Preliminary results on the prevalence of nematodes, cestodes and ectoparasites in fish organs and fillets.

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Protozoan and metazoan parasites frequently infest fish worldwide. Some of them are both fish pathogens and recognized agents of important zoonoses with high public health impact. The increasing consumption of seafood in France as well as the trendy consumption of raw fish products are two main reasons to identify hazards caused by parasites for the consumers and to define efficient prevention strategies to improve the safety of fish and fishery products

I- Fish Parasites Project

The Fish-Parasites project (Figure 1) aims at improving the safety of fish and fish-derived products through a multidisciplinary work program that includes: (i) identifying larval nematodes or cestodes detected in the most currently consumed fishes in Europe; (ii) exploring the potentially structuring role of host species, geography, seasonality and other factors on parasite population; (iii) providing technical strategies to improve parasite detection in fish fillets; (iv) exploring the involvement of fish parasites in the alteration of marketable fish products; (v) setting a scientific platform to help the operators (business operators, technicians, veterinaries and even staffs of fish stores) to identify parasites in fish; (vi) developing continuing education, training programs for staffs of industry or fish-stores, other professionals and specialized media staffs.

Fifteen fish species were selected according to a risk ranking analysis based on French fish consumption, consumer exposure (sold fresh or frozen, consumed raw or cooked) and Anisakid level of infestation (data from literature).
Fish were either sampled during Ifremer scientific campaign or were bought from local fish processing companies.
A standardized protocol was used by all partners to collect fish biometric data, environmental data (fishing date, fishing area, ...) and to sample, store and identify the parasites. All data were gathered in a database (PARAFISH) specifically designed for the project.

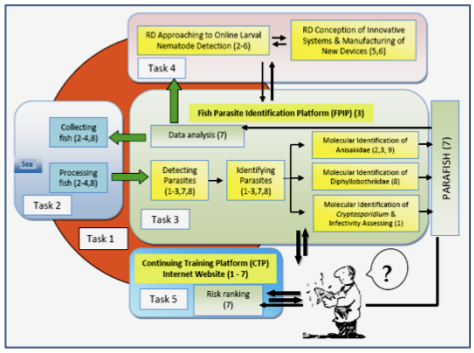

Figure 1. Workflows and structure of the project. Collecting and processing (Task 2) lead to Task 3 (Detecting and identifying fish parasites). The operator (bottom right), who could be a business operator, a technician or a fish store staff, is able to submit an altered fish or fish-derived product to the FPIP for parasitological analysis, and to apply for training to CTP. Task 1 (coordination, brownish circular surface in the background) underlies the whole action.

II- Preliminary results of Anisakid prevalence

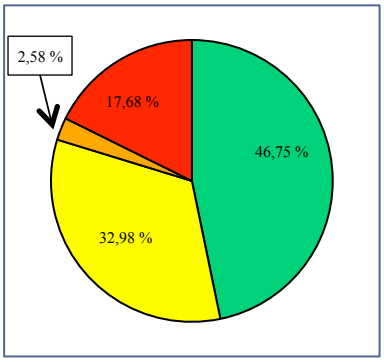

Figure 2. global Anisakid prevalence (all fish species): non parasitized fish; fish parasites found only in viscera; fish parasites found only in fillets; fish parasites found both in viscera and fillets

1510 fish from the fifteen selected species (anchovy, sea bass, cod, haddock, herring, saithe, blue ling, monkfish, mackerel, whiting, hake, plaice, sardine, salmon and sole) were sampled (English Channel, North Sea, Irish Sea, Northwest of Scotland, Faroe Plateau, Bay of Biscay and Mediterranean sea).

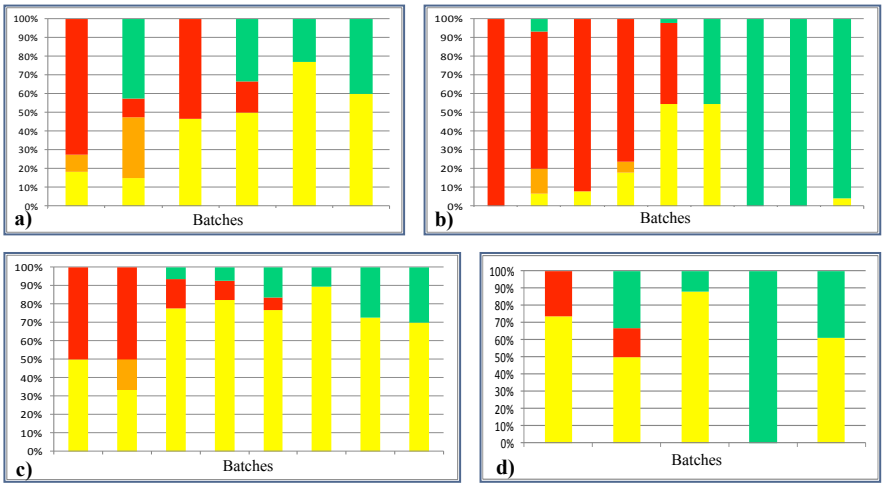

Figure 3. Anisakid prevalence in whiting (a), hake (b), cod (c) and mackerel (d): fish parasites found only in viscera; fish parasites found only in fillets; fish parasites found both in viscera and fillets; non parasitized fish. Each batch has been determined by a fishing date and a fishing area.

III- Preliminary results of prevalence of other parasites

895 out of 1510 sampled fish had at least one parasite, all taxonomic groups gathered, including nematodes. 48 fish (anchovy, sea bass, cod, saithe, mackerel, whiting, hake, salmon and sole) were infected by cestodes either larvae or adults. 121 fish (sea bass, cod, haddock, saithe, mackerel, whiting, hake, ling, plaice, sardine and salmon) were infected by adult copepods either on the body surface (probably underestimated), or in the gills and/or oral cavity (Lernaeopodidae or Caligidae) or in the fillets (*Sarcotaces* sp.).

Conclusion

The data obtained show strong differences between samples. They may be due to environmental factors (fishing area, season, ...) or host factors (weight, reproduction status, ...). These data will be thus statistically analyzed to determine the potential structuring role of some factors on Anisakid distribution in fish.

Out of 1510 sampled fish, 804 had Anisakid parasites. However, only 306 had Anisakid parasites in their fillets.

Moreover, molecular identification of the sampled parasites is in progress. Anisakid species distribution in fish consumed in France will be determined at the end of the Fish-Parasites project.

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