Letter to the editor regarding the paper "Rare tapeworm segments case report and review of literature"

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Dear Editor,

My initial enthusiasm was born from the premise of reading about an uncommon species of human parasite in the article "Rare tapeworm segments case report and review of literature" by Ahmed Ali Gaffer11Gaffer A. Rare tapeworm segments case report and review of literature. *Clinical Case Reports* . 2023;11(4). doi:https://doi.org/10.1002/ccr3.7167, which has given way first to confusion and then to a sincere disappointment, due to the many mistakes, inaccuracies, and misspellings which unfortunately result in a chaotic and inconclusive report.

First, it should be noted that in most of his manuscript, the author makes incorrect use of the terms "cestode" and "trematode" as if they were interchangeable. As it is known, cestodes and trematodes belong to two different classes, Cestoda and Trematoda, within the phylum Platyhelminthes. These two groups of parasitic flatworms, while sharing some similarities (e.g. bilateral symmetry and the lack of a body cavity) by having a common ancestor, count many different morphological characteristics such that the two cannot be easily confused. In particular, the head or more properly "scolex", neck**,** and the ribbon-like segmented body (strobila) composed of segments called proglottids, in addition to the lack of a mouth and digestive tract, are all external peculiarities of adult cestodes, while adult trematodes typically have an anterior mouth, organs of attachment or "suckers" and an unsegmented leaf-shaped body22Bogitsh BJ, Carter CE, Oeltmann TN. *Human Parasitology* . Academic Press, An Imprint Of Elsevier; 2019.. Having said that, it seems that the observed parasite would belong to Cestoda rather than Trematoda, assuming it is a parasite.

The second major problem in the report is the total lack of the minimum morphological features that are usually required for the identification of a cestode. The image attached has a very poor resolution quality, the micrometer bar is absent and the author admits that eggs have not been detected in the observed specimen. The presumed scolex, an organ whose dimensions and morphologies often represent critical keys in classifying Cestoda genera and species33Khalil LF, Jones A, Rodney Alan Bray, C.A.B. International. *Keys to the Cestode Parasites of Vertebrates* . Cab International; 1994., lacks any useful detail. Inside each "triangular-shaped" segment it is honestly difficult to understand how it was possible to identify a uterus just from an amorphous central mass and consequently to count the individual "uterine branches" of the hypothetical tapeworm. It should be remarked that this is an act that would usually require the injection of India ink through a lateral genital pore, another useful point of reference, not observed in the image provided44CDC. CDC - DPDx - Taeniasis. www.cdc.gov. Published January 22, 2019.*https://www.cdc.gov/dpdx/taeniasis/index.html*. Here

the doubt is that the author has confused the uterine branches with the segments of the elements he observed, which - if it were a cestode - should instead be its proglottids (!).

The scenario described so far becomes even more entangled in the final reflections when the author hypothesizes that we are dealing with an infective larval stage, expressing concern about the risk that the parasite "is ready to become adult worm". In Cestoda, the larval forms, known as metacestodes, are quite different from the adult tapeworms, even because they lack of reproductive organs contained in the proglottids.

To provide a minimum of clarity, perhaps it is necessary to briefly recall the biological cycle of a human cestode. In most cases, it involves two hosts: embryos develop into metacestodes in an intermediate host; metacestodes mature into adult worms in a definitive host. Humans can serve as both intermediate and definitive hosts.

The intermediate host usually becomes infected after ingesting food or water contaminated with the parasite's eggs. Once in the intestine, the eggs hatch releasing oncospheres that penetrate the intestinal walls, pass to the mesenteric capillaries, and from there to the bloodstream, through which they can reach various tissues (muscle, liver, lung, brain, bone), encyst and develop in metacestodes.

The clinical spectrum of metacestode infections varies from asymptomatic to life-threatening conditions, essentially depending on the site of encystment. Given the parasitized sites, the approach to these infections is usually represented by imaging techniques, serology, and molecular diagnostics, the optical microscopy is useful only when the parasite is observed in biopsy specimens for histological examination55Lynne Shore Garcia. *Diagnostic Medical Parasitology* . Washington Asm Press; 2016..

Examples of human metacestodiasis are cysticercosis, echinococcosis, and sparganosis, caused – respectively - by metacestodes of Taenia solium, Echinococcus spp., and Spirometra spp.

The definitive host becomes infected if it consumes raw (or undercooked) meat containing the larval forms. Inside the intestine of the new host the metacestodes evert their scoleces through which they tenaciously attach themselves to the intestinal wall and, in a few months, they develop in adult worms, with the production of proglottids, a process known as strobilation.

Those caused by adult cestodes are among the most common intestinal infections worldwide, afflicting millions of people, especially in developing countries. The symptoms are usually mild and non-specific and they can be diagnosed by the identification of eggs or proglottids in stool, a few months after the infection.

Examples of human cestodiases are taeniasis, dibothriocephaliasis, and hymenolepiasis, caused by the adult tapeworm of Taenia spp., Dibotriocephalus spp., and Hymenolepis spp.

However, this whole premise would seem to have been ignored by the author who, all along the manuscript, describes what he considers to be a parasite as it would be an adult tapeworm but - inexplicably - he comes to the conclusion that it is a larval form(!).

For all the reasons described above, any comparative work with already described cestode species is also particularly difficult, if not impossible.

Cases of rare or uncommon cestodiasis in humans have sometimes been described, such as in the case of infections by adults anoplocephalids of the genera Mathevotaenia66Lamom C, Greer GJ. Human Infection with an Anoplocephalid Tapeworm of the Genus Mathevotaenia. *The American Journal of Tropical Medicine and Hygiene* . 1986;35(4):824-826. doi:https://doi.org/10.4269/ajtmh.1986.35.824, Bertiella, Inermicapsifer, and Moniezia, by davaineids of the genus Raillitiella and Metacestoides77Sapp SGH, Bradbury RS. The forgotten exotic tapeworms: a review of uncommon zoonotic Cyclophyllidea. Parasitology. 2020;147(5):533-558. doi:https://doi.org/10.1017/S003118202000013X, but none of the above have similar features to those reported by the author. Not even among non-cyclophyllid cestodes, such as diphyllobothrids, can morphological similarities be found with the proposed case. Some of the infections with juvenile aberrant cestodes have been described in the literature, but no similarities can be found with these either88Garin F, Maria Teresa Galán-Puchades, Moulignier A, et al. Human brain abscess due to a tetra-acetabulate plerocercoid

metacestode (Cyclophyllidea). American Journal of Tropical Medicine and Hygiene. Published online May 1, 2005. doi:https://doi.org/10.4269/ajtmh.2005.72.513.

So, ultimately, are the elements in the picture cestodes and did they cause this patient's clinical manifestations?

As I have tried to stress, while it is certainly possible to rule out the grounds that we are dealing with a "rare tapeworm", without more data or better images, it is not possible to comment further on the true nature of the elements found by the author, although similarities with the material of plant or fungal origin are certainly evident (spines? Trichomes? Spores?). Given the eating habits of the young patient, it is also possible that there is another type of parasite, not observed by the author, behind the reported symptoms or that another type of pathogen is responsible, maybe a virus or a bacteria.

To finish, although new technologies, such as the genetic tests called upon to help by the author, can certainly make an important contribution to today's parasitological diagnostics, it should be remembered that their role must be to accompany and integrate the morphological identification of parasites by optical microscopy and not to replace it. The risk, is that basic skills in morphological identification under the light microscope are lost, which would paradoxically lead, among other things, to failure to detect precisely those species that are rare or entirely new in human pathology99Bradbury RS, Sapp SGH, Potters I, et al. Where Have All the Diagnostic Morphological Parasitologists Gone? Humphries RM, ed. Journal of Clinical Microbiology. 2022;60(11). doi:https://doi.org/10.1128/jcm.00986-22.