Can you name this pathogen?

A 70 year old retired surgeon born in Russia presented at our hospital ER with symptoms of abdominal cramping and diarrhea. Laboratory studies were ordered that included stool cultures and O&P exams. Stool cultures were negative, but the diagnosis was made quickly from the O&P exam below.

Questioning of the patient led to what was thought to be the probable source of the infection. His wife stated that he was particularly fond of a traditional Russian dish that she prepared for him.

*What is the agent and how was it acquired?*
The patient was infected with a *Diphyllobothrium* species but he denied consuming any raw fish product in the recent past. However, the patient’s wife told the infectious disease physician that several weeks prior to the onset of her husband’s symptoms she had prepared for him a traditional dish called Coulibiac which he enjoyed eating. No others including his wife consumed any of the dish. Coulibiac is described as a loaf of fish, meat, or vegetables, baked into a pastry shell. The Russian version is made with salmon or sturgeon and includes mushrooms and hard-boiled eggs (see Fig. 1). This was thought to be the source of infection.

**Diphyllobothriasis** occurs in all geographic areas where there is human consumption of raw, poorly cooked, or pickled freshwater fish such as pike, perch, salmon, trout, whitefish, grayling etc. Even dried and smoked fish may contain viable encysted larvae. Infection is common in Japan but rare in the United States. It was once more common in the US and was referred to as “Jewish housewife’s disease” because Jewish housewives would often taste “gefilte fish” before it was cooked. Other groups who tend to eat raw or undercooked fish include Scandinavians, Russians, and Finns. Adult *Diphyllobothrium* worms mature in about 5-6 weeks, can reach 10 meters in length, and may live up to 30 years untreated. Many cases are asymptomatic but symptomatic disease may cause abdominal discomfort, diarrhea, vomiting, and weight loss. A small number of infections may lead to vitamin B₁₂ deficiency which resembles pernicious anemia. Humans and mammals serve as intermediate hosts and dogs can be reservoirs and should be treated.

Diagnosis can be made by identifying the characteristic large oval operculated eggs in stool (figures 2) even without specimen concentration or by proglottids which are often passed in chains by *D. latum* (figure 3.).

**Figure 1: Coulibiac**

**Figure 2: Diphyllobothrium egg**

Speciation can be made based on morphology but may be difficult (figure 3.).
Diphyllobothrium spp. are not host specific. Stool samples may contain as many as 3,000 proglottids.

Praziquantel and niclosamide are historic treatments for all species.
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