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# Report of myiasis in Ameerega bassleri (Anura: Dendrobatidae) from San Martín region, Peru

## Reporte de miasis en Ameerega bassleri (Anura: Dendrobatidae) en la región San Martín, Perú

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## ABSTRACT

We report a case of myiasis in an adult Ameerega bassleri frog observed at kilometer 18 of the Tarapoto–Yurimaguas road, San Martín region, Peru. The observation took place on 5 February 2025 at 22:33 h. The frog exhibited a skin opening in which dipteran larvae were clearly visible embedded in the left dorsolateral region. This condition is rarely documented in Neotropical anurans and had not been previously reported for this species. The larvae were likely Sarcophagidae (flesh-fly) maggots, which are known agents of amphibian myiasis. This finding highlights the importance of monitoring parasitic infections in wild amphibian populations – especially in endemic species with restricted ranges – within the context of emerging diseases and ecological factors that may favor such infestations.

**Keywords:** *Ameerega bassleri*; Dendrobatidae; myiasis; Sarcophagidae; Peru

## RESUMEN

Se reporta un caso de miasis en un individuo adulto de Ameerega bassleri, observado en el kilómetro 18 de la carretera Tarapoto–Yurimaguas, región San Martín (Perú). La observación ocurrió el 5 de febrero de 2025 a las 22:33 h. El ejemplar presentó un orificio en la piel, en cuya periferia se podían observar claramente larvas de díptero incrustadas en la región dorsolateral, una condición poco documentada en anuros neotropicales y no reportada previamente para esta especie. Las larvas observadas probablemente pertenecían a la familia Sarcophagidae (moscas flesh-fly), conocidas por causar miasis en anfibios silvestres. Este hallazgo resalta la importancia de monitorear las afecciones parasitarias en poblaciones silvestres de anfibios, especialmente en especies endémicas de distribución restringida, en el contexto de enfermedades emergentes y potenciales factores ecológicos que pudieran favorecer estas infestaciones.

**Palabras clave:** *Ameerega bassleri*; Dendrobatidae; miasis; Sarcophagidae; Perú

## 1. INTRODUCTION

Myiasis is a parasitic disease caused by the infestation of living animal tissues by fly larvae (order Diptera) (1,2). This parasitic phenomenon affects a wide variety of vertebrates worldwide, including humans, domestic animals, and wildlife (3,4). In amphibians, cases of myiasis have been documented in different regions and families: for example, in temperate regions of Europe, North America, and Oceania, myiasis has been reported as caused by larvae of Calliphoridae (blowflies), Chloropidae, Muscidae, and Sarcophagidae, either obligatorily or facultatively (1,5–7). Nevertheless, reports of myiasis in tropical amphibians are infrequent and fragmentary, so each new case contributes valuable information on these poorly known host–parasite interactions (2,5).

In the Neotropics, cases of myiasis in amphibians have been considered rare but are emerging as herpetological studies intensify. The first documented case in a Neotropical anuran dates back to the 1980s, when lethal parasitism of Atelopus varius (harlequin toad, family Bufonidae) by larvae of Notochaeta bufonivora (now Lucilia bufonivora, Diptera: Sarcophagidae) was reported in Costa Rica (8). Since then, additional episodes have been recorded in different countries and anuran families: for example, in Panama, myiasis caused by Sarcophagidae was documented in the glass frog Hyalinobatrachium fleischmanni (Centrolenidae) (9); in Colombia, sarcophagid larvae were reported in the terrestrial frog Pristimantis thectopternus (Strabomantidae) (10); and in Argentina, cases have been observed in Atlantic Forest anurans (Rhinella ornata and Boana faber) caused by phorid flies (Megaselia scalaris, family Phoridae) (11). In Brazil, infestations have been recorded in several leptodactylid species, including Adenomera marmorata, Leptodactylus latrans, and Physalaemus cuvieri, mostly attributed to larvae of Sarcophagidae (12–14). Indeed, throughout Central and South America, the Sarcophagidae family appears as the main etiological agent of myiasis in wild anurans (9,14,15). Only occasionally have other dipteran families been implicated; a notable example is Leptodactylus fuscus in Brazil and Argentina, where Megaselia (Phoridae) was identified as the causative agent instead of sarcophagids (11,16).

In Peru, the first evidence of myiasis in amphibians was reported in poison frogs (family Dendrobatidae). Hagman et al. (2005) documented multiple cases of myiasis in dart frogs of the genus Epipedobates (now separated into Ameerega and Epipedobates) in the Peruvian Amazon, caused by larvae of the sarcophagid fly Sarcodexia lambens. These cases represented the first evidence of myiasis in Peruvian anurans and the first record of fly parasitism in poison frogs worldwide. In the records of Hagman et al. (2005), most affected individuals corresponded to larger-bodied dendrobatid species, such as Epipedobates trivittatus (now Ameerega trivittata), while no infestations were found in smaller sympatric species. This suggests that small-bodied anurans may succumb rapidly to larval infection (within 1–3 days) and therefore remain undetected in the field, consistent with observations in temperate amphibians where smaller individuals are consumed more quickly by parasitic larvae. Likewise, it was observed that many dendrobatids parasitized in Peru were found sitting in water or very humid environments. Poison frogs typically avoid remaining in water, so this unusual behavior could indicate either a sickness behavior of the host or a strategy of the larvae to maintain a favorable moist microenvironment (17,18). A similar pattern has been reported in other cases of myiasis: for example, in Panama, a Rhinella alata toad infested by sarcophagid larvae was found moribund near a stream, and the infection was suspected to have caused its death (19).

Ameerega bassleri (Melin, 1941) is a poison frog of the family Dendrobatidae, endemic to Peru, distributed in montane forests of the upper Amazon (eastern Andes) at intermediate elevations. It is diurnal, terrestrial, and territorial, and displays aposematic (warning) coloration, as do other dart frogs (17). To date, the only reports of myiasis in Ameerega bassleri are scarce and all of them originate from the Peruvian Amazon (17). The present work constitutes a documented record of myiasis in A. bassleri, expanding the knowledge of parasitic interactions affecting Neotropical amphibians endemic to Peru.

## 2. MATERIALS Y METHODS

During a nocturnal survey on February 5, 2025 (22:33 h), an adult individual of *Ameerega bassleri* was observed at kilometer 18 of the Tarapoto–Yurimaguas road, San Martín region, Peru (coordinates 6°27'18.13" S, 76°17'13.73" W; 408 m a.s.l.). The specimen was resting in a roadside ditch through which a small stream of water was flowing. This behavior is unusual for the species, since *A. bassleri* typically sleeps on low vegetation rather than within bodies of water. The location had adjacent secondary and primary vegetation, with a very humid environment. When illuminated with a flashlight, an open lesion was noted on the left side of the body, so the finding was documented with high-resolution photographs. No direct manipulation or collection of the specimen was performed in order to minimize stress on the animal. Photographs were taken with a digital reflex camera, focusing on details of the lesion and visible larvae. It was not possible to extract the larvae for taxonomic identification; however, the observable characteristics were compared with descriptions of dipteran larvae causing myiasis reported in the literature.

## 3. RESULTS

The adult specimen of *Ameerega bassleri* presented an open lesion of approximately 5 mm in diameter on the left dorsolateral region of the body. Within the opening, several whitish, vermiform larvae were observed, tightly clustered and showing active movements. Figure 1 shows the *A. bassleri* specimen; the wound exhibited slightly inflamed edges and areas of exposed subdermal tissue, although no purulent secretion or foul odor was detected. The visible larvae were estimated to be 4–6 mm in length and lacked pigmentation (white to cream-colored), characteristics typical of sarcophagid larvae in early developmental stages. No adult fly activity was observed in the vicinity at the time of detection, although oviposition or larviposition may have occurred hours earlier.

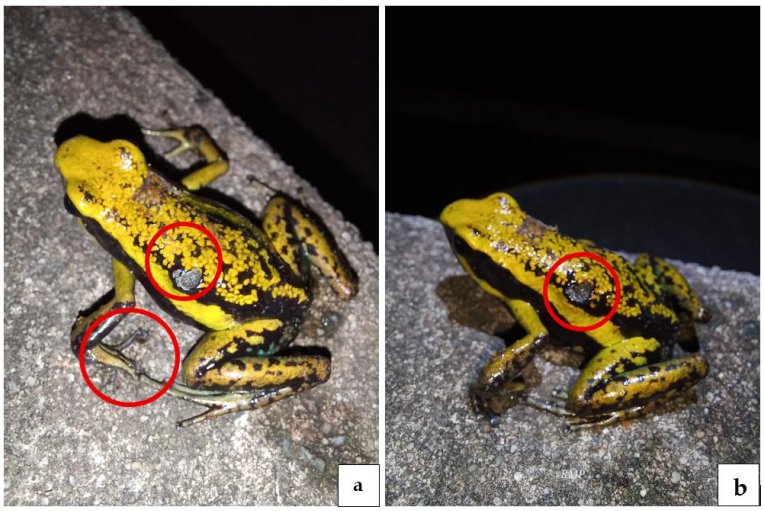


**Figure 1.** Lesions indicated with red circles: one on the left dorsolateral side and another that could represent either a lesion or a malformation on the left forelimb, possibly caused by larvae of the family Sarcophagidae

In addition to the main lesion on the side, an anomaly was noted on the frog's left forelimb: the fingers of the hand were bent backward in an abnormal position (possible subluxation or malformation). This condition could represent a previous or congenital injury, or perhaps be associated with the infestation itself (if larvae affected muscle or nerve tissue of the limb). In Figure 1 (a and b), the location of the dorsolateral lesion and the unusual posture of the specimen's left hand can be distinguished. After visual documentation, the individual was left in place to avoid excessive disturbance; its final outcome could not be observed, but it is likely that the larval infestation compromised its survival, since similar cases in other frogs have proven fatal without veterinary intervention.

## 4. DISCUSSION

Nuestros hallazgos concuerdan con reportes previos de miasis en ranas venenosas de la Amazonía: las larvas observadas son muy probablemente de la familia Sarcophagidae, conocidos vulgarmente como "moscas de la carne" o flesh-flies, las cuales han sido identificadas como agentes etiológicos en la mayoría de casos de miasis en anuros de Centro y Sudamérica. En específico, *Sarcodexia lambens* (Diptera: Sarcophagidae) ha sido reportada parasitando ranas dendrobátidas peruanas (*Epipedobates/Ameerega*), por lo que es razonable inferir que las larvas en *A. bassleri* podrían corresponder a dicha especie u otra estrechamente afín. Desafortunadamente, la identificación taxonómica precisa no fue posible en nuestro caso debido a la falta de colecta de especímenes; estudios previos han señalado que la determinación de sarcofágidos a nivel de género o especie es difícil basándose solo en morfología larval (14). De hecho, Vélez et al. (2025) (2), reportaron el caso más reciente de miasis en dendrobátidos (en *Oophaga sylvatica*, noroeste de Ecuador) identificando las larvas causales mediante características morfológicas detalladas (observación del esqueleto cefalofaríngeo y espiráculos posteriores) y análisis genético, concluyendo que pertenecían al género *Sarcophaga* dentro de Sarcophagidae. En nuestro caso, las características observadas in situ (color, tamaño, localización subdérmica) ya sugieren fuertemente que se trata de larvas de moscas Sarcophagidae y no de otros dípteros (Calliphoridae tienden a ser más grandes y de desarrollo diferente, Phoridae como *Megaselia* son de hábitos distintos).

Un aspecto ecológico relevante es el comportamiento inusual de *A. bassleri* al momento de su hallazgo: posado dentro de una cuneta acuosa. Hagman et al. (2005) (17), ya habían notado que la mayoría de *Epipedobates/Ameerega* parasitados en Perú fueron encontrados en el agua o en charcos, a pesar de que estos anuros normalmente son terrestres y generalmente buscan humedad charcos de agua cuando van a colocar sus huevos.

En términos de la patogénesis, las miasis en anfibios pueden ser de tipo obligatorio o facultativo. Algunas especies de moscas son parásitos obligados cuyos huevos o larvas deben invadir tejidos vivos para completar su ciclo, un ejemplo de esto es *Lucilia bufonivora* en sapos europeos (20,21). Otras son parásitos facultativos que usualmente se desarrollan en materia orgánica en descomposición, pero que oportunísticamente infestan animales heridos o debilitados (22). Las moscas Sarcophagidae generalmente incluyen formas de parasitismo facultativo. Es posible que los casos en anuros dendrobátidos representen instancias de parasitismo facultativo: las larvas aprovechan heridas preexistentes en la rana (quizá ocasionadas por peleas intraespecíficas, depredadores, u otros factores) para invadir el tejido subcutáneo. Vélez et al. (2025) (2), reporta que en *O. sylvatica* la miasis encontrada podría haberse dado en una herida abierta donde las larvas fueron depositadas, dado que encontraron las lesiones principalmente en zonas expuestas del cuerpo. En *A. bassleri*, la presencia de la deformidad o lesión en la mano y el orificio dorsolateral podría indicar que el animal tenía alguna herida o debilidad previa que atrajo a las moscas. Es posible que *A. bassleri,* al igual que otros dendrobátidos, sea territorial y pueda involucrarse en combates con congéneres u otros animales lo que aumenta la probabilidad de lesiones cutáneas (23,24).

## CONCLUSIONS

This study documents an additional case of myiasis in *Ameerega bassleri*, expanding the knowledge of host–parasite interactions in Amazonian dendrobatids. The evidence suggests that Sarcophagidae larvae were involved, in agreement with previous reports in other poison frog species. This finding highlights the importance of including health assessments in wildlife amphibian monitoring and of conducting future studies with both morphological and molecular identification of the causal agents, within the framework of emerging diseases that threaten biodiversity.

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## CONFLICT OF INTEREST

There are no conflicts of interest related to the subject of this work.

## CONTRIBUTION OF THE AUTHORS

Conceptualization, data curation, and formal analysis: Mori-Pezo, R. R. & Mendoza-Tamani, P. Funding acquisition and investigation: Mori-Pezo, R. R. & Apagüeño-Vasquez, H. M. Methodology: Mori-Pezo, R. R. & Mendoza-Tamani, P. Project administration: Mori-Pezo, R. R. Resources: Apagüeño-Vasquez, H. M. Software: Mori-Pezo, R. R. & Mendoza-Tamani, P. Supervision and validation: Mori-Pezo, R. R. Visualization and writing – original draft: Mori-Pezo, R. R. & Mendoza-Tamani, P. Writing – review & editing: Mendoza-Tamani, P.

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