

**UNIVERSITATEA DE ȘTIINȚE AGRICOLE ȘI MEDICINĂ VETERINARĂ
CLUJ-NAPOCA**



Școala Doctorală de Medicină Veterinară



ABSTRACT

HABILITATION THESIS

**SCIENTIFIC CONTRIBUTIONS TO THE STUDY OF
PROTOTHECOSIS IN ANIMALS AND HUMANS**

Domain: Veterinary Medicine

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ABSTRACT

This habilitation thesis aims to present the professional and scientific results obtained in my activity in the academic and research field after obtaining the doctorate in veterinary medicine so far, as well as the development plan of the future university professional career.

The habilitation thesis entitled "Scientific contributions in the study of protothecosis in animals and humans" is intended to present the most important personal achievements in the field of scientific research, containing the recent results of the field of study. The paper is based on my professional activity carried out within the University of Agricultural Sciences and Veterinary Medicine, the Faculty of Veterinary Medicine in Cluj-Napoca and the Veterinary Sanitary and Food Safety Directorate, in collaboration with colleagues from the country and abroad.

The publishing and scientific research activity after defending the doctoral thesis (1998-2002) can be summarized as follows:

- Coordinating three research contracts as a grant director;
- Participation as a member of the research team in a number of 10 grants;
- Elaboration of a number of 4 books published at national publishing houses (1 as single author, 1 as first author, 2 as co-author);
- Elaboration of a number of 6 textbooks (1 as single author, 1 as first author, 4 as co-author);
- Elaboration of 2 practical work guides (1 as first author, 1 as co-author);
- 2 publications are completed and are being edited (Protothecosis in animals and humans, Practicum of special virology) both to be published during 2023/2024);
- 14 ISI articles with IF (of which 3 as first author, 1 as corresponding author and 8 as co-author);
- 96 BDI articles (of which 33 as first author)

Natural infection in animals. The disease caused by algae in the genus *Prototheca* is known as "protothecosis". The infection has an evolution, most often chronic, except for cows in which some forms of mastitis have an acute evolutionary phase. There are various localizations, more frequently cutaneous and less often systemic or generalized forms. However, it is estimated that the disease is rare, which may be due to the fact that the prototypes are little known. It has long been considered that only *P. zopfii* and *P. wickerhamii* species show pathogenic capacity, but more recent data also include *P. blaschkaea* and *P. stagnora* species. Infections, both in humans and animals, can also be caused by *Chlorella* green algae and must be differentiated from those caused by *Prototheca*. Infections with *Chlorella* species are reported in this sense: lymphadenitis in cows, skin infection in humans, disseminated infection in rams.

Natural infection in humans. The first report of infection in humans is made by Ashford, Ciferri and Dalman (1930), who isolated a strain from the intestinal contents of two patients affected by "sprue", naming the isolated strain *Prototheca portoricensis* (*P. ciferri*). The first case, well documented, was described in Sierra Leone, at a rice cultivator, from which a strain of skin lesion was isolated, which was morphologically and culturally characterized and was named *Prototheca segbwema*. It has thus been shown that green algae are capable of causing disease in humans, cases being subsequently described in many countries on all continents.

Experimental infection. In order to clarify the pathogenic capacity of *Prototheca* strains, several researchers have performed experimental infections on laboratory animals (mice, guinea pigs, rabbits) or on animals of economic interest (cows and sheep).

To confirm the diagnosis, secretions from open lesions, tissue samples taken by biopsy, diarrheal stool samples, bursitis fluid, tenosynovitis, milk (cows, sheep, goats), eye secretions and CSF (especially in dogs) are sent to laboratories. In slaughtered or dead animals, fragments of organs with granulomatous lesions, regional lymph nodes, intestinal wall, fragments of mammary gland, brain or other tissues in which granulomatous lesions are found.

The isolation of prototypes on culture media is the most important diagnostic test. Direct seeding of samples for isolation is often negative due to their small number in the sample. For this reason, various enrichment processes have been imagined, targeting primarily milk, manure and other samples taken from the outside environment. The stated purpose of the proceedings is to increase the number of prototypes per unit volume, in order to increase the chances of isolation.

Recommendations for the prevention of mastitis with *Prototheca*:

- clearly identifying the predisposing causes, as the epidemiologic sources still remain poorly defined, and attempts to isolate microorganisms from the environment are often unsuccessful;
- avoidance of intensive and prolonged treatments with antibiotics, which favors the colonization of prostheses, the installation of the phenomenon of antibiotic resistance and therapeutic inefficiency;
- herd removal of animals with clinical and subclinical mastitis diagnosed with *Prototheca*, as they are carriers and eliminators;
- control of milk and faeces in infected herds to detect those with subclinical forms, which are carriers and eliminators for more than 100 days;
- radical improvement of the hygiene conditions in the shelters, of the hygiene of the milking and of the milking devices, as well as of the various milk collection containers.