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Evolution of the Seed-A Review

Teena Agrawal* and Priyanka Danai

Banasthali University, Niwai, India

Corresponding author

Abstract

Origin of the seeds was the first step in the evolution of the fruit of the recent angiosperms. In fruit the seeds are enclosed in the protective covering so that the most important structures for the origin of the species should be protected, heterospory was the first step in the evolution of the seeds. Since as the evolution proceeds out from algae to the higher plants than one can seen the evolution of the heterospory from the lower group to the prominent heterospory in the case of the pteridophytes and the gymnosperms. Seeds are very important part of the life cycles of any plants, since they have the protected embryo and the generation for the propagation of the species, heterospory was the very important aspects of the evolution of the seeds and the development of the plants of the earth.

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Introduction

Evolution is the process in which there are the gradual changes which are generally permanent in nature in the biological entities over successive generations. The life on the earth is the resultant of the evolution of the billions of the years from hot, volcanic eruptions to the primitive oceans. From 6 billion years ago the there was not any life on the earth. There were many volcanic eruptions and earth was like the hot water bowls. Later on as the environment changes it was pretty suitable for the development and the evolution of the life on the earth. Algae like organisms were the first organisms in the pathway of the evolution, since unicellular Blue green algae and the members of the chlorophyaces were the first organisms in the lines of the evolution for the development of the multicellular organisms. Algae are the vast and diverse assemblage in the evolution and development of the variety of the plants on the palnet. Since algae varies from Chlorophyceae to the Rhodophycea, in that series a line of the evolution can be seen and the development of the different organs also can be visible with clear anatomical and the Morphological variations.

Development of the seed in the plant was the very fundamental step in the propagation of the species, since in the seed the embryo are protected in the hard seed coats which provides the means of propagation of the species in the adverse environment (Oliver, 1928).

However the evolution of the seed was not the direct part of the evolution. It takes a long and natural selection of the many species which extinct and survive with more or less modification of the characters and the organs like structures. Heterospory was the first step in the development of the seeds.

Since, in the early algae like organisms, we can observe the clear cut examples of the homosporius kind distribution of the spores. They are distrusted typically in the sporangia which are either on the thallus or they are deep seated in the thallus like structures. However in some members of the rhodophyceae we can observe the heterospory like habit, although suitable examples of the heterospory was seen only in the case of the bryophytes and further taxa (Scott, 1964).

In higher algae the oogamous structures is also the pioneers step in the development of the heterospory. Similarly bryophytes also retain the heterospory in all genera's, first time in the evolution retention of the female oocytes was placed in the bryophytes, this was for the protection of the embryo and for the survival of the species in the competition or the struggle of the species in the evolution, in case of the anthoceros we can seen the examples of the slightly land adaptation but it was only the step towards the giganteous steps for the development of the lands plants on the earth.

In the early Devonian period there have been changes in the sizes of the spores; this was the evolutionary divergence of the many lines which leads to the development f the many microspores and the megaspores of the future aspects of the seeds.

Microspores were more in the number and smaller in the sizes and they retain in the sporangia whereas megaspores were less in the number and they are large in the sizes and they place in the mega sporangia.

Development of the mega gametophytes is also the another step in the development of the seeds, since in these structures the embryo are deep seated and they are protected with the tissue, these step were the crucial step in the evolution of the seed like habit (Thomas, 1913).

The origin of the heterospory also can be seen in the paleobotanical evidences. From the fossil record one can observe that there were very clear cut examples of the widespread heterospory in different members of the group. By the late carboniferous period and in the early devonian period the examples of the heterospory can be seen in the variety of the genera's like *Lycopsida*, *Lepidostrobous*, *Pleuromia*, Lepidocarpon, *Midesmia*. Among them some of the examples of the fossils pterdophytes have approached to the condition of the clear heterospory (Williumson and Scott, 1894).

Spermatophytes are different from all other kinds of the plants in the development of the ovule, it is an enlarge megasporangium having the tissue which nourishes the embryo in the sporangium (Fig. 2). Later on, these ovules turn in to the seeds (Stewart, 1956). Regarding the morphological nature of the ovules a number of the ovules a number of the theories has been proposed among them some of the theories are considered as

a) The axial theory:
b) Sui-generis
c) The foliar theory, it was supported by the Eames (1964).

Fig.1 Origin of seeds

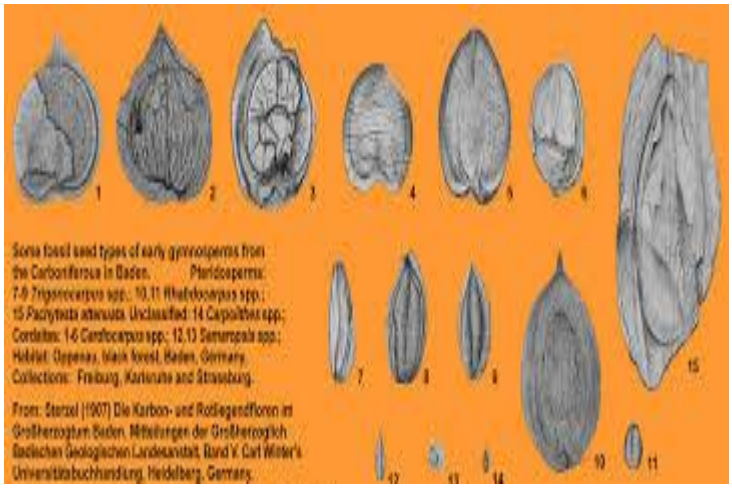


Fig.2 Life cycles of a spermatophytes

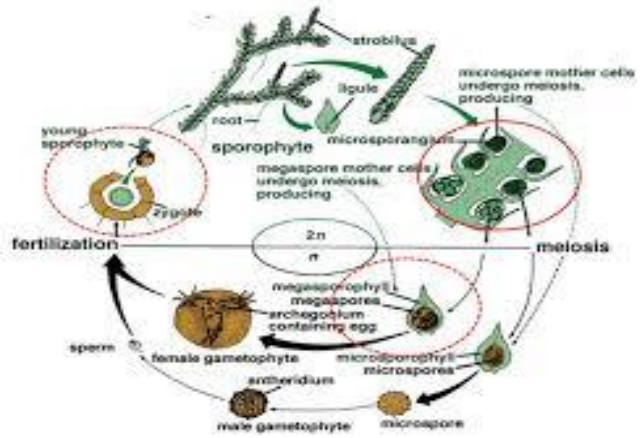
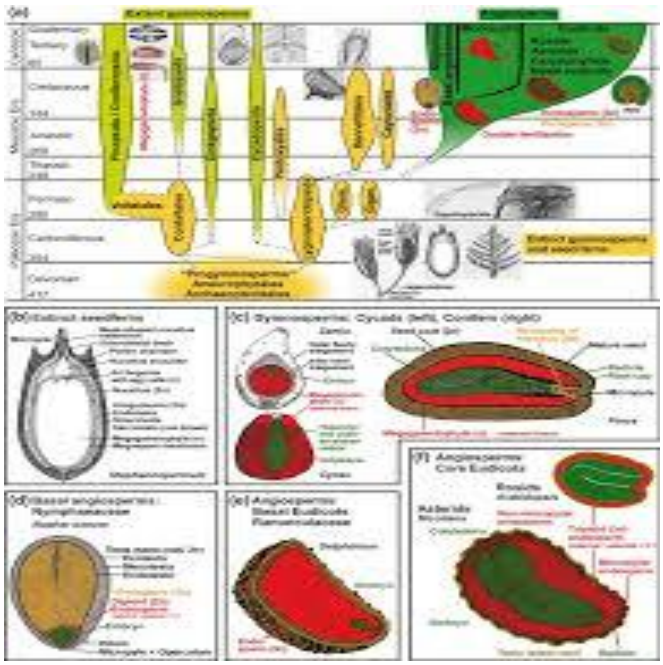


Fig.3 Developments of the seeds in different taxa



According to that among the three foliar two of them are the modified integuments and one of them is the modification of the leaflet which turns in to the nucleus which bears the ovule on it. After the discovery of the ovule *Lagenostoma lomaxii*, by Oliver and Scott (1904) a number of probable theories have been proposed for the explanation of the origin of the ovules and the seeds (Fig. 1). For this Paleozoic description of the ovules has been proposed.

Paleozoic ovules has been classified in to the two categories, one of them is the 1) paltyspermae 2) rediospermae

Among them paltyspermae are the bilaterally symmetrical ovules whereas the rediospermae are the radically symmetrical ovules (Oliver, 1903).

Paleozoic ovules also have been classified also in many ways. One of the most important theories proposed by the Seward (1917), he classified the ovules in to three categories (Fig. 3).

1) Cardiocarplaes
2) Lagenostomales
3) Trigonocarpales

For the origin of the ovules a concept was given, it was the telome concept. This concept was the fusion of the concept of the Andrews (1961), Smith (1959), Long (1960). They all consider the pteridosperm ovules from the terminal ferns megasporangium surrounded by the steriles and the fertile telomes. The following stages explain the step in the evolution of the ovules.

1) Reduction in the number of the megaspores to one.
2) Modification of the apex part of the megaspores in to the pollen bearing chamber device.
3) Surrounding sterile telomes changes in to the integuments of the ovules.
4) Partial fusion of the telomes in the cupule like structures that was later fused in to the seed integuments and provides the protections.

Similarly another modification leads to the formation of the ovules, these lines or the statements are supported by the fossils evidences of the late Devonian and the carboniferous period fossil remains

The statements in the previous discussion clear leads to the facts that pteridospermales lines of the evolution arises in different lines of small cladiastics. The multiple origins of the ovules show that pteridospermales have a number of lines of the ovules evolutions. The origin of the heterospory can be elucidates as the polyphylitic in the origin. However opponents of the group of the polyphyltic origin shows that the origin of the ovule is the monophylietic, there were some common ancestors of the pteridopseramales which leads to the lines of the evolution of the ovules.

However the ovules development was the very significant step in the evolution of the seeds and the development of the species on the planet. A number of the account can be write down in that prospective, since fossils evidences as well as the development evidences supports and provides the examples for the evolution of the seeds and fruit.

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