OUTLINES
OF
CLASSIFICATION.

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OUTLINES

OF

CLASSIFICATION OF PLANTS,

BY

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MONTREAL

E. M. RENOUF, Publisher

1895.

THE *Implementing Act of Parliament of Canada in the Year one thousand eight hundred and ninety five* by D. P. FENHALLON, in the Office of the Minister of Agriculture.

OUTLINES OF CLASSIFICATION.

Synopsis.

Branch I.—Protophyta.

CLASS 1.—MYXOGASTRÆ, (Slime Moulds.)

Orders—Peritrichæ.
Columbellifæræ.
Lathoderinææ.
Calotrichææ.

CLASS 2.—SCHIZOMYCETÆ, (Fission Fungi.)

Orders—Myxobacteriææ.
Cystophorææ.
Nematogenerææ.

From the nature of the organisms included in the protophyta, it is improbable that many of them will ever be found in the fossil state, although Kenan¹ claims to have recognized several species of bacteria in the tissues of carboniferous plants.

Branch II.—Thallophyta.

CLASS 3.—ASCOMYCETES, (Sac Fungi.)

Orders—Perisporiæææ.
Tuberæææ.
Pyrenomycetææ.
Discomycetææ.
Uredinææ.
Ustilaginææ.
Sphaeropsidææ.
Melanconicææ.
Hyphomycetæææ.

Fossil representatives occur in the carboniferous and later formations, chiefly upon leaves and in lignite.

CLASS 4.—BASIDIOMYCETES, (Higher Fungi.)

Orders—Gasteromycetææ.
Hymenomycetææ.

Fossil representatives occur in the carboniferous, *Girardia sphaerospoma*, *Gasteromyces furcatus*, etc.

CLASS 5.—CHLOROPHYCÆ, (Green Algae.)

Orders—Protoconoidææ.
Coenogamææ.
Siphonææ.
Confervoidææ.

Fossil representatives, in the form of siliceous diatom valves, are especially abundant in the Tertiary and Quaternary, often forming extensive deposits known under the name of infusorial earth.

CLASS 6.—PHÆOPHYCÆ, (Brown Algae.)

Orders—Phæosporeææ.
Dictyotææ.
Fucoidææ.

The earliest fossil representatives of the brown algae occur in the Upper Silurian whence they pass into the Lower Devonian. They appear in these early formations as plants of great size (*Aematophyton*), indicating that they must also have flourished at much earlier periods, but the remains of the vegetation which existed prior to the Upper Silurian are now represented only by a carbonaceous residue in the form of graptolite. Phæophyceæ are found more or less abundantly in all the later formations, and the genus *Fucus* is well defined in the Cretaceous.

CLASS 7.—CORTICHIETÆ.

Order—Coleochæetæææ.

No fossil representatives known.

CLASS 8.—RHODOPHYCÆ.

Order—Floridææ.

Fossil representatives from the Silurian upward, and especially abundant in the Cretaceous.

CLASS 9.—CHAROPHYCÆ.

Order—Characææ.

Represented by many species in the lower Cretaceous, in the Tertiary and Quaternary.

Branch III.—Bryophyta.

CLASS III.—HAPLODONT.

- Orders—Jungermanniaceæ,
Ricciaceæ,
Anthocerotaceæ,
Marchantiaceæ.

Found only in recent formations—Tertiary and Quaternary.
Marchantia.

CLASS II.—MUSCINI.

- Orders—Sphagnaceæ,
Andreaeaceæ,
Phascaceæ,
Bryaceæ.

Fossils found only in the Tertiary and Quaternary. *Gymnostomum*, *Sphagnum*, *Hypnum*.

Branch IV.—Pteridophyta.

CLASS IZ.—FILICES.

- Orders—Filices,
Salvinaceæ,
Marsiliaceæ,
Ophioglossaceæ,
Marattiaceæ.

Fossil representatives numerous from the Devonian (*Parka*, *Protosalpinx*, *Neuropteris*, *Sphenopteris*, etc.) through the carboniferous to recent formations.

CLASS IX.—EQUSETINA.

- Orders—Equisetaceæ,
Calamitæ,
Annulatæ,
Asterophyllitæ.

Fossil representatives numerous from the Devonian (*Calamites*, *Asterophyllites*, etc.) and throughout the carboniferous.

CLASS 14.—SPHENOPHYLL.

Order—Sphenophyllaceæ.

Fossil representatives in the Silurian-Cambrian and upward.

CLASS 15.—LYCOPODIN.

- Orders—Lycopodiaceæ,
Psilotaceæ,
Selaginellaceæ,
Isoetaceæ.

Fossil representative: numerous and often very large, from the Upper Silurian (*Psilophyton*, etc.) through the Devonian (*Lepidodendron*) and Carboniferous.

Branch V.—Spermaphyta.

CLASS VI.—GYMNOSPERM.

- Orders—Cycadaceæ,
Coniferae,
Taxaceæ,
Gnetaceæ.

Fossil representatives very numerous from the Devonian (*Dadoxylon*, *Cordaites*, etc.) and through the Carboniferous and more recent formations.

CLASS 17.—ANGIOSPERM.

Sub Class 1.—Monocotyledons.

Sub Class 2.—Dicotyledons.

Orders: numerous.

Fossil representatives are very numerous as leaves, lignite, &c., from the Permian upward, becoming more numerous in recent formations.

BRANCH I.—Protophyta.

NETS

Unicellular Plant, often forming more or less extensive plasmodia
plasmodia by coalescence.

CLASS I.—MYXOGASTRICES.
(Slime Moulds.)

Orders.

1. Peridictyon	2. Collimetiseta
3. Lathodermes	4. Calorrichia.

Asexual reproduction predominant.

Saprophytic plants, devoid of a cell wall except in the spores. Reproduction through amoeboid swarm spores, asexual by simple fission, or sexual (?) (Goebel) by conjugation and the formation of plasmodia, from which asexual spores arise.

CLASS II.—SLIME MYCELS.
(Slime Mould Fungi.)

Orders.

1. Myxobolus	2. Cyrtophora
3. Nematozoua	

Asexual reproduction predominant.

Parasitic or saprophytic plants, sometimes forming gelatinous plasmodia. Reproduction wholly asexual by simple division of a mother cell, more rarely by endogenous spore formation.

No well defined separation of sexual and asexual phases of growth

BLANCH II.—Thallophyta.

NOTE

Unicellular or multicellular plants, the latter often with a stem-like habit of growth.

Sexual generation predominant.

Sporophyte Generation (Asexual Phase.)

Oophyte Generation. (Sexual Phase.)

Alternation of generations often well defined

III. ASCOMYCETES (Sac Fungi.)	IV. BASIDIOMYCETES. (Higher Fungi.)	V. CHLOROPHYTES (Green Algae.)	VI. PHAEOPHYTES (Brown Algae.)	VII. COLEOPHYTES. (Red Algae.)
<i>Orders.</i>	<i>Orders.</i>	<i>Orders.</i>	<i>Orders.</i>	<i>Order.</i>
1. Perisporiaceae. 2. Tuberoideae. 3. Pyrenomycetaceae. 4. Discomycetaceae. 5. Uredinales. 6. Ustilaginaceae. 7. Sphaeropsidaceae. 8. Melanconiaceae. 9. Hyphomycetaceae.	1. Gasteromycetaceae. 2. Hymenomycetaceae.	1. Protococcoideae. 2. Conjugatiales. 3. Siphonales. 4. Confervoidae.	1. Phaeosporaceae. 2. Dictyotaceae. 3. Fucoideae.	1. Coleochaetaceae.
Asexual reproduction commonly predominant.	Asexual reproduction predominant.	Sexual reproduction often by conjugation with the formation of Zygospores. Asexual reproduction predominant.	Reproduction wholly sexual in Fucoideae, asexual in Phaeosporaceae and Dictyotaceae.	Asexual reproduction by swarm spores predominant.
1. Perfect plant ♂. 2. Antheridia ♀.		1. Perfect plant ♂. 2. Antheridia ♀. 3. Spermatozooids.	1. Perfect plant ♂ or ♀. 2. Antheridia ♀. 3. Spermatozooids.	1. Perfect plant ♂. 2. Antheridia ♀. 3. Spermatozooids.
1. Perfect plant ♂. II. Archicarpus ♀.		1. Perfect plant ♂. II. Oogonium.	1. Perfect plant ♂ or ♀. II. Oogonia.	1. Perfect plant ♂. II. Oogonium.
	No clearly defined sexual reproduction known.	III. Oosphere (Ovum).	III. Oospheres (Ova).	III. Oospheres (Ovum).
3 x III. Aseis. 4 x IV. Spores.		4 x IV. Oospore. 5 x V. Swarm spores.	4 x IV. Oospore. 5 x V. Swarm spores.	4 x IV. Oospore. 5 x V. Swarm spores.

Thallophyta.-(Continued.)

BLENCH III—Bryophyta.

NOTES

Cellular plants with roots, epidermis and stomata,
often with leafy stems.
Sexual generation predominant

VIII. RHODOPHYCEÆ. (Red Seaweeds.)	IX. CHAROPHYCEÆ.	X. HEPATICA. (Liverworts.)	XI. MARCHANTIA. (Mosses.)
<i>Order.</i>	<i>Order.</i>	<i>Order.</i>	<i>Order.</i>
1. Florideæ.	1. Characeæ.	1. Jangennanthaceæ 2. Ricciaceæ. 3. Anthocerotaceæ 4. Marchantiaceæ.	1. Splachnaceæ 2. Andraceæ 3. Phascaceæ 4. Bryaceæ
Asexual reproduction often predominant by means of tetragonidia.	Asexual reproduction often predominant by means of bulli, or tubers, or special vegetative branches.	Asexual reproduction often predominant, by means of simple separation of the vegetative axis, by adventitious shoots or by gemmæ.	Asexual reproduction predominant by the development of a protonema, more rarely through gemmæ.
1. Perfect plant ♂ or ♀ 2. Spermatogonia. 3. Spermatia ♂	1. Perfect plant ♂ 2. Antheridium ♂ 3. Spermatozooids motile	1. Perfect plant ♂ or ♀ 2. Antheridia ♂ 3. Spermatozooids motile.	1. Perfect plant ♂ or ♀ 2. Antheridia ♂ 3. Spermatozooids motile.
1. Perfect plant ♂ or ♀ II. Procarp.	1. Perfect plant ♂ II. Oogonium.	1. Perfect plant ♂ or ♀ II. Archegonium.	1. Perfect plant ♂ or ♀ II. Archegonium.
III. Trichogyne.	III. Oosphere.	III. Oosphere (Ovum).	III. Oosphere (Ovum)
3 x III. Carpospores.	4 x IV. Oospore.	4 x IV. Oospore.	4 x IV. Oospore
4 x IV. Protonema.	5 x V. Pro-embryo.	5 x V. Embryo rudimentary. 6 x VI. Sporogonium parasitic upon the sexual generation.	5 x V. Embryo rudimentary. 6 x VI. Sporogonium parasitic upon the sexual generation.
		7 x VII. Spores with elaters.	7 x VII. Spores
		8 x VIII. Protonema.	8 x VIII. Protonema.

Oophyte Generation.
(Sexual Phase.)
Alternation of generations well defined.

Sporophyte Generation.
(Asexual Phase)

idophyta.

distinct Vascular System.
(Cryptogams.)
subordinate.

XIV. SPHENOPHYLLACE.

Heterosporous.

Order.

1. Sphenophyllaceae.

Represented by fossil forms only. The succession as in the heterosporous Lycopodiace.

XV. LYCOPODINACE.

(Club Mosses.)

Homosporous.

Order.

1. Psilotaceae.

Sexual reproduction predominant.

1. Prothallus rudimentary.

2. Antheridium.

3. Spermatozooids motile.

1. Prothallus rudimentary.

II. Archegonium.

III. Oosphere (Ovum).

1 x IV. Oospore.

5 x V. Suspensor.

6 x VI. Embryo rudimentary.

7 x VII. Normal plant.

8 x VIII. Sporangiferous leaf.

9 x IX. Sporangium.

10 x X. Spores.

Heterosporous.

Order.

1. Selaginellaceae.

2. Isoetes.

Asexual propagation subordinate, by division of the main axis, rarely by apogamy.

1. Prothallus rudimentary.

2. Antheridium.

3. Spermatozooids motile.

1. Prothallus rudimentary.

II. Archegonium.

III. Oosphere (Ovum).

4. Oospore.

5. Suspensor.

6. Embryo rudimentary.

7. Normal plant.

8. Sporangiferous leaf.

9. Microsporangia.

10. Microspores.

IV. Oospore.

V. Suspensor.

VI. Embryo rudimentary.

VIII. Sporangiferous leaf.

VII. Normal plant.

IX. Macrosporangia.

X. Macrospores.

BRANCH V.—Spermaphyta.

True seed plants.

Sexual generation very subordinate, in the Dicotyledons becoming almost completely suppressed with respect to the general structure.

XVI.—GYMNOSPERMA.
Carpels open, seeds naked.

XVII.—ANGIOSPERMA.
Carpels forming closed seed vessels

Heterosporous; prothalli two $\times$ 5.

Heterosporous, the rudimentary prothalli often wanting.

1. Monocotyledons.

2. Dicotyledons.

Orders.

Orders numerous.

Orders numerous.

1. Cycadaceae.
2. Coniferae.
3. Taxaceae.
1. Gnetaeace.

Asexual propagation subordinate; sometimes by tubers.

Asexual propagation subordinate, rarely wholly replacing the sexual; varied, by means of runners, stolons, offsets, bulbs, suckers, tubers, and rarely by parthenogenesis.

1. Prothallus rudimentary.
2. Antheridium rudimentary. (Pollen tube.)
3. Spermatozoids none. (Protoplasm of the antheridium.)

1. Prothallus not developed.
2. Antheridium rudimentary. (Pollen tube)
3. Spermatozoids none. (Protoplasm of the antheridium.)

1. Prothallus not developed.
2. Antheridium rudimentary. (Pollen tube.)
3. Spermatozoids none. (Protoplasm of the antheridium.)

- I. Prothallus (endosperm), formed before impregnation; parasitic upon the asexual generation. (Seeds albuminous)
- II. Archegonium well formed.
- III. Oosphere (Ovum.)

- I. Prothallus (endosperm), formed only after impregnation of the ovum; parasitic upon the asexual generation. (Seeds albuminous.)

- I. Prothallus (endosperm) formed only after impregnation of the ovum, generally obliterated. (Seeds exalbuminous)

- II. Archegonium not formed.
- III. Oosphere (Ovum. Germ cell.)

- II. Archegonium not formed.
- III Oosphere (Ovum or Germ cell.)

1. Oospore.
5. Suspensor.
6. Embryo with 2 to several cotyledons.
7. Normal plant.
8. Anthophylla.
9. Microsporangia (Anthers.)
10. Microspores (Pollen.)

1. Oospore.
5. Suspensor.
6. Embryo with one cotyledon.
7. Normal plant.
8. Stamens.
9. Microsporangia (Anthers.)
10. Microspores. (Pollen.)

4. Oospore.
5. Suspensor.
6. Embryo with two cotyledons.
7. Normal plant.
8. Stamens.
9. Microsporangia (Anthers)
10. Microspores. (Pollen)

- IV. Oospore.
- V. Suspensor.
- VI. Embryo with 2 to several cotyledons
- VII. Normal plant.
- VIII. Carpophyllum.
- IX. Macrosporangia (Ovules.)
- X. Macrospore (Embryo sac.)

- IV. Oospore.
- V. Suspensor.
- VI. Embryo with one cotyledon.
- VII. Normal plant.
- VIII. Pistil.
- IX. Macrosporangia (Ovules)
- X. Macrospore (Embryo sac.)

- IV. Oospore.
- V. Suspensor.
- VI. Embryo with two cotyledons.
- VII. Normal plant.
- VIII. Pistil.
- IX. Macrosporangia (Ovules)
- X. Macrospore (Embryo sac.)

NOTES

Sporophyte Generation.
(Sexual Phase)
Oophyte Generation
(Asexual Phase)
Alteration of generations clearly defined.