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Lankesterella poeppigii n. sp. (Apicomplexa, Lankesterellidae) de *Bufo poeppigii* (Tschudi, 1845) del Perú

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Abstract

Lankesterella poeppigii n. sp. is described from *Bufo poeppigii* (Tschudi, 1845) from Peru. Merogony and oogony occur in the capillary endothelium and the macrophages in the liver, spleen and kidneys. Meronts are oval, 25,2–29,4 x 15,7–16,8 µm in size and yield 35–46 merozoites. Oocysts are 26,3–29,4 x 15,1–17,6 µm in size; sporozoites 9,2-9,8 x 4,2–5,0 µm in size, assemble in macrophages. Released 8,7–9,8 x 2,8–3,1 µm sporozoites enter erythrocytes. *L. poeppigii* is compared with *Lankesterella petiti* Lainson & Paperna, 1995 infecting *Bufo marinus* (Linnaeus, 1758) in Brazil. The above mentioned specific characters, added to differences in hosts and geographical location warrant the description of *Lankesterella poeppigii* from *B. poeppigii* as a new species.

Keywords: *Lankesterella poeppigii* n. sp., *Bufo poeppigii*, shizonts, oocysts, sporozoites.

Resumen

Lankesterella poeppigii n. sp. es descrita de *Bufo poeppigii* (Tschudi, 1845) del Perú. La merogonia y oogonia se producen en el endotelio capilar y los macrófagos en el hígado, el bazo y los riñones. Los esquizontes son ovalados, 25,2–29,4 x 15,7–16,8 micras de tamaño y producen 35–46 merozoitos. Los ooquistes miden 26,3–29,4 x 15,1–17,6 micras de tamaño; esporozoitos, reunidos en los macrófagos, miden 9,2-9,8 x 4,2-5,0 micras de tamaño. Liberados, los esporozoitos miden 8,7–9,8 x 2,8–3,1 micras y entran en los eritrocitos. *Lankesterella poeppigii* es comparada con *L. petiti* Lainson y Paperna, 1995, que infecta a *Bufo marinus* (Linnaeus, 1758) en Brasil. Los caracteres específicos citados, sumados a las diferencias entre los huespédes y en la localización geográfica justifican la clasificación de la *Lankesterella* de *B. poeppigii* como una nueva especie.

Palabras clave: *Lankesterella poeppigii* n. sp., *Bufo poeppigii*, esquizontes, ooquistes, esporozoitos.

Introduction

Life history of *Lankesterella minima* (Chaussat, 1850) Labbé, 1899, parasite of *Rana esculenta* Linnaeus, 1758, was studied by Nöller (1912, 1920). Later studies include light and electron microscopic accounts on *L. minima* (Desser et al., 1990) and additional species of both frogs (Stehbens, 1966a,b; Paperna & Ogara, 1996; Paperna & Martin, 2001) and toads: by Mansour & Mohammed (1962) from *Bufo regularis* Reuss, 1833 and by Lainson & Paperna (1995) from *B. marinus*.

In the present communication we describe a new species of *Lankesterella* from a Peruvian toad.

Material and methods

The toads were caught in February 1987, in a forest area of North Peru, department Tumbes and were given to us by the Museum of Natural History of Lima, Peru by courtesy of Dr. Luz Sarmiento and Dr. Nelly Carrillo.

Twenty one *Bufo poeppigii* (Tschudi, 1845) were examined in Lima, 14 toads were found infected with a Lankesterella. Only three toads were brought to Paris for autopsied and examined for parasitic protozoans description in blood and tissue.

Thin blood films and touch preparations from the liver, spleen and kidneys were fixed in absolute methanol and stained with phosphate buffered (pH 7,4) 10% Giemsa for one hour.

Tissue samples were fixed in Carnoy fluid, 5 µm sections of paraffin embedded tissue were stained with Giemsa-Collophonium method (Bray & Garnham, 1962). All measurements are in micrometers (µm).

Lankesterella poeppigii n. sp.

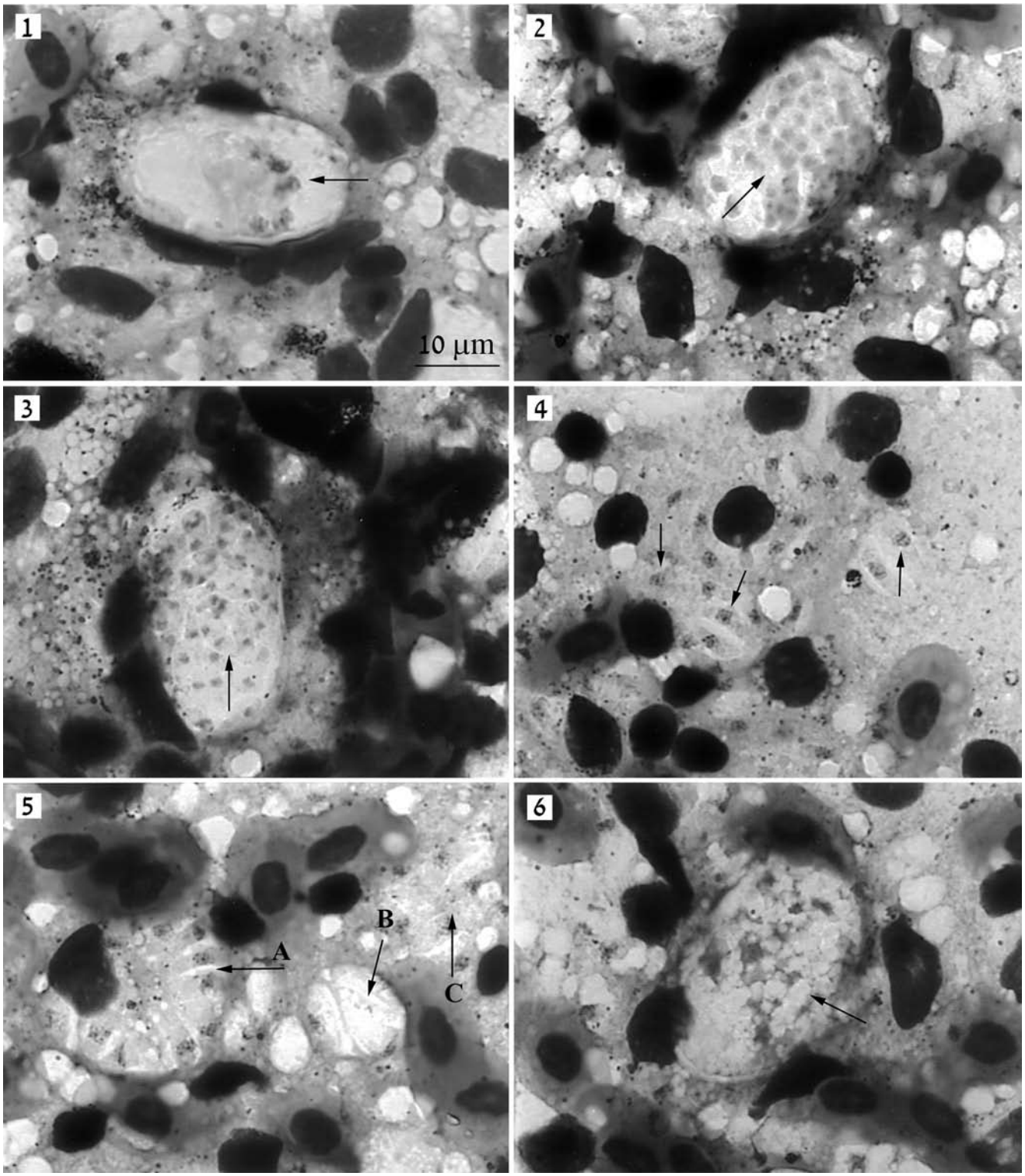
(Figures 1–12)

Type material: blood smear, fine section of liver and impression smear of liver from *Bufo poeppigii*, deposited under the number: PXX 160–165, in the collection of the Laboratoire de parasitologie comparée et modèles experimentaux, Muséum National d'Histoire Naturelle, Paris, France.–

Diagnosis

Meronts as well as oocysts develop apparently in capillary endothelial cells or in macrophages of the liver, spleen and kidneys.

Premature schizont with 6 nuclei reach a size of 28,0 x 15,4 (Fig. 1). Ripe meronts are oval, 25,2–29,4 x 15,7–16,8, enclosed in a conspicuous border and contain either numerous (~46) nuclei (Fig. 2) or fully formed merozoites ~35 (Fig. 3). Numerous elongate 8,1–10,6 x 1,7–2,2 zoites with a median round nucleus are apparently the merozoites released from ripe or collapsed meronts by the smear action (Fig. 4). These presumed merozoites were consumed by macrophages; macrophages 21,6 x 20,2 in size contained ~10 merozoites (Fig. 5). Macrogametocytes and microgametocytes were not detected. The oocysts are oval, 26,3–29,4 x 15,1–17,6, enclosed in a conspicuous border (envelope, limiting wall), the undifferentiated oocyst contents are vacuolated (foamy) and show a denser central mass (Figs. 6, 7). Oocysts with formed sporozoites were not found. Sporozoites 9,2–9,8 x 4,2–5,0, with traceable refractile body, released from the oocysts accumulate in macrophages (monocytes); their numbers varied from one (Fig. 8) or few ~6 (Fig. 9, 10) in macrophages expanding to size of 21,6–25,5 x



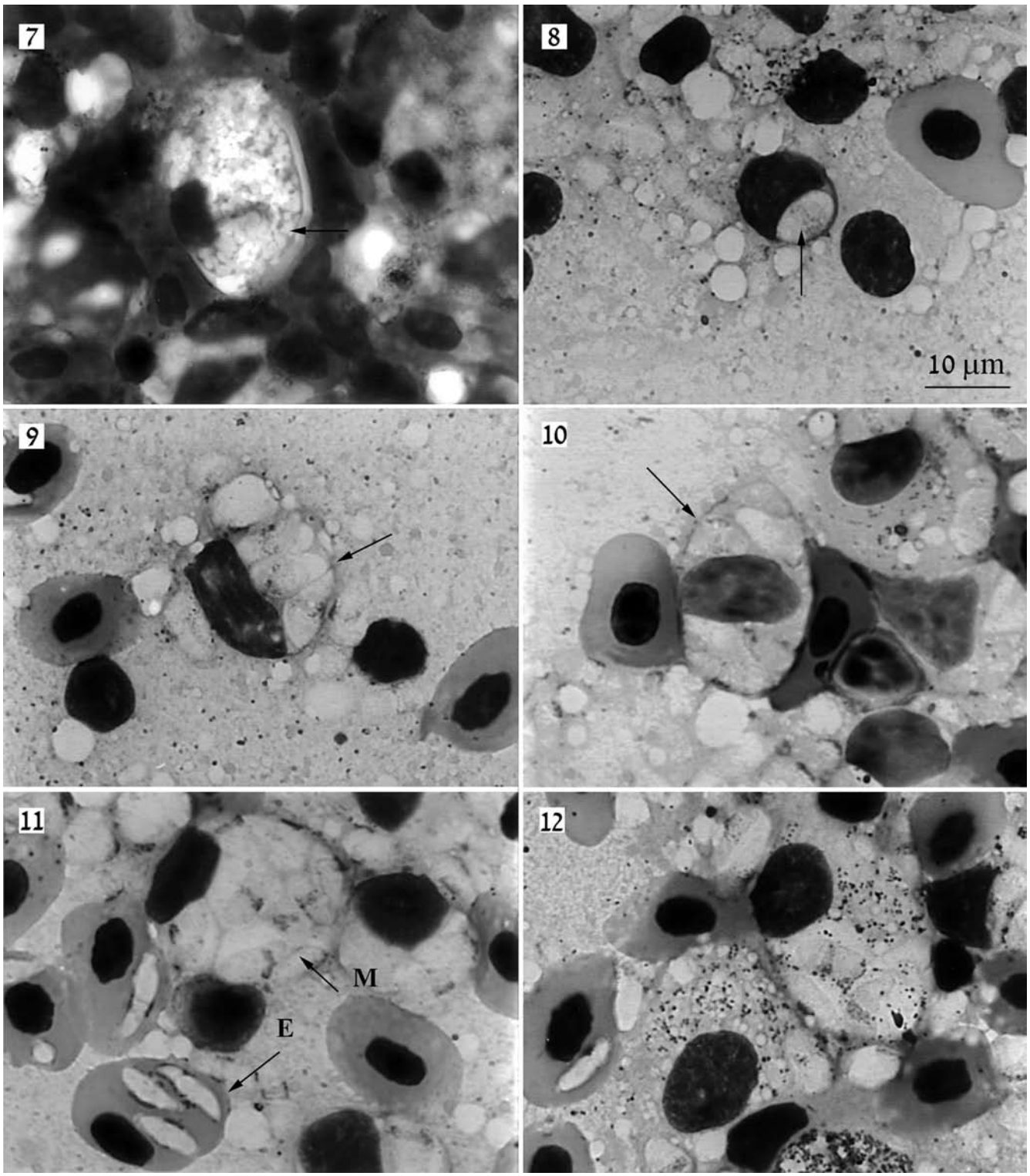
Figures 1–6. Impression smears with different stages of *Lankesterella poeppigii* n. sp. in the liver of *Bufo poeppigii* from Peru, scale (for all figures) 10µm. (1) Premature schizont. (2) Schizont with divided nuclei. (3) Schizont with differentiated merozoites. (4) Merozoites released from the ripe schizont. (5) Merozoites accumulated in a macrophages (A–B–C). (6) Non differentiated oocyst.

15,9–21,8 and up to 16, causing the macrophage to expand up to a size of 28 x 19,6 (Fig. 11).

Only few melanin–accumulating macrophages accumulate sporozoites (Fig. 12). Sporozoites finally enter erythrocytes, the infection is heavy and multiple. Up to 3 sporozoites are commonly observed in one erythrocyte. Intra–erythrocytic sporozoites are 8,7–9,8 x 2,8–3,1 in size, the nuclear chromatin is conspicuous only on the sporozoite margins and the refractile body is faintly visible (Figs. 11, 12).

Discussion

The criteria for specific differentiation of *Lankesterella* are limited. The most frequently encountered stages of *Lankesterella* are the sporozoites found in the peripheral blood erythrocytes. In spite the considerable structural divergences observed among the sporozoite shapes (Paperna & Landau, unpublished), a system for taxonomic differentiation has not been developed. Descriptions of the stages developing in the viscera are less available, as they require necropsy of the host.



Figures 7—12. Impression smears with different stages of *Lankesterella poeppigii* n. sp. from the liver of *Bufo poeppigii* from Peru, scale (for all figures) 10µm. (7) Non differentiated oocyst showing distinct wall. (8) Monocyt with a single sporozoite. (9) Macrophage with ~ 6 sporozoites. (10) Macrophages accumulating from 6 to over 16 sporozoites. (11) Erythrocytes (E) with 1—3 ripe sporozoites and macrophages (M) with accumulated few and numerous sporozoites. (12) Melanomacrophages with accumulated sporozoites.

The revealed life history of *L. poeppigii* is similar to that reported by Mansour and Mohammed (1962) for *L. bufonis* parasitizing *Bufo regularis* in Egypt. Here too, released sporozoites accumulated in macrophages or endothelial cells, prior their establishment in circulating erythrocytes. Invasion of macrophages prior establishment in the circulating erythrocyte is not unique to *Lankesterella* of toads, and has been observed also in frog species. The sporozoites invade liver parenchyma, tissue macrophages (Paperna & Martin, 2001) and even circulating macrophages (Paperna & Ogara, 1996).

In the other *Lankesterella* reported from South America toads, *L. petiti* infecting *Bufo marinus* in Brazil (Lainson & Paperna 1995), the oocysts in the viscera were 19–22 x 12–14, with sporozoites numbers ranging from 12 to 30 and 7,0–9,0 x 1,0–1,4 in size. Authors did not provide an image of sporozoite–infected erythrocyte. By comparison, oocysts of *L. poeppigii* are

larger, the intraerythrocytic sporozoites are of a same length but considerably stouter. We were unable to obtain the number of sporozoites formed in the oocyst.

In our opinion the above mentioned specific characters added to differences in hosts and geographical location are warrant ranking the *Lankesterella* from *B. poeppigii* as a new species.

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