



DNA barcoding reveals unexpected earthworm community patterns in the Nouragues reserve in French Guiana

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Earthworm species identification is often difficult due to a lack of stable and easily observable diagnostic characters, a high degree of phenotypic plasticity, or the absence of characters in juvenile stages. As a consequence, earthworm taxonomy is poorly resolved in most regions of the world, especially in tropical countries that host most of the described and expected biodiversity of the group. These constraints also represent a serious problem for any ecological study requiring species identifications and/or reliable species lists.

DNA barcoding represents an efficient approach to counter this taxonomic deficit. In the nature reserve of the Nouragues, French Guiana, the systematic DNA barcoding of 750 individual specimens collected in 10 distinct habitats allowed the detection of 50 earthworm molecular operational taxonomic units (MOTUs). Most of these MOTUs are new for science, and an other significant part was only represented by juvenile specimens, illustrating how barcoding can help us in the assessment of biodiversity patterns in groups with a strong taxonomic impediment. Comparing the sequences with a global DNA barcode library, we were able to identify a few MOTUs or to assign them to unidentified species detected elsewhere in the world. These may represent potential cases of biological invasion. Using the number and composition of MOTUs in different habitats and microhabitats, we produced a complete screening of earthworm community structure in the reserve. We found that lowland forests and stream banks had the highest MOTUs diversity. Although the soil habitat hosted the highest number of MOTUs, we also found a significant richness in decaying trunks and in epiphytic soils up to more than 40 m above the ground level.

Key words: DNA barcoding, Cytochrome C Oxidase 1, earthworms, rain forests, rarefaction curves, species richness estimation, MOTUs, Amazonia