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ISOENZYME PATTERNS OF *LEISHMANIA* ISOLATES FROM COLOMBIA

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Abstract. Promastigotes from four cutaneous leishmaniasis cases from Colombia were tested by cellulose acetate electrophoresis using nine enzyme systems. The isoenzyme profiles of the Colombian isolates were indistinguishable from each other and from Panamanian *Leishmania braziliensis panamensis* controls, but were distinct from an isolate of *Leishmania braziliensis guyanensis* from Brazil and three isolates from the *Leishmania mexicana* complex for the enzyme phosphogluconate dehydrogenase.

Morales et al.[1] isolated three strains of Colombian *Leishmania* from *Lutzomyia trapidoi* sand flies collected in the Department of Tolima, municipality of Mariquita. Based on the behavior of these strains in culture media and in hamsters, the isolates were tentatively identified as belonging to the *Leishmania mexicana* complex. *Lutzomyia trapidoi* has been reported as a vector of *Leishmania braziliensis panamensis* in Panama by Johnson et al.[2] and McConnell.[3]

Werner[4] identified 14 human *Leishmania* isolates from various regions of Colombia as *L. braziliensis* based on growth patterns in culture media and lesion development in hamsters. Four of the promastigote isolates from cutaneous lesions, W12-YRU, W9-MT, W3-JJB and R102-GS (Nos. 1, 5, 8 and 11, respectively, of Werner[4]), were examined by cellulose acetate electrophoresis[5] at Gorgas Memorial Laboratory, Panama to determine their isoenzyme patterns for nine enzymes.

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RESULTS

All four of the Colombian isolates tested showed indistinguishable electrophoretic mobilities for the following enzymes: acid phosphatase (EC 3.1.3.2), alanine aminotransferase (EC 2.6.1.2), aspartate aminotransferase (EC 2.6.1.1), glucose-6-phosphate dehydrogenase (EC 1.1.1.49), hexokinase (EC 2.7.1.1), malic enzyme (EC 1.1.1.40), phosphoglucose isomerase (EC 5.3.1.9), and phosphoglucomutase (EC 2.7.5.1). The zymograms also were indistinguishable from those of 13 *Leishmania braziliensis panamensis* isolates from clinical cases and sylvatic reservoir hosts in Panama previously tested by Kreutzer and Christensen.[5] However, the isozyme patterns of both groups were distinct from those of *Leishmania braziliensis guyanensis* (IM-74) from Brazil, *Leishmania mexicana mexicana* (LV-4) from Belize, *L. m. aristedesi* (GML-3) from Panama and *L. m. amazonensis* (IM-83) from Brazil for the enzyme phosphogluconate dehydrogenase (EC 1.1.1.44) (Fig. 1). Electrophoretic mobilities of this enzyme previously had been shown to distinguish members of the *Leishmania braziliensis* and *Leishmania mexicana* complexes from *L. b. panamensis*.[6]

DISCUSSION

The data presented provide evidence that *L. b. panamensis* may be indigenous to Colombia as well as Panama. Variability in cultural growth characteristics among members of the *Leishmania braziliensis* complex has been well doc-

FIGURE 1. Zymogram of phosphoglaconate dehydrogenase using promastigotes of: **1.** *Leishmania braziliensis guyanensis* (IM-74) from Brazil; **2.** *L. b. panamensis* (GML-1=LS-333) from Panama, **3–6.** Colombian isolates (W3-JJB, R102-GS, W9-MT, and W12-YRU, respectively); **7.** *Leishmania mexicana mexicana* (LV-4) from Belize; **8.** *L. m. aristedesi* (GML-3=1746) from Panama; **9.** *L. m. amazonensis* (IM-83) from Brazil; and **10.** *L. b. panamensis* (GML-274=LC50) from Panama.

umented by Walton et al.[7,8] The results of our isoenzyme studies are considered to be a more reliable indicator of subspecific designation than the growth characteristics in culture and hamster described earlier by Werner.[4] Lainson and Shaw,[9] in their taxonomic revision of New World leishmaniasis, noted the occurrence of the following leishmaniae taxa in Latin American countries which border Colombia: *L. b. braziliensis*, Brazil, Peru, Ecuador and Venezuela; *L. b. guyanensis*, Brazil, probably Venezuela; *L. b. panamensis*, Panama; *L. peruviana*, Peru; *L. m. amazonensis*, Brazil; *L. m. pifanoi*, Venezuela. Additionally, *L. m. aristedesi* has been reported from Panama.[10]

Isoenzyme profiles have proved to be an important research tool in taxonomic evaluation of the leishmaniae.

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