

From perennials to bulbs to tropical exotica, *Botanicum* is a feast of botanical knowledge.

- *Botanicum* has sold over 37 thousand copies worldwide. The core *Welcome to the Museum* books have sold a combined quantity of over 1 million copies worldwide (as of July 2022)
- Contents: The First Plants; Trees; Palms and Cycads, Herbaceous Plants; Grasses, Cattails, Sedges and Rushes; Orchids and Bromeliads; Adapting to Environments
- Shortlisted for the British Book Design & Production award.
- Created in consultation with The Royal Botanic Gardens Kew, this title has been created with world-class experts and advisors
- Over 100 full colour, immaculately detailed pages featuring plant species from all over the world
- The large, high quality format makes this the perfect gift for book lovers

THE FIRST PLANTS

Algae

Earth was formed around 4540 million years ago. Within 500 million years, life had evolved. The earliest life forms were simple molecules of carbon, hydrogen, oxygen, and nitrogen. These molecules combined to form amino acids, which are the building blocks of proteins. The first life forms were simple cells, which grew and reproduced. Over time, these cells evolved into more complex organisms, including plants and animals.

Algae are non-vascular plants that live in aquatic environments. They are the most diverse group of organisms on Earth, with over 30,000 species. They are found in a wide range of habitats, from freshwater lakes and rivers to the deep ocean. Algae are important primary producers in aquatic ecosystems, and they play a role in the carbon cycle. Some algae are used as food for humans and animals, and others are used in industry.



Key to plate

- 1. Green algae**
This group includes the most diverse and common algae. They are found in a wide range of habitats, from freshwater lakes and rivers to the deep ocean. They are important primary producers in aquatic ecosystems.
- 2. Red algae**
These algae are found in shallow, clear, warm waters. They are important primary producers in these environments.
- 3. Brown algae**
These algae are found in shallow, cool, temperate waters. They are important primary producers in these environments.
- 4. Diatoms**
These algae are found in both freshwater and marine environments. They are important primary producers in both environments.
- 5. Blue-green algae**
These algae are found in a wide range of habitats, from freshwater lakes and rivers to the deep ocean. They are important primary producers in aquatic ecosystems.

THE FIRST PLANTS

Bryophytes

Plants that live on land and are the first vascular plants to have evolved. They are the most diverse group of land plants, with over 20,000 species. They are found in a wide range of habitats, from freshwater lakes and rivers to the deep ocean. Bryophytes are important primary producers in aquatic ecosystems, and they play a role in the carbon cycle. Some bryophytes are used as food for humans and animals, and others are used in industry.

Bryophytes are non-vascular plants that live on land. They are the most diverse group of land plants, with over 20,000 species. They are found in a wide range of habitats, from freshwater lakes and rivers to the deep ocean. Bryophytes are important primary producers in aquatic ecosystems, and they play a role in the carbon cycle. Some bryophytes are used as food for humans and animals, and others are used in industry.



Key to plate

- 1. Mosses**
These plants are the most diverse and common bryophytes. They are found in a wide range of habitats, from freshwater lakes and rivers to the deep ocean.
- 2. Liverworts**
These plants are found in a wide range of habitats, from freshwater lakes and rivers to the deep ocean.
- 3. Hornworts**
These plants are found in a wide range of habitats, from freshwater lakes and rivers to the deep ocean.
- 4. Charophytes**
These plants are found in a wide range of habitats, from freshwater lakes and rivers to the deep ocean.
- 5. Embryophytes**
These plants are found in a wide range of habitats, from freshwater lakes and rivers to the deep ocean.

THE FIRST PLANTS

Fungi and Lichens

The group of organisms most able to inhabit barren, cold, or dry land around 450 million years ago. They are the most diverse group of organisms on Earth, with over 100,000 species. They are found in a wide range of habitats, from freshwater lakes and rivers to the deep ocean. Fungi and lichens are important primary producers in aquatic ecosystems, and they play a role in the carbon cycle. Some fungi and lichens are used as food for humans and animals, and others are used in industry.

Fungi and lichens are organisms that live on land. They are the most diverse group of organisms on Earth, with over 100,000 species. They are found in a wide range of habitats, from freshwater lakes and rivers to the deep ocean. Fungi and lichens are important primary producers in aquatic ecosystems, and they play a role in the carbon cycle. Some fungi and lichens are used as food for humans and animals, and others are used in industry.



Key to plate


- 1. Mushrooms**
These fungi are the most diverse and common fungi. They are found in a wide range of habitats, from freshwater lakes and rivers to the deep ocean.
- 2. Lichens**
These organisms are found in a wide range of habitats, from freshwater lakes and rivers to the deep ocean.
- 3. Fungi**
These organisms are found in a wide range of habitats, from freshwater lakes and rivers to the deep ocean.
- 4. Lichens**
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THE FIRST PLANTS

Club Mosses, Horsetails and Whisk Ferns

The common names we use for plants are sometimes not an accurate reflection of scientific definitions. Club mosses, for example, are not actually mosses, in fact they are vascular plants. This means that they contain a well-developed system of specialised cells, known as vascular bundles, which allow the plants to grow upright and much taller than bryophytes, which lack a vascular system (see pages 10–11). Horsetails and whisk ferns also contain vascular strands.

These three groups of plants, which reproduce by spores, have ancient lineages and are often referred to as 'living fossils' because there are fossil remains dating from 400–270 million years ago that are very similar in structure to the club mosses, horsetails and whisk ferns we see growing today, but with one important difference: the present-day plants are small herbs – usually less than 1 m in height. By comparison, their ancestors were giants. Horsetail and lycophyte trees (related to club mosses), towering up to 40 m in height, dominated the early Carboniferous landscapes (see pages 18–19). The giant tree-forms of these plants met the fate of most species of life on Earth – extinction, out-competed by better adapted rivals so that all we are now left with are the miniature forms that were able to survive.



Key to plate

- 1. Club moss**
Selaginella selaginoides
Height: 10 cm
Club mosses have small, scale-like leaves wrapped all around their stems.
- 2. Whisk fern**
Psidium complanatum
Height up to 75 cm
This species of whisk fern is usually found hanging from the trunks of trees in tropical regions. It does not have roots or leaves but it has small scales on the stem.
- 3. Horsetail**
Equisetum hyemale
Cone height: 1 cm
The spores of horsetails come from sporangia which are produced at the margin of polygonal structures grouped into a cone. These cones are usually situated at the apex (top) of the plant.
- 4. Field horsetail**
Equisetum arvense
Diameter: 3–5 mm
Section through stem
This section through a young horsetail stem shows how vascular bundles (the round circular sections) extend up through the whole plant stem. These woody strands allow the upward movement of water and sap throughout the plant.
- 5. Field horsetail**
Equisetum arvense
Height: 20–50 cm
The vegetative shoots of field horsetails have sheathed branches and look fern-like. The actual leaves are small, papery and fused into a sheath on the stem. The cones that contain the spores are found on pale, fertile shoots, which grow below the larger green vegetative ones. Field horsetails grow in damp or wet places.
- 6. Sporangium of a club moss**
Sporeangium complanatum
Sporangium length: 2–2.5 mm
Sporangia are very small but bear the sporangia (spore production centres).

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