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Sage Journals

Case Report

First molecular detection of *Leishmania infantum* in a domestic cat from Costa Rica

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Case summary A 4-year-old, neutered male domestic cat was presented with an indolent, non-ulcerated and painless subcutaneous nodule on the left hindlimb. Abdominal ultrasonography revealed generalized lymphadenomegaly and splenomegaly with a honeycomb pattern. The cat tested negative for feline leukemia virus and feline immunodeficiency virus. Fine-needle aspiration of the lesion showed mixed inflammatory cells, including eosinophils and macrophages containing small intracytoplasmic basophilic inclusions considered suspicious for *Leishmania*-like organisms. The mass was surgically excised for histopathological and molecular evaluation. Histopathology demonstrated eosinophilic granulomatous inflammation with secondary furunculosis, without unequivocal visualization of amastigotes. Quantitative RT-PCR was positive for *Leishmania* species, and conventional PCR targeting the ITS-1 gene, followed by sequencing, showed 99.62% identity with *Leishmania infantum*. No anti-*Leishmania* treatment was administered because the lesion was completely excised, the cat remained clinically well and specific anti-*Leishmania* drugs are not readily accessible in Costa Rica. At the 7-month follow-up, no recurrence of the nodule was observed.

Relevance and novel information This report describes the first molecular detection of *L infantum* in a Costa Rican domestic cat and the first record from the country's Central Valley. The case highlights the diagnostic challenges of feline *Leishmania* infection and supports *Leishmania* infection among the differential diagnoses for feline cutaneous nodules in Central America. It also underlines the need for further studies on the epidemiological role of cats in a One Health context.

Plain language summary

First confirmed detection of *Leishmania infantum* in a healthy pet cat in Costa Rica

Leishmaniasis is a protozoal disease transmitted by sandflies that can affect both people and animals. Dogs are the best-known domestic hosts, but cats can also become infected, often without any clinical signs. In this report, an apparently healthy pet cat from Costa Rica had a small skin lump removed. Molecular testing of the lump identified *Leishmania infantum*, although the parasite was not detected on histopathology. The cat remained clinically healthy after surgery and did not receive antiparasitic treatment. This case is important because it provides the first molecular evidence of *L infantum* in a Costa Rican domestic cat and suggests that cats without obvious clinical signs may carry this parasite. In endemic or emerging areas, veterinarians should consider *Leishmania* infection as a possible cause of cutaneous nodules and support surveillance from a One Health perspective.

Keywords
Feline leishmaniosis, *Leishmania infantum*, cytology, molecular diagnosis, subcutaneous nodule, Costa Rica

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Introduction

Leishmaniasis is a zoonotic disease caused by protozoan parasites of the genus *Leishmania* and transmitted by phlebotomine sandflies, affecting humans, wildlife and domestic animals. Clinical manifestations are often cryptic and non-specific, and local transmission dynamics are influenced by environmental and anthropogenic drivers such as deforestation, climate change and urban expansion.[1] In Costa Rica, the most prevalent species is *Leishmania panamensis*, the primary etiological agent of human cutaneous leishmaniasis, followed by *Leishmania braziliensis*.[2,3] In contrast, reports of *Leishmania infantum*, the species classically associated with visceral leishmaniasis and canine reservoirs, are extremely rare in the country. The last documented detection of *L infantum* in Costa Rica dates to the year 2000 and was restricted to the province of Guanacaste.[4]

Domestic cats have traditionally been considered accidental or secondary hosts of *Leishmania* species; however, increasing numbers of feline cases have been reported worldwide, suggesting that cats may play a broader role in the epidemiology of leishmaniasis than previously recognized.[5,6] Most feline cases described to date are associated with cutaneous or mucocutaneous disease, frequently in immunocompromised animals,[7,8] although many infected cats may remain subclinical.

The present report describes the first molecular detection of *L infantum* in a Costa Rican domestic cat and the first record from the country's Central Valley. The occurrence of this parasite in a feline patient from an urban environment, distant from historically recognized endemic areas, challenges the current understanding of the geographic distribution of *L infantum* in Costa Rica and supports the need to investigate whether this zoonotic parasite may be circulating outside traditionally recognized transmission zones.

Case description

A 4-year-old, neutered male cat was admitted to a private veterinary clinic on 31 December 2024, because of the presence of a 1.5 cm subcutaneous nodule located on the left hindlimb, caudal to the stifle (Figure 1). On physical examination, the lesion was mobile, non-alopecic, non-ulcerated and painless. A complete diagnostic work-up was initiated. Point-of-care testing for feline leukemia virus (FeLV) antigen and feline immunodeficiency virus (FIV) antibodies was performed using a commercial rapid immunochromatographic kit (FIVab/FeLV AG Test Kit; BioNote), and both results were negative. Follow-up testing in 30 days (FeLV) and 60 days (FIV) was not performed. Abdominal ultrasonography revealed generalized lymphadenomegaly, marked urinary sediment within the bladder, splenomegaly with a moderate honeycomb pattern and marked enteritis characterized by thickening of the intestinal muscular layer. No vomiting, diarrhea, weight loss or lethargy was reported by the owner at presentation. Urinalysis showed mildly turbid urine (turbidity +1) with a urine specific gravity of 1.016 and pH 6; blood was +1 with 0–3 erythrocytes/HPF (high-power field) and 0–1 leukocytes/HPF; no crystalluria or bacteriuria was observed. Amorphous sediment (+1) was noted. The cat had received intravenous fluids before sampling.

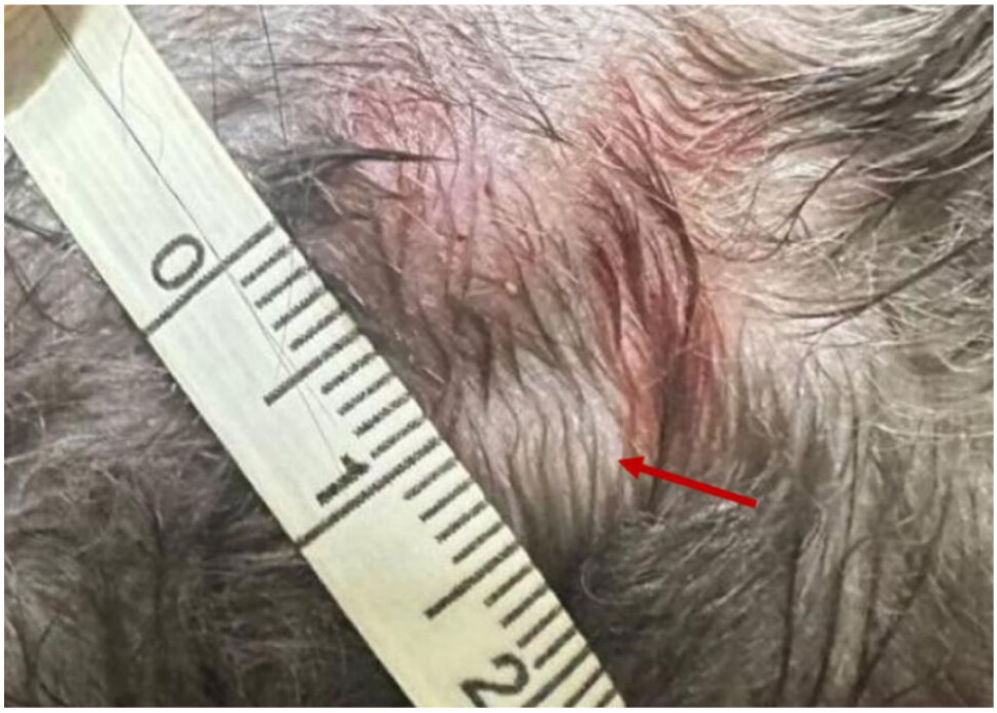

Figure 1 Subcutaneous nodule (approximately 1.5 cm in diameter) located on the left hindlimb of the cat (arrow)

Fine-needle aspiration cytology of the mass revealed mixed inflammatory cells, predominantly lymphocytes, with a moderate number of eosinophils and macrophages containing small intracytoplasmic basophilic inclusions considered suspicious for *Leishmania*-like organisms (Figure 2). The subcutaneous nodule was surgically excised and examined histologically and molecularly. Histopathological evaluation showed eosinophilic granulomatous inflammation with secondary furunculosis, without unequivocal visualization of amastigotes.

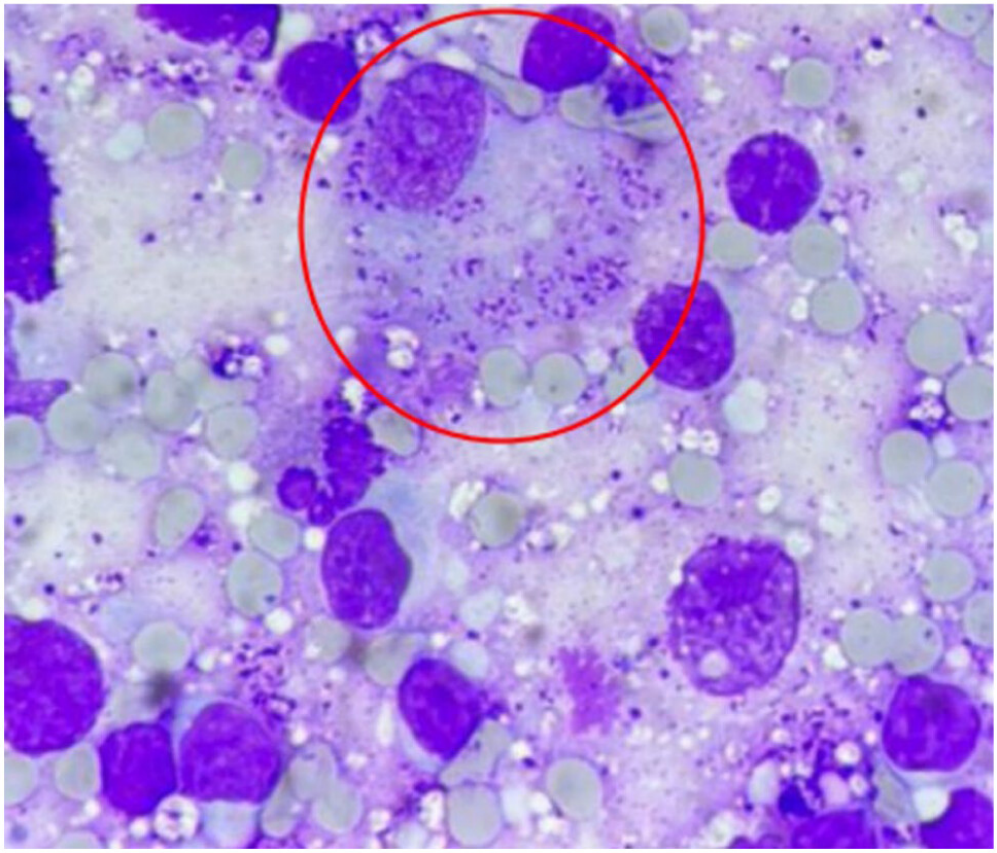

Figure 2 Fine-needle aspiration cytology of the lesion showing macrophages containing small intracytoplasmic basophilic inclusions (1–2 µm), considered suspicious for *Leishmania*-like organisms (Wright stain)

Molecular diagnosis

Genomic DNA was extracted from the excised tissue using the DNeasy Blood & Tissue Kit (QIAGEN), following the manufacturer's instructions. Initial screening for *Leishmania* species was performed by quantitative RT-PCR (qPCR) targeting a 111 base pair (bp) fragment of the kinetoplast minicircle DNA (kDNA).[9] For species identification, conventional PCR was performed targeting the internal transcribed spacer 1 (ITS-1) region using primers LITSR and L5.8S, which amplify an approximately 330 bp fragment.[10] PCR products were visualized by electrophoresis on 2% agarose gels stained with GelRed and run at 90 V for 50 mins. Amplicon size was estimated using a 100 bp DNA ladder. A positive PCR product was submitted for bidirectional Sanger sequencing at MACROGEN. Chromatograms were manually edited using BioEdit v7.2.5. Species-level identification was performed by BLAST comparison against reference sequences available in GenBank.

Molecular results

The qPCR was positive for *Leishmania* species (quantification cycle value: 32). Conventional PCR targeting the ITS-1 gene generated a 330 bp amplicon. Sequencing of the PCR product showed 99.62% identity with *L infantum* (GenBank accession number MG778653), previously isolated from a naturally infected dog in Brazil. The obtained sequence was deposited in GenBank under accession number PV791013.

Clinical evolution and follow-up

No anti-*Leishmania* treatment was administered because the lesion was completely excised, the cat remained clinically well and specific anti-*Leishmania* drugs are not readily accessible in Costa Rica. Clinical management was limited to complete surgical excision of the lesion and supportive care. At the 7-month follow-up evaluation (August 2025), the owner reported that the cat remained clinically well, with no recurrence of lesions or systemic signs. Periodic ultrasonographic follow-up was recommended.

Discussion

Leishmaniasis may present in different clinical forms, including cutaneous, mucocutaneous and visceral diseases, all of which are characterized by non-specific clinical manifestations. Cutaneous lesions typically present as nodules, ulcers or plaques, most often affecting the head, ears and distal limbs. Visceral leishmaniasis, in contrast, is associated with systemic involvement and may include splenomegaly, lymphadenomegaly, anemia, apathy and weight loss.[5–7] In the present case, the cat exhibited a single, non-ulcerated cutaneous nodule. However, the ultrasonographic findings of generalized lymphadenomegaly and splenomegaly raised concern for possible systemic involvement.[6,11] Nevertheless, dissemination could not be confirmed owing to sampling limitations.

The diagnosis of leishmaniasis in cats remains challenging. Seroconversion may require prolonged periods, up to 22 months in some cases, potentially leading to false-negative results in serological assays.[6,12] Likewise, PCR performed on peripheral blood may yield false-negative results because of low parasitemia, whereas aspirates from lymph nodes, bone marrow or skin lesions tend to increase diagnostic sensitivity.[6,13] Histopathology may underestimate parasite burden, and amastigotes may be scarce or not observed in some feline cases.[7] In the present case, histopathology revealed eosinophilic granulomatous inflammation without visible amastigotes, and the diagnosis was supported by the complementary use of cytology and molecular sequencing of the lesion. This finding highlights the importance of combining cytological and molecular techniques when feline *Leishmania* infection is suspected, particularly when histopathological findings are not classical.[6]

Most feline cases of leishmaniasis reported in Europe and South America involve animals coinfected with immunosuppressive retroviruses such as FIV or FeLV.[14,15] In contrast, the present patient tested negative for both viruses, suggesting that susceptibility to *L infantum* may occur even in the absence of classical immunosuppressive comorbidities. Cats are often reported to remain subclinically infected, and this may help to explain why some infected animals show limited or no overt clinical signs.[5,6] Moreover, the absence of lesion recurrence after surgical excision, despite the lack of anti-*Leishmania* treatment, suggests local clinical control; however, persistence of infection at other sites could not be excluded.[5]

From an epidemiological perspective, this case is particularly relevant. In Costa Rica, human cutaneous leishmaniasis is primarily associated with *L panamensis*, followed by *L braziliensis*.[3,16] Reports of *L infantum* are exceedingly rare and were last documented more than 25 years ago, with a single case in the province of Heredia, which was introduced from Spain.[17] The detection of *L infantum* in a domestic cat from the Central Valley supports the need to investigate whether this parasite may be circulating more widely than currently recognized and highlights the need to reassess the distribution of sandfly vectors in urban and peri-urban areas. Furthermore, this finding raises important questions regarding the role of cats as accidental hosts or possible secondary reservoirs in local transmission dynamics.[6,12] Because cats may remain infected without obvious clinical signs, increased awareness and surveillance in endemic or emerging areas may be warranted from a One Health perspective.

Conclusions

Feline leishmaniosis remains an underrecognized condition with highly variable clinical presentations. The present case demonstrates that *L infantum* infection may occur in cats without obvious clinical signs outside historically recognized endemic regions, and that a combination of cytological, histopathological and molecular findings may support diagnosis when *Leishmania* infection is suspected. Veterinary practitioners in Central America should therefore include leishmaniosis in the differential diagnosis of feline cutaneous nodules. Further studies are needed to clarify the epidemiological role of cats in local transmission cycles and to better define their potential public health relevance.

Author note

The nucleotide sequence generated in this study has been deposited in the GenBank database under accession number PV791013.

Conflict of interest

The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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Ethical approval

The work described in this manuscript involved the use of non-experimental (owned or unowned) animals. Established internationally recognized high standards (‘best practice’) of veterinary clinical care for the individual patient were always followed, and/or this work involved the use of cadavers. Ethical approval from a committee was therefore not specifically required for publication in *JFMS Open Reports*. Although not required, where ethical approval was still obtained, it is stated in the manuscript.

Informed consent

Informed consent (verbal or written) was obtained from the owner or legal custodian of all animal(s) described in this work (experimental or non-experimental animals, including cadavers, tissues, and samples) for all procedure(s) undertaken (prospective or retrospective studies). No animals or people are identifiable within this publication, and therefore, additional informed consent for publication was not required.

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