

Freshwater Fish-Borne Zoonotic Helminths

Vasco Menconi

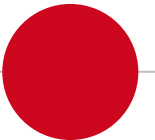
Istituto Zooprofilattico Sperimentale delle Venezie – Research and International Cooperation Office

Webinar on Aquatic Animal Health Strengthening National Capacities for Sustainable Aquaculture - 2 September 2026

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Introduction



As the **global population** continues to grow, **fish consumption** has increased accordingly, therefore, **fisheries** and **aquaculture production** have experienced substantial expansion on a global scale.

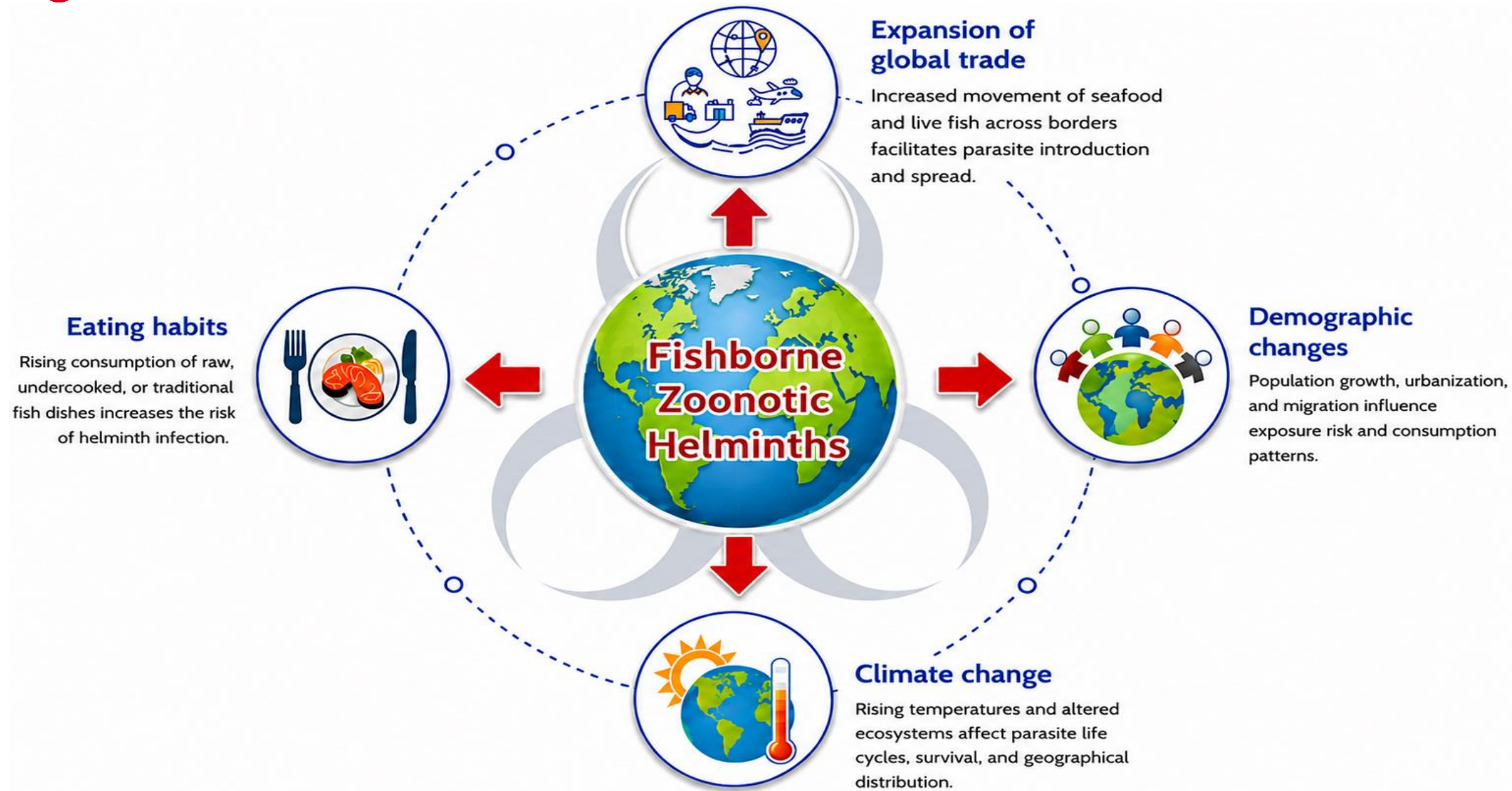


THEY ARE NOT RISK-FREE!



In recent years fishborne zoonotic helminth has called the attention of the **scientific community** and **food safety authorities**.

Factors influencing the prevalence and spread of parasites



● Freshwater Fish-Borne Zoonotic Helminths

Growing interest in fish-borne zoonotic parasites among the scientific community and public health authorities has led to the publication of numerous articles and technical documents



EFSA Journal 2010; 8(4):1543

SCIENTIFIC OPINION

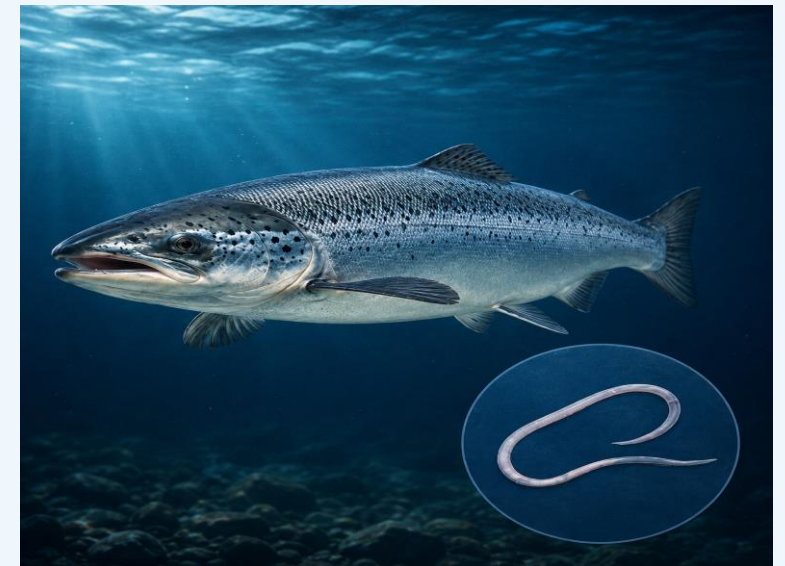
Scientific Opinion on risk assessment of parasites in fishery products¹

EFSA Panel on Biological Hazards (BIOHAZ)^{2,3}

European Food Safety Authority (EFSA), Parma, Italy

EFSA Scientific Opinion – 2010

Assess the risk posed by parasites transmitted through fishery products.



EFSA 2010 vs 2024: evolution of the assessment of fish-borne zoonotic parasites

2010 Baseline opinion

- Covered mainly marine than freshwater fishery products
- Wild-caught freshwater fish were considered at risk when eaten raw or almost raw
- Farmed freshwater fish were discussed, but evidence was limited

2024 Re-evaluation of certain aspects of the EFSA Scientific Opinion of April 2010

- Reassessed relevant farmed finfish using post-2010 surveillance data
- Dedicated assessment of zoonotic parasites in wild-caught freshwater fishing areas
- Explicitly identified freshwater zoonotic parasites:
 - Europe: *Dibothriocephalus* spp./*D. latus*, *D. dendriticus*, *Opisthorchis felineus*
 - Asia: broad range including *Opisthorchis*, *Metorchis*, *Haplorchis*, *Clonorchis*, *Centrocestus* and *Gnathostoma*

KEY MESSAGE: Freshwater parasites were already recognised in 2010; the 2024 re-evaluation substantially expands and strengthens the evidence base, with dedicated assessments of freshwater aquaculture and wild inland fisheries

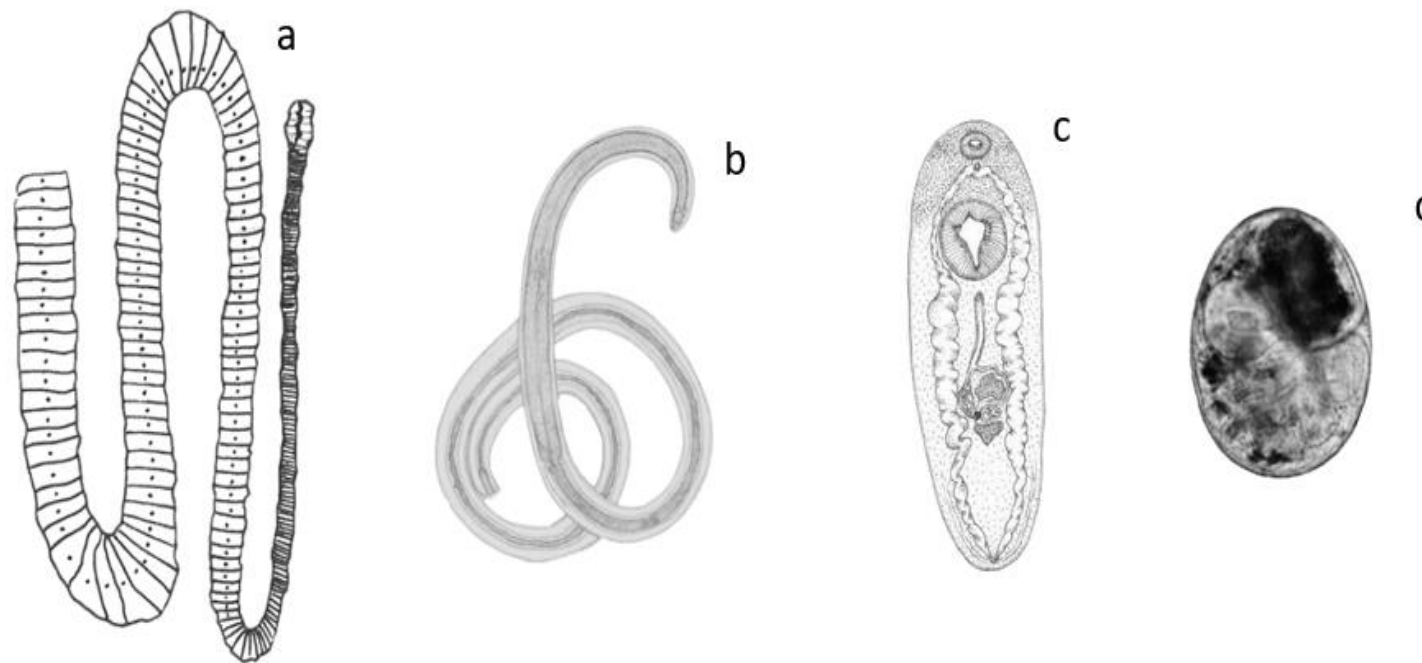
● **EURO-PAR-FISH: From Wild Waters to Human Health: a pilot study to address the knowledge gap on zoonotic helminths in freshwater fish**

EURO-PAR-FISH aim to address the knowledge gaps on freshwater fish borne zoonotic helminths in European countries: Italy, France, Poland

STARTED 2026

SPECIFIC OBJECTIVES

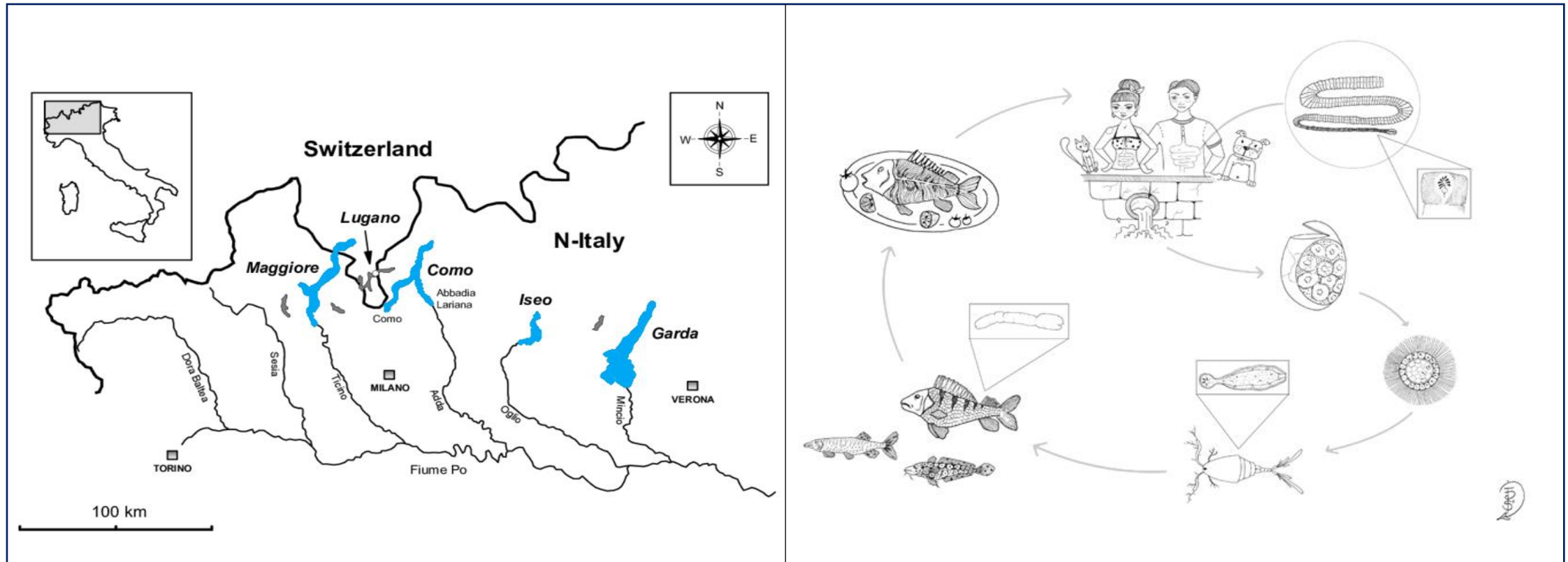
- 01 Epidemiological data
- 02 Diagnosis & genetic characterization of zoonotic parasites
- 03 Assess consumer eating habits related to freshwater fish
- 04 Practical & theoretical training



a *Dibothriocephalus latus*; b *Eustrongylides excisus*; c *Clinostomum complanatum*; d *Opisthorchis felinus*

Dibothriocephalus latus

Dibothriocephalus latus (Cestoda: Diphyllbothriidae) is mainly widespread in the Circumpolar/northern hemisphere. In Europe the infection affect the fish fauna of large subalpine lakes of France, Switzerland, and Italy



Freshwater environment → copepod → fish → human



Parasitological examination

FILLETING



Filleting and degutting

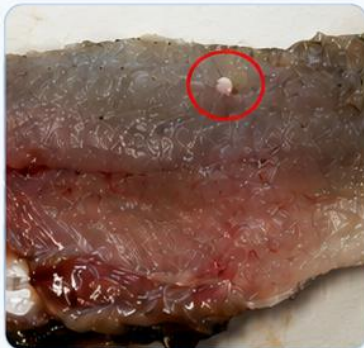
to allow the visual inspection of visceral and muscular tissue.



VISUAL INSPECTION

Direct observation

of the flesh and body cavities under good lighting to detect visible parasites (larvae or cysts).



CANDLING

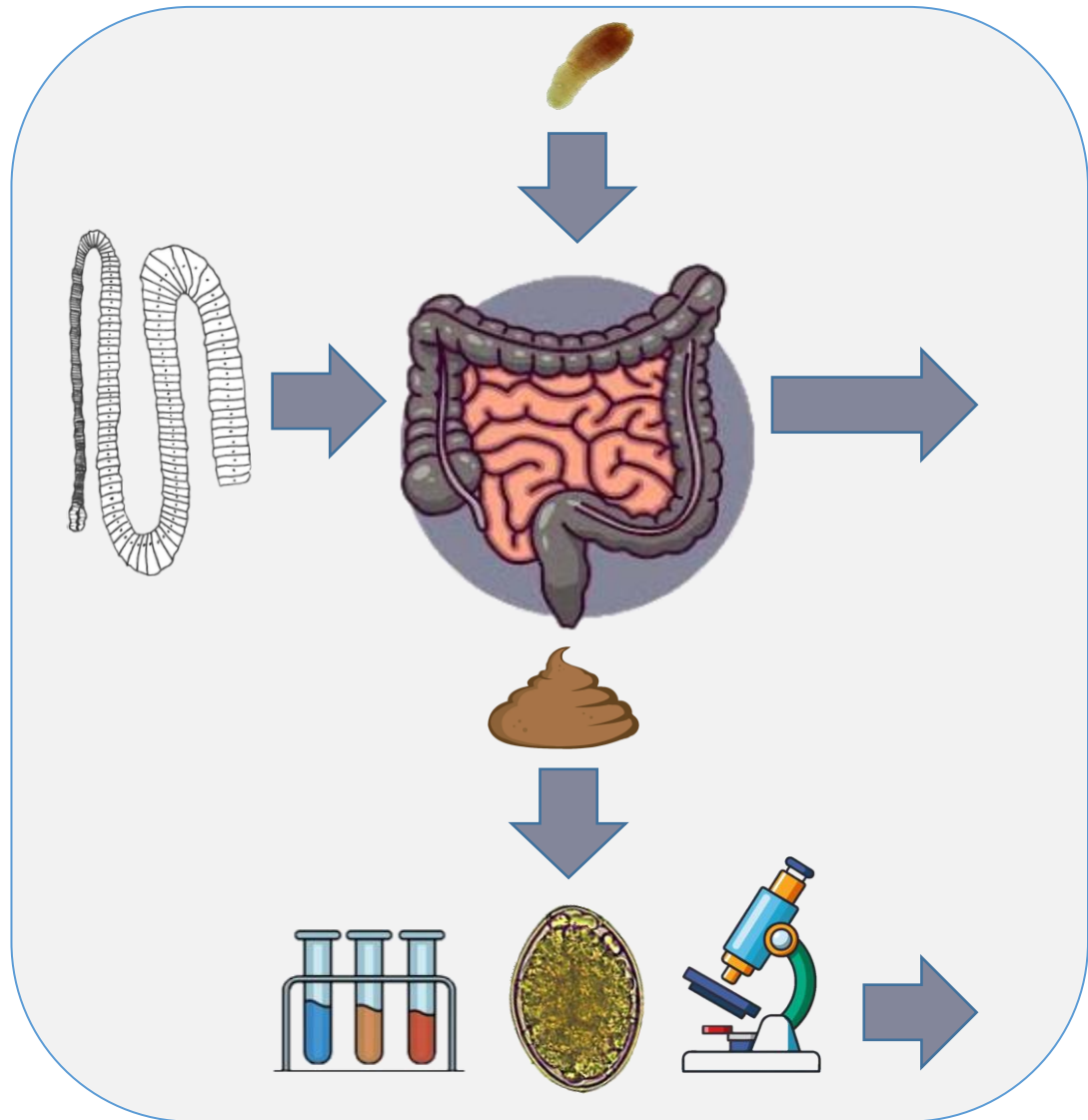
Transillumination

of the fillet using a light box to detect opaque parasites embedded in the musculature.





The dibothriocephalosis



Clinical presentation

Infections are generally asymptomatic or associated with mild and highly variable symptoms.

Approximately 25% of cases present with:

- Diarrhea
- Abdominal pain
- Fatigue
- Headache
- Intestinal obstruction
- Constipation

Hematological alterations due to intestinal absorption of vitamin B12 by the parasite occur sporadically.

DIAGNOSIS: stool test | **TREATMENT:** praziquantel (600 mg single oral dose)



Opisthorchis & Opisthorchiasis

- Small, leaf-shaped liver fluke (family Opisthorchiidae)
- The main pathogenic species are: *O. viverrini* and *O. felineus*

GLOBAL DISTRIBUTION

SOUTHEAST ASIA

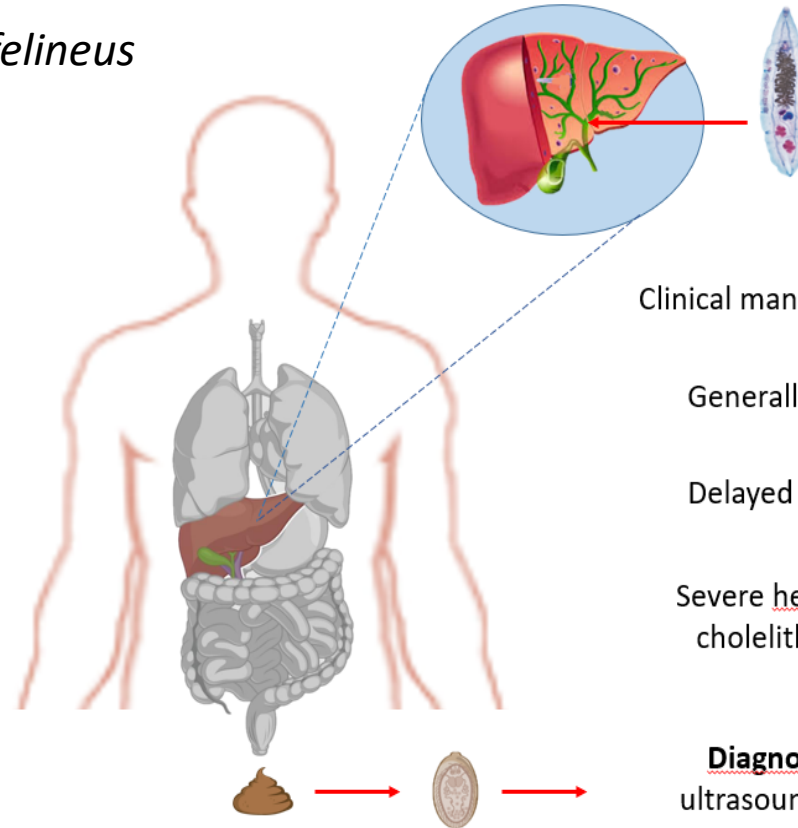
O. viverrini

Thailand, Laos, Cambodia,
Vietnam

EUROPE & EURASIA

O. felineus

Italy, Germany, Belarus,
Ukraine, Russia, Kazakhstan



Symptomatology

Clinical manifestations depend on the number of metacercariae ingested.

Generally mild or asymptomatic infections



Delayed or missed diagnosis → chronic forms



Severe hepatobiliary diseases: cholecystitis, cholelithiasis, cholangitis, and periductal fibrosis

Diagnosis: stool test to check for eggs, ultrasound, CT scan, MRI, cholangiography



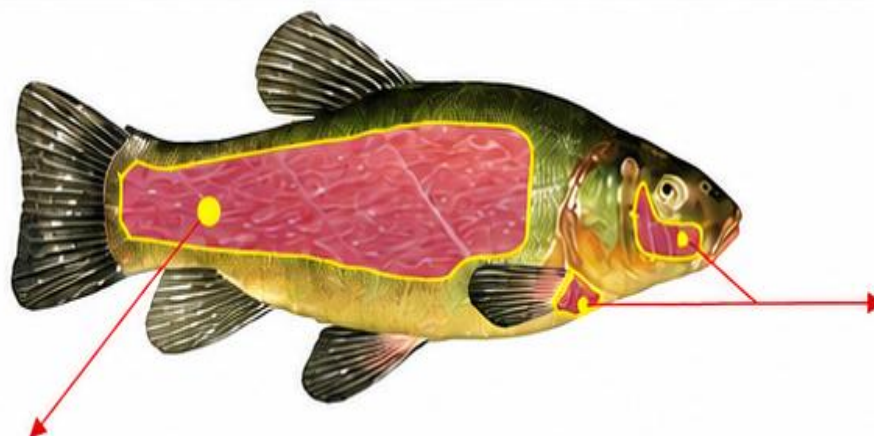
Treatment: praziquantel 40 mg/kg

Life cycle → aquatic snail → fish host (cyprinid) → Cat

Parasitological examination and identification

1 Sampling and meat inspection

Compression (squash) technique on muscle tissue (Compressor for meat inspection).



2 Observation under a stereomicroscope



PARASITE RECOVERY



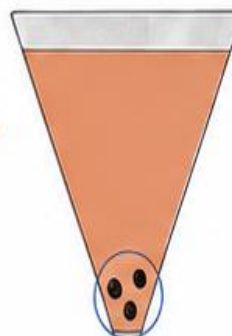
1 Homogenization of muscle tissue



2 Digestion 0.25% pepsin 1.5% HCl 37 °C



3 Filtration through 500 µm sieve



4 Overnight sedimentation



5 Observation of sediment under a stereomicroscope



IDENTIFICATION



ELSEVIER

Contents lists available at [ScienceDirect](https://www.sciencedirect.com)

International Journal of
Food Microbiology

journal homepage: www.elsevier.com/locate/ijfoodmicro

Short communication

Development and validation of species-specific molecular diagnostic tool for *Opisthorchis felineus* (Digenea, Opisthorchiidae) metacercariae

Monica Caffara^{a,*}, Laura Serracca^b, Andrea Gustinelli^a, Walter Vencia^b, Irene Rossini^b, Marino Prearo^c, Maria L. Fioravanti^a



Eustrongylides sp.

The taxonomy of the genus *Eustrongylides* has undergone several revisions; currently, three species are considered valid: *E. tubifex*, *E. excisus*, and *E. ignotus*. The genus *Eustrongylides* has a complex life cycle and a cosmopolitan distribution



Life cycle



life cycle → oligochaete → fish → piscivorous bird

Parasitological examination and identification

Detection and morphological characterization of *Eustrongylides excisus*

MACROSCOPIC FINDINGS



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Journal of Parasitology

journal homepage: www.journalofparasitology.org

DOI: 10.1645/19-44



MORPHOLOGICAL AND MOLECULAR CHARACTERIZATION OF LARVAL AND ADULT STAGES OF *EUSTRONGYLIDES EXCISUS* (NEMATODA: DIOCTOPHYMATOIDEA) WITH HISTOPATHOLOGICAL OBSERVATIONS

Angelica Mazzone¹, Monica Caffara¹, Andrea Gustinelli¹, Francesco Agnelli², Elisa Sgariglia², Giovanni Lo Vaglio³,
Francesco Quaglio⁴, and Maria L. Fioravanti¹





Clinical presentation, exposure route and management

Year	Location	No. of cases	Source of infection	Symptoms and treatment
1982	Maryland (USA)	3	Ingestion of live fish during fishing	Abdominal pain within 24 hours; surgical removal
1989	New Jersey (USA)	1	Ingestion of live fish during fishing	Severe abdominal pain, vomiting; surgical removal
1989	New York (USA)	1	Homemade sushi/sashimi with raw fish	Abdominal pain similar to appendicitis; surgical removal
2014	Sudan (Africa)	2	Not specified	Spontaneous skin eruption of larvae; surgical removal

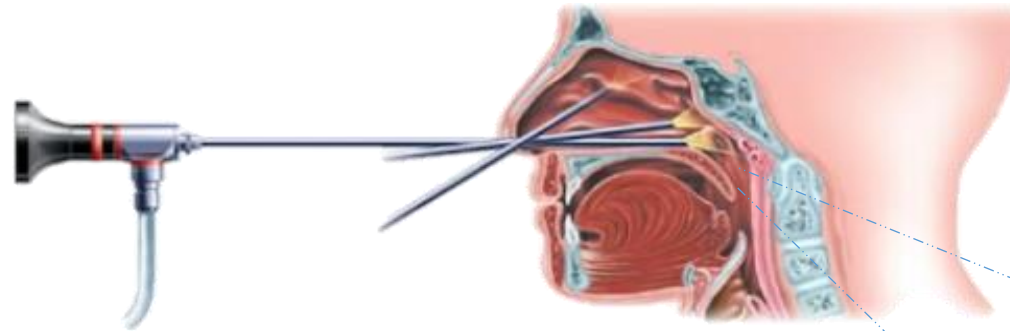
***Clinostomum complanatum* & Halzoun syndrome**

Clinostomum complanatum is a cosmopolitan digenean trematode. It causes parasitic infections in fish, known as yellow grub disease. The disease in humans was first reported in Korea in 1995 and subsequently in Japan and Israel. No human cases have yet been reported in Europe

Rare disease (accidental host)



Metacercaria encysted
in the muscle mass of
the fish host



Symptoms

Pharyngitis and laryngitis

Diagnosis and treatment

Endoscopic surgery





Recommended inactivation treatments for fish-borne parasites

Parasite	Treatment	Parameters
<i>Dibothriocephalus spp.</i>	Freezing	−18°C per 24 h
	Cooking	>56°C
<i>Opisthorchis spp., Clonorchis spp.</i>	Freezing	−10°C per 5 days
	Salting	13.6% NaCl, 24 h
<i>Trematode metacercariae</i>	Cooking	50°C per 5 h; 70°C per 30 minutes
	Irradiation	0.15–0.5 kGy

Consumption of raw or undercooked, inadequately treated fish is the main route of transmission.

Fishborne zoonotic parasites and aquaculture

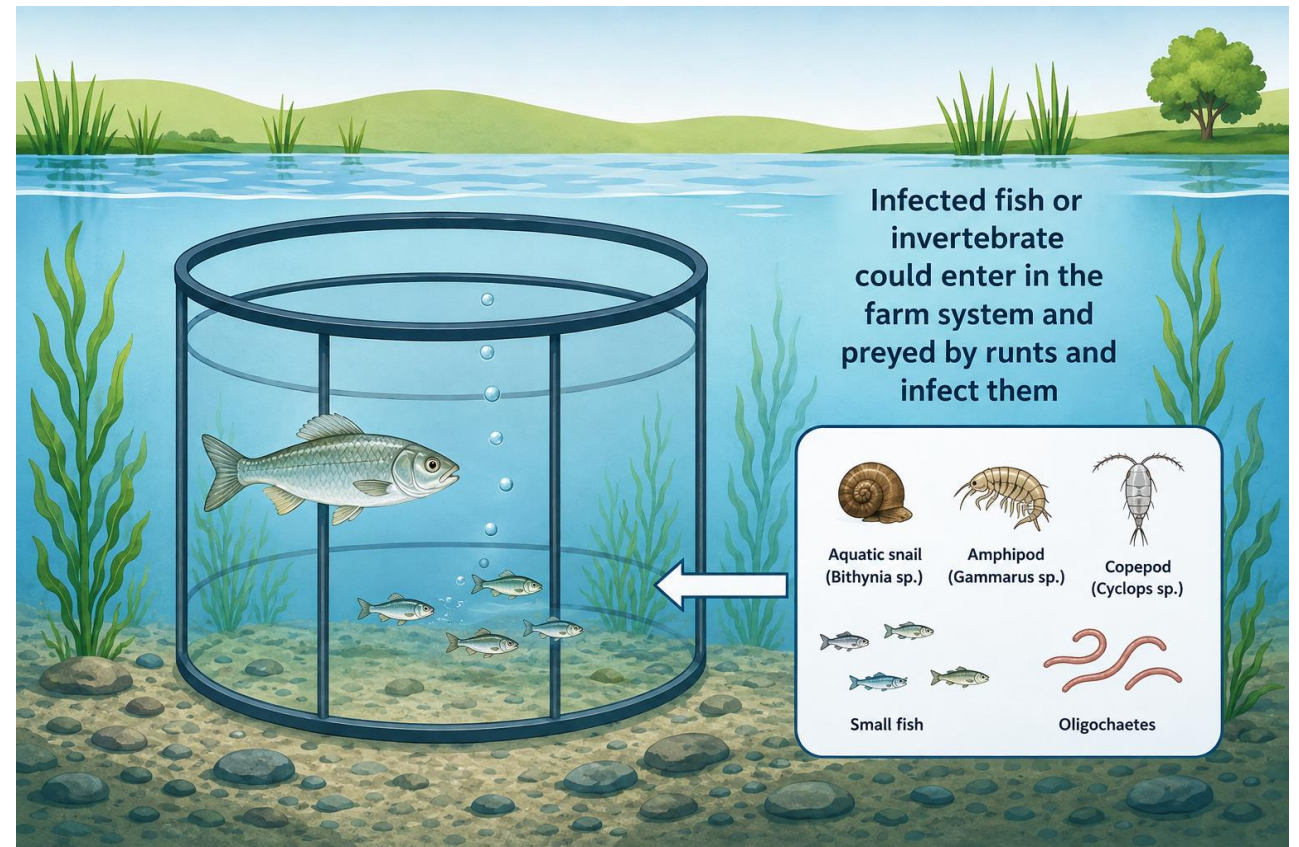
Effective prevention of parasite transmission from the environment to farmed animals requires rigorous management and biosecurity measures throughout the aquaculture system.

Nutrition & production management

- Use commercial feed
- Manage fish size classes appropriately

Farm hygiene & environmental management

- Maintain pond/tank hygiene
- Implement effective biosecurity measures



Carry out documented parasitological self-control program to verify the absence of parasites throughout the production chain



Nutrition & Production Management



Fish used as feed, potentially containing viable parasite larvae



Formulated commercial feed or thermal treated raw fish wastes



Farm hygiene & environmental management

Cleaning and sterilizing ponds effectively lowers the number of intermediate hosts and disrupt the lifecycle. Ponds that have not been cleaned and sterilized before refilling are at increased risk of retaining large numbers of intermediate hosts



Earth ponds are difficult to be sanitized



A plastic-lined bottom allows easier cleaning



Ensures a higher level of biosecurity



Farm Hygiene & Environmental Management

Water intake to the ponds is also a potential risk factor for introducing infected intermediate host or parasite larval stage into the ponds



intermediate hosts



Aquatic snail
(*Bithynia* sp.)



Amphipod
(*Gammarus* sp.)



Copepod
(*Cyclops* sp.)



Small fish



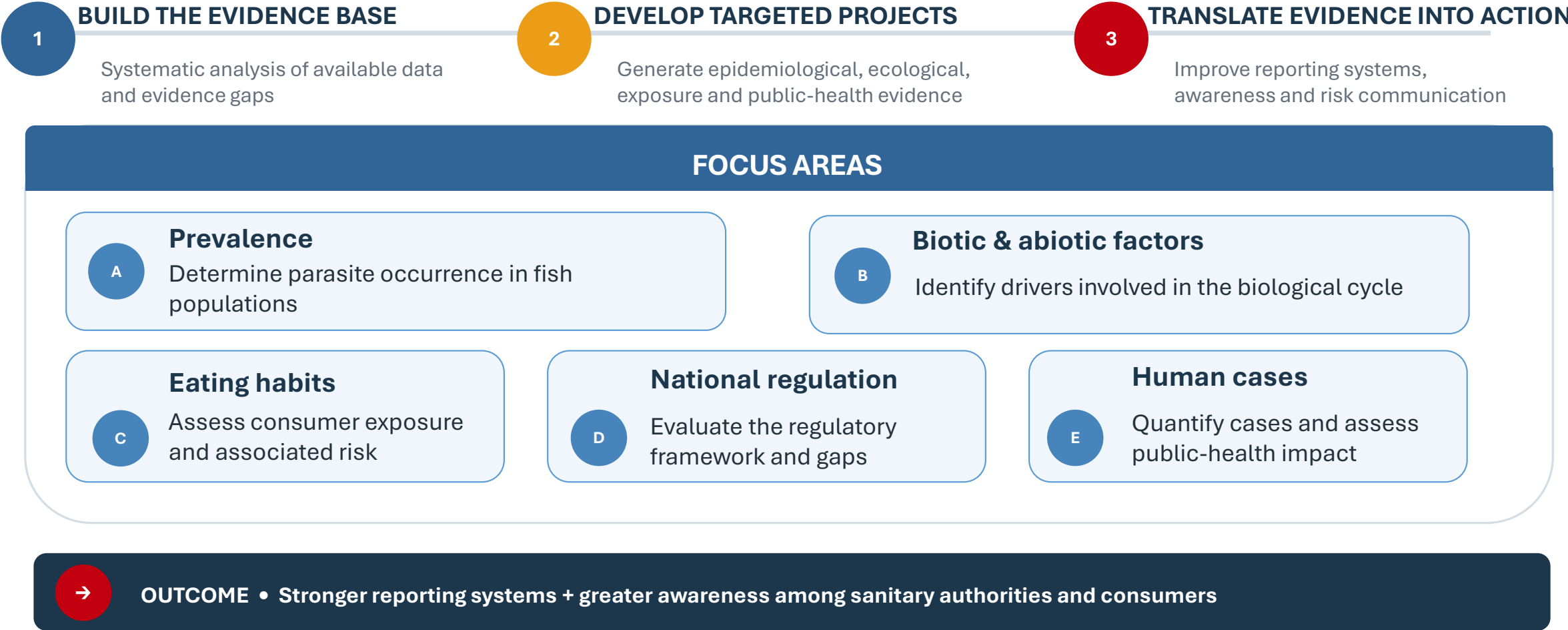
Oligochaetes

Biosecurity focus:
control water sources

KEY RISK • Uncontrolled water intake may introduce infected hosts or parasite larvae into production ponds.

Pathways in the study of fish borne zoonotic parasites

A multidisciplinary framework to identify drivers of emergence, characterize risks and strengthen public-health response. is crucial for managing the risks and to Identifying the factors and mechanisms that lead to disease emergence



ResearchGate

Eat fish responsibly!