Leishmania and Endotrypanum are two genera of digenetic parasites belonging to the family Trypanosomatidae. This family also includes the genera Trypanosoma, and at least four genera of parasites that only infect vertebrates. Within the Trypanosomatidae, Leishmania, and Endotrypanum, both transmitted by phlebotomine sandflies (Xenarthra: genera Onchopodops and Bradyops), parasites of the genus Leishmania can infect reptiles and several orders of mammals, and have a world-wide distribution in tropical and subtropical areas. The reptilian Leishmania have been classified in a separate genus — Sauroleishmania — although this division has been questioned by several authors. As the classification of several species isolated from lizards is currently the subject of a separate study, we will not discuss Leishmania of reptiles here.

At present, about 30 species of Leishmania that infect mammals have been described, and these are divided into species that (1) develop within the midgut and foregut of the sandfly host — classified as the subgenera L. (Viannia), and (2) undergo an additional developmental phase within the hindgut — classified as the subgenera L. (Leishmania). Species of both subgenera can be human pathogens and produce a range of clinical conditions.

Parasites of the genus Endotrypanum are unique among the Trypanosomatidae in that they infect the erythrocytes of the mammalian host; however, these forms are rarely seen in naturally infected sloths. Diagnosis usually relies on the examination of parasites from cultures or from sandflies, and these forms of the parasite are morphologically indistinguishable from the Leishmania promastigotes.

Currently, there are only two named species of Endotrypanum: E. schoutedeni and E. munteri. The intracellular trypanosomatids of these species are trypanosomonad, and no promastigote stages are produced in culture, have grown poorly in standard culture media. Preference is generally given to the development of the intraerythrocytic stages present in the original isolates.

The Real Endotrypanum?

Intraerythrocytic forms of Endotrypanum have been seen only in fresh blood preparations from captured wild sloths, and these forms have never been identified inside erythrocytes in experimental infections. Sloths are reservoirs of many Leishmania species as well as Endotrypanum, and current laboratory strains of Endotrypanum generally grow poorly or do not grow in culture. Therefore, these strains of Endotrypanum might be Paraleishmania parasitized in vitro, and isolated, that, during in vitro culture, have grown preferentially over the intraerythrocytic
reason for maintaining these parasites as a Section in the *Paraleishmania* is a further step in the life cycle of the *Endotrypanum* species. Current laboratory strains of *Leishmania* are polyphyletic in origin (Fig. 1). If current isolates of *Leishmania* include rodents and humans. In fact, *Leishmania* species within the genus *Endotrypanum* are polyphyletic in origin, as are the groups observed by the analysis of the restriction fragment length polymorphism of the intergenic transcribed spacers of the *rRNA* gene (ITS*rRNA*). The dashed lines represent zymodemes of strains currently classified as *Endotrypanum*. The alternative possibility of transferring them to another genus does not favour this hypothesis, as it is impossible to classify these *Leishmania* species within the genus *Endotrypanum* under the existing definitions for this genus. If such a revised *Endotrypanum* genus were developed as amastigotes in their hosts, it would not be possible to discriminate between *Leishmania* and *Endotrypanum* on the basis of their morphological development in the vertebrate host. This classification would require a more comprehensive description of *Leishmania* species, including an extension of its host range to include rodents and humans. In fact, *Leishmania* species within the genus *Endotrypanum* are polyphyletic in origin, as are the groups observed by the analysis of the restriction fragment length polymorphism of the intergenic transcribed spacers of the *rRNA* gene (ITS*rRNA*). The dashed lines represent zymodemes of strains currently classified as *Endotrypanum*. These zymodemes are related to different *Paraleishmania* species. EZ12 is closest to *L. hertigi* strain and is almost identical to these two *Leishmania* species by ITS*rRNA* analysis. EZ12 is very similar to *L. hertigi* and *L. colombiensis* by MLEE and ITS*rRNA* analysis.

Many aspects of the natural history of *Endotrypanum* and the *Paraleishmania* are still unknown; therefore, on the basis of available molecular data, we propose placing the *Paraleishmania* Section as a polyphyletic clade within the genus *Leishmania* and, provisionally, classifying all current laboratory strains of *Endotrypanum* as *Paraleishmania*. All species of this Section are Neotropical, indicating a New World origin for the *Paraleishmania*. By definition, *Leishmania* species are digenetic parasites with two distinct stages in their life cycle: a motile flagellate stage that lives extracellularly within the alimentary tract of the sandfly vector and a nonmotile amastigote stage that resides within macrophages of the vertebrate host. *Endotrypanum* species are also digenetic parasites, but these flagellates assume an amastigote or trypomastigote form inside the erythrocytes of their hosts, while in the sandfly the parasite assumes promastigote morphology. We therefore reserve the genus *Endotrypanum* for the description of the *intraerythrocytic* trypanosomatid parasite of sloths. The re-description of this genus will require further studies on fresh isolates from sloths, which can be clearly demonstrated to have an *intraerythrocytic* cycle.

**References**


ParaSite

Fungi, Lynx and Gills on the Web

Parasites in general
Pathogens of pathogens?
Rusi Fari's favourite examples, but particularly of bacteria attacking helminths. While Tom McCluskey knew of fungi which trap (and eat) nematodes, Alan Trudgett, an immunologist from Queens University, Belfast, Northern Ireland, was interested in viruses. He knew of 'virus-like particles' – 'they looked like herpes viruses but I'm not an electron microscopist.' He thought, however, that the rather scattered distribution of helminths makes transmission to a fresh individual difficult, so a helminth virus must either integrate into the genome of the host, or be transmitted by how they trap the vermiform stage of the plant parasitic nematodes (e.g. by adhesive knobs, networks or conidia, or by rings or constricting rings); some of them parasitize cyst nematodes, consuming everything inside, including eggs. For dramatic pictures, also of posteriori app, see http://apes.peachnet.edu/ hymen/; sponsored by the Society of Nematologists.)

Trichinella in Switzerland – in lynx
The ProMED-mail post is more usually concerned with virus infections than with worms, but there was an exception in December when Bruno Gottstein (University of Berne, Switzerland) described work done there on the corpses of lynx. Five out of 19 were found to harbour Trichinella muscle-stage larvae, identified by PCR as Trichinella britovi, a species known to infect the red fox. (Swiss pigs are free of Trichinella spp and the red fox was the only Trichinella-infected host there.) Apparently, the lynx was re-introduced into Switzerland about ten years ago and the population has increased and spread. The nematode is believed to be transmitted directly, by lynx eating dead foxes.

Hamburger gill disease
This infection of catfish, normally known as proliferative gill disease (PGD), causes the gills to swell, bleed easily and become necrotic, and the fish to gasp for air. Farm-raised catfish are the 5th most popular food fish in the USA, worth about US$592 million per year, and the disease costs the industry US$50–100 million a year. It featured in the ProMED-mail post when Gary Burtle (University of Georgia, USA) was reported to have found a case near Atlanta.

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Comment

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