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Infusions and Their Pathogenic Significance

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Abstract

This paper explores various disciplines within zoology, emphasizing the interconnectedness of zoology with other biological sciences. Focusing on the evolution of unicellular animals, it investigates the origins of Sporales and Khivchins, with a specific emphasis on infusoria, including their reproductive strategies. The study highlights conjugation and autogamy processes, offering insights into the diversity and evolution of these organisms.

Keywords: *Zoology, Unicellular Animals, Infusoria, Reproductive Strategies.*

1. Introduction

Zoology studies the structure, lifestyle, distribution and relationship of animals with their environment, as well as their private and historical development.

Zoology is a complex science that includes several disciplines. Systematics studies the hierarchical (subordination) relations between different systematic groups based on the diversity of species, their mutual similarity or difference from each other.

Morphology - studies the external structure of animals.

Anatomy - studies the internal structure.

Comparative evolutionary morphology examines the structure and historical development of animals belonging to different systematic groups.

Embryology is the embryonic development (ontogeny) of animals, and phylogenetics is the evolution of the animal kingdom.

Ecology is a science that studies the relationship of animals with the external environment.

Zoology is inextricably linked with other biological sciences, as well as medicine, veterinary medicine and agriculture. Many departments of zoology are part of such complex sciences as parasitology, hydrobiology, epizootology, epidemiology. The study of human and animal parasites has gained great importance for medical and veterinary parasitology.

The achievements of zoology are of great importance in the development of the scientific-materialistic outlook on nature. The scientific evidence collected by the science of zoology served as the basis for the creation of the evolutionary theory of the development of the organic world. Man is also a conscious being who emerged from the animal world as a result of a long historical development and rose to the highest level of evolutionary development.

2. Materials And Methods

Unicellular animals are truly specialized organoids and eukaryotic organisms with a nucleus. In this respect, they differ from prokaryotes. Therefore, they were caused by the evolution of the organic world, which lasted for a long time before the appearance of the cell.

In the evolution of the animal world, single-celled animals are the first to appear. In the process of evolution, the structure of these animals became more and more complex.

The origin of the Sporales is also related to the Khivchins. This is proved by the fact that the gametes of coccidials and blood spores are similar to those of real chywins.

The ancient colony of Khivchinli originated from multicellular organisms. The class of algae is phylogenetically related to algae. Phytomonads, shielded hyacinths, euglenas, and chrysomonads can be included at the same time in single-celled animals and benthic algae. In the course of the evolution of plants, similar one-celled algae emerged from other algae with a more complex structure. Multicellular animals originated from heterotroph feeding colonial animals.

There are more than 8000 types of infusoria, and their size is different, that is, most of them are 30-40 µm, some are 100-300 µm, and some are 1-3 mm. The shape of the body is also different, but most of them are long, fluffy or bald due to their adaptation to living life in hiding. The cilia are different in different infusoria, that is, they are of equal length and in the same plane, and close cilia are connected to each other. As a result, it can form a strong locomotor, and in some cases, it can be located in a ball. Infusoria, in turn, two large nuclei are called vegetative macronucleus, and the smaller one is called generative micronucleus. The genetic reproduction of infusoria is specially called conjugation, this process takes place as a result of the proximity of two infusoria and the exchange of nuclei. Cytoplasm of infusoria consists of two layers, i.e. ectoplasm and endoplasm. The ectoplasm is covered with a pellicle on the surface and consists of 2 layers. Each layer consists of two membranes. When an infusoria cilia is viewed under an electron microscope, it is possible to observe fibrils arranged in 9 pairs on 2 edges in the center. In simple infusoria, the mouth opening is located on the front side of the body. In most infusoria, the mouth opening is located on the side of the body at the bottom of a pre-oral cavity called the peristome. A subclass of ciliates. They are simple in structure, they feed on bacteria, organic particles and small algae, and most species are free-living. They include many species, including the infusoria slipper. Order Hymenostomes. The infusoria paramestia (shoe) is 0.25-0.35 mm in size, has a round cross-section, and travels 8-9 times the length of its body in one second. The outer surface is pellicle and contains cilia. Each of the cilia has a basal body. Also, the trichocysts, which perform a protective function, appear under the pellicle in the form of rods, and burst out of the holes in the pellicle when exposed. There are two nuclei in the endoplasm of the shoe. The macronucleus is involved in metabolism. Micronucleus stores sex and genetic chromosomes. Asexual reproduction of infusoria is by transverse division into two, i.e. first micronucleus, then macronucleus and protoplasm are also divided into two transversely. If the temperature and nutrients are sufficient, each infusoria divides 2 times to form 4 infusoria. Then they reproduce sexually, i.e. conjugation. As a result of the convergence of the sides of the peristome in both infusoria and the melting of the pellicle, a protoplasmic bridge is formed, and the macronucleus is divided into small pieces and absorbed, 3 of the nuclei formed by the 2-fold mitotic division of the micronucleus are absorbed. The remaining one, in turn, is divided by 2, so one is stationary, and one is migratory. After the exchange of nuclei between them, the fusion of new nuclei with another nucleus is completed, that is, the formation of a synkaryon nucleus. Later, as a result of the resulting nucleus dividing 3 times, 4 out of 8 nuclei are micronuclei and the remaining 4 are macronuclei. A subclass of spiral ciliates. This, in turn, is divided into abdominal ciliates, less ciliates, various ciliates. Abdominal ciliates live in fresh waters and in the sea. The cilia on the abdomen are united. Different ciliates are very large compared to others. All eyelashes except around the mouth count the same. And those with few cilia have little known as eyelashes. Most of them are found in the sea. Round ciliates, on the other hand, are sedentary, bacteria food. Around the mouth, there are cilia in 3 rows. They are divided into 2 categories: nomadic and sedentary.

3. Results and Discussion

Infusoria reproduce in two ways, asexually and sexually. A genetic reproduction is carried out by the transverse division of the body. For this, first of all, chromosomes are formed inside the macronucleus and their number doubles, but before the nucleus divides, the chromosomes become thin again and become invisible. Only after that, the macronucleus is slightly elongated and divided into two. At the same time, the micronucleus is divided into two by mitosis. During the division of the nuclei, a transversely thinned area begins to appear in the middle of the body of the infusoria. One macronucleus and one macronucleus are transferred to both future young individuals before the division of the body into two. Organoids are also divided into two parts. After the young individuals are separated from each other, they have missing body parts, including cilia, mouth, throat, and some missing organoids and appendages. Some infusoria are first wrapped in a cyst for asexual reproduction, and 4, 8, sometimes more young, smaller individuals are formed inside it by palintomy. Young, small individuals come out of the cyst, feed, grow and wrap up in the cyst and divide again.

In some groups of infusoria (sucking infusoria) budding method of asexual reproduction is also found. There are two types of budding. One of them is simple or monotomous budding, in which a daughter bud smaller than the mother body is formed and separated.

In such reproduction, the infusoria seems to be divided into two. In the second type of budding, several (4-12) buds appear in the body of the mother infusoria, and after they take the form of an infusoria (mother), they all separate and spread at the same time. Such budding is clearly expressed in the species of Ephelota gemmipara from the absorbent infusoria.

In infusoria, reproduction by asexual division is repeated at different time intervals. At normal temperature and if there are enough food products, the shoe infusoria is divided into two once every 14-16 hours.

Some small infusoria divide 2-3 times a day, while Stentor (trumpet) divides asexually 2-3 times a week. After several repetitions of asexual division, they proceed to sexual reproduction. But sometimes changes in environmental factors cause the beginning of the process of sexual reproduction. Such factors can be motivated, for example, by a sharp decrease in food products in the water basin. Sexual reproduction of infusoria is carried out by conjugation. Conjugation occurs only between compatible individuals, and meiosis and the exchange of nuclei between individuals ensure that the genotypes of conjugants are different.

The body of infusoria is covered with cilia and has a large and small nucleus. Digestive and excretory organoids are more complex than other unicellular organisms. Infusoria were found for the first time in hay bales. The word "infusoria" also means "hay-feeding animals" in Latin. We will study infusoria on the example of a tufelka. The tufelka can be found in water bodies with a lot of plant remains. Its length is 0.1–0.3 mm, and the shape of its body resembles the bottom of a shoe. That's why this animal is called a shoe. The surface of the body is covered with many eyelashes. Due to the vibration of the cilia, the shoe floats forward with the blunt side.

The tufelka feeds on bacteria. On the side of the body, there is a long groove-like cavity, at the bottom of which there is a "mouth" hole. The mouth opens to the larynx. As a result of the vibration of the cilia located around the pit, food accumulates at the bottom of the larynx and forms a digestive vacuole. The vacuole breaks off from the pharynx and falls into the cytoplasm. Vacuoles circulate around the body of the shoe with the flow of cytoplasm and digest the food. The remains of undigested food are expelled into the water through a hole on the back of the body.

Two contractile vacuoles of the shoe are located on the anterior and posterior sides. They alternately shrink. The surplus of water and unnecessary products formed in the metabolism are collected from the cytoplasm in vacuoles and are expelled from them. Oxygen enters the shoe cytoplasm together with water.

The conjugation process takes place in the following scheme:

1. Two compatible infusoria are united by their peristomal sides.

2. The pellicle in the place where they are united (touched) dissolves, and a cytoplasmic bridge is formed between the con-yugants. In both infusoria, the macronucleus dissolves, and the micronuclei divide twice by mitosis, each of which produces 4 nuclei.

3. 3 of the micronuclei in the conjugants melt, and the remaining 1 is divided once again by mitosis to form 2 pronuclei. One of them is a female (stable) nucleus, and the other 2 is a male (mobile) nucleus. Male nuclei are exchanged through the cytoplasmic bridge between conjugants. Cytoplasm and other substances are also partially exchanged.

4. Male nuclei received with the female nucleus merge to form a synkaryon. This completes the exchange of infusoria with their genetic information (hereditary characters).

5. Spouses are separated from each other. The synkaryon divides 3 times in a row by meiosis and forms 8 nuclei. 4 of them become macronuclei, 3 of the remaining 4 melt and 1 forms a micronucleus.

6. The body of the infusoria is divided into 2. In this case, the micronucleus is also divided into two by mitosis. As a result, each divided young infusoria will have 2 macronuclei and 1 micronucleus.

7. Young infusoria are again divided into 2 by mitosis. In this process, the macronucleus does not divide, but the micronucleus is divided into 2 by mitosis.

4. Conclusion

As a result, dividing young infusoria will have 1 macronucleus and 1 micronucleus. Thus, after each infusoria involved in the conjugation eventually separates, it forms 4 female individuals. But long-term asexual reproduction in infusoria can reduce their vitality and weaken them, leading to the process of "depression". To avoid such situations, infusoria undergo a process similar to sexual reproduction. This process is called autogamy and it takes place as follows:

1. The process begins with the dissolution of the macronucleus. The micronucleus divides successively and forms 8 nuclei with haploid chromosomes. 6 of them will melt.

2. The remaining two nuclei fuse together to form a diploid chromosomal synkaryon. 3. Synkaryon divides two times and forms four nuclei. Two of them become macronuclei and two become micronuclei.

4. The infusoria is divided into two, and one macronucleus and one micronucleus are transferred to each young individual.

More than 8000 species of infusoria are known. The type of infusoria is divided into 2 classes: ciliated and sucking infusoria. And the class of ciliated infusoria is further divided into subclasses of equal ciliates, circular ciliates and spiral ciliates.

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