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Publisher: Taylor & Francis

Informa Ltd Registered in England and Wales Registered Number:
1072954 Registered office: Mortimer House, 37-41 Mortimer Street,
London W1T 3JH, UK

Transactions of the Botanical Society of Edinburgh

Publication details, including instructions for authors and subscription information:

<http://www.tandfonline.com/loi/tped18>

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Published online: 01 Dec 2010.

To cite this article: Dr Thomas Anderson (1866) III. Notice of the effects of the Cyclone of 5th October 1864 on the Botanic Garden, Calcutta , Transactions of the Botanical Society of Edinburgh, 8:1-4, 366-375, DOI: [10.1080/03746606609468596](https://doi.org/10.1080/03746606609468596)

To link to this article: <http://dx.doi.org/10.1080/03746606609468596>

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and since its discovery the station has been robbed by some fern collector. It is to be hoped that it will be found in some other Irish station. Specimens of the plant from the University Herbarium were also exhibited, collected at Vacluse, Montpellier, Sierra de Gador and Sierra Vernisa in Spain. From the single frond of the Irish specimen which was shown, it was not easy to come to a definite conclusion as to the species. Mr Newman, however, has determined the Irish plant to be the true *Asplenium Petrarchæ*, and has noticed it in the popular fourth edition of his "British Ferns."

III. *Notice of the effects of the Cyclone of 5th October 1864 on the Botanic Garden, Calcutta.* By Dr THOMAS ANDERSON.

The history and general character of the Cyclone as it occurred at Calcutta have been repeatedly narrated, and are so well known to every one, that no description is required here. As experienced in the Botanical Garden, the cyclone differed in being somewhat more violent than in Calcutta, and the influence of the storm-wave extended more inland. The greater fury of the storm in the Botanical Garden is accounted for by the garden being nearer the centre of the cyclone than Calcutta, but principally by the open surface of the river, across which the gale at its height blew diagonally, and thus struck the garden with a force unbroken, for the space of a mile, by any obstacle whatever. Few trees fell before 11 o'clock A.M. on the 5th October, and almost none after 4.30 P.M. At 4 o'clock, the great specimen of *Adansonia digitata*, the Baobab tree of Africa, was uprooted, and fell with a crash that caused vibrations in the earth which were felt at a distance of some hundred yards. This tree, which had withstood the greatest force of the gale, seems to have at last given way from its roots having become loosened in the soil by the storm-wave, whose waters rose to a height of 4 feet on the trunk of the tree. Three gigantic specimens of *Casuarina equisetifolia*, the oldest of the species in the garden, and none of them less than 150 feet in height, fell comparatively early in the storm. One of them was seen in the act of falling about

11 A.M. Many trees, but especially *Casuarina equisetifolia*, and young specimens of Teak, were not uprooted, but their stems were broken across 15 or 20 feet above the ground, while every branch was wrenched off. They are now nothing but bare poles without a leaf. The devastating wave overthrew almost every shrub and small tree that had withstood the fury of the wind, loosened and swept away the soil about the roots of large trees, and thus caused many of them to fall even after the great force of the storm was exhausted. The garden was covered with straw brought up by the tide and storm-wave from the villages below. Many hundred cartloads of straw were collected and burned some weeks after the cyclone. Timber and rubbish of all kinds were scattered everywhere, and even a portion of the helm of a ship was carried a quarter of a mile into the garden, and was found at the base of a large tree of *Gmelina arborea*, opposite the dwelling-house of the gardener of the Agri-Horticultural Society. Near this a log of mahogany, 4 feet in diameter and 15 feet long, was overturned by the storm-wave ; and near the centre of the garden another log, 2 feet thick and 20 feet long, was carried some distance by the receding wave. Many of the most picturesque parts of the garden resulting from the grouping of trees, or from well-developed single specimens, no longer exist. In the teak avenue, along the road from Kyd's monument to the large bridge over the Khal, only two mutilated specimens remain. The trees in this avenue were sixty-nine years old. Out of sixty-seven mahogany trees thirty-one have been blown down, two of which were sent to this garden by the Court of Directors of the East India Company in 1796. These two trees had attained a circumference of 13 feet 6 inches, and had produced seed for the last two years. The mahogany grove, consisting of trees forty-five years old, is destroyed. The *Casuarina* avenue, planted by Dr Wallich, has suffered severely. Only four trees in it are standing, and these are much injured. Three of the originally introduced specimens of this species, and which were the parents of nearly all the *Casuarinas* near Calcutta, were blown down. The magnificent specimen of *Adansonia digitata*, whose diameter is 12 feet, fell towards the end of the storm after the storm-wave had

passed over the garden. All the trees of *Amherstia nobilis* have been partially uprooted ; they are supported merely by their branches, and all of them must be removed after young plants have been obtained from them by layering. The great Banyan received considerable damage, but fortunately on the north side, where the loss of the branches does not in the least spoil the contour of the tree. The Pinetum, containing many fine specimens of *Araucaria*, suffered much from the storm. Of about twenty-five specimens of *Araucaria* not one has been left with the main stem entire ; in most of the trees nearly a third of the stem and branches remain. Among Coniferæ, the destruction of all the trees of *Pinus longifolia* deserves notice ; also of a very large specimen of *Dammara orientalis*, introduced from Amboyna in 1798. Amidst all this destruction, I am glad to be able to report that Cycadææ and palms, and indeed Endogenæ generally, have escaped with little injury. Only two species of palms have suffered severely—one is *Areca Catechu*, the common betel-nut palm, of which hardly a specimen now remains in the garden, and *Arenga saccharifera*, most of the trees of which have been blown out of the perpendicular, although few of them have been uprooted. The great destruction of exogens by the cyclone, while endogenous species escaped, produced a peculiar effect on the scenery about Calcutta. The country, as seen from the roof of my dwelling-house, a height of 80 feet, appears to be covered with three species of palms, *Cocos nucifera*, *Phoenix sylvestris*, *Borassus flabelliformis*, and bamboos. The destruction of the foliage of the trees and shrubs at an unnatural period, and indeed at the time when the trees had ceased to grow, and were maturing the woody growth of the rainy season, has had a strange influence on some species. The most general effect has been the absence of flowers in spring, and departures from the usual course of shedding of leaves.

Some trees have been killed by the mere force of the wind, or by the violent strain they have sustained. The pressure during the height of the storm is said to have been 120 lbs. on the square foot. Some species, especially of Dipterocarpeæ, Guttiferæ, the genera *Dalbergia*, *Pterocarpus*, *Acacia*, *Araucaria* and *Dammara* have their stems

covered with exudations of resin, or gum, which have oozed through the bark on the upward flow of the sap in March. There are very few species of trees in the garden of which specimens have not been thrown down; the only species that seem to have entirely escaped, and of which the specimens, with few exceptions, are unique, are—

Dipterocarpus alatus	Terminalia angustifolia
Crataeva Roxburghii	citrina
Flacourtia cataphracta	Berryi
Hydnocarpus inebrians	travancorensis
Gynocardia odorata	tomentosa
Eriodendron orientale	paniculata
Sterculia ornata	Nauclea parviflora
comosa	cordifolia
angustifolia	Mimusops hexandra
Visenia velutina	indica
Hopea faginea	Diospyros Sapota
Acer oblongum	embryopteris
Ailanthus excelsa	Spathodea Rheedii
Erythrina indica	adenophylla
Pterocarpus indicus	Vitex saligna
dalbergioides	Camphora officinarum
Poinciana regia	Beilschmiedia Roxburghiana
Cassia nodosa	Cryptocarya floribunda
Pithecolobium bigeminum	

The greater number of species of *Ficus* have also escaped. The powerful aërial roots of many of this species enable these trees to resist the most violent storms. It is apparent, from this imperfect inquiry, that at least one-half of the trees have been blown down, while nearly all that are standing are very much shattered.

In the following extensive list of trees uprooted by the Cyclone no account is taken of innumerable small trees and shrubs, nor of injuries to trees that may have been left standing; all such have been excluded from the list, which thus contains only species that have been thrown down and destroyed. The list contains 1010 specimens distributed among 364 species, which is nearly the entire number of arborescent species in the garden.

*Trees uprooted in the Royal Botanical Garden, Calcutta, in the
Cyclone of 5th October 1864.*

<i>Dilleniaceæ.</i>	1	<i>Dillenia scabrella</i>
1 <i>Dillenia retusa.</i> Grafted on	1	<i>pentagyna</i>
<i>Dillenia scabrella.</i>	1	<i>speciosa</i>

Magnoliaceæ.

- 1 *Magnolia spheocarpa*. Planted
by Dr Roxburgh.

- 1 *Michelia champaca*

Anonaceæ.

- 1 *Alphonsea ventricosa*. Unique.
Introduced in 1797.

- 1 *Saccopetalum longiflorum*

- 1 *Guatteria fasciculata*

Canellaceæ.

- 1 *Canella alba*

Bixineæ.

- 4 *Cochlospermum orinocense*

- 2 *Bixa orellana*

- 1 *Flacourtia ferox*
inermis. The only
original specimen
of Dr Roxburgh's
planting left.

- 1 rotundifolia. Unique.

Tamariscineæ.

- 1 *Tamarix indica*

Hypericineæ.

- 3 *Ancistrolobus carneus*

Guttiferae.

- 5 *Calophyllum Inophyllum*

- 1 *Mammea siamensis*

- 3 *Xanthochymus pictorius*

- 1 dulcis

- 3 *Garcinia Roxburghii*. No unin-
jured specimen left.

- 1 purpurea

- 3 Cowa

- 1 cornea. One unin-
jured specimen left.

Dipterocarpeæ.

- 1 *Dipterocarpus lævis*. Unique.
Introduced before 1794.

- 2 *Shorea robusta*. One specimen
remaining.

- 1 *Hopea odorata*

Malvaceæ.

- 1 *Kydia calycina*

- 1 *Hibiscus tortuosus*

- 3 macrophyllus

- 1 tricuspis

- 1 *Thespesia populnea*

- 2 *Adansonia digitata*. Two small
specimens left.

- 2 *Bombax malabaricum*

- 1 *Ochroma Lagopus*. Unique.
Species lost.

Sterculiaceæ.

- 3 *Sterculia villosa*

- 1 colorata

- 1 alata

- 1 urens

- 2 foetida. All large
specimens lost.

- 1 parviflora

- 1 guttata

- 2 pallens

- 4 companulata

- 4 populifolia

- 1 *Heritiera macrophylla*

- 1 littoralis

- 4 *Kleinhovia hospita*

- 3 *Pterospermum lancifolium*

- 2 aceroides

- 1 acerifolium

- 1 suberifolium

- 6 *Eriolæna spectabilis*

- 1 Candollei

- 1 *Guazuma tomentosa*

Tiliaceæ.

- 2 *Grewia asiatica*

- 1 *Elæocarpus longifolius*

- 3 *Berrya Ammonilla*

Linææ.

- 1 *Erythroxylon monogynum*

Rutaceæ.

- 1 *Xanthoxylon Budrunga*

- 1 *Clausena sumatrana*

- 2 *Feronia Elephantum*

- 1 *Ægle Marmelos*

Simarubaceæ.

- 1 *Balanites ægyptiaca*. Unique.
A few seedlings raised last
year remaining.

Burseraceæ.

- 5 *Boswellia thurifera*

- 7 *Garuga pinnata*

- 1 *Balsamodendron Roxburghii*

- 1 *Icica indica*

- 1 bengalensis

- 1 *Canarium geniculatum*

- 1 *Filicium decipiens*

Meliaceæ.

- 2 *Melia composita*

<p>1 <i>Melia</i> sp.
 1 <i>Azadirachta indica</i>
 4 <i>Epicharis exarillata</i>
 1 <i>Sandoricum indicum</i>
 1 <i>Mallea Rothii</i>
 3 <i>Aglala undulata</i>
 3 <i>spectabilis</i>
 1 <i>midnaporensis</i>
 1 <i>Milnea edulis</i>
 4 <i>Amoora Rohituka</i>
 1 <i>Walsura robusta</i>
 <i>Piscidia</i>.
 1 <i>Heynea trijuga</i>
 32 <i>Swietenia Mahagoni</i> (old)
 12 (young).
 These plants were 12 years
 old.
 8 <i>Swietenia Chloroxylon</i>
 3 <i>Soymida febrifuga</i>
 8 <i>Chickrassia tabularis</i>
 2 <i>Cedrela Toona</i>. All the large
 trees lost.
 <i>Olacineæ</i>.
 1 <i>Olax scandens</i>
 <i>Celastrineæ</i>.
 1 <i>Euonymus grossus</i>
 1 <i>glaber</i>
 1 <i>Celastrus fascicularis</i>
 1 <i>Elæodendron longifolium</i>
 1 <i>glaucum</i>
 <i>Sapindaceæ</i>.
 1 <i>Cupania canescens</i>
 1 <i>sapida</i>
 1 <i>madagascariensis</i>
 1 <i>Scytalia mangifolia</i>
 1 <i>Schleichera trijuga</i>
 3 <i>Erioglossum edule</i>
 1 <i>Sapindus angustifolius</i>
 3 <i>emarginatus</i>
 2 <i>Saponaria</i>
 1 <i>Nephelium Litchi</i>
 1 <i>Longan</i>
 2 <i>Harpulia cupanioides</i>
 <i>Sabiaceæ</i>.
 2 <i>Meliosma simplicifolia</i>
 <i>Anacardiaceæ</i>.
 1 <i>Rhus parviflora</i>
 43 <i>Mangifera indica</i>
 1 (Singapore)</p> | <p>2 <i>Bonea oppositifolia</i>. A few
 small plants left.
 1 <i>Buchanania latifolia</i>
 1 <i>angustifolia</i>
 8 <i>Melanorrhœa usitatissima</i>. One
 plant left.
 2 <i>Schinus terebinthifolia</i>
 1 <i>Semicarpus Anacardium</i>
 1 <i>cuneifolia</i>
 3 <i>Holigarna racemosa</i>
 1 <i>Spondias sp.</i>
 1 <i>lutea</i>
 <i>Moringaceæ</i>.
 2 <i>Moringa pterygosperma</i>
 <i>Leguminosæ</i>.
 1 <i>Agati grandiflora</i>
 2 <i>Erythrina ovalifolia</i>
 1 <i>stricta</i>
 3 <i>Butea frondosa</i>
 5 <i>Pterocarpus Marsupium</i>
 3 <i>Pongamia glabra</i>
 1 <i>heterocarpa</i>
 4 <i>tetraptera</i>
 35 <i>Dalbergia Sissoo</i>
 4 <i>zeylanica</i>
 1 <i>frondosa</i>
 1 <i>latifolia</i>. One much
 injured specimen
 remains.
 1 <i>scandens</i>
 1 <i>sp. (Madras)</i>
 1 <i>Colvillea racemosa</i>
 2 <i>Poinciana regia</i>
 1 <i>Lebidibia coriaria</i>
 11 <i>Jonesia Asoca</i>
 5 <i>Tamarindus indica</i>
 4 <i>Hymenæa Courbaril</i>
 5 <i>Phanera Richardiana</i>
 9 <i>purpurea</i>
 1 <i>parviflora</i>
 2 <i>retusa</i>
 4 <i>Hardwickia binata</i>
 1 <i>pinnata</i>. Unique.
 2 <i>Parkia biglandulosa</i>
 1 <i>Brunonis</i>
 1 <i>Prosopis spicigera</i>
 1 <i>Cassia emarginata</i>
 1 <i>Fistula</i>
 1 <i>grandis</i>
 1 <i>sumatrana</i>
 2 <i>Xylia dolabriformis</i></p> |
|--|---|

- 5 Pithecolobium dulce
4 Acacia Serissa
1 tomentosa
6 Catechu
1 Sundra
1 Albizzia stipulata
1 elata
1 paludosa
1 Smithiana
3 odoratissima
2 diluta
- Rosaceæ.*
1 Photinia bengalensis
1 eugenifolia
- Combretaceæ.*
3 Terminalia Chebula
1 tomentosa
2 Catappa
1 Belerica
3 Arjuna
1 procera
2 sp. Unique, entirely lost.
1 oblonga
1 bialata
- Terminaliæ have hardly suffered at all. Many specimens of all, except the above-mentioned species, remain.
- 2 Conocarpus latifolius. Only a few small seedlings remain.
- Rhizophoraceæ.*
9 Carallia lucida
- Lythraceæ.*
1 Lagerstromia Regina
1 Byrsonima lucida
2 Lafcensia vandelliana. Two small specimens, 2 years old, remain.
1 Duabanga sonneratioides
- Alangiaceæ.*
1 Alangium decapetalum
- Myrtaceæ.*
2 Eucalyptus resinifera
3 Callistemon salignum
1 lanceolatum
2 Metrosideros vera
2 Eugenia geminiflora
6 Jambolana
10 myrtifolia
2 malaccacensis
- 1 Eugenia pulchella
1 Psidium pomiferum
1 Melaleuca Cajuputi
- Samydaceæ.*
2 Homalium tomentosum.
1 longifolium
- Araliaceæ*
1 Tupidanthus calyptratus
- Rubiaceæ.*
2 Rondeletia tinctoria.
2 Hymenodictyon thyrsoiflorum
5 Nauclea Cadamba
1 macrophylla
1 Randia rubiginosa
4 uliginosa
3 decussata
1 Gardenia longispina
5 latifolia
1 turgida
1 sp.
7 Ixora parviflora
3 Canthium floribundum
1 Morinda exserta
1 bracteata
- Sapotaceæ.*
1 Sapota Achras. Several specimens remain.
4 Sideroxylon attenuatum
1 inerme
1 Bassia longifolia
1 latifolia
1 butyracea
1 Imbricaria coriacea
1 Mimusops Elengi
1 Kaki
- Ebenaceæ.*
1 Diospyros Ebenum
4 montana
1 heterophylla
3 lancifolia
1 sp.
1 sp.
1 sp.
- Jasminaceæ.*
4 Olea europæa. One much injured old tree remains.
5 Visiania paniculata
2 robusta
1 Olea myrtifolia
1 grata

- 4 *Olea glandulifera*. Probably
lost, except as regards
seedlings in pots.
3 *Linociera dichotoma*
8 *macrophylla*
11 *Noronhia emarginata*
1 *Nyctanthes Arbor-tristis*

Apocynaceæ.

- 1 *Plumeria acuminata*
1 *alba*
1 *Wrightia mollissima*
5 *Alstonia macrophylla*. One
tree left standing.
2 *scholaris* No large
trees exist.
4 *Holarrhena antidysenterica*
1 *Thevetia neriifolia*

Loganiaceæ.

- 1 *Strychnos Potatorum*
1 *spinosa*

Bignoniaceæ.

- 1 *Stereospermum fimbriatum*
1 *sp.*
1 *sp. (Pegu)*
4 *chelonioides*
1 *suaveolens*
3 *Spathodea amœna*
2 *xylocarpa*
5 *crispa*
1 *serrulata*
1 *stipulata*
2 *campanulata*
3 *Calosanthos indica*
1 *Millingtonia hortensis*
4 *Kigelia pinnata*
4 *Crescentia alata*
3 *Tecoma undulata*. Two small
plants a year old re-
main.
1 *serratifolia*

Boraginææ.

- 1 *Cordia Myxa*
5 *Sebestena*
1 *lævis*
1 *tectonifolia*
1 *bantamensis*
1 *angustifolia*
3 *grandis*
1 *Ehretia lævis*

Verbenaceæ.

- 3 *Citharexylon subseriatum*
52 *Tectona grandis* (old). The
majority of these are
nearly 70 years old.
30 *grandis* (young). From
15 to 25 years old.
3 *ternifolia*. One speci-
men left.
2 *Premna spinosa*
2 *Callicarpa arborea*
4 *Gmelina arborea*
1 *asiatica*. One injured
specimen left.
1 *Vitex alata*
1 *Leucoxylon*

Nyctaginaceæ.

- 1 *Pisonia inermis*

Polygonaceæ.

- 2 *Triplaris americana*

Proteaceæ.

- 4 *Grevillea robusta*. All the old
seed-bearing trees have been
destroyed.

Aquilariaceæ.

- 3 *Aquilaria Agallochum*

Santalaceæ.

- 5 *Santalum album*

Lauraceæ.

- 2 *Cinnamomum malabathrum*
1 *Tetranthera Roxburghii*
3 *Tetradenia foliosa*

Celtideæ.

- 1 *Ulmus integrifolia*
2 *Celtis tetrandra*
1 *sinensis*

Moraceæ.

- 1 *Artocarpus Chaplasha*
4 *integrifolia*. The
species is lost ex-
cept a small seed-
ling in a pot.
3 *Lakoocha*
3 *incisa*
3 *Ficus artocarpifolia*. No large
trees left.
1 *indica*
1 *conglomerata*

<p>1 Ficus Roxburghii
1 excelsa
2 religiosa
1 Brosimum, Alicastrum
2 Streblus asper</p> <p style="text-align: center;"><i>Euphorbiaceæ.</i></p> <p>1 Aleurites triloba
2 Croton Joufra
1 oblongifolium
2 Cleidion javanicum
2 Trewia nudiflora
1 Rottlera tinctoria
1 tetracocca
1 Stillingia sebifera
1 Omalanthus sp.
1 Pierardia dulcis
2 Hemicyclia sepiaria
1 Briedelia amœna
1 lancifolia
3 Amanoa attenuata
1 Berryana
7 Phyllanthus tremulus
1 Emblica officinalis
1 Bischofia javanica
1 Glochidium lancifolium
1 Putranjiva Roxburghii
1 Cluytia collina
1 oblongifolia
1 Antidesma Bunius</p> <p style="text-align: center;"><i>Casuarinaceæ.</i></p> <p>19 Casuarina equisetifolia. All the
oldest trees have been lost.
8 Casuarina equisetifolia (young)</p> <p style="text-align: center;"><i>Coniferæ.</i></p> <p>2 Juniperus virginiana
2 Cupressus torulosa
3 sempervirens
5 Pinus longifolia. All the trees
have been lost. There
are a few plants under
five feet left.</p> | <p>1 Pinus khasyana. Unique spe-
cies lost.
1 Araucaria Bidwillii
1 Cookii
1 Cunninghami
4 excelsa. The largest
trees remain.
2 Dammara orientalis. One spe-
cimen introduced in 1797.
No trees of this species exist
here now.
1 Podocarpus Maki
1 neriifolia</p> <p style="text-align: center;"><i>Cycadaceæ.</i></p> <p>1 Cycas circinalis. <i>C. spherica</i>
Roxb.
5 Rumphii. Many speci-
mens remain.</p> <p style="text-align: center;"><i>Musaceæ.</i></p> <p>1 Ravenala madagascariensis</p> <p style="text-align: center;"><i>Palmaceæ.</i></p> <p>2 Oreodoxa oleracea. The ori-
ginal trees introduced by
Lord Auckland remain.
39 Areca Catechu
4 Arenga saccharifera
3 Caryota urens
4 obtusa
4 sp.
1 Borassus flabelliformis
1 Corypha umbraculifera
1 Livistona sinensis
1 Chamærops Martiana
1 Phoenix sylvestris
8 Cocos nucifera</p> <p style="text-align: center;"><i>Pandanaceæ.</i></p> <p>1 Pandanus odoratissimus</p> <p style="text-align: center;"><i>Gramineæ.</i></p> <p>4 Bambusa gigantea. One speci-
men left.
1 arundinacea</p> |
|---|--|

Dr Wallich drew up a very full report on the effects of the gale of 3d June 1842. It appears from his report that that storm did great damage to the garden. Dr Wallich states that 362 trees were blown down. I observe that in this number he includes shrubs sometimes not more than five feet high; and he points out that of the 362 trees blown down 106 were teak trees, many of which were of large size.

This gale of 1842 happened before Mr Griffith had denuded the garden of most of its fine timber trees. The garden was then thickly covered with trees; and accordingly the number lost in that gale bore a very small proportion to the vast number left standing. In May 1843, eleven months after the gale, Mr Griffith, in his report to Government, says—"At present the garden is literally choked with trees." Had more trees existed in the garden when the Cyclone of last October occurred, it is most likely that less damage would have been sustained, as the trees would have sheltered each other. In a garden liable to be devastated at any time by furious storms, every arborescent species should be represented by at least five specimens. Unique specimens of many species must always exist, but still the endeavours of the Director should be to procure, if possible, five specimens of each species.

IV. *Notice of Plants collected in Iceland.* By M. ED. JARDIN, Cherbourg.

I have much pleasure in offering to the Botanical Society of Edinburgh some specimens of plants which I collected during my visit to Iceland, Faröes, and Norway. Perhaps there are some new species, but I have neither time nor books, nor experience sufficient to make a complete study of them. I shall, however, notice some plants which deserve attention, on account of their station and locality.

A species of *Equisetum* was gathered by me in hot-springs near Reykjavik; and in the place where it grows, the water was disagreeably warm to the hand. A species of *Chara*, and a *Potamogeton* were also gathered in those hot waters. In the waters of the hot-springs of the Geysers, in the interior of Iceland, a *Juncus* grows very near to the boiling cauldron. This is nearly always covered by the water, when it spreads outward from the opening; there is also a kind of *Conferva* from the dry bed of a rivulet which is filled after the eruption. Some mosses and lichens have been gathered on the summits of the mountains, and a fern, *Cystopteris fragilis* in the *Almannegiaa*, which is a rock where, in the older times, the Althing was convoked