Example of research paper on evolution and adaptation of plant

Environment, Plants

The transition from aquatic to terrestrial habitat no doubt posed some challenges to plants. They have had to overcome challenges in order to adapt completely to life on land. Some of the challenges that that plants faced by moving from water to land was the problem of water loss. They also had to overcome the challenge of reproduction. Also, terrestrial plants have had to evolve new ways of feeding. Some of these are presented below.

The evolution of plants to terrestrial habitat took place from their ancestors which were algae. Algae had to adapt to living in shallow waters, one that was prone to repeated desiccation. The similarity between algae and plants are found in terms of chloroplast type, cellulose cell wall and the energy storage molecule which was starch. Plants are eukaryotic organisms. They are also multicellular organisms. In terms of reproduction, they exhibit alternation of generation from diploid generations to haploid generations. They also exhibit heteromorphism, which is a diploid generation that is morphologically different from a haploid generation. Plants are also primary producers who make their food through photosynthesis. 1

Living on land was destined to cause some challenges to terrestrial plants which were previously aquatic. The adaptation to terrestrial land has led to the development of complex bodies which are made up of extensively specialized cells which are adapted to the various functions that plant performs. 1

Waxy cuticles were developed to solve the problem of water loss. The waxy cuticle prevented the loss of water from the plants by evaporation. The transformation from aquatic to terrestrial habitat means plants are now permanently exposed to air. Air has varying humidity at different times. This

means that there is danger of water being lost to the atmosphere from the plants. This poses a threat of desiccation to the plants. To counter these problems, plants had to develop a cuticle that keeps the water inside of the plant and prevents it from easily being evaporated to the atmosphere from prolonged exposure to air. 1 Another structure that plants had to develop was the stomata. This is because the cuticle seals all parts of the surface of the plant, preventing both water and air from passing through the plant. The waxy cuticle prevents the diffusion of oxygen and carbon dioxide into and from the plant. However, as living things, plants also have to respire, they gave to undergo carbon fixation in order to take part in photosynthesis. Therefore there has to be a portal through which the air comes in and goes out of the plant. 2

This led to the development of a structure that opens and closes intermittently, the stomata. This allows cabondioxide to go in, and oxygen to come out of the plants.

Also, in the area of reproduction, the sporophyte became the dominant generation. Plants undergo alternation of generation like algae. In algae, which are ancestors of terrestrial plants, the dominant generation was the haploid generation, [the gametophyte]. The trend is reversed in terrestrial plants in which the dominant generation is the diploid generation [the sporophyte].

Also, a challenge with being a terrestrial plant was the problem of access to sunlight. Plants countered this problem by growing tall in order to have extensive access to sunlight through their extensive network of leaves. However, they still have to depend on the soil for their nutrients and access

to water. Vascularisation enabled plants to transport materials from the roots to the leaves and vice versa. 2

The different types of living plants show the adaptation by the varieties of plants that exist today. Bryophytes are non-vascular plants. Because of this, they are short. Their vascularization is not as developed as the one in vascular plants. Pteridophytes are seedless plants, although they are vascular. They still depend on water for fertilization using motile sperm. 3

Seeded plants are the most successful plant groups in the world today. They consist of the gymnosperms and angiosperms. Both of these groups evolved from a common ancestral group which is the progymnosperm. The seed of these seeded plants have evolved via changes to the megagametophyte. This is the reproductive structure that is common to all heterosporous plants. These changes include the elimination of water as a medium through which sperms fertilize eggs. This is done by the evolution of the seed, which distribute the sporophyte. 3 This has conferred on them the advantage that reproduction can take place over a distance and had given them the opportunity to be diverse in various habitats.

The angiosperms have developed a complex relationship with seed dispersers and animal pollinators to make sure that their seeds are dispersed to wide areas. Also gymnosperms have also relied on seed dispersal by other agents and also on wind for the dispersion of their seeds. This has ensured that these plants have offspring in locations different from where they are found.

Cited References

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