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B.Sc HONS Part-III Paper-VI
Topic :- Parthenogenesis.
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Q. Write an essay on parthenogenesis.

Ans. Parthenogenesis is a process is process in which an avum develops without fertilization. In such cases development proceeds under the influence of activation caused by any activating agent other than sperms. However in some cases sperm acts an activating agent but its nucleus does not participate in development. As ovum takesplant in development and therefore parthenogenesis is considered as sexual mode of reproduction.

In rotifers, amiphides, wasps, ants, and some vertebrates domestics turkeys parthenogenesis occurs as normal, then called natural parthenogenesis.

When an unfertilized egg is stimulated by certain artificial agents like heat, cold, ultraviolet rays, hyper or hypotonic salt solution, electric current etc then called artificial parthenogenessis.

Parthenogenesis is of two types on the basis of chromosomes number.

1. Haplodiploidy (Arrhenotoky) : The male develops from unfertilized egg and female develops from fertilized egg then it is called haplodiploidy. As reslut the number of chromosomes is haploid in male while diploid number of chromosomes in female. In such cases ovum forms normally by Oogenesis but in sperms formation meiosis fails to occur. In this only meiotic division occurs in primary spermatocyle resulting formation of two heploid sperms only in place of four. This type of parthenogenesis occurs in many insects such as wasps, ants, honey bees and also insome mites and rotifers.

Honey bee is social colonial insect. In honey bees colony there are three types of bees, queen bee, worrerssdones queen been and workers are diploid but drones are fertile haploid male. Queen bee & workers develop from fertilized ova and drones developed by unfertilized ova.

2. Diploid parthenogenesis (or thelytoky) : In some cases eggs are diploid in diploid parthenogenesis. It occurs due to non occurrence or incomplete occurrence of meiotic division during Oogenesis. In such type of parthenogenesis diploid male or female may be but mainly found in diploid female. It in diploid egg fertilisation takes place then individual will be triploid.

Diploid parthenogenesis is categorized into two types :

(a) Obligatory parthenogenesis : When parthenogenesis is the only mode of reproduction then it is called obligatory or complete or toal parthenogenesis. Only female individuals are found is obligation parthenogenesis. If in some males obligatory parthenogenesis occur then these males are genetically non functional.

In case of complete absence of meiosis it is termed apomictic thelytoky.

When meosis occurs it reduces the number of chromosomes to half. But fusion of ovum whith polar body or divided nucleus resumes its number to diploid, then it is termed automeiotic thelytoky.

(b) Cyclic parthenogenesis : When parthenogenesis alternates with the sexual mode of reproduction then it is termed cyclic parthenogenesis. There is variation in mode of alternations also.

(i) Regular alternation between parthenogenetic and sexual generations occur in gall flies (cynipidae).

(ii) One sexual generation is produced after several generations of parthenogenesis such as Aphides, Daphrides & rotifers.

(iii) It alternates irregularly in some cases.

Significance of parthenogenesis :

(i) Control of sex ration – queen bee regulates sex ratio by controlling fertilization of eggs.

(ii) Rapid breeding – It serves as rapid mode of breeding.

(iii) Rotation of hybridization – Problem of occurrence of normal meiosis in hybrides is removed by parthenogenesis.

(iv) Relation ot polyploidy – Occurrence of normal meiosis is not possible in triploid (3n) and pentaploid (5n). This problem is removed by adopting parthenogenesis.

(v) Variation – Total parthenogenesis eleminates the chance of recombination and exchange of genes. It creates problem in adapting the animals in new environment. But adopting of cyclic parthenogenes removes this problem.

Disadvantages : As total parthenogenesis elminates the chances of recombination and exchange of genes. It creates problem in adapting the animal in new environment Due to this survival of these become impossible