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**PARASITIC INFESTATIONS IN COMMERCIAL FISH SPECIES
OF THE UKRAINIAN PART OF THE DANUBE DELTA:
EPIZOOTIC AND SANITARY SIGNIFICANCE**

**ПАРАЗИТАРНІ ІНВАЗІЇ У ПРОМИСЛОВИХ ВИДАХ РИБ
УКРАЇНСЬКОЇ ЧАСТИНИ ДЕЛЬТИ ДУНАЮ:
ЕПІЗООТИЧНЕ ТА САНІТАРНЕ ЗНАЧЕННЯ**

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The Danube River is one of the largest and most important transnational river systems in Europe, playing a decisive role in maintaining ecological balance, preserving biodiversity, and supporting the development of fisheries. The Ukrainian part of the Danube Delta, owing to its favorable hydrological and hydrochemical conditions, is distinguished by a rich ichthyofaunal composition, with commercial fish species accounting for a significant share. At the same time, modern fish populations of the region are subject to numerous natural and anthropogenic factors that adversely affect their condition [1]. These include climate change, anthropogenic pressure, environmental pollution, and parasitic infestations.

Fish parasites are an integral component of aquatic ecosystems, forming a complex system of interactions between hosts and their environment. They not only influence the physiological state and productivity of fish, but also serve as bioindicators, reflecting the quality of the aquatic environment as well as the ecological conditions of feeding and migration [2]. The study of parasite communities in ichthyofauna has become especially relevant under conditions of intensive industrial and recreational use of aquatic resources in the Ukrainian stretch of the Danube. Consequently, parasitological research holds not only scientific but also applied significance for fisheries, veterinary and sanitary control, and public health.

Parasitological studies were conducted in the Vilkovo area between March 2022 and May 2023. The material consisted of samples from the catches of commercial fishermen, ensuring representativeness of the studied

specimens. The research included two stages: organoleptic assessment and parasitological inspection.

The organoleptic assessment involved determining morphological and physiological indicators: external appearance, coloration, odor, condition of the skin, scales, fins, gill lamellae, eyes, internal organs, and muscle tissue. Each month, 35 specimens of Danube herring (*Alosa immaculata*) were collected. For comparison, occasional specimens of crucian carp (*Carassius* sp.) were also included in the study.

Parasitological inspections were carried out by random sampling, selecting 25 specimens from each batch of fish. Particular attention was given to the analysis of muscle tissue and internal organs. Classical microscopy methods were used, including verification of parasite viability by physical stimulation (needle pricking) and visual diagnosis under a binocular magnifier.

The organoleptic evaluation confirmed that most individuals of Danube herring were characterized by species-typical indicators: natural coloration, specific odor, elastic skin, and transparent corneas. Occasional crucian carp specimens in the samples showed deviations from these characteristics and exhibited signs of pathological changes.

Parasitological inspections revealed the following pathologies:

1. **Crucian carp (*Carassius* sp.)**. Throughout the study period, 5 to 10 infected individuals per sample were recorded. The main pathological changes manifested as white nodules on the gill covers and fins. Microscopic analysis confirmed the diagnosis – ichthyophthiriosis (*Ichthyophthirius multifiliis*).

Table 1

Prevalence of *Ichthyophthirius multifiliis* in crucian carp (*Carassius* sp.)

Month / Year	Number of examined specimens	Infected crucian carp (ind.)	Prevalence (%)
March 2022	25	5	20.0
June 2022	25	6	24.0
September 2022	25	7	28.0
December 2022	25	8	32.0
March 2023	25	10	40.0
May 2023	25	7	28.0

2. Danube herring (*Alosa immaculata*) Larvae and adult forms of nematodes of the genus *Anisakis simplex* were found in the tissues and internal organs of herring [3]. The highest number of infestations was recorded in March 2023, when several larvae were found in eight specimens at the same time.

Table 2

**Cases of *Anisakis simplex* detection in Danube herring
(*Alosa immaculata*)**

Month / Year	Number of examined specimens	Individuals with <i>Anisakis simplex</i>	Maximum number of larvae per fish	Localization
March 2022	35	2	1–2	Stomach, intestine
July 2022	35	3	1–3	Stomach, intestine
October 2022	35	4	2–3	Stomach, intestine
March 2023	35	8	3–5	Stomach, intestine
May 2023	35	5	2–4	Stomach, intestine

The obtained results indicate that the parasitic burden in certain fish species of the Ukrainian section of the Danube is stable and tends to intensify during the spring period. Ichthyophthiriosis in crucian carp reduces its physiological state and market quality, while also posing a potential threat to aquaculture farms. In the case of the Danube herring, the detection of *Anisakis simplex* has important sanitary and epidemiological significance. Although muscle tissue was not affected, compliance with veterinary and sanitary regulations remains essential, particularly for fish consumed without heat treatment.

In summary, crucian carp (*Carassius* sp.) is systematically affected by the causative agent of ichthyophthiriosis, which reduces its commercial value and presents a potential risk to fisheries. In Danube shad (*Alosa immaculata*), larvae of *Anisakis simplex* were detected, but the invasion did not extend to muscle tissue, thereby lowering consumer risks provided that sanitary regulations are observed. The established parasitic infestations highlight the need for regular monitoring of the ichthyofauna of the Ukrainian section of the Danube in order to control epizootic processes, ensure the safety of fish products, and preserve biodiversity.

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