideratum*. To collect materials for this end must be the chief function of this Society, and the report of the investigations in this Province will occupy a prominent position in the (to be) published '*Transactions*.' Dr. Litchfield, whose talent for organization was of much use in the formation of the Botanical Society of London, next occupied the attention of the meeting. He dwelt particularly on the necessity of a Botanical Garden—set forth the advantages which would accrue to Canada from its institution, and directed attention to the means already at their disposal. Dr. Leitch ther passed in review what had been brought before the meeting, and after paying Dr. Lawson a well-merted compliment, moved, seconded by Dr. Williamson, 'That this meeting resolve to form a Botanical Society.' This motion having been unanimously agreed to, Prof. Mowat read the proposed laws, which, on motion of Dr. Dupuis, seconded by Dr. Yates, were received, with the reservation of the right of the Council to make any desired alterations. This having also been agreed to, the Botanical Society of Canada was declared to be constituted, and it was agreed that all official communications should be addressed to Prof. Lawson, Kingston, Canada. Business over, the members repaired to a sort of Converzatione in the Laboratory, where were exhibited microscopic preparations, drawings and scientific works, among which the reporter of the Daily News observed Schnitzlein's Iconography, Hooker's Rhododendrons, Harvey's American Algæ, Seemann's Herald Botany, Hooker's Flora of North America, and other illustrated works.

22, Canonbury Square, London N.,
December 9, 1861.

Dear Sir:

Dr. Schultz Bipontinus, an intimate friend of mine, and a great laborer in the field of Compositæ, desires me to address a few lines to you, and through you to the Botanical Society of Canada. He is most anxious to get a set of Canadian Compositæ for his herbarium, and would be very glad if any member of your society would send

him what he could spare. Schultz would make him ample returns for what he gets, so that your members would not be the losers by this exchange. Anything sent to me shall be forwarded to him.

I had another article in the Bonplandia about your Society, using your reports (kindly sent to me), to show the usefulness of admitting *ladies* in popular societies, and at the same time giving a list of the papers you have published in the two first parts of your (I should say *our*) Transactions.

The Bonplandia will be illustrated with colored plates, drawn by Fitch and printed in England. This to commence on the 15th of December, 1861. None save really new genera and species will be coloured.

With best wishes for the success of your Society,

Yours very truly,

BERTHOLD SEEMANN.

REMARKS ON THE PREPARATION OF SKELETON FLOWERS.

By Prof. JOHN R. DICKSON, M. D.

The parts intended for preparation should be macerated in rain-water until such time as the succulent portions are thoroughly decomposed. Summer is the best season for this process, and if the vessel in which it is conducted be exposed to the sun's rays, decomposition will more readily take place.

There should not only be sufficient water to cover the contents of the macerating vessel, but also an additional quantity added to make allowance for what will be lost by evaporation, so that no portion of the plant may become exposed to the air, and thus desiccated, as its form and color would thereby be destroyed.

At the end of a fortnight or three weeks, the plant may be taken out of the water and placed on some soft fabric such as flannel, and an attempt made to remove the succulent parts by gentle friction with a camel's hair brush. If the fibrous part is not readily denuded thus, the plant must be replaced in the water, and allowed to remain some time longer, but occasionally may be subjected to the process above indicated.

As soon as it is found that the succulent parts can be readily removed, the maceration has been continued long enough; the preparation should be removed from the water, and the ligneous portion thoroughly but carefully cleansed and freed from all other tissues with the camel's hair brush.

If it is now found that the preparation is not sufficiently white, it may be bleached by immersing it for a few days in cold water, holding chloride of lime in solution, and may afterwards be exposed to the sun, or allowed to dry in a warm room.

If there is any difficulty in maintaining the natural shape of plant, the stem may be strengthened by passing fine wire for some distance through its centre, which will enable it to sustain the weight.

This process is adapted to the various parts of plants having a fibrous-tissue framework, such as stems, leaves, fruit and flowers, and also to grasses.

Tenth Meeting.

FRIDAY EVENING, 10TH JANUARY, 1862.

The Very Rev. Principal Leitch, President, in the Chair.

In opening the proceedings the Chairman stated that the first blank in the Society had been caused by the death of Colonel Jackson, of Portsmouth, near Kingston, who had been well known as the most successful cultivator of culinary vegetables in this part of the country.

The President also alluded in feeling terms to the lamented death of H. R. H. the Prince Consort, which had cast a gloom not upon England alone, but upon every English colony and every country in which science was pursued.

The following new members were admitted, viz:

Fellows—Mr S. D. Grasse, Mr John V. Noel.

Members—Mrs Harper, Johnson Street; Mrs Maxwell Strange, Union Street; Miss Logie, Queen Street; Rev. K. Maclennan, Whitby; James Gray, Esq., Banker, Picton, C. W.

Corresponding Members—Dr. Ferdinand Cohn, Breslau; Dr. Patterson, Leith; Dr. W. H. Lowe, President Botanical Society of Edinburgh; Dr. Eug. Fournier, Vice-Secretary, Botanical Society of France, 20 Rue Bonaparte a Paris; Dr. Schultz Bipontinus, Hanover.

The Secretary exhibited specimens of the remarkable fruit of Martynia proboscidea, from the garden of Thomas Briggs, Jr., Esq., and from Mr A. Bell, Perth.

Professor Williamson stated that he had cultivated the plant successfully for many years.

The following donations were announced:

From John Watkins, Esq., a donation of sixty dollars, to be applied to the improvement of the Botanic Garden.

From Principal Dawson, Montreal, a collection of White Mountain Plants.

From Mr B. Billings, Jr., Prescott, a collection of Flowering and Cryptogamic Plants, chiefly mosses.

From Mr R. J. Holmes, F. B. S. C., for the Society's Library:—1-2. The Canadian Naturalist and Geologist, Vols. I. and II. 3. Strawberry Culture; by R. G. Pardee. 4-5. The Grape Vine, its Culture, Uses and History; by G. W. Johnson, 2 vols. 6. Studies in Animal Life; by G. H. Lewes. 7. The Principles of Botany, by W. H. Willshire, M. D., M. B. S. London. 8. The American Handbook of Ornamental Trees, by Thomas Meehan.

The following papers were read:—

1. Remarks on the mode of preparing Dissected Plants. By Professor Dickson, M. D. A very beautiful group of dissected specimens was exhibited from Mrs. Dickson, including some interesting species, such as Physalis Alkekenji, Datura,

Stramonium, Lunaria vulgaris, Ilex Aquifolium, Papaver somniferum, Hyoscyamus niger, Nigella sativa, Poa pratensis, Briza media, &c.

2. Lines written for the Botanical Society of Canada. By Mrs Prof. Weir. Read by Rev. Prof. Weir, A. M.

3. On Pimpla lunator and other enemies to the insect-enemies of Vegetation. By Edward C. Fox, Bal. Coll., Oxon, F. B. S. C., with specimens.

4. On the Shore Limits of the Marine Algæ of the North Eastern Coast of the United States. By Rev. Alex. F. Kemp, Cor. M. B. S. C.

In illustration of this paper, specimens were exhibited from Mr. Kemp of Agarum Turneri var. trilaminatum, Chætomorpha melagonium, Gigartina mammilosa, Halosaccion ramentaceum, Furcellaria fastigiata, and Fucus furcatus.

A very interesting collection of American Sea-Weeds was also exhibited from Mrs John Macpherson, Barrie Street.

Professor Williamson alluded to some of the more interesting phenomena presented by the distribution of marine plants along the American coast, and referred to some of the results of observations which he had made at different points along the coast.

Principal Leitch spoke of the importance of such researches in several points of view. The fact of plants being found to inhabit definite zones or lines along the shore to which their distribution was restricted, as found by Mr Kemp, served to show that there was here an apparent barrier to that tendency to specific change which is argued for in the speculations of Lamarck, the author of the Vestiges, and Darwin.

5. On the Plants of the neighborhood of Ramsay, and adjoining localities. By John K. McMorine.

Office-Bearers for the Second Session (1861-62) were elected as follows:—

PRESIDENT:—VERY REV. PRINCIPAL LEITCH, D. D.

VICE-PRESIDENTS:—PROF. WILLIAMSON, LL.D.; PROF. DICKSON, M. D.

COUNCIL:

PROF. FOWLER, M. D., King Street.
W. G. HINDS, ESQ., Banker.
PROF. LITCHFIELD, M. D., Rockwood.
M. FLANAGAN, ESQ., City Clerk.
PROF. H. YATES, M. D., King Street.
W. FERGUSON, ESQ., Bellevue Terrace.
J. DUFF, ESQ., Princess Street.
J. J. BURROWES, ESQ., County Crown Attorney.
GEORGE BAXTER, ESQ., Pittsburg.
OCTAVIUS YATES, M. D., William Street.
THOS. BRIGGS, JR., ESQ., Regent Street.
PROF. LAVELL, M. D., Johnson Street.
AUGUSTUS THIBODO, ESQ., Johnson Street.
REV. PROF. WEIR, A. M., Queen Street.
JOHN WATKINS, ESQ., King Street.
JOHN CREIGHTON, ESQ., Arch Street.
REV. PROF. MOWAT, A. M., Johnson Street.
ARCH. J. MACDONELL, ESQ., Recorder.
JOHN CARRUTHERS, ESQ., Earl Street.
HUGH FRASER, ESQ., Pleasant Street.
JEREMIAH MEAGHER, ESQ., Union Street.
HON. ALEX. CAMPBELL, M. L. C.

SECRETARY:—PROF. LAWSON.

TREASURER:—ANDREW DRUMMOND, ESQ.

CURATORS:

MR. J. F. INGERSOLL,
MR. JOHN K. McMORINE,
MR. W. B. FERGUSON,
MR. JOHN BELL,
MR. A. T. DRUMMOND,
MR. ALEX. BELL.

LIBRARIAN:—MR. R. V. ROGERS, B. A.

A SUMMER RAMBLE IN THE WOODS.

By John May, A. M.

Read by Professor Litchfield, M. D., 19th December, 1861.

Quite lately I was asked to write
A paper to be read to-night;
(Something on shrubs, or flowers, or trees;)
So here is my attempt to please,
As full of reason and of rhyme
As I could make it in the time.
It might, perchance, not be unwise,
Ere going further, to premise
That none can speak, with any shew
Of sense, on what he does not know;
And thus my simple, modest Muse
Avoids the lofty and abstruse,
But loves in simple garb to go
Where forests wave and streamlets flow.

O! it is sweet on summer morn,
When flowers the grassy mead adorn,
To wander in the wild-wood glen,
The thicket shade, the quivering fen;
To climb the heights and see the spray
Dash'd on the face of loving day;
To hear the distant waters roar,
Or gather pebbles on the shore;
To start the hare, or, with your cur,
To know the partridge by his whirr;
To hear on some tall bough the dove
Utter the soft complaint of love;
Whilst mocking squirrel on lofty limb
Defies you to get up to him;
The chipmonk, too, in nimble style,
Darts tim'rously to the stony pile,
Sits temptingly a moment there,
Then vanishes into his lair;
Or if, perchance, his house should be
Beneath the roof of some tall tree,
He quick'descends, with sudden squeak;
For him your dog begins to seek;
First snuffs a while, then tears away
The leaves, the rubbish and the clay,
With many a howl and rapid scratch,
Intent the little scamp to catch:
Perhaps, while thus engaged, his prey
Makes his escape some other way,
Leaving his foe to dig with pain—
As better folks have done—in vain;
But, should the persevering brute
Find him at last beneath the root,
The hapless little creature's fate
Is far too mournful to relate!

You next descry, a few yards hence,
A squirrel sitting on the fence,
His wide tail sloping o'er his back,
Endeavouring a nut to crack,
Or chiselling out with yellow tusk
The fleshy part within the husk.
In high relief, on topmost rail
He sits; you think you cannot fail
To end his days with random shot;
You shy the stone—it hits him not!
Away he springs. and doubly quick
You give pursuit with murd'rous stick;
That lofty oak!—see how he strains
To reach it! should he, all your pains
Are lost; for if you have no gun,
Here is the end of all your fun.

Now, when your sport begins to fail,
Perchance upon the morning gale
A fragrant odour steals along;
At first 'tis faint, but soon how strong!
Then, as the odorous spot you fly,
A pretty creature you espy
With bushy tail above his back;
While broad, clean stripes of white and black
With fair pretence attract the eye
Of 'th unsuspecting passer-by.
Like some lost child of splendid sin,
All bright without, all foul within;
Or like the scamp with pious art
That hides the blackness of his heart;
Outward all grace and beauty bloom;
Within—more noisesome than the tomb!
A person, once, to skunks unknown,
Was rambling through the woods alone;
When suddenly, at bend of road,
He lights upon the skunk's abode.
Enravish'd with the creature's charms,
He takes the sweet thing to his arms;
Returning home at evening gray
He meets a neighbour by the way;
His prize displays, and asks "is that
Not a fine sample of the cat?"
Whilst thus engaged in quick retreat,
A sudden rustling at your feet,
Among the leaves and herbage dry,
Announces that a snake is nigh.
An instant fear your heart assails,
As one before the spectre quails
That sudden rises on his sight
Passing a lonely house at night:
A moment only: stooping quick,
You seize the nearest stone or stick;
His wrathful head is raised on high,
Malignant gleams his baleful eye;
His rapid tongue, fork'd, quivering, bright,
Breathes deadly challenge to the fight:
Brave, foolish thing! swift on his head
Descends the blow, and he is dead!
But, should you, in a boyish vein,
His scaly body part in twain,
Half moving off with toilsome gait
Leaves the remainder to its fate;
And only when the sun doth fail
Ceases the motion of the tail!
Or, if the serpent you would slay
A more refined and neater way,
Seize it as though it were a whip.
Snap it, and off the head will slip!

Pray whence this feeling mixed with fear
And hatred when a snake is near?
How comes it with such eager will
We haste the harmless thing to kill?
Who meets a partridge with his gun
And kills it, does so just for fun;
But all men seem to think it right
To kill the snake for very spite.
Methinks 'tis some unsettled score
Dated in ages long before
The flood, when Satan lying spake
From the curs'd belly of the snake
Words fraught with ruin and disgrace,
And death and torment to our race!
Hark! 'tis the baying of the hound;
The hemlocks echo back the sound.
Behold! a creature strange is here,
Thick coated with the prickly spear;
A bristling porcupine with skill
(Some people say) to hurl his quill.
Your dog, impatient, fumes in vain;
Advances, snaps, retreats with pain!
Swift on the sturdy creature's pate
Descends the club and seals his fate.

Whence comes that hollow, ringing sound
Echoing through the woods around?
Most like the sleeper's heavy snore,
Or rapid tapping at one's door?
At rise of sun, on April morn,
The farmer hears this rousing horn,
Invoking loud each slumbering thing
To rise and hail th' approach of Spring.
On yonder dry and barkless tree
The little workman you may see,
Pecking away with all his might
To bring forth maggots to the light;
With scarlet night-cap on his head,
Out early toiling for his bread.
Though hard the wood, 'tis morticed well,
In rows of holes all parallel;
Or curved with nicest art and rule
As though the bird had been at school.
Now, dragging forth the struggling prey,
He fills his beak and hies away
With wavy flight to where his brood
Are waiting for their morning food,
In a most curious house on high
Hid from the truant school-boy's eye.
And scoop'd and planed with nicest skill,
With no tool save the little bill,
In a tall trunk whose branchless form
Heeds not the howling of the storm;
But come away and let him rest,
Touch not the little fellow's nest.

Here dashes by the hurrying stream,
Scarce reach'd by one faint struggling beam;
Dense heaves the wood on either side
The swelling bosom of its pride;
Here lifts the oak its awful form
To woo the breeze or mock the storm;
The gloomy fir, of shapely height,
Rising so scrup'lously upright;
The maple, too, whose useful trunk
Affords us fuel, sugar, spunk;
The graceful elm, whose equal stem
The settlers found of use to them
To rear the barn, or simple hut
On which the basswood troughs were put,
Well hollowed out and laid with care,
Each one above an under pair,
Twofold; the insidious rain to catch,
In lieu of shingle, slate or thatch;
The basswood, seldom useful found—
Outward too soft, within unsound;
The spreading beech that idly fares
Two years for every one it bears;
The cedar, too, whose pounded bark
Oft lights the traveller in the dark—
Whose light, free wood material yields
To roof your house or fence your fields,
Or chase with sparkling heat away
The frosty breath of wintry day;
With various plants of humbler fame
Which space forbids me now to name.

Hark to the moaning of the wood!
The distant dashing of the flood,
As wild it tosses on alone
Its headlong path of craggy stone,
To where it lulls itself asleep,
Or faint its weary waters creep
Across the low and level marge,
And spread among the trees at large;
Once trees; now but a leafless grove,
Where the hoarse bull-frog loves to rove,
And raise that far-resounding note
That booms from his capacious throat.
Two Red-men, if the tale be true,
Once fell asleep in their canoe;
And when they woke a monstrous frog
Was sitting near them on a log;
In idle humour him they seized,
And the unlucky creature teased
By pouring spirits down his throat,
Then set the staggering thing afloat,
When loud he roared, "More rum! more rum!"
But the historian here is dumb,
Whether 'twas from the pain he bore,
Or that his frogship wanted more:
Yet all tradition plainly shows
That thus the bull-frog's cry arose.

Now droops the day on ocean's breast;
The weary warbler seeks his rest;
The sombre crow, with pond'rous flight,
Makes homeward on th' approach of night
Whilst deeper in the ethereal plain
Laborious floats the heavy crane.
Night moves apace in ebon chair;
A peaceful silence fills the air,
Save when some dire mosquito wings
About your face, alights, and stings!
Or frogs symphonious join to raise
In neighb'ring pond their hymn of praise;
Or e'en remote in shady dell,
The half-heard tinklings of the bell
Shew that the greedy cow may fail
To seek betimes the welcome pail.
O! is there here some bearded man
Who, when a little school-boy ran
His dreary mile or lonely league,
Oppressed with terror and fatigue.
To seek the truant herd, not yet
Returned, although the sun is set?
If such there be, he too can tell
How vague fear in his heart did swell
As desperately he gallop'd by
The thicket shade where panthers lie;
And how his breath returned again
As he emerged into the plain.
This is the cows' accustomed spot,
Yet here the plaguy beasts are not;
A moment now he glances round;
He sees no sign, he hears no sound;
Before him lies the dismal road,
Dense woods around—the wolf's abode!
Fast beats the tim'rous youngster's heart;
He dashes on, but oft does start;
At stir of leaf or sigh of air,
He fancies some dread thing is there;
And scarce his very hat for dread
Will keep its place upon his head!
Swift ply the feet; no fleetest hind
Could leave the frantic youth behind.

Now o'er the sable robes of Night
Fair Cynthia sheds her silver light;
And, humming soft notes thro' the trees,
Wings gently by the evening breeze.
Night warns us home; too late's the hour
To seek for lichen, moss or flower;
Call in the dogs, bring home the gun,
My Summer Ramble now is done.

KINGSTON, NOV. 29TH, 1861.

Eleventh Meeting.

FRIDAY EVENING, 14TH FEBRUARY, 1862.

Professor Dickson, Vice-President, in the Chair.

The following new members were admitted:

Mrs Prof. Litchfield, Rockwood; Mrs Rybert Kent, Union Street; Miss Wylie, Almonte; Mr. Burrowes, Kingston Mills; Mr. Samuel Andrews, Clark's Mills, Camden.

Edward Tuckerman, A. M., Professor of Botany, Amherst College, was elected an Honorary Member.

Dr. Duncanson, Forth Bank, Alloa, was elected a Corresponding Member.

The following donations were announced:—From Judge Logie, Hamilton, a valuable collection of Tree Seeds for the Garden. From Professor Blytt, Christiania, his Norge Flora, part I. From the Australian Apiarian Society, the Society's Rules, &c. From the Board of Arts and Manufactures of Upper Canada, several numbers of their Journal. From the Horticultural Society of Melbourne, List of Prizes, &c. From Principal Dawson, Montreal, several papers on Fossil Botany.

The following papers were read:—

1. On Fungi.

2. List of Lichens collected chiefly on the Thousand Islands. By A. T. DRUMMOND, Jr., B. A., and R. DRUMMOND.

3. On the Polar Plant. By W. GORRIE, with Remarks by Rev. Prof. WILLIAMSON.

4. Additional observations on the Medicinal Plants of the neighborhood of Harrowsmith. By THOS. R. DUPUIS, M. D.

5. Notices of the Great Dragon Tree of Orotavo, from the writings of Baron Humboldt and Prof. Piazzi Smith. By Rev. Prof. MOWAT.

Photographs, including one of the Dragon Tree, taken by Prof. P. Smith at Orotavo, were shown by means of an oxy-calcium microscope; also, preparations illustrating the minute structure of woods, &c., and the reproductive organs of Cryptogamic plants, the antheridia and archegonia of mosses, &c.

REMARKS ON DR. TROUSDALE'S CASE OF POISONING WITH CICUTA MACULATA.

Professor Lawson called attention to a serious case of poisoning that had occurred through the mistaken use of the roots of Cicuta maculata for those of Aralia racemosa. He remarked:—

Settlers in a new country are prone to seek, in the plants around them, reme-

dies for the diseases under which they suffer. The woods and swamps of Canada are rich in plants having energetic properties, and when mistakes are made through ignorance, or want of proper advice, melancholy accidents frequently happen. A case of this kind is reported as follows, in a letter from Dr. J. D. Trousdale, of Melrose, a graduate of the Kingston University, and a Fellow of the Botanical Society :—

"On the afternoon of Wednesday, 11th December, Mr. Henry Jones, of the Township of Thurlow, went out into his fields to gather what is commonly called "spignut" or spikenard (*Aralia racemosa*, L.), to make a syrup for his step-daughter, to relieve a "pain in the stomach." Unfortunately he gathered by mistake, the roots of another herb (*Cicuta maculata*, L.), of which he ate, and on returning to his house he cut off pieces, of which he and the different members of his family partook. They had no sooner sat down to supper than Mr. Jones leant back, and fell from his chair in a spasm, and in a few minutes more others of the family were taken ill. Being from home when sent for, I did not reach the patients till about ten o'clock in the evening (five or six hours after the first seizure), and in a few minutes afterwards, Dr. Chanonhouse, of Shannonville, who had also been sent for, arrived. We found Mr. Jones in spasms, which were subsiding, and most of the members of his family were very sick. We carried out the treatment for such cases, but seeing that Mr. Jones was sinking, we complied with his wife's request than another medical man should be sent for. All our efforts failed, and the man died in about twenty hours after partaking of the poison. By the vigorous use of emetics and other remedies, the three other members of the family who had partaken of the poison were restored. The surviving members described to me their sensations. They first felt a deathly sickness and sinking feeling in the regions of the heart and stomach, then extreme weakness of the lower limbs, followed by general weakness, in consequence of which they were unable to stand ; but all the while they knew *perfectly well all* that was being said or done. Even Mr. Jones, although unable to speak, would open his eyes when requested to do so, and would occasionally observe what was being done as though he knew all about it : but on account of the remarkable dilation of the pupils, he could only keep his eyes open a moment at a time. I never saw the pupils more, if as much, dilated, even by Atropa for the operation of cataract. There was also a twitching or throwing of the legs. Deceased's pulse was from 120 to 140 ; breathing variable, from 45 to 58.

J. D. TROUSDALE, M. D."

We have here a case, which, but for the timely services rendered by Drs. Trousdale and Chanonhouse, might have resulted in the death of a whole family.

Dr. Trousdale has determined the plant whose roots were used to be *Cicuta maculata*, L. He has also forwarded specimens of roots, dead stems, and fruit, to the Botanical Society, and an examination of these has confirmed the accuracy of

the determination. This plant belongs to the natural order *Umbelliferæ*, an eminently poisonous order, which contains such plants as Conium maculatum, Cicuta virosa, Œnanthe crocata, Æthusa Cynapium, &c. The Cicuta maculata, which has been the cause of the present accident, is known throughout Canada and the States, by such common names as Water Hemlock, Spotted Cowbane, Beaver Poison, Musquash Root, &c. That it is mistaken for Aralia racemosa, at this season of the year when foliage is absent, is not at all remarkable. However, in summer it more closely resembles other innocent plants of its own order, Umbelliferæ. The Cicuta is widely distributed. In the central parts of Upper Canada it appears to be common. It is recorded as growing at Montreal (Holmes' list of Herb.) ; and East Riding of Northumberland (Mr. Macoun). We have examined specimens from Prescott, (Mr. Billings), Churchill, Hudson's Bay Territories, (Mr. McTavish), Banks of Comale Creek, Texas, (Lindheimer), &c., so that it has evidently a wide range. It does not occur in any of our local plant lists, from Hamilton or the west, but as Torrey and Gray speak of it stretching to Oregon, it is probably common *throughout* Canada. Dr. Trousdale alludes to the accidental poisoning some time ago of seven horses, which fell a sacrifice to this weed in the same locality whence the present more serious case reaches us.

The plant grows in swamps and lowland meadows, from four to six or eight feet high, the stem is, at the base, of the thickness of the forefinger, more or less, cylindrical, hollow, finely striate with green and purple, sometimes spotted. The foliage varies greatly as in most water plants. The leaves are compound biternately divided, with short broadly sheathing petioles; segments lanceolate, of variable breadth, mucronately serrate, all stalked, the primary veins running to the *notches* (instead of the *points*) of the serratures. The flowers are in large, chiefly terminal, umbels, composed of little umbellets, with sometimes one or two leaflets as a false involucre. The involucels are composed of from five to six short linear leaves. The fruit is appropriately likened by Torrey and Gray to Anise. The root consists of a cluster of large somewhat fusiform tubers not unlike those of Aconitum Napellus. The tuber in section shows a large white pith, surrounded by a well-defined ring of a yellow or greenish hue, outside of which the tissue is paler, the outer skin brown. The whole tissue is soft and cellular, the cells being transparent, some containing minute, regular starch granules, and large quantities of a green oily fluid are seen throughout the tissue. The part forming the dark ring or zone contains spiral vessels, which present the anomaly of being angular, somewhat like scalariform vessels, but the fibre is unrollable, and the apparent angularity depends merely upon the nice adjustment of the sides of the spiral vessel to the smaller cells, with which it is surrounded.

The roots sent by Dr. Trousdale have been planted in the Kingston Botanic Garden.

It seems proper to allude to the allied species of Cicuta, viz., *C. virosa*, which is best known in Europe, being an indigenous European plant. It does not occur in the United States, and is little known in British America beyond the record in Sir William Hooker's "Flora Boreali-Americana," vol. i., page 259, viz., "Woody country of North America, between lat. 54° and 64° North. Sir John Richardson and Mr. Drummond."

There is still another North American species of this genus, viz., *Cicuta bulbifera*, which is a common Canadian plant, growing by the edges of creeks and in wet swamps. It is particularly abundant in the neighborhood of Kingston, as along the little Cataraqui Creek, and many other places. It is always profusely bulbiferous on the upper part of the stem.

LINES FOR THE BOTANICAL SOCIETY OF CANADA.

By Mrs Professor Weir.

Read 10th January, 1862, by Prof. G. Weir, A. M.

Altho' my modest muse may not aspire
To climb the heights of Scientific Lore
Where sons of Genius shine,
And though I dare not even hope to please
This *erudite* and *learn'd* Society
By simple lay of mine.

Yet, with a *humble Fellow* bear, I pray,
Though mine is no seraphic strain,
While I my song shall sing,
To say how much I love our pleasing themes,
How much I wish that I to this great shrine
Could worthier off'ring bring!

THE FLOWERS.

Why love the flowers, those perishable things
Whose starlike blossoms fade so soon away?
Why gaze with tender longing on the bloom
Which even now is falling to decay?

Oh! what were man without the Fair and Bright,
The Beautiful, in earth, in sea and sky,
What draws him from himself in darker hours,
What soothes his soul and leads his thoughts on high!

This longing for the Lovely and the True
Inwoven in our inmost souls—would seem
A something borne within us from afar,
Of Paradise a lingering precious dream.

Ah! yes, we've lov'd the flowers e'rs since the days
When happy guileless children, blithe and free,
We gathered gem-like daisies on the mead,
Or shook the snowy blossoms from the tree.

Whence comes that gush of feeling o'er the heart
While gazing on some flower to childhood dear?
A latent chord is touched and memory wakes
Thoughts slumbering there through many a weary year.

While life is yet a dream, and youth's bright sun
Sheds glowing rosy tints o'er earthly bowers,
How throbs the heart to read those words that breathe
Their magic in the language of the flowers!

Bright children of the glad and sunny days
Of smiling spring, and glowing summer-time,
Now twined to form the snowy bridal wreath,
Now wreathed by loving hands to deck the shrine,

The lowly shrine, where sleep the loved and lost—
No, not the lost but loved ones gone before—
Life seemed far brighter while they lingered here—
Whose smile shall light our path on earth no more.

Yes, from our childhood's hours when first we grasp
Too eagerly and crush the wish'd for prize,
We gather, love and scatter flowers, until
We leave this scene to seek our native skies.

Fair emblems of our mortal state, how soon
At Autumn's blasts they wither on the stem;
They die forgotten 'neath the Winter's snows,
And we, too, soon shall droop and die like them.

But genial Spring shall come again, and they
Shall bloom once more, as we again shall bloom
Beyond the grave—for, see the buds and flowers
Of promise springing even from the tomb!

They cling around the sod—those precious things—
Robbing the lonely spot of half its gloom,
Like some now sainted soul whose name yet lives
To breathe, e'en from the grave, a sweet perfume.

Some noble soul—who, while he trod life's path
Liv'd not for self alone, but left behind
Deeds that can never die—for blest is he
Who lives to serve and elevate his kind.

Like him whose earnest voice first called us here,
That son of Science from a distant isle,
Who came at duty's call, whose hand has rear'd
This hardy sapling on Canadian soil.

Long may it flourish in this glorious land,
'Neath Freedom's shelter, and in peaceful times,
Strike deep its roots, and spread its branches wide,
Till it o'ershadows even distant climes!

And may our children's children yet to come
Take pleasure in its ample boughs, and say,
They love to rest beneath its pleasant shade
When we who hailed its rise have pass'd away.

ON THE GEOGRAPHICAL DISTRIBUTION OF THE CONIFERÆ IN CANADA.

By the Hon. WILLIAM SHEPPARD, D.C.L., F.B.S.C., of Fairymead, Drummondville, Lower Canada.

Pinus Banksiana (Gray Pine).†—This is essentially a northern pine, not having been observed south of the St. Lawrence. It grows abundantly in Labrador, and up the north shore of the St. Lawrence, among the rocks of the Laurentian formation. At St. Paul's Bay it has taken possession of the sand dunes near the shore. It appears again at Quebec, on the road to Caprouge, though now nearly all cut away. A few full-grown specimens are preserved in Mount Hermon Cemetery, as a memorial of an extensive grove formerly inhabiting that vicinity; the soil there being the shale of the Oneida sand-stones. Proceeding upwards, we find it in some quantity on the sandhills at Three Rivers. This pine inhabits extensively that Laurentian tract of country between the headwaters of the Saguenay westward to Lake Huron, occupying the fissures of the rocks. It appears to thrive on the dryest and worst of soils. It attains a height of 40 to 50 feet, but is worthless for any economical purpose. The branches are open and distant, not making a picturesque object, except in connection with the wild scenery in which it delights to dwell.

Pinus rigida (Pitch Pine).—A scarce tree in Canada; found by Mr. C. Billings, near Brockville, and may be sought for with probable success in the Laurentian Hills, between that town and Kingston, and among the Thousand Islands. Possibly the *P. Banksiana* may also be discovered in the same locality. Its principal habitats are from Lake Champlain southwards.

Pinus resinosa (Red Pine; also, though improperly, called Norway Pine).—This pine is found in scattered localities on many of the tributaries of the St. Lawrence and the Bay of Quinte, but in the greatest abundance at the headwaters of the Ottawa, growing in the poorest land. Very large quantities of this timber—principally from the last mentioned tract of country—are yearly floated down to market at Quebec for exportation. It attains a height of from 60 to 70 feet, and the trunks are straight, and generally free from branches to the height of 30 to 40 feet. The timber of this species, if not quite equal, at least approaches in quality to that of the Norway Pine, which is obtained in commerce principally from the ports in the Baltic. Next, after white pine, it forms the greatest article of exportation from Canada. The young branches are well furnished with long leaves of a dark-green color, giving the tree a massive appearance, yet it is wanting in picturesque effect.

† Omitting the diagnoses, I give the botanical name from Dr. A. Gray's "Manual of the Botany of the Northern States," a sufficient identification of the plants; the common names are for the most part local.

Pinus Strobus (White Pine).—This pine is the most magnificent, and at the same time the most useful, of all our Canadian trees. It grows scattered throughout the province, preferring richer soil than do the pines already mentioned; the quality of the soil causing it to be social or gregarious. The timber of the white pine furnishes by far the greatest article of exportation the produce of our forests affords. It is taken to market in the shape of square timber, of all sizes, from 12 inches to double that dimension, and in lengths from 20 to 60 feet, and more. Larger sizes are partially squared, to be afterwards wrought into masts and bowsprits, for which purpose it is admirably fitted, by reason of its lightness and strength. Large quantities are also floated to the many saw mills scattered about the province, to be cut into planks and boards, principally for exportation, finding outlets from Quebec to Britain and Ireland, and by railroads and sailing craft to the neighboring states. This pine is exclusively used in the province for carpentry and joiner's work for our buildings, being well adapted to all the purposes of house-building, easily worked, and generally free of knots. While this tree is the most useful and the largest product of our forests, it is the most picturesque of all those we possess, when growing in places where it has room to expand its massive branches from the ground upwards, densely clothed with foliage, and broken into great masses of light and shade, which the painter delights to contemplate. This tree is seen raising its head above all the other denizens of the forest, frequently attaining a height of 120 feet and upwards.

Pinus serotina (Pond Pine)—Dr Gray ignores this species, probably referring it to *P. rigida* as a variety merely, though he does not say so; other authors make it a distinct species. On the authority of Pursh, it is here adopted as a native of Canada. The latter botanist found it at Anticosti, on the occasion of his visiting that island in 1817. As this is a southern species, its having established itself on that northern island is a singular circumstance; yet Pursh was well acquainted with the pines of America, and could scarcely have been mistaken. On the same occasion he brought back, in the shape of dried specimens, as well as in a living state, many plants which seem peculiar to the island.

Assuming the existence of this pine in Anticosti, we possess five species in Canada.

Abies balsamea (Balsam Spruce).—This tree grows sparingly throughout the province, on dry and rocky soils, in the company of the white and black spruce. It grows very symmetrically to the height of about 30 to 40 feet, spreading its branches around the stem, from the ground upwards, in regular tiers, forming a tapering pyramid. It is much grown as an ornamental tree, especially in the south, where it is a favorite object for lawns and plantations. The well-known Canada Balsam is the produce of this tree, showing itself in blisters between the wood and the bark. The timber is soft, and of little practical utility, except for fence rails

and for the manufacture of butter firkins, for which latter purpose it is preferred to any other timber, in consequence of its communicating no unpleasant taint to butter.

Abies canadensis (Hemlock Spruce).—A large tree growing abundantly throughout a great part of Canada, congregating densely on dry sandy soils little adapted for cultivation. The timber is coarse, and not much used for economical purposes, except for the walls of farm houses and barns. A moderate quantity is yearly cut up into lathwood, and taken to Quebec for exportation, to meet the limited demand which exists for this article of commerce. The bark abounds in tannin, and is exclusively used in Lower Canada by the tanner, being a good substitute for oak bark. This is a beautiful and picturesque tree, where it has free room to display its light spray and dark-green foliage, becoming varied in shape, and presenting large masses of light and shade. It is well worthy of a place in ornamental grounds.

Abies alba (White Spruce).—A straight pyramidal tree, attaining the height of about 50 feet: growing everywhere in dry grounds in the company of the black spruce, but in smaller numbers. The timber is light, on which account it is used in common with the next species for the small spars of shipping; it is also sawed into planks for exportation, being of a colour and texture resembling the white deal of Norway. The leaves are of a bright green, and are longer than those of the black spruce; the cones also are of a different shape. These marks serve to distinguish the two trees, which have a great general resemblance. It is a beautiful object on the lawn, with its graceful branches regularly feathered down to the ground.

Abies nigra (Black Spruce).—This is a somewhat taller and stoughter tree than the last-described species, on which account it is more useful as a deal-producing timber, the quality being very similar. It is widely diffused throughout the country, grows on dry and rocky soils, and is generally found along with the white spruce, though in some localities inhabited by this species, the other is absent.—This is the tree from whose branches the well-known spruce beer is manufactured, a wholesome and pleasant beverage in warm weather.

Larix americana (American Larch, Tamarac).—The leaves of our larch are in bundles of many, and are deciduous, like its congener of the Old World. It delights in rich moist lands, where it attains the height of sixty feet and upwards, with a proportionately stout stem, straight and taper; it is found scattered throughout the province, growing in such abundance, in favourable soil, as almost to exclude other trees. It is also often seen in sandy soils, in which the moisture is retained by what are called "hardpans" underlying them, and preventing the escape of water; in such situations it grows thickly together, but attains no size, and dies off prematurely. This tree furnishes timber of superior quality, strong, heavy, and

durable, answering well for railway ties, and admirably adapted for ship-building, for which purpose it is floated to market dressed on two opposite sides only. It also makes first-rate firewood for steamers, and is used extensively as such by those plying on our rivers. This tree, when growing singly, forms a beautiful object, its slender, pendulous spray adding much to its gracefulness; it well deserves a place in ornamental grounds.

Thuja occidentalis (White Cedar; in Canada erroneously).—It grows in rich, moist soils everywhere, and on the banks of rivers, there taking a bowed shape, and crowding together, frequently to the exclusion of other trees. The foliage is of a dark olive color, becoming foxey in winter. The wood furnishes the best rails and posts for fencing, being almost everlasting, except the portion sunk in the ground, where it is subject to slow decay.

Juniperus communis (Juniper).—A recumbent bush spreading on all sides from a common centre. Grows along the banks of the St Lawrence on both sides from Quebec downwards. On the Plains of Abraham a single specimen is found. Upwards it is not met with till we reach the Falls of Chaudiere, in Hull, where a few specimens exist. Foliage, light olive; berries blue, possessing the properties of the juniper berries of the North of Europe.

Juniperus virginiana (Red Cedar).—A small tree growing along the shores of the Upper Lakes. It appears to dread the severe climate of Lower Canada, for, with the exception of a few specimens at the Falls of the Chaudiere in Hull, it is not found in this section of the province in the shape of a tree; but a variety with a dwarf prostrate habit grows on the rocks on both shores of the St. Lawrence below Quebec, generally associated with the common juniper; the deep clothing of snow proving a protection to it in the severe winter weather of those localities, and in all probability causing its procumbent habit. This variety rises with a single stem, but, instead of assuming the shape of a tree, becomes quite prostrate, and is blown about in all directions by the wind. The timber of the tree, as growing in Upper Canada, resembles in texture, and has the fragrance of, *J. bermudiana*, with which lead-pencils are made; it is light, close-grained, strong, and indestructible: possessing these good qualities, it is much used for the ties of railroads.

Taxus canadensis (Ground Hemlock).—Our yew can scarcely be distinguished botanically from the European tree, its decumbent habit constituting the greatest difference between them. It grows in rich shady woods, steep banks of rivers, and dark ravines throughout the province, forming extensive patches in its favorite localities. It never rises to the size of a tree like its namesake of England, therefore it is unsuited to the purpose for which our sturdy forefathers used this wood. It forms only a prostrate bush, the branches bending upwards. The berries are red, like those of the European species, yet I once found in a deep ravine a very marked variety bearing white berries, partially translucent.

REMARKS ON A NEW CULINARY VEGETABLE, THE PARSNIP CHERVIL.

By Mrs Prof. Weir.

Read 15th November, 1861.

On 30th August, 1861, Messrs. Vilmorin, Andrieux & Co., the eminent Seedsmen of Paris, sent a circular to the Botanical Society of Canada, in which they recommended the cultivation of this root, on the ground that it had acquired new importance from the fact that the disease attacked all the early varieties of Potato.

This vegetable is in fact one of the best of those recently introduced, being desirable for its feculent qualities, its flavor (which is something between that of a chestnut and a potato), and also on account of its productiveness, yielding as it does six tons an acre.

Another merit of this vegetable is that it comes into use early in the season; in the beginning of June the roots are formed, and they keep good until the April following. It requires the same treatment as the potato, and, like it, can be cooked in a variety of ways.

The cultivation of it is very simple. It ought to be sown in the month of September or October, either in lines or scattered as you would carrot seed, care being taken to press down the soil lightly after it is sown.

We ought to remark at the same time that, unlike the potato, which thrives best in a light, dry or sandy soil, the Chærophyllum bulbosum is most successfully cultivated in rather damp soil which has previously been prepared and manured.

If sown later than the period above mentioned, it will be necessary to use seed which has been kept for some time in a layer of earth or damp sand; without which precaution it is not likely to germinate till the year following. The roots are gathered in the month of July, and preserved in the same way as potatoes, care being taken to turn them occasionally to prevent their deteriorating.

This root has received various names, such as Myrrhis bulbosa, Spreng. Scandix bulbosa, of some German botanists, Chærophyllum bulbosum, L. But the name by which it is likely to be known in common use is Parsnip Chervil.

Professor Lindley says it is regarded by French gourmands as 'un vegetal des plus delicieux,' and he agrees with them. It is in fact, he says, uncommonly good to eat, very like a boiled Spanish chestnut, without its crispness or hardness. In Europe, as has already been remarked, it is sown in September or October, but it may be found better to sow it in spring in Canada. The plant is a native of Europe, and was cultivated in England by Mr Philip Miller so long ago as 1726, but as a botanical curiosity only. Again, a few years ago, it was proposed for cultivation,

but the roots were found to be too small to be of much use. Since then, however, it has been improved by cultivation; the roots are figured as of the size and nearly the shape of an undersized early horn carrot. It is likely, therefore, to form a substantial addition to our culinary crops.

It has been stated in the Gardeners' Chronicle that the Royal Horticultural Society bought up for their members all the good seed that was procurable, and this was to be distributed in small packets last month. It will, therefore, be satisfactory to the members of the Botanical Society of Canada to learn that our Society had previously secured a supply of seeds, which will be distributed to members in good time for sowing.

ON THE DEVELOPMENT OF BOTRYDIUM GRANULATUM.

Professor Lawson has given in the Edinburgh New Philosophical Journal for October, 1860, a lengthy description, with microscopical drawings, of a very interesting organism belonging to the group of Algæ, which grows on the lake shore at Kingston. The following extract gives some of the general results arrived at in the paper, which enters fully into all the details of the plant's history. It is the Botrydium (Hydrogastrum) granulatum of modern botanists, and is believed to be identical with the "Bladder-headed Laver" found by Dillenius some hundred years ago, between "Newington et Hackney, prope Londinum," as described by that author.

The mature *Botrydium* consists of a transparent sac, branched in the lower part, filled with fluid, and containing in the upper part or head endochrome, in which are numerous spherules. This sac, which is very tough and elastic, is distended with the fluid contents, and consequently presents a turgid appearance. Thus, if pricked with a sharp point, the sac bursts, and the watery contents are squirted out with force, scattering the spherules. This may probably take place spontaneously. When exposed to drought, the sac collapses, and allows exit to the spores by its gradual dissolution. But one of the most curious facts that I have to mention is one that probably explains the adaptation of the plant for its peculiar habitat. If a patch of *Botrydium in situ* is covered with water for a few hours, and then examined, it will be found that the sacs have burst spontaneously and scattered their contents, even although they did not appear to be quite mature This result seems to depend upon a process of endosmosis. Moisture is absorbed through the whole surface of the plant, and to such an extent as to burst the already turgid sac, and thus the spherules are set free, and floated away from the parent, to form new colonies. While the collapsing of the plant by drought, and its gradual dissolution on the subsequent application of moisture, is one means of permitting the freedom and development of the spherules, the inundation of the plant's habitat by

the water of the lake is a more speedy, and probably a more certain mode of determining the rupture, and transporting the spherules to suitable localities for germination.

These spherules, when carefully watched after their exit, are found to assume a new aspect. They gradually lose their spherical form, becoming more or less elliptical or elongated, and then passing through successive stages, until they have acquired the globose head, and neck, and root of the parent. If a process of impregnation takes place, I think it must be looked for *after* the spherules have quitted the parent sac. I have certainly seen phytozoid-like bodies *apparently* produced from the granular endochrome; but as to the contact of these with the spherules, and the effect thereof, this is precisely the point at which all such investigations become misty.

Several points remain still to be noticed.

Most algæ absorb nourishment through their tissues from the surrounding medium only. This is not the case with *Botrydium*. It is furnished with an extensively ramifying root, the object of which is not to spread over the surface, and give off buds for new individuals, as has been stated by some writers, but to enter the soil and absorb nourishment. Several authors have admitted this to a certain extent. Berkeley suggested the probability that "the rooting threads of *Botrydium*, *Caulerpa*, &c., do absorb nutriment from the soil, and perhaps for the reason that they are frequently exposed to the dry air, and would therefore wither without such a provision," &c. Not only is it capable of so absorbing nourishment; it is truly a terrestrial plant, furnished with a widely ramifying, absorbing root, whose fibres do not contain endochrome; and it is incapable of being developed under water, for submersion has the effect of bursting its cell-wall.

Most authors regard *Botrydium* as unicellular, and truly so. Hassall, while merely quoting in the text brief characters from Greville and Harvey, gives a drawing (Plate 77, fig. 5) which by no means represents an unicellular plant, and I do not understand it.

While correctly describing this plant as developed from a "spore" or "gonidium," we find many authors also describing an additional mode of increase. This is best shown in Endlicher's figure (Lindl. Veg. K. fig. 9). In the words of Griffith and Henfrey, it is described as follows:—"The figure represents a specimen with a second budding from it by vegetative increase, and in this way the plants come to form tufts or groups like little bunches of grapes; hence the name" (Micrógr. Dict. p. 103). In reference to this statement, I would mention that I have not been able to find a single instance of a bud arising or being given off in this way from a filament to form a new plant. It may, however, occur. But it must be observed, that the appearance of the plants in clusters does not depend upon such a mode of growth. If it did, we should have each cluster consisting of differently sized glo-

bules, according to their respective ages; whereas there is usually a general uniformity in size, showing that all the plants of each cluster are about the same age, and have probably arisen contemporaneously from one batch of spores.

The conclusions that seem to be warranted by the author's observations are these:—

1. *Botrydium granulatum* is an unicellular plant.

2. It is strictly terrestrial, and is incapable of being developed under water, like most algæ.

3. It is furnished with finely branched root fibres, which enable it to absorb nourishment from the soil, like other land plants.

4. Reproduction is effected by means of young spherical cells, formed in the endochrome in the interior of the parent one, which are set free at maturity, by the bursting of the cell membrane of the parent.

5. Even when the plant is not mature, an inundation of the habitat by water bursts the membrane, and thus effects the liberation of the spores.

6. If a process of impregnation occurs, it probably takes place after the spherules and endochrome have been ejected.

7. The plant does not increase by buds given off from the radical filaments (as stated by several writers), so far as the author has observed.

COMMUNICATION FROM HIS EXCELLENCY LORD MONCK, ON A FIBRE PLANT SUITED TO THE CLIMATE OF CANADA.

I. Letter from DENIS GODLEY, Esq., Secretary to His Excellency LORD MONCK, Governor General of Canada, to PROFESSOR LAWSON, Secretary of the Botanical Society of Canada:

QUEBEC, MAY 16, 1862.

SIR,

I am directed by the Governor General to transmit to you herewith a copy of a letter which was addressed to Lord Lyons by Doctor Hart, and which Lord Lyons forwarded to His Excellency.

Some of the seeds of the plant to which Doctor Hart alludes, are also enclosed.

His Excellency thinks it likely that the Botanical Society of Canada, of which you are Secretary, may be interested in this matter, and will cause the seeds to be sown with a view to testing the value of the plant bearing them.

I have the honor to be, Sir,

Your obedient Servant,

DENIS GODLEY,

Governor's Secy.

GEORGE LAWSON, ESQ., &c., &c., &c.

II. Letter from FREDERIC W. HART, M. D., St. Louis, to The LORD LYONS.

ST. LOUIS, MAY 1ST, 1862.

MY LORD,

Feeling that Her Majesty's Government is deeply interested in the Cultivation of Cotton in the British Provinces, and having, during a sojourn in the Rocky Mountains these last three years, discovered a plant that excels cotton in length of fibre or staple, firmer in texture, and fine as silk,—I determined to plant a few seeds taken from the wild, and last year found to my satisfaction, that the bulb or bolls, which in the wild plant are about the size of hen eggs, under culture grew to the size of a turkey or goose egg, and bore twice the quantity of silk that the Mississippi plant bears of cotton.

I gathered four pounds of the silk from the plant, and saved a quantity of the seed, some of which I herewith forward you.

On my return in January last to the U. S., I was robbed by the Indian Kiowas on the plains. They stole my silk but left my seed.

The silk weed of the Rocky Mountains grows on the Creek bottoms, pushes out in June, and ripens in September, October and November.

It grows about five feet high, wild. It does not branch in the wild state, but it branches under cultivation and bears full of large bolls or pods.

The seed is all on the *outside* of the silk, and slips off at a touch, leaving the most beautiful silk I ever saw.

It can be cultivated on the St. Lawrence bottoms, Canada, and in Upper Canada the whole country is suitable for its cultivation, the climate being similar, and even warmer than that of the localities where I discovered the plant.

As an old Cotton Planter of Mississippi, having raised ten crops in Yazoo, in Mississippi, my brands invariably commanding the highest market price, I feel the fullest confidence in recommending this seed for cultivation in the Canadas, and to the attention of Her Majesty's Government.

Should your Lordship require further information on this subject, I shall be happy to continue this correspondence.

I remain, &c.,

(Signed), FREDERIC W. HART, M. D.

THE LORD LYONS, &C., &C.

III. Letter from Professor LAWSON, Secretary of the Botanical Society of Canada, to DENIS GODLEY, Esq., Secretary to His Excellency LORD MONCK, Governor General.

KINGSTON, 22ND MAY, 1862.

SIR,

I had the honor to receive your letter of 16th May, with accompanying copy of letter addressed to Lord Lyons by Dr. Hart, of St. Louis. And I have to request that you will convey to His Excellency LORD MONCK, the best thanks of the Members of the Botanical Society for the information which he has done them the honor to communicate, and for the accompanying seeds.

I have also to state that, in accordance with His Excellency's wishes, the seeds have been sown in the Botanic Garden here, with a view to testing the value of the plant as a source of fibre. The crop will be watched with care, and duly reported upon to His Excellency, so soon as the results can be obtained.

In the meantime it may be desirable to indicate briefly the probable character of the plant, and what likelihood there is of its becoming useful.

An examination of the seeds shows Dr. Hart's fibre plant to be an *Asclepias*, of which genus there are many species, inhabiting different parts of the American Continent, all producing a greater or less amount of fibrous material, usually of great beauty and lustre; and fibre-yielding plants of allied genera occur in India and elsewhere.

The beautiful silky material contained in the seed pods of Asclepiads, has ne-

cessarily attracted attention in this as in other countries, but, as attempts to spin it failed, its use in the arts has hitherto been confined to the stuffing of pillows and beds, and such-like purposes, among the settlers. There is every reason to believe, however, that the silk-cotton of our Asclepiads may now be economised for spinning purposes, and therefore a greater interest is to be attached to Dr. Hart's plant at the present time than would have been necessary a few years ago.

The results of experiments that have been made in India, and by manufacturers in England, with the silk-cotton obtained from an allied plant, the *Calotropis gigantea*, or Mudar Plant of Bengal, (which is essentially an Asclepias), offer inducements to attempt the raising of Asclepias fibres in Canada. The silk-cotton of the Mudar Plant is now becoming an article of export from India for the manufacture of a light substitute for flannel, and has been employed by Messrs. Thresher & Glenine, of London, for this and other manufactures, as appears from the remarks of Dr. Alexander Hunter made at a meeting of the Madras Agri-Horticultural Society on 15th January last. The Mudar material works well with either silk or cotton, and is now known in commerce as Mudar Silk Cotton. There is no reason whatever why the silk-cotton of Dr. Hart's plant, and the silk-cotton of our indigenous Canadian Asclepiads, should not prove as applicable to the purposes of the manufacturer as the silk-cotton of India.

It is desirable to observe that the silk-cotton found in the pod of Asclepias represents only half its riches as a fibre plant. A beautiful, and apparently very valuable, fibre is also obtained from the stem, which I am inclined to regard as of even greater importance than the silk-cotton itself; it is of quite a different character from that found in the pods, being not cottony nor so glossy, but of much greater strength, resembling in fact not cotton but flax. One of our Canadian species, *Asclepias incarnata*, has been experimentally cultivated with a view to the production of fibre, and the results of the experiments have been given by Judge Logie in the second part of the Botanical Society's Annals, page 87. Specimens of the fibre were exhibited by Mr. Freed, to the Hamilton Association, in 1860, and the Report of Mr. McMiking, a paper manufacturer, is given in Judge Logie's paper, shewing the fibre to be strong, flexible, silky, of a beautiful high color, brilliant lustre, and easily bleached, in fact too good for paper-making, but of undoubted utility and value as a fibre. Thi species is still under experiment in the Botanic Garden here.

The success that has attended the use of the Mudar flax in India, (as well as the Mudar cotton,) seems also to hold out a strong inducement to the use of Asclepias flax in this country. The Mudar flax, from its tenacity, is called "Bowstring Hemp" in India, and is one of the strongest fibres known. Dr. Hunter, who has carefully studied the vegetable fibres of India for many years, states that it possesses most of the qualities of flax, and can be worked with the same machinery, as the fibre splits to almost any degree of fineness with the hackle, and bears dressing

and beating well. For many years it was employed by the wealthy natives in India for making strong cloths, cambrics and lawns, worn by the Rajahs, and it is still employed for making fishing lines, nets, gins, bow-strings and tiger-traps, on account of its strength. It does not rot readily in water, as the resinous milky juice of the plant seems to preserve it.

Other Indian Asclepiads likewise yield fibre of great strength, which seems to be partly due to the presence in the plants' juice of an organic product similar in physical properties to caoutchouc or gutta percha.

Judging from the observations and experiments of Dr. Hart, on the Silk Cotton Plant found by him on the Rocky Mountains, and from the results of experiments that have been made by others on allied species—on Asclepias flax in Canada, and on Asclepias cotton and flax in India—it is not unlikely that both Asclepias flax and Asclepias cotton may ultimately become important materials of export from Canada. The Asclepiads grow luxuriantly in a wild state throughout Canada, especially in the western parts, and, being strong-growing perennial plants, they are capable of easy cultivation, and would require not a tithe of the field-labour necessary for the growth of common flax.

Permit me further to mention that in addition to the seeds sown in the Botanic Garden, some have also been sent to members of the Botanical Society in other parts of Canada, for trial, and copies of your communication, with Dr. Hart's letter, have been furnished to the members, with a view to enquiry, and to observation and experiment on Dr. Hart's Asclepias, as well as on the indigenous species of our country.

I have the honor to be, Sir,

Your most obedient humble servant,

GEORGE LAWSON, Ph D., LL.D.,

Secretary to the Botanical Society of Canada.

DENIS GODLEY, ESQ.,

Secretary to His Excellency LORD MONCK,

Governor General of Canada.

List of samples accompanying the above Letter.

1. Mudar Silk Cotton, from *Calotropis gigantea.* From Mr. Jaffrey, of the Agri-Horticultural Garden, Madras, India.
2. Canadian Silk Cotton, from *Asclepias Cornuti.* Kingston, C. W.
3. Canadian Silk Cotton—another kind—from *Asclepias incarnata.* Hamilton, C. W. Judge Logie.
4. Asclepias Flax—Canadian—in the rough state, unhackled and unbleached, from stem of *Asclepias incarnata,* the same plant which yields Cotton No. 3. Hamilton, C. W. Judge Logie.

CONTENTS OF THIS PART.

FIRST SESSION,—(*Continued*).

PAGE.

Proceedings of Sixth Meeting, 12th April, 1861,.....109

Proceedings of Seventh Meeting, 14th June, 1861,.....110

Regulations for the Exchange of Specimens,.....111

Description of the Curculio, its mode of destroying Fruit, and the various means employed to check its progress. By THOMAS BRIGGS, Jr., Pres. Hort. Soc., Kingston,.....112

List of Plants observed growing principally within four miles of Prescott, C. W., and for the most part in 1860. By B. BILLINGS, Jr., F. B. S. C.,.....114

On Fungi, their relation to Disease. By JOHN LOWE, M. D., M. R. C. S., Eng.,.....140

On the Sexual Development and Economy of Bees, and on the Saccharine Matter of Plants viewed in relation thereto. By the Very Rev. Principal LEITCH, President,.....146

On the History, Properties and Cultivation of Cotton. By Lieut. F. R. STANTON,.....155

SECOND SESSION.

Proceedings of Eighth Meeting, 15th November, 1861,.....167

Introductory Address. By Prof. WILLIAMSON, V. P.,.....167

Proceedings of Ninth Meeting, 13th December, 1861.....171

Letter from Sigr. AGOSTINO TODARO, Palermo,.....172

Letter from M. AUGUSTE LEJOLIS, Paris,.....173

Letter from Prof. KUTZING, Nordhausen,.....173

Letter from T. CARUEL, Florence,.....173

Letter from Dr EUG. FOURNIER, Paris,.....173

Communications from Dr BERTHOLD SEEMANN, London,.....174

Remarks on the Preparation of Skeleton Flowers. By Prof. JOHN DICKSON, M. D.,.....176

Proceedings of Tenth Meeting, 10th January, 1862,.....177

List of Office-Bearers for 1861-62,.....178

A Summer Ramble in the Woods. By JOHN MAY, A. M.,.....179

Proceedings of Eleventh Meeting, 14th February, 1862,.....181

Remarks on Dr. TROUSDALE's case of Poisoning with *Cicuta maculata*,.....181

Lines for the Botanical Society of Canada. By Mrs Prof. WEIR,.....184

On the Geographical Distribution of the Coniferæ in Canada. By the Hon. WILLIAM SHEPHARD, D. C. L.,.....185

On a new Culinary Vegetable, the Parsnip Chervil. By Mrs Professor WEIR,.....189

On the Development of *Botrydium granulatum*. By Professor LAWSON,.....190