

Case Report

Human subcutaneous sparganosis caused by *Spirometra erinaceieuropaei* in Vietnam

Le Van Hai¹, Lam Van Lenh¹, Dang Thanh Chung², Pham Van Thinh², Nguyen Thu Hien², Tran Dinh Thiet³, Cao Hong Phuc⁴, Do Thanh Hoa⁵, Do Ngoc Anh⁶, Nguyen Ngoc Tuan⁷

¹ Department of Military Field Surgery, Military Hospital 103, Military Medical University, Hanoi, Vietnam

² Department of Pathology – Forensic Medicine, 103 Military Hospital, Vietnam Military Medical University, Hanoi, Vietnam

³ Centre of Oncology, Military Hospital 103, Vietnam Military Medical University, Ha Noi, Vietnam

⁴ Department of Military Occupational Medicine, Vietnam Military Medical University, Hanoi, Vietnam

⁵ Emergency Department, Military Central Hospital 108, Hanoi, Vietnam

⁶ Department of Medical Parasitology, Vietnam Military Medical University, Hanoi, Vietnam

⁷ Department of Medical Immunology, Vietnam Military Medical University, Hanoi, Vietnam

Abstract

Introduction: Human sparganosis is a rare zoonotic disease caused by *Spirometra* spp. To our knowledge, this is the second documented case of human subcutaneous sparganosis in Vietnam, following the first case reported in 1995.

Case Presentation: A rare case of human subcutaneous sparganosis caused by *Spirometra erinaceieuropaei* was detected in Vietnam on April 27, 2023, using morphological and molecular methods. The source of the infection is presumed to be associated with the consumption of raw vegetables and frog hotpot.

Conclusions: This case highlights the diagnostic value of molecular tools and suggests potential shifts in transmission patterns in urban Vietnam.

Key words: Subcutaneous sparganosis; *Spirometra erinaceieuropaei*; human; Vietnam; case report.

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Introduction

Human sparganosis is a rare zoonotic disease caused by cestode parasites of the genus *Spirometra*. It is transmitted to humans through eating or using contaminated food that contains infected intermediate hosts, such as fish, reptiles, and amphibians [1-3]. Humans, dogs, and cats have been confirmed as the principal definitive hosts, with *Cyclops* serving as the first intermediate host, and various vertebrates, including fish, reptiles, and amphibians, as second intermediate hosts [1,2,4]. Epidemiologically, human sparganosis has been reported worldwide; however, the disease is most commonly reported in Asian countries such as China [3], Japan [5], Korea [6], Taiwan [7], and Thailand [8,9]. Furthermore, human cases of sparganosis have also been documented from North America, South America, and several African countries [1,3].

Previously, human subcutaneous sparganosis was first documented in Vietnamese people in 1995 [10]. Since then, no subsequent cases of this disease have been reported, highlighting the rarity of subcutaneous sparganosis in Vietnam. A case of human subcutaneous infection with *Spirometra erinaceieuropaei*, identified in Vietnam by both morphological features and genetic

analysis, is reported herein. It is believed that this is the second reported case of subcutaneous sparganosis in Vietnam to be accurately confirmed at the species level using molecular tools.

Case Report

A 40-year-old Vietnamese woman was admitted to Military Hospital 103 (Ha Dong Town, Hanoi, Vietnam) on April 27, 2023, with a five-year history of a single subcutaneous, painless, non-itching nodule on the medial aspect of her right thigh. The lesion caused a change in skin color, presenting as circumscribed erythema and measuring approximately 1.5 cm in diameter (Figure 1A). During this period, the patient reported no increase in the size or change in the appearance of the lesion. On physical examination, a firm, smooth, irregular subcutaneous nodule was palpated on the medial aspect of the right upper thigh. The patient reported mild right thigh discomfort but denied fatigue, fever, nausea, vomiting, or watery diarrhea. Laboratory investigations, including complete blood count, C-reactive protein, and liver function tests, were all within the normal range. Her blood was tested by ELISA for *Taenia* spp., *Echinococcus* spp., *Toxocara* spp., *Fasciola* spp. and *Strongyloides* spp., all

of which were negative. Ultrasound examination of the lesion revealed a single heterogeneous hyperechoic nodule measuring 1.2×3 cm, with well-defined margins and no detectable internal vascular flow (Figure 1B). Additional imaging studies, including abdominal ultrasound, chest X-ray, and leg X-ray, were unremarkable. As the clinical presentation suggested a benign subcutaneous nodule, the patient was referred for surgical excision. Upon incision, a white, thin, flat, worm-like structure measuring approximately 0.2×15 cm was extracted (Figure 1C). A portion of the sample was preserved in 0.9% NaCl and sent to the Department of Parasitology at Military Medical University for molecular identification. The remaining part of the sample was embedded in paraffin and processed for histological examination. The morphological and histological findings revealed typical features of spargana, including a folded cuticle with microvilli and calcareous bodies (Figure 2). These features were in agreement with the diagnosis of subcutaneous sparganosis in humans. Following the removal of the lesion, antibiotic administration, and the use of anti-inflammatory medication, the symptoms resolved rapidly. The patient admitted to frequent consumption of raw vegetables and frog hotpot, but had no history of

travel outside Vietnam.

For species determination, total DNA was extracted from part of the worm body using the G-spin™ Total DNA Extraction Mini Kit (iNtRON, Korea) according to the manufacturer's instructions. For amplification of the 18S rRNA gene, the primer pair wormA (forward, 5'-GCG AAT GGC TCA TTA AAT CAG-3') and wormB (reverse, 5'-CTT GTT ACG ACT TTT ACT TCC-3') was employed [11]. The amplification conditions for the 18S rRNA gene were as follows: 94°C for 5 minutes, 35 cycles of 94°C for 30 seconds, 54°C for 30 seconds, 72°C for 120 seconds, and a final extension at 72°C for 15 minutes. The 18S rRNA gene sequencing was performed using wormA and wormB together with two inner primers, EriF (5'-CCG TCC TAG TTC TGA CCA TAA AC-3') and EriR (5'-GGT CAG AAC TAG GAC GGT ATC T-3') (self-designed primers). The mitochondrial cytochrome oxidase subunit I (*cox1*) gene was amplified and sequenced using the JB3 (5'-TTT TTT GGG CAT CCT GAG GTT TAT-3') and JB4.5 (5'-TAA AGA AAG AAC ATA ATG AAA ATG-3') primers, as described previously [12]. For amplification of the *cox1* gene, the conditions were an initial denaturation step at 95 °C for 5 minutes, followed by 35 cycles (94 °C for 30 seconds, 53 °C for

Figure 1. The lesion on the patient's thigh prior to surgical excision (A, B) and plerocercoid larva of *Spirometra* removed intraoperatively (C).

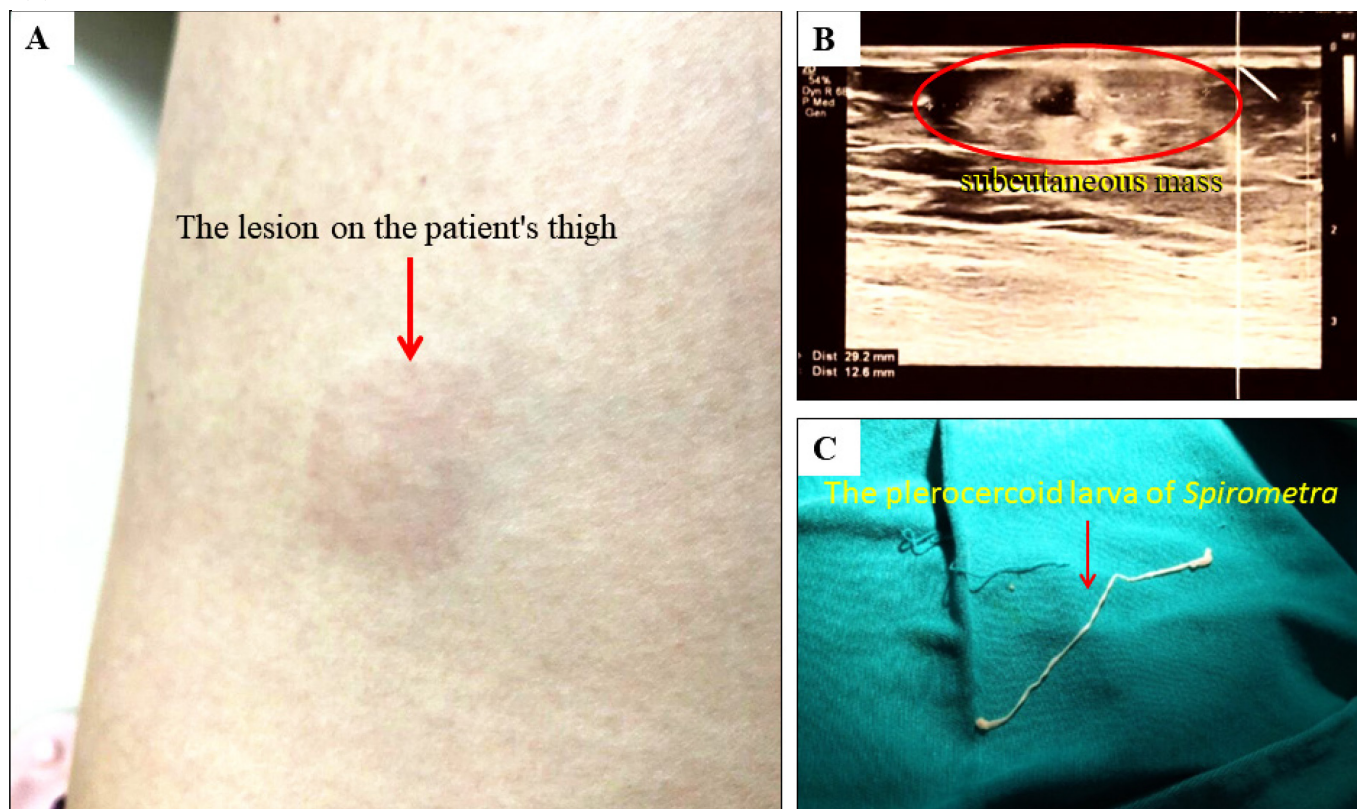
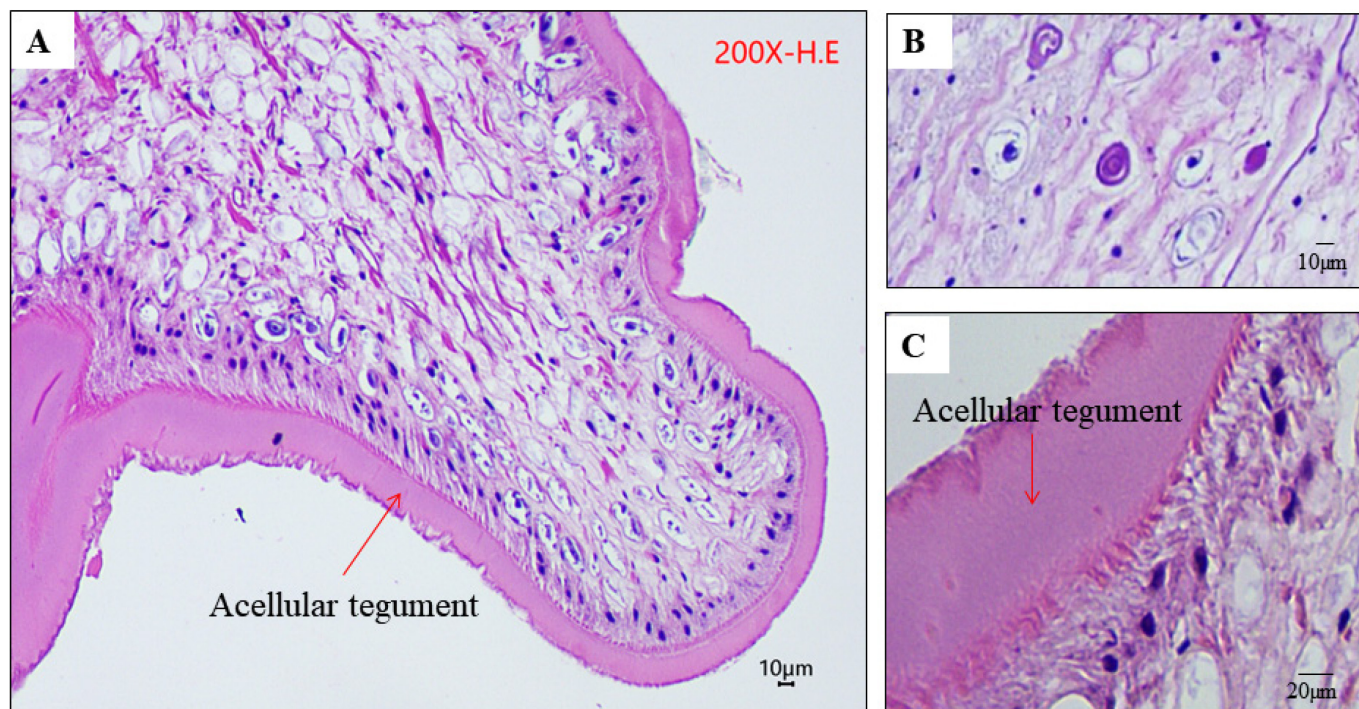


Figure 2. H&E staining of the plerocercoid larva of *Spirometra erinaceieuropaei*. Typical histopathological characteristics of cestodes, including the highly folded eosinophilic acellular tegument (A, C) and the occurrence of calcareous bodies (B).



30 seconds, and 72 °C for 30 seconds), and a final extension at 72 °C for 15 minutes. The sequencing products were analyzed using the BLAST tool, showing > 99% identity with the 18S and *cox1* genes of *S. erinaceieuropaei*. The sequences were deposited in GenBank under accession numbers OR143745.1 and OR145754.1.

Discussion

Human beings are accidental hosts of *S. erinaceieuropaei* and become infected by ingesting raw or undercooked second-intermediate hosts or by drinking freshwater containing infected copepods [1-3,11,13]. Therefore, human subcutaneous sparganosis is uncommon and is mainly reported through clinical case reports. To date, more than 2,000 human clinical cases have been documented in various countries around the world, with the majority described in Asian countries, particularly in China, which accounts for more than 80% of the cases, while countries such as Thailand, Laos, and Cambodia have also documented sporadic human infections [9,14]. Currently, the genus *Spirometra* comprises 64 nominal species [2], but only five are recognized as valid: *S. erinaceieuropaei*, *S. mansonoides*, *S. pretoriensis*, *S. proliferum*, and *S. theileri* [2,3,14]. Among these, *S. erinaceieuropaei* is regarded as the most frequent species [2,6,14]. According to a literature survey, subcutaneous lesions

are the most common manifestation, followed by sparganosis involving the central nervous system, viscera, eyes, and muscles [11,15].

The clinical features of *Spirometra* infection in humans are largely non-specific, and the lack of commercially available serological tests makes the disease difficult to diagnose and prone to misdiagnosis [2,3,13]. Previously, several cases of subcutaneous parasitic nodules in humans have been reported in Vietnam, and the causative agents were confirmed only by morphological and molecular methods after surgical removal [16,17]. The patient presented with a single subcutaneous lesion and no eosinophilia. This finding is in agreement with previously published reports [13,15,18]. In the current case, the patient resided in an urban district of Hanoi, Northern Vietnam, and frequently consumed raw vegetables and frog hotpot. Thus, these were considered probable risk factors for infection in this case. In addition, the traditional use of frog meat for treating open wounds and issues related to water safety in Vietnam is a favorable factor for the emergence and persistence of parasitic diseases in general, and *Spirometra* infections in particular [19]. Current literature indicates that most cases of sparganosis in Vietnam have involved ocular manifestations [20], and only one case of subcutaneous sparganosis had been documented prior to 1995 [10]. Furthermore, the occurrence of this case in an urban

setting may suggest evolving transmission dynamics, potentially linked to modern food distribution systems, changing dietary habits, and increased availability of high-risk traditional dishes in cities. Collectively, these observations emphasize that sparganosis should remain an important differential diagnosis even in urban populations and highlight the need for increased awareness and preventive measures. This case provides additional valuable epidemiological information on sparganosis and underscores the need for further investigations to clarify the prevalence and transmission pathways of this disease in Vietnam.

The parasite isolated from the current case was identified as *S. erinaceieuropaei* using morphological and histological examinations of the larva, as well as sequence comparisons of the 18S rRNA and *cox1* genes. It is believed that this is the second case of human subcutaneous sparganosis identified in Vietnam and one of the very few confirmed cases in Southeast Asia using a combination of morphological and molecular tools. Previous studies have shown that the *cox1* gene is a useful genetic marker for identifying the genus and species of *Spirometra* parasites due to its relatively rapid evolutionary rate and high interspecific variability, enabling reliable discrimination among closely related cestode species [2,21,22]. In contrast, the 18S rRNA gene is more conserved and provides reliable resolution at higher taxonomic levels; therefore, it is commonly used to estimate phylogenetic relationships [23]. For these reasons, molecular tools have been widely applied in parasitology to improve taxonomic accuracy and phylogenetic consistency, particularly in cases where morphological identification is challenging or ambiguous.

Previously, a rare case of human infection with adult *S. erinaceieuropaei* in Vietnam was reported using molecular identification [19]. In the present case, the approach to species identification, involving post-surgical sampling from the lesion for molecular analysis, is consistent with most previous publications [5,8,13]. Based on molecular data, previous studies have shown that *S. erinaceieuropaei* is commonly distributed in Europe [2,24]. In Asia, including Vietnam, human sparganosis is also most commonly caused by this species [3]. The morphology of *Spirometra* species is highly similar and difficult to differentiate, making species identification based on morphological characteristics alone challenging [3,15]. Therefore, precise species identification can only be achieved through molecular methods, which are currently based on DNA sequencing [2]. This finding highlights the importance of integrating molecular

identification techniques with traditional morphological methods to achieve accurate species determination and improve diagnostic accuracy in human sparganosis.

According to the medical literature, the treatment of human subcutaneous sparganosis is primarily based on complete surgical removal of the larva [2,3,13]. However, no standardized therapeutic approach has been established for cases in which the lesion is located at a site unsuitable for surgical excision [13]. In our case, the patient had a single lesion that was completely removed by surgery. Therefore, praziquantel was not administered, as this drug is only cautiously considered in the management of *Spirometra* infections [2]. The successful outcome of this case highlights that complete surgical excision remains the standard treatment for subcutaneous sparganosis, thereby avoiding the need for potentially ineffective and unnecessary drug therapies.

Conclusions

Sparganosis caused by *S. erinaceieuropaei* is rare in humans. Further characterization of *S. erinaceieuropaei* infection is recommended to elucidate the prevalence and transmission pathways of this disease in Vietnam.

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Ethics Approval and Consent to Participate

Written informed consent was obtained from the patient for the publication of this case report and any accompanying images.

Corresponding author

Nguyen Ngoc Tuan, MD, PhD
Department of Medical Immunology,
Vietnam Military Medical University,
160 Phung Hung road, Ha Dong district,
Ha Noi city, Vietnam;
Email: nguyenngoctuanmd@gmail.com

Conflict of interest

No conflict of interest is declared.

References

1. Czyżewska J, Namiot A, Koziółkiewicz K, Matowicka-Karna J, Dzięcioł J, Kemon H (2019) The first case of human

- sparganosis in Poland and a review of the cases in Europe. *Parasitol Int* 70: 89-91. doi: 10.1016/j.parint.2019.02.005.
2. Kuchta R, Kołodziej-Sobocińska M, Brabec J, Młocicki D, Salamatin R, Scholz T (2020) Sparganosis (*Spirometra*) in Europe in the molecular era. *Clin Infect Dis* 72: 882-890. doi: 10.1093/cid/ciaa1036.
3. Liu Q, Li M-W, Wang Z-D, Zhao G-H, Zhu X-Q (2015) Human sparganosis, a neglected food borne zoonosis. *Lancet Infect Dis* 15: 1226-1235. doi: 10.1016/S1473-3099(15)00133-4.
4. Sharma S, Mahajan RK, Ram H, Karikalan M, Achra A (2021) Sparganosis mimicking a soft-tissue tumor: A diagnostic challenge. *Trop Parasitol* 11: 49-52. doi: 10.4103/tp.TP_40_20.
5. Tappe D, Berger L, Haeupler A, Muntau B, Racz P, Harder Y, Specht K, Prazeres da Costa C, Poppert S (2013) Molecular diagnosis of subcutaneous *Spirometra erinaceieuropaei* sparganosis in a Japanese immigrant. *Am J Trop Med Hyg* 88: 198-202. doi: 10.4269/ajtmh.2012.12-0406.
6. Kim J-G, Ahn C-S, Sohn W-M, Nawa Y, Kong Y (2018) Human sparganosis in Korea. *J Korean Med Sci* 33: e273. doi: 10.3346/jkms.2018.33.e273.
7. Chang JH, Lin OS, Yeh KT (1999) Subcutaneous sparganosis-a case report and a review of human sparganosis in Taiwan. *Kaohsiung J Med Sci* 15: 567-571.
8. Boonyasiri A, Cheunsuchon P, Suputtamongkol Y, Yamasaki H, Sanpool O, Maleewong W, Intapan PM (2014) Nine Human sparganosis cases in Thailand with molecular identification of causative parasite species. *Am J Trop Med Hyg* 91: 389-393. doi: 10.4269/ajtmh.14-0178.
9. Wiwanitkit V (2005) A review of human sparganosis in Thailand. *Int J Infect Dis* 9: 312-316. doi: 10.1016/j.ijid.2004.08.003.
10. Vortel V, Pur J, Halberstadt P, Valkounová J (1995) Human sparganosis. *Cesk Patol* 31: 3-8.
11. Bagrade G, Králová-Hromadová I, Bazsalovicsová E, Radačovská A, Kołodziej-Sobocińska M (2021) The first records of *Spirometra erinaceieuropaei* (Cestoda: Diphyllbothriidae), a causative agent of human sparganosis, in Latvian wildlife. *Parasitol Res* 120: 365-371. doi: 10.1007/s00436-020-06957-0.
12. Bowles J, Blair D, McManus DP (1992) Genetic variants within the genus *Echinococcus* identified by mitochondrial DNA sequencing. *Mol Biochem Parasitol* 54: 165-173. doi: 10.1016/0166-6851(92)90109-W.
13. Muigg V, Ruf M-T, Schwarzkopf S, Huang S, Denisjuk N, Stürmann A, Ritzler M, Wampfler R, Poppert S, Neumayr A (2019) Case report: human subcutaneous sparganosis in a Thai migrant. *Am J Trop Med Hyg* 101: 1170-1173. doi: 10.4269/ajtmh.19-0456.
14. Yamasaki H, Sanpool O, Rodpai R, Sadaow L, Laummaunwai P, Un M, Thanchomnang T, Laymanivong S, Aung WPP, Intapan PM, Maleewong W (2021) *Spirometra* species from Asia: genetic diversity and taxonomic challenges. *Parasitol Int* 80: 102181. doi: 10.1016/j.parint.2020.102181.
15. Liu W, Gong T, Chen S, Liu Q, Zhou H, He J, Wu Y, Li F, Liu Y (2022) Epidemiology, diagnosis, and prevention of sparganosis in Asia. *Animals* 12: 1578. doi: 10.3390/ani12121578.
16. Dang TCT, Nguyen TH, Do TD, Uga S, Morishima Y, Sugiyama H, Yamasaki H (2010) A human case of subcutaneous dirofilariasis caused by *Dirofilaria repens* in Vietnam: histologic and molecular confirmation. *Parasitol Res* 107: 1003-1007. doi: 10.1007/s00436-010-1961-4.
17. Nguyen TH, Vu THA, Nguyen TTT, Do NA (2026): Unusual subcutaneous tumor caused by *Dracunculus* sp. in Vietnam: integrated clinical, parasitological, imaging, and molecular evidence. *J Parasit Dis*. doi: 10.1007/s12639-026-01906-7.
18. Huang X, Jia C, Zhan Y, Fu S, Zhang H (2023) Subcutaneous sparganosis: a case report and literature review. *Int J Dermatol* 62: 1067-1069. doi: 10.1111/ijd.16617.
19. Le AT, Do L-QT, Nguyen H-BT, Nguyen H-NT, Do AN (2017) Case report: the first case of human infection by adult of *Spirometra erinaceieuropaei* in Vietnam. *BMC Infect Dis* 17: 669. doi: 10.1186/s12879-017-2786-x.
20. Botterel F, Bourée P (2006) Ocular sparganosis: a case report. *J Travel Med* 10: 245-246. doi: 10.2310/7060.2003.40468.
21. Zhang X, Duan JY, Shi YL, Jiang P, Zeng DJ, Wang ZQ, Cui J (2017) Comparative mitochondrial genomics among *Spirometra* (Cestoda: Diphyllbothriidae) and the molecular phylogeny of related tapeworms. *Mol Phylogenet Evol* 117: 75-82. doi: 10.1016/j.ympev.2017.06.003.
22. Dai RS, Liu GH, Song HQ, Lin RQ, Yuan ZG, Li MW, Huang SY, Liu W, Zhu XQ (2011) Sequence variability in two mitochondrial DNA regions and internal transcribed spacer among three cestodes infecting animals and humans from China. *J Helminthol* 86: 245-251. doi: 10.1017/S0022149X11000319.
23. Liu D-W, Kato H, Sugane K (1997) The nucleotide sequence and predicted secondary structure of small subunit (18S) ribosomal RNA from *Spirometra erinaceieuropaei*. *Gene* 184: 221-227. doi: 10.1016/S0378-1119(96)00599-9.
24. Sanders TL, Sobotyck C, Jimenez Castro PD, Abdu A, Baade J, Borst M, Dangoudoubiyam S, Delcambre BA, Gruntmeir JM, Lee A, Leutenegger C, Lozoya C, Murphy G, Pulaski C, Schaefer J, Vatta A, Walden HDS, Lejeune M, Verocai GG (2025) Molecular characterization of *Spirometra* isolates across the USA. *Parasitology* 152: 477-486. doi: 10.1017/S003118202500054X.