The range of *Clinostomum complanatum* within French freshwater habitats hosting European perch (*Perca fluviatilis*)

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Context: life cycle

Definitive host
Parasite present in the **mouth**, **pharynx**, and upper part of the **oesophagus**

Piscivorous birds as heron, egret, bittern

Rarely reptiles or mammals

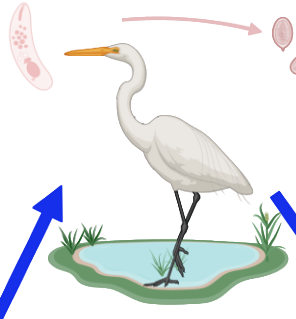
Clinostomum

Classification: **Trematoda Digenea**

Fresh and **brackish waters** (some data in seawater [!!]), mostly stagnant waters (lakes, ponds, lagoons…) but also described in rivers

Adultes mature and produce eggs by sexual reproduction

Eggs expelled with saliva or bird faeces



Eggs hatch in water and evolve toward miracidia

Miracidia get into the snail

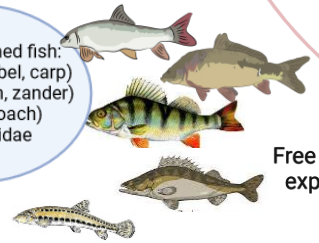
Miracidium evolve toward sporocyst which produce cercariae by asexual reproduction

1st intermediate host
Aquatic snail (Lymnaeidae)

Free swimming cercariae expelled from the snail looks to fish

2nd intermediate host
Presence in **muscle tissues**, **skin**, **fins**, **oral cavity**, **body cavity**, **liver**, **mesenteries**, **gills**

Wild and farmed fish:
Cyprinidae (barbel, carp)
Percidae (perch, zander)
Cobitidae (loach)
Centrarchidae

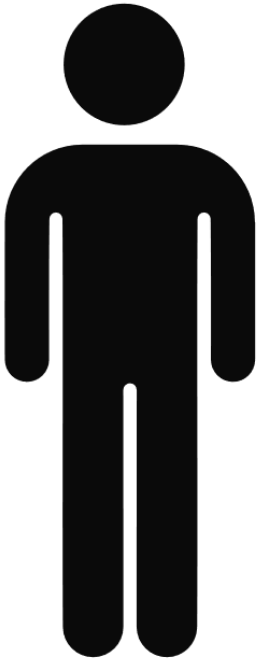


Evolution of ceracriae toward metacercariae

Metacercariae are transmitted to bird by predation of infected fish

Clinostomum

Context: human cases & pathology



Disease: **Clinostomiasis**

Human cases following consumption of raw or undercooked fish (carp, perch)

Described in **Japan, Israel, Korea, India** and **Thailand**

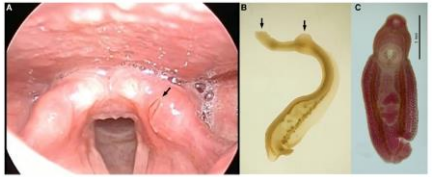
- 19 human cases in Japan (1938-2014)
- 7 human cases in Korea (1995-2023)

Underdiagnosis highly potential due to a lack of diagnostic equipment (endoscopy)

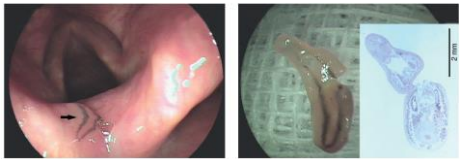
Pathology due to the establishment of worm in the human **pharynx** or **larynx**

- Halzoun syndrom, pains, inflammation, discomfort in the throat, allergic pharyngitis

Remedy = elimination of the parasite by endoscopy

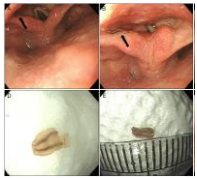


Song et al., 2018 ; Corée

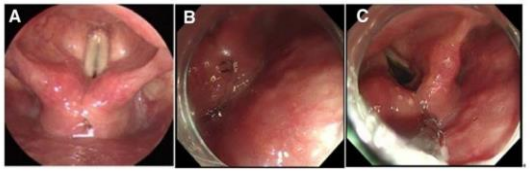


Park et al., 2009 ; Corée

Lee et al., 2017 ; Corée



Kim et al., 2019 ; Corée



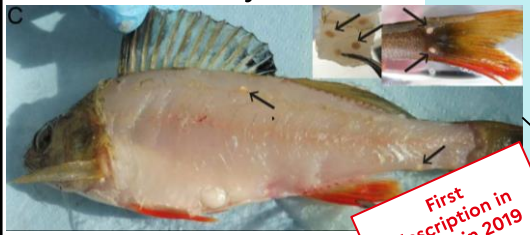
Kim et al., 2023 ; Corée

Ermakiova et al., 2024 ; Tambov region, Russia

C. complanatum in Europe and France

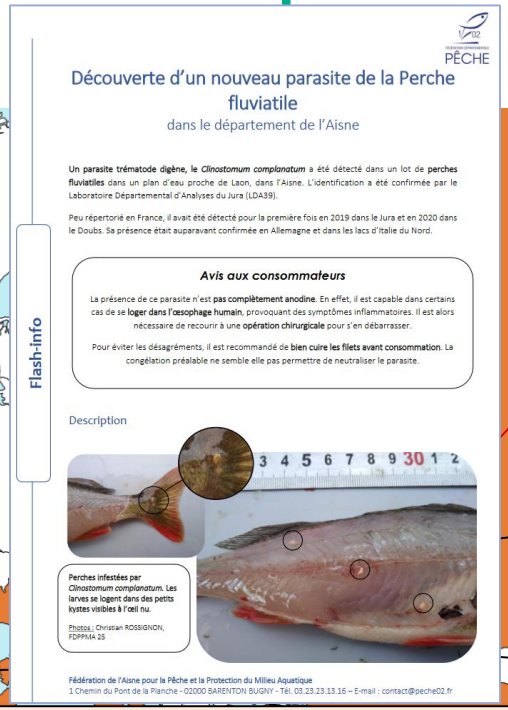
Characteristic white-yellow cysts of 6mm to 2mm

➔ Confirmed by molecular method



C. complanatum
Rochat et al. under review
(Jura, France)
Perca fluviatilis

First description in France in 2019 in the Doubs department



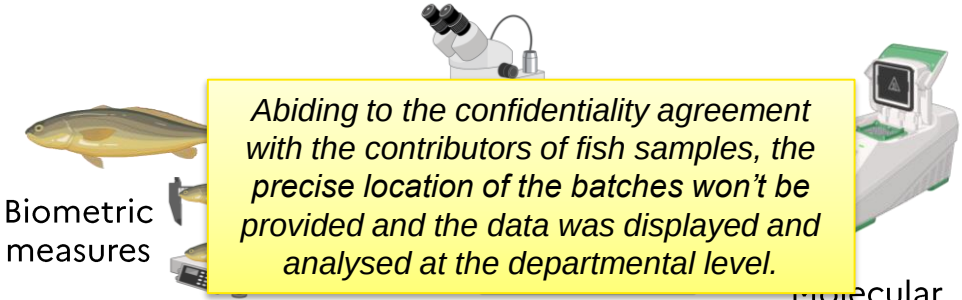
➔ Characterize the range of *Clinostomum complanatum* within French freshwater habitats.

Distribution of *Clinostomum* in France _ Sampling

European perch
(*Perca fluviatilis*)

Rudd
(*Scardinius erythrophthalmus*)

Pumpkinseed
(*Lepomis gibbosus*)



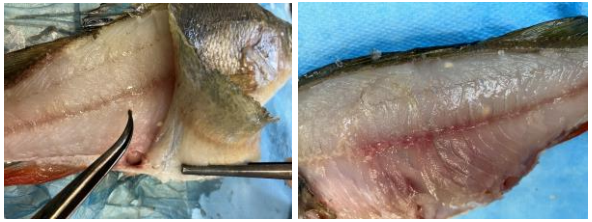
Biometric measures

Weight

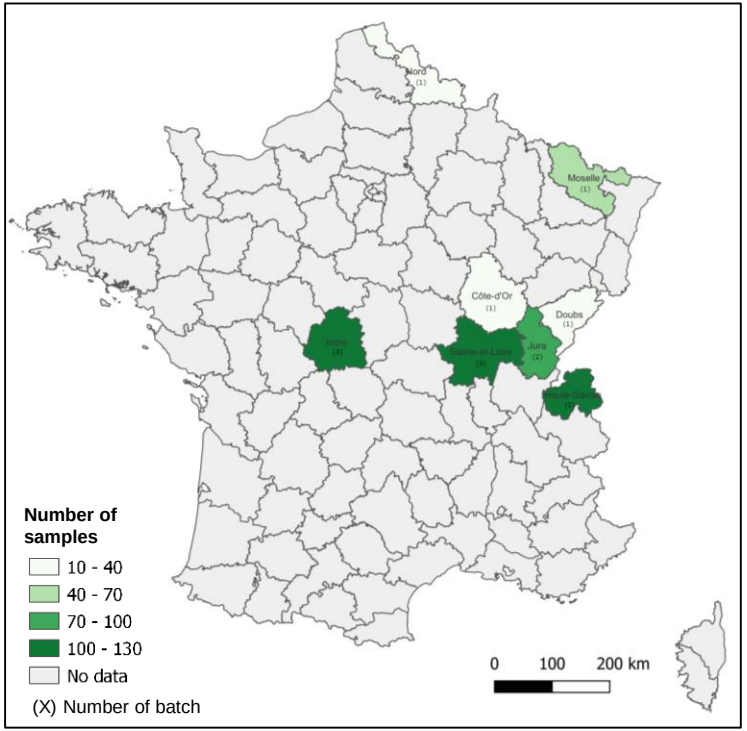
Isolation of cysts

Molecular identification

Abiding to the confidentiality agreement with the contributors of fish samples, the precise location of the batches won't be provided and the data was displayed and analysed at the departmental level.



100% of identifications = *Clinostomum complanatum*



30 to 50 individuals/ batch

14 batches
526 fish

Infestation levels and genetic diversity of *Clinostomum* infestation

Results have been recently submitted.
Please see our publication for results or contact us for more details
Maureen.duflot@anses.fr and/or melanie.gay@anses.fr

Conclusions

Preliminary attempt to elucidate the distribution of *C. complanatum* in French freshwater ecosystems, with a focus on European perch

Observations of metacercariae in fish were reported from 5 out of 8 sampled departments in continental France, suggesting wider distribution of this parasite in France than expected

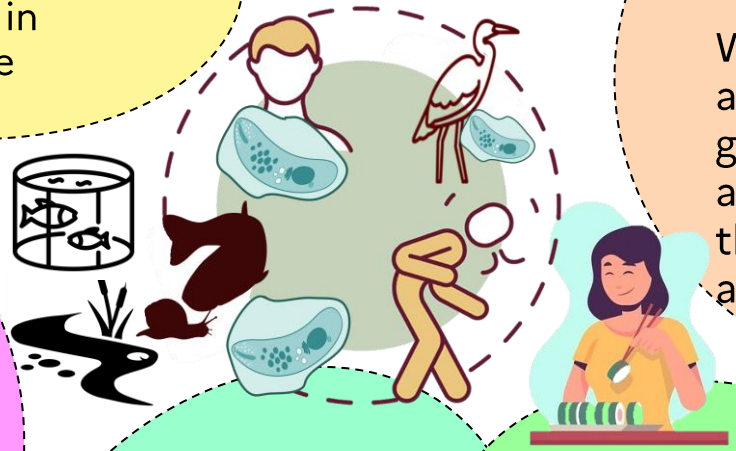
Low genetic diversity was observed on the generated *cox1* sequences. Similarity between the sequences of *C. complanatum* from France, Italy, Iran and Turkey was observed however European *C. complanatum* seems to differ genetically from the one of the East of Asia

Outlooks

Further, broader investigations, to better characterize the presence of *C. complanatum* in France

Environmental factors : T°C, flow, habitat characteristics, fish communities.

Wider variety **of fish species** and complete missing geographical data > to better assess the potential risk for the consumer and the aquaculture sector



Characterize **the zoonotic potential of the *C. complanatum* present in Europe**. Future human case declaration across Europe will be precious and need to be characterized cautiously.

Safety guidelines to control the dispersion of these parasites

Understand **origin of *C. complanatum***: hosts, by migration or following stock river

Description/ DNA of *Clinostomum* sp.

Please don't hesitate to contact us

Thank you for your attention

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