

ANNOTATION

of the thesis on competition for the degree of doctor of philosophy (PhD)
on specialty «6D060700 – Biology»

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Functional morphology of the locomotor apparatus of some certain species of trematodes

The general description of the work. The thesis is dedicated to the research of the morphofunctional peculiarities of the structure and spatial organization of the muscular apparatus of some representatives of the class Trematoda, the phylum of Plathelminthes.

Actuality of the research subject. The representatives of the parasitic classes of the phylum of Plathelminthes belong to one of the numerous taxons of animal organisms. The researchers in the spheres of biology, ecology, and systematics develop an interest to study of flatworms. The class of Trematoda is one of the classes of the flatworms, which according to the modern data numbers from 15 to 30 thousand of species (Kurochkin, 1984, 1987).

The class Trematoda includes the parasitic flatworms, possessing the unique in their difficulty life cycles, connected with the alternations of generations and the change of host animals (vertebrates as well as invertebrates). Particularly, the development cycles of the trematodes, for which water birds serve as the primary or the bridging host, are very diverse and cannot be depicted in a single scheme. Each development stage of the trematodes is characterized by their own morphological, biological and ecological peculiarities. Therefore they are the objects of numerous researches.

All species of the trematodes in the stage of adult specimens are endoparasites of both people and vertebrates, which, parasitizing, cause the different kinds of trematode infections. These diseases do the undisputable harm to health of people as well as to health of the economically important animal species. The trematodes have wide geographical distribution; both species of «huge» (a meter and more) and small, reaching 1-3 mm, sizes are met among them. According to the information of the researchers, from 5 to 15 new species of the flukes are discovered for science annually.

To present day a vast number of works, including the works of foreign authors, dedicated to the different aspects of study of the trematodes, exist. Attention of the researchers to the issues of detailed study of the life cycles of the trematodes, their fauna and biology does not diminish.

The special directions of the researches are those connected with physiology, genetics, biochemistry, immunology, histology of organs and tissues, the research of functional morphology of the flukes.

Use of the methods of functional morphology in parasitology and trematodology, in particular, lets us to reveal and comprehend the adaptation mechanisms of trematodes to existence in the conditions of the concrete organs of

the host. Only such approach can provide the data about adaptation of the concrete cells, tissues and organs of helminthes to endoparasitic existence. The ultra structural and histological data in normal state (without influence of different preparations when studying helminthes) form the basis for selective screening of anthelminthics.

An interest to study of fine organization is developed by the researchers of such different countries as Great Britain, the USA, Japan, Canada, China, India, Russia and etc., for example, such authors as Erasmus D. (1972), Dorsey C., Cousin C., Lewis F., Stirewalt M. (2002), Fujiino T., Ichii Y., Choi D. (1979 a), Fujiino T., Ichii Y., Choi D. (1979 b), Fujiino T., Fried B., Hosier D. (1994); Halton D., Maule A. (2004), Davidov, Kuperman (1993) and etc.

To present day attention has not been sufficiently paid to study of the structure and spatial organization of the muscular system of the trematodes. Only general principles of structure are well-known, and they are described in the works of classic authors Dogel V.A. (1947, 1981) and Ginecinskaya T.A. (1968). Recently works of Yastrebov V.M. (1997a, 1997b, 1997), Yastrebov V.M., Yastrebov I.V., Belov N.A. (2004), Yastrebov V.M., Yastrebova I.V. (2014) appeared. These works represent analytical comprehension and systematization of the topographic researches on anatomy and morphology of the muscular system of a very small group of the flukes, not exceeding 30 species. Undoubtedly, the works of these authors constitute an example of the complex approach to study of the motor apparatus of the trematodes. The conclusions on topography are built upon the data of light optical histological methods.

A large amount of the works of foreign authors Daniel B., Preston T., Sothgate V. (1992), Bachia D., Avelar L., Vigorosi F., Coli D., Mortara R. (2006) is dedicated to study and systematization of the muscular system of the larval stages of the trematodes, which frequently are parasites of different invertebrate and vertebrate animals.

To present day the issues on ultra structure of the muscular elements and the muscular system as a whole remain insufficiently explored.

The purpose of the work: To study the peculiarities of the locomotor apparatus of the trematodes with different localization from different systematic groups.

To attain the purpose the following problems were solved:

1. To study the ultra structural and morphological peculiarities of the muscular system of body of the trematodes from the different systematic groups.
2. To define the ultra structural peculiarities of the muscular cells.
3. To study ultra structure of the sub cellular elements, the constituent part of a muscular cell of the skin-muscular sac of trematodes.
4. To define the peculiarities of morphology and the functions of the muscular elements in providing of adaptations to the conditions in the localization organ.

The methods of research. The incomplete helminthological dissection according to Skryabin was executed. Specific belonging of the adult specimens was defined according to generally accepted determinants. Examination of ultra

structure was conducted by the method of transmission electron microscopy. The ultra thin sections were prepared according to the method of B.Weekly. The specimens were prepared by the generally accepted method of E.Reynolds. Colouring of the sections was conducted according to the method of Ehrlich by hematoxylin with addition of eosin.

The object of research. To study the ultra structural peculiarities of the muscular system the trematodes from the different systematic groups and the places of localization in the host were taken.

Scientific novelty. For the first time the ultra structural electron microscopic researches of the elements of the muscular system of the skin-muscular sac of the trematodes from the different systematic groups having different localization in the organs of the hosts (endoecology) were conducted.

For the first time the peculiarities of ultra structural organization of the elements of the motor apparatus of body of the trematodes related to two suborders, three families, and four species were defined.

Theoretical and practical significance of work. The results of the thesis research are concluded in the possibility of use of the thesis materials as a supplement when reading courses «Zoology of invertebrates», when training bachelors and masters on specialty «Biology», «Veterinary medicine», «General medicine», when conducting seminar and practical lessons on courses «Histology», «Cytology», and «Embryology», «Parasitology», and when reading courses «General parasitology» and «Functional morphological invertebrates».

Practical significance of the data, obtained in the process of preparation of the thesis, is connected with use at selective screening of the anthelmintics affecting on the elements of the muscular system.

The key provisions pronounced on defense.

1. The organizational peculiarities of the structural elements of the muscular apparatus of the skin-muscular sac of the trematodes and their determination by the endoecological peculiarities.

2. The characteristic for systematic groups of trematodes structural organization of the muscular apparatus is connected with the adaptation changes to the conditions of localization organs.

3. The ultra structural peculiarities of the muscles of the skin-muscular sac of trematodes are formed on the basis of the modification abilities of the nonstriated muscular cell and tissue.

On the basis of the conducted research and the analysis of results of the obtained data the following conclusions were made:

1. The ultra structural peculiarities of all components of the motor apparatus of the skin-muscular sac reflect their functional abilities.

2. The modification peculiarities of the muscular elements of the different muscular layers appeared and were formed on the basis of structural lability and abilities of the nonstriated muscular system.

3. Depending on belonging to the concrete muscular layers of body of the trematodes and their executed functions the nonstriated muscular cells obtain the characteristic ultra structural peculiarities.

4. The ultra structural peculiarity of distribution of the sub cellular elements in the muscular cells of the trematodes consists in their relation to peripheral parts, and the bulk of a cell is occupied with fibrillary elements.

5. The ultra structural peculiarities of the basal lamina of tegument are connected with and depend on the relation of the helminthes to the conditions of the concrete organs of the host and do not depend on their taxonomic position.

6. The peculiarities of structural interaction of the basal lamina of tegument and the muscular layers, which become evident in the process of electron microscopic research, can characterize their functional interactions.

7. Functional morphology of the muscular layers of body of the trematodes reveals their dependence on the systematic position of helminthes only in presence or absence of the separate types of parenchymal muscles. At the trematodes with undifferentiated body (*P. cuneatus*, *S. rarus*, *T. cucumerinum*) the parenchymal muscles are present and their maturity depends on the localization organ of the trematodes, and at the trematodes with differentiated body (*D. huronense*) the parenchymal muscles of the second region of body, beyond the Brandes organ, are very poorly represented.

Connection with the plan of basic scientific works. The research on the thesis was conducted within the framework of the «International scientific and technical programs and projects for 2013-2015» on the topic: «Study of morphological and functional characteristics of tissue and cellular mechanisms of adaptations of parasitic flatworms of the class of trematodes» (Registration number 0113RK01135, inventory number 0214RK01298).

Personal contribution of the author. The author of the work participated in selection of the conception and the research object, definition of the work purpose, statement of the research problems, and in addition to this in conduction of the experiments, gathering and analysis of the obtained data and writing of the thesis.

Approbation. The fundamental positions and results of the thesis were reported and presented on international and republican scientific conferences:

- The X International scientifically practical conference «Advanced scientific development – 2014», (Prague, 2014);

- The XI International scientifically practical conference «Advanced science – 2015» (Sheffield, Great Britain, 2015);

- The XIV and XIIV annual scientific conferences with international participation «Theory and practice of struggle against parasitic diseases» (Federal State Budget Institution «All-Russian Scientific Research Institute of Fundamental and Applied Parasitology of Animals and Plants named after K.I. Skryabin», Moscow, 2015-2016);

- The International scientifically practical conference «VII Toraigyrov reading. Quality of life in Pavlodar region. State and perspectives» (Pavlodar, 2015).

In addition to this, the work was discussed on scientific seminars and semester reports of the chair «Biology and ecology» of the PSU named after S.Toraigyrov.

The publications. The core results of the thesis were published in 11 scientific publications, including 3 articles in the scientific issues recommended by the Committee on control in the sphere of education and science of the Republic of Kazakhstan; 2 articles in international scientific issues, possessing the nonzero impact-factor in the informational database of Scopus company, 5 – in the materials of foreign scientific conferences, and 1 – in the materials of the international scientifically practical conference of the Republic of Kazakhstan.

Structure. The thesis is stated on 112 pages of typewritten text and is composed of definitions, designations and abbreviations, an introduction, four chapters (Review of literature, Material and methods, Results, Discussion), a conclusion and the list of references consisting of 214 titles of native and foreign authors. The text is illustrated with 3 tables and 42 pictures.