

D. SUBULATA. Schimp.

Sporangium gibbous, ovate, cernuous lid, long beaked, leaves lanceolate at the base, secund falcate, stems short forming loose tufts on the soil. Fruit in autumn. Common in all localities.

ORDER.—SPHAGNEL. Mont.

SPHAGNUM. Squarrosum. Pal.

Leaves ovate, acuminate, squarrose, grass green above, branchlets horizontal and deflexed, pores large, growing in bogs, forming dense and extensive patches, in some places solitary, oftener mixed with other species; fruiting in summer. (Pennant, Halifax Co.)

ART. III.—THE EAST INDIAN HERBARIUM OF KING'S COLLEGE, WINDSOR. BY PROF. HOW, D. C. L., WITH INTRODUCTION BY GEORGE LAWSON, Ph. D., LL. D., *Dalhousie College, Halifax.*

(Read January 14, 1878.)

Prof. Lawson's Introduction.

BEFORE reading Professor How's paper, I desire to ask permission of the Institute to offer a few prefatory observations. The collection of Indian Plants in King's College consists of 168 specimens. It is not a large one by any means, when we reflect upon the richness of the Indian Flora, and the immense territory which it occupies. But it is a collection of very great interest to botanists. Its chief source of value has to be pointed out to those not already intimate with Indian Botany. This collection, formed about the close of the eighteenth century, leads us back to the early history of Botany in India, but its interest is not merely of the dusty antiquarian kind. Nomenclature has always been regarded by systematic botanists as practically the most important department of their science, of which classification is the framework, and in no other de-

partment of knowledge, has so much careful attention been paid to it. The modern system of botanical nomenclature originated with Linnæus, the Swedish naturalist, who was in the zenith of his glory, as botanical classification itself was, in the middle of the eighteenth century. The plants studied then were chiefly those of western Europe, but those of distant lands, of America and the Indies, were greedily sought for, and carefully named and described. The names originally applied by Linnæus under the binominal system which he invented, and by his followers, are to this day held sacred by virtue of the law of priority which the common consent of botanists has established. A country or state may lose its name by conquest, or by fusion with another; a lady may lose her name by entering into a matrimonial partnership; a man may lose his name by Act of Parliament: but a plant's name, once given, goes on unchanged in the stream of time forever. The identification of plants with the first or original binominal names given to them by the early botanists, becomes then a matter of great importance, and it is in this respect that the King's College Collection is valuable.

For two hundred years the Botany of India has been more or less known to Europeans. The first knowledge of Indian plants long preceded the Linnæan era. The first work on the subject was the *Hortus Malabaricus* of Henry Van Rheedé, a Dutch Governor of Malabar; the specimens were collected in 1674 and 1675 by the Brahmins, and sent to Cochin, where drawings of them were executed by Mathæus, a Carmelite and missionary; descriptions were made in the Malabar language, which were afterwards translated into Portuguese, and from that into Latin, and the work was at length published at Amsterdam, between 1686 and 1703, in 12 volumes folio, with 794 plates. Dennstædt published at Weimar, in 1818, an identification of Van Rheedé's plants with Linnæan names;—the same Dennstædt whose memory is kept green on every wayside bank in Nova Scotia by the fragrant fern *Dennstædtia punctilobula*.

In London, between 1696 and 1705, Plukenet published quarto plates with figures of nearly 3000 plants, many of them Indian. John Burmann of Amsterdam, published the *Thesaurus Zeylanicus* in 1737, with figures of 155 Ceylon plants.

George Everhard Rumphius, a Hanover physician and merchant, was consul of Amboina. He collected specimens, afterwards became blind, but, by assistance from some young men, completed his "Herbarium Amboinense" in 1690. He died in 1706. His manuscript lay in the Dutch East India Company's office for upwards of 30 years. Between 1741 and 1757 it was published by John Burmann of Amsterdam, with a Latin translation (that of Rumphius' having been lost). The work consisted of 7 volumes, representing drawings of 1300 plants.

Dr. Paul Hermann was sent out in 1670, at the expense of the East India Company, to describe the plants and spices of Ceylon, and his *Museum Zeylanicum* was published in 1717. Hermann's Herbarium lay unknown for half a century, after which it passed into the hands of Linnæus, and afforded material for his *Flora Zeylanica*, published at Stockholm, in 1747, and is now, as a part of Sir Joseph Banks' Herbarium, in the British Museum.

In 1768, Prof. Nicholas Laur. Burmann, of Amsterdam, son of the author of *Flora Zeylanica*, published his *Flora India*, describing some 1500 species, and the mistakes of that work are corrected in DeCandolle's *Prodromus*.

A very large collection of Indian Plants existed in the Oxford Herbarium at an early period, but it is only of late years that it has been subjected to scientific examination.

In the same year as the publication of Burmann's *Flora Zeylanica*, viz., 1768, John Gerard Kœnig, a Danish pupil of Linnæus, landed in India as Physician to the Tranquebar Missions, and, by imparting some of his own enthusiasm to his companions, originated the Society of "United Brothers," who lightened their labour of instructing the natives by botanical recreations. This was the commencement of the study of Botany in India, under the Linnaean method. Such men as Jones, Fleming, Hunter, Anderson, Berry, John, Roxburgh, Klein, Buchanan Hamilton, and "the venerable Rottler," the last survivor of the group, formed themselves into a Society for promoting Botany; plants were collected, and were named, at first by the Society in common—to such was usually added the word "*nobis*;" but, as opportunities for meeting became less frequent, and their confidence

in themselves greater, Roxburgh, Klein and Rottler commenced attaching names without consulting with their friends. Confusion was an unavoidable result, and much of the labour of recent Indian botanists has been devoted to unravelling the tangled skeins of these early workers in the science. The specimens forming the King's College Herbarium are from Dr. Rottler and Dr. Klein, and it will be seen from what I have said that their historical interest is only exceeded by their scientific value. Koenig's collections are in the British Museum. Many of Rottler's plants were described by himself in the *Nova Acta Acad. Nat. Curiosorum* of Berlin; but Willdenow, Vahl and Smith gave new names to many of the others which they described, without reference to his, so that, among Rottler's plants, names may be found that have never been published. Klein's plants were principally described by Willdenow.

I hope next summer to be able to go over the Windsor Herbarium with Dr. How, and, by comparing the specimens with those in my own Indian Herbarium, to identify them with modern names. In the meantime I have thought that the members of the Institute might like to know what was the real point of interest in this collection, which I have endeavoured to indicate by bringing together a few facts in the early history of Indian Botany, chiefly derived from the "*Prodromus Floræ Peninsulæ Indiæ Orientalis*" of Wight and Arnott.

THE EAST INDIAN HERBARIUM IN THE MUSEUM OF KING'S COLLEGE, WINDSOR, N. S.

BY HENRY HOW, D. C. L., *Professor of Chemistry and Natural History, University of King's College, Windsor, N. S.*

It will perhaps be of interest to the members of the Institute, and to some of those belonging to Scientific Bodies which have found it advantageous to exchange their periodicals for our "*Transactions and Proceedings*," to have a list of certain East Indian Plants which have been for close upon three-quarters of a century in the Museum of King's College, such plants being by no means easily accessible on this continent. The plants in

question were sent in 1802, to the Honorable Sir Thomas Strange, Madras, from Dr. Rottler and Dr. Klein, and were presented by the first named, who had been Chief Justice of Nova Scotia, to King's College, Windsor, in 1804. I think it not improbable they were examined, when they arrived, by a former Vice President of this College, Rev. Dr. Cochran, who, I believe was an enthusiastic botanist, and doubtless secured for the College Library the greater part of the valuable works on Botany of an early date which it contains; he made, I may state, a large collection of N. S. plants, which, I have heard, failed for want of agreement in negotiations, of which I do not know the particulars, to become the property of the College, and was diverted to other keeping in an Upper Province. The plants from the East Indies were in all probability untouched for many years after Dr. Cochran's death, and, excepting for a partial examination which I gave them about 1855, or soon after I arrived here from England, they have only been handled in removal from the old to the new Museum, until last summer, when I went over the whole of them and made the list which I now submit to the Institute. The plants are not mounted, but are enclosed in separate sheets of coarse paper, each, with a few exceptions as noted, having a label attached or lying with it. They are almost all in a very good state of preservation. I have copied the labels as accurately as I could, omitting some characters unknown to me, which I would not venture to reproduce. Of the sheets numbered 168 seriatim, nine contain no plants or are wanting, and in five the labels are missing, while there are three plants loose and unlabelled, and in two cases, instead of a name, Linnæan class-marks are given. The station is never mentioned, except apparently once, it being Madras. The collection is known to us as "The Strange" or "East Indian" Herbarium. The following is the list of plants, etc.:—

1. *Justicia repens*.
2. *Sida*, sp. nov.
3. *Hedysarum*.
4. *Asclepias*.
5. *Grewia*.

6. *Urtica*.
7. *Polygonum*, sp.
8. *Conyza*.
9. *Phlomis*, sp.
10. do. do.
11. *Strychnos potatorum*, (ab amiciss. Heyne.)
12. *Glycine filiformis*.
13. *Hibisc ficulneus*.
14. *Santalum album*.
15. *Arum spirale*.
16. *Ophio glossum scandens*.
17. *Hydrolea*, (*Zylanica* ?)
18. *Poa interrupta*
19. *Polypodium dichotomum*.
20. *Bubroma Gūazūma*.
21. *Ipomœa pestygridis*.
22. *Acrostichum digitatum*.
23. *Apocynum frutescens*.
24. *Ocymum album*.
25. *Panioi milizai*, Str. Menerj, Cinghal. Lamej, Tam.
26. *Illecebrum lanas*, Kilei-Siru-Pulei, T.
27. *Melochia odorifera*, Punnak Kulek Kiri, T.
28. *Nyctanthes arbor tristis*.
29. *Barleria Prionitis*.
30. *Cyperus Haspan*.
31. *Amama debilis*, (under some characters unknown to writer.)
32. *Atriplex*.
33. *Mattom Kaj pillu*. *Cynosur*. *Ægypticus*.
34. *Indigofera*.
35. *Acrostichum heterophyllum*.
36. *Polygonum glabrum*.
37. *Gratiola lucida*, Willden.
38. *Phyllanth. debilis*, nob. *Niruri* ? *affinis*.
39. *Carissa spinarum*.
40. *Trigonella (indica* ?)
41. *Phasæolus trilobis*.

42. *Psoralea tetragonoloba*
43. *Indigofera hirsuta*.
44. *Buchnera Asiatica*.
45. *Cassia occidentalis*.
46. *Nyctanthes angustifol.*
47. *Cleome viscosa*.
48. *Memecylon capitellat.*
49. *Cressa Indica*.
50. *Amania sanguinolenta*.
51. *Æschinomene aspera*.
52. *Hedysarum biflorum*, Willden.
53. *Bassia longifolia*.
54. *Agrostis linearis*.
55. *Hibiscus obtusifol.* Willd.
56. *Sida cordifolia*.
57. *Scirpus capitat.* ? Lin., *S. caribæus*, Rottl.
58. *Ficus Benghalensis*.
59. *Arachis hypogæa*.
60. *Furriena scirpioides*, Koenig. *Scirpus ciliaris*, Lin.
61. *Cyperus aristatus*, Rottl., *Scirp. intricat*, Lin.
62. *Saccharum cylindricum*, Willd., *S. Koenigii*, Retz.
63. No plant.
64. *Scirpus lateralis*.
65. No plant.
66. *Xyris pauciflora*, Willd.
67. *Saccharum spontaneum*.
68. *Scirpus tortuosus*, nob., *Katshij pillu*, Tam.
69. *Cyperus arenarius*.
70. *Calyptanthus*, Schwarz. *Myrtus communis*, Lin.
71. *Solanum nigrum*. *Baccis rubris*.
72. *Carissa Carandas*.
73. *Cyperus monostachyos*.
74. *Poa viscosa*.
75. *Cyperus triflorus*.
76. *Ixora parviflora*, Vahl. *Kadluma*, Tam. d. 20 Mart., 1794.
77. No plant.
78. *Jasminum auriculatum*.

79. *Justicia paniculata*, Vahl.
 80. *Jasminum grandiflorum*.
 81. *Acrostichum* an *Calomelanos* ?
 82. *Cacalia coccinea*.
 83. No plant.
 84. *Polygonum aviculare*. Florib. octandris, trigynis axillaribus. Fol. indivisis, linearibus, alternis, acutis. Caule herbaceo, ad radicem diviso.
 85. No plant.
 86. do.
 87. *Hedysarum giganteum*.
 88-90. No plants.
 91. *Hedysarum nummularifoli*.
 92. No label (one unattached in next paper gives *Ferreola buxifolia* Roxb ?)
 93. *Antidesma acida*.
 94. *Cissampelos* (Pareira).
 95. *Mimosa catechu*.
 96. *Hydrocotyle Asiatica*.
 97. *Rhamnus Nagera*.
 98. *Achyranth, corymbosa*.
 99. *Nauclea orientalis*.
 100. *Ipomoea Quamoclit*.
 101. *Achyranthes polygonoides*.
 102. *Combretum laxum*.
 103. *Gentiana verticillata*.
 104. *Illecebrum lanatum*.
 105. *Gentiana diffusa*.
 106. *Impatiens Sinensis*.
 107. *Conyza bracteata*.
 108. *Artemisia vulgaris*.
 109. *Sigesbeckia orientalis*.
 110. *Verbesina biflora*.
 111. No plant.
 112. *Hedysarum pulchellum*.
 113. *Echites*, sp.
 114. *Coniam*, [(sic) um. ?]

115. Germinalia, T. ?
116. *Convolvulus nervosa*.
117. *Ornithogalum tuberosum*.
118. *Hexandria monogyn*.
119. *Rubus*.
120. *Achyranthes dioica*
121. *Inula Indica*.
122. *Scirpus squamosos*'
123. *Scirpus articulatus*.
124. *Andropogon pilosum*.
125. *Cenchrus granularis*.
126. *Commelina spirata*
127. *Cyperus exaltatus*.
- 128-129. No labels.
130. *Poa glabra*.
131. *Peganum Harmala*
132. No label
133. *Cotyledon paniculata*.
134. *Limonia*.
135. *Bauhinia*, sp.
136. *Sinaba*.
137. *Verbena Boswalli*
138. *Syngenesia polygam*.
139. *Onopordum lanatum*.
140. *Echinops spinosus*.
141. *Verbesina dichotom*.
142. *Polygonum lapathifolium*.
143. *Indigofera*.
144. *Tagetes minima*.
145. No label.
146. *Rhus*.
147. *Solanum quadrangulum*.
148. *Indigofera dendroides*.
149. *Scirpus*.
150. *Hedysarum diphyllus*.
151. *Crotalaria*.
152. *Mimosa dulcis*, Roxb. Pl. Car. 1,99.

153. *Ægilops ciliaris*, Koenig.
An *Ischæmum* ?
Auf der Reise von Madras nach. Wanda-wasi, 1799.
154. *Lichen fuciformis*.
155. *Fucus* sp. n. ? *Siliculosus proximus*.
156. *Tradescantia axillaris*.
157. *Lycopodium plumosum*.
158. *Fucus cartilagineus*. Exper.
150. *Psoralea corylifolia*, (under characters unknown to writer.)
160. *Excecaria Agallocha*.
161. *Panicum tripoides* ? (Under unknown characters.)
162. *Andropogon prostratum*, “ “ “
163. *Andropogon gryllus*.
164. *Justicia* (*Achatodes* ?)
165. *Carthamus cæruleus*.
166. *Flacourtia sepiaria*, Roxb. Wuddla (?), Tam.
167. *Eriocaulon sexangulare*.
168. *Galedupa scandens*.
- Three plants loose and wanting labels.

NOTE ON SOME OF THE WORKS ON BOTANY IN THE LIBRARY
OF KING'S COLLEGE.

It will probably be interesting to local botanists to have the titles of some of the most important books on Botany in the Library of King's College. The following is a list of them :—

1. English Botany, or coloured figures of British Plants, etc., by James Sowerby. 36 vols., 1790—1814.
2. Hull's British Flora. 1799.
3. “ Elements of Botany. 2 vols., 1800.
4. Flora Anglica, Gulielmi Hudsoni. 1798.
5. Flora Scotica, Rev. John Lightfoot. 1777.
6. British and Garden Botany. Geo. H. Grindon. 1864.
7. Flora Diætetica or History of Esculent Plants. C. Bryant. 1783.
8. Flora Boreali-Americana. Andreas Michaux. 2 vols. 1803.

9. *Flora Americæ Septentrionalis, or Descriptions of the Plants of North America*, by Frederick Pursh. 2 vols. 1814.
10. *North American Botany*. Eaton and Wright, 1840.
11. *Icones Plantarum sponte nascentium in regnis Daniæ et Norvegiæ ad illustrandum opus Floræ Danicæ*. 7 vols., folio, 1754. Colored Plates.
12. *Flora of Colorado*. Porter and Coulton. 1874.
13. *Linnæi Bibliotheca Botanica*.
14. " *Systema Naturæ*, translated into English. 7 vols. (2 "Vegetables.")
15. *G. Hudsoni Philosophia Botanica*. 1770.
16. *Botanical Extracts or Philosophy of Botany*. Robert J. Thornton. 2 vols., folio, (the second consisting of fine plates), 1810.
17. *Evelyn's Sylva or Discourse of Forest Trees and Propagation of Timber in His Majesty's Dominions*. Fifth Edition, 1729.
18. *A General System of Gardening and Botany* by George Don. 4to. Vols. III. and IV. only.

ART. IV.—ON THE NECESSITY FOR PRELIMINARY SCIENTIFIC TRAINING FOR CIVIL AND MINING ENGINEERS.—BY EDWIN GILPIN, M. A., F. G. S., MINING ENGINEER.

(Read. Feb. 11, 1878.)

IN view of the attempt now being made to establish a Nova Scotia School of Science and Technology in this town, it may not be out of place to attempt to anticipate the objections that will be raised against it by those who have not considered clearly its aims; and to endeavour to show the advantages that its training would confer on those who, in a few years, by the irresistible march of time, must become rulers and leaders of our country.

I would be glad indeed to explain and show how wide-spread