

## Parasites in the nasal cavity of yellowfin tuna

### Introduction

The first thing I did when I joined the research institute was to help write a paper on how to tell the difference between small yellowfin and bigeye based on their appearance. At that time, the International Commission for the Conservation of Atlantic Tuna (ICCAT) was planning to develop a simple method for identifying yellowfin and bigeye tuna, which were incidentally caught in the rapidly developing purse seining and pole and line fisheries and 30 to 40 centimeters long having a similar appearance. The Standing Committee on Research and Statistics (SCRS) of ICCAT decided that each country would tackle this issue.

I investigated the purse seine catches at the Yaizu fish market, and found that many of them were covered in frost and deformed, and at first it was quite difficult for amateurs to find bigeye, which are fewer in number than yellowfin. However, it turns out that with practice, it is possible to identify them fairly accurately based on their striped patterns and body shape. In this investigation, we focused on identifying from the appearance, so we were unaware of the existence of the parasites that exist in the nasal cavity, which will be described below.

When I was watching the NHK TV drama series ``Ranman," I saw that a plant discovered by Mr. Tomitaro Makino who then asked a Russian expert to identify it had been given a scientific name that included the name makinoi. Then I remembered the human name derived from klawei in this parasite (Figure below: Scientific name is *Nasicola klawei*). This parasite is described in the section on yellowfin tuna in ICCAT's Field manual, and this parasite infects yellowfin tuna 85-95% of the time, but not bigeye tuna. So it is said that it can be used for identification of these two species. As I researched this parasite further, I came across a number of interesting matters.

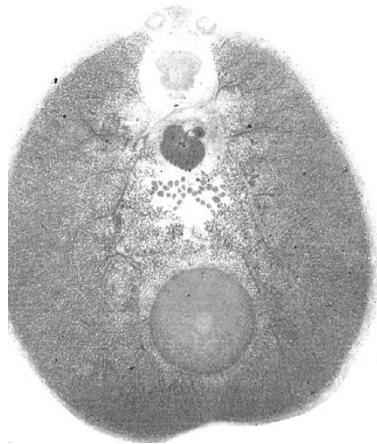


Figure: *Nasicola klawei*

(From Kohn et al. 2004. The sample comes from Meguro Parasitological Museum Collection 15.438)

The vertical line indicates 5 mm.

### Exchange between IATTC (Inter-American Tropical Tuna Commission) and Japanese tuna researchers

Although this is a bit of a detour, I would like to talk about the relationship between the IATTC and Japanese tuna research. The IATTC is one of the regional fishery management organizations located in La Jolla, a suburb of San Diego in southern California, that researches and manages tuna resources in the eastern Pacific Ocean, and is the world's first international organization related to tuna. The IATTC recognized the need to obtain information on Japanese tuna long line fisheries from a Japanese tuna research institute (formerly the Nankai Fisheries Research Institute which was later taken over by formerly the Far Seas Fisheries Research Institute) as Japan's tuna longline fishing industry rapidly expanded after the war, reaching the eastern Pacific Ocean under its jurisdiction. The IATTC provided funding and accepted Japanese researchers. The first person dispatched to La Jolla in the early 1960s was Mr. Akira Suda. Every few years since then, many Japanese researchers conducted joint research there. Currently, such joint research is no longer being conducted, perhaps because detailed fishing information has become public. When Japanese researchers first started being dispatched, there was Dr. M.B. Schaefer (founder of the production model used in resource analysis) who was famous for the Schaefer model, and Mr. Suda, who had high expectations from Mr. Schaefer, was asked to extend his stay. He did not extend his stay as that time was the golden age for Japan's tuna fishing industry. After that, the IATTC had a charismatic director Dr. James Joseph, who explained everything from research to management almost by himself at annual meetings, giving the impression of a one-man show. The IATTC was conducting the world's highest level of research and management. When I was there, my research partner was Mr. P.K. Tomlinson, who was

the co-author of a generalized version of the Schaefer model (Generalized Production Model by Pella-Tomlinson). Mr. Tomlinson seemed to have been recruited by Mr. Joseph who recognized his talent. He had an excellent mathematical background and was able to skillfully use computers from the time when they were first introduced, and at the same time was well versed in the actual state of fishing. However, he was also a bit of an oddball, not interested in promotion or fame.

### Who is Klawe?

Now, back to the main topic, the IATTC had a Polish-American researcher named Dr. W.L. Klawe (affectionately known as Vitek). Although he passed away a few years ago, he was very helpful for Japanese researchers who conducted research at the IATTC in many ways other than research, including daily life in an unfamiliar foreign country. He was more of a naturalist than a fisheries researcher, and was literally knowledgeable about animals, plants, and other things related to nature. A few years later, I learned that, as mentioned earlier, a specific parasite that lives in the nasal cavity is almost always present in yellowfin tuna, but not in bigeye tuna, and that it serves as an indicator for distinguishing the two species. This parasite is an inconspicuous parasite that is round, flat, and translucent, about 1 cm long, even when it grows up. When I actually made a small incision in the nasal cavity, I found it right away, and it was certainly present in all the yellowfin tuna individuals I examined. Unfortunately, however, I do not remember whether I also researched bigeye at that time. Several times during my stay at the IATTC, I noticed that this parasite had a similar spelling to Vitek's real name and asked him if there was any connection. The answer was that he was the first discoverer of this parasite, and that the author of the scientific name put his name in the scientific name.

### Can yellowfin tuna and bigeye tuna be easily distinguished based on the presence or absence of this parasite?

However, when researching the literature regarding this parasite (*Nasicola klawei*), there was a report that a similar parasite of another species exists in the nasal cavity of bigeye off the coast of Brazil. I wondered if it would be impossible to easily distinguish between yellowfin and bigeye tuna based on their presence or absence. So I asked Dr. Kazuya Nagasawa, an expert on fish parasites, this question. Although the story is complex and more detailed research is needed before any conclusions can be drawn, Nagasawa said the two types of parasites are so similar that they probably cannot be easily distinguished

with the naked eye. If that is the case, ICCAT's field manual may need to be revised. I would also like to take a closer look at the bigeye's nasal cavity someday. Furthermore, according to Dr. Nagasawa, Vitek was the first to discover a new species of parasitic copepod (*Caligus klawei*), and it was named after him. Vitek collected a huge number of parasitic copepods from pelagic fish in the eastern Pacific Ocean and donated the specimens to the late Professor Sueo Shiino of the Faculty of Fisheries, Mie Prefectural University (currently the Faculty of Fisheries, Mie University). I also learned that Dr. Shiino has published many papers using these specimens.

### Closing

I was surprised to learn that this unknown parasite is involved in things that are familiar to me. In particular, Dr. Nagasawa told me that there was a major paper by an American author that investigated copepods that parasitize fish belonging to Family Scombridae (mackerel and tuna) around the world and even created a distribution map of each species. The parasites that exist in the nasal cavities of the tuna species discussed in this essay appear to exist not only in yellowfin tuna and bigeye tuna, but also in Atlantic bluefin tuna and other species. Recently, emphasis has been placed on resource analysis, but even if it is not directly related to this, it is desired that this type of research be enriched. I wonder if there should be a Japanese researcher specialized in a comprehensive research on parasites in the nasal cavities of fish belonging to Family Scombridae. This is because I think it shows the underlying strength of a country's scientific research. One last tidbit: When I was picking up some edamame (boiled green soybeans) with Vitek, he kept calling it "edomame," so when I told him it was edamame instead, he looked at me quizzically. He seemed to think it was Edo mame (note: Edo is the old Tokyo and mame is beans). Since even Homer sometimes nods, I feel a little bit relieved that even a knowledgeable person can make mistakes.