



Mata Atlântica enchytraeids (Paraná, Brazil): The genus *Achaeta* (Oligochaeta, Enchytraeidae)

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Abstract

Among terrestrial enchytraeid oligochaetes, species of the genus *Achaeta* are conspicuous by their complete absence of chaetae. Knowledge of *Achaeta* species in South America is scarce, only four species were known so far. Here we describe three more species of *Achaeta* from South America, *A. hanagarthi*, *A. paranensis* and *A. singularis* spp. nov., and we provide revised and type-based redescriptions of *A. neotropica* Černosvitov, 1937 and *A. piti* Bittencourt, 1974. The species were found in the framework of the German-Brazilian project "SOLOBIOMA, Soil biota and biogeochemistry in the Atlantic rainforest of Brazil", which monitors forest regeneration on previously degraded areas by comparing successional stages from pastures to old-growth forests. Species descriptions are based on observations of specimens *in vivo* and as stained whole mounts; special attention is given to variations among specimens. The three new species are ascribed to a single author (Schmelz). They lack pyriform glands and have spermathecal ectal pores in lateral position. Further distinguishing traits concern the location of preclitellar nephridia, coelomocyte texture, distribution pattern of epidermal and clitellar gland cells, and the inner topography of the prostomium, the latter a new character in *Achaeta* taxonomy. In *A. hanagarthi* all sexual organs except the spermathecae are shifted one segment forward. *A. singularis* is most peculiar by a short and deeply incised brain and by the apparent absence of a suboesophageal ganglion, the ventral ganglia of segments II, III, and IV being separate. This species was only found in forests and is possibly a true representative of the old autochthonous forest soil fauna. *A. hanagarthi* and *A. singularis* are similar to the ill-described *A. silvatica* Nurminen, 1973; the latter is considered as a *species inquirenda* here. Type reinvestigations revealed that contrary to the original descriptions, *A. piti* has six segmental pyriform glands and reproductive organs except spermathecae shifted one segment forward, and that *A. neotropica* has the first preclitellar nephridium at 6/7 and ectal spermathecal pores in

lateral position. *A. neotropica* is highly variable and probably a species aggregate, difficult to resolve with traditional light-microscopical methods. The recently described *A. becki* Schmelz & Collado 2005 is tentatively included in *A. neotropica*. The taxonomic descriptions contribute to the general anatomy of the genus; our study further serves as a guide to neotropical species of *Achaeta*.

Key words: Oligochaeta, Enchytraeidae, *Achaeta*, systematic

Introduction

Among terrestrial enchytraeid oligochaetes, species of the genus *Achaeta* are conspicuous by their complete absence of chaetae. *Achaeta* has a worldwide distribution, and species have been described from habitats as diverse as the Siberian tundra (*A. macrocyta* Christensen & Dózsa-Farkas, 1999), the tropical rain forest of Borneo (*A. pigmentosa* Christensen & Dózsa-Farkas, 2007) and the European marine littoral (*A. littoralis* Lasserre, 1968). About two thirds of the ca. 40 currently accepted species are known from soils in Europe, probably because of higher research intensity here than in the rest of the world. Knowledge of enchytraeid species in South America is scarce, Römbke (2007) summarizes the state-of-the-art. Four species were known so far, *A. neotropica* Černosvitov, 1937, *A. piti* Bittencourt, 1974, *A. iridescens* Christoffersen, 1979, and *A. becki* Schmelz and Collado, 2005. In this paper we describe three more species of *Achaeta* from South America, *A. hanagarthi*, *A. paranensis* and *A. singularis* spp. nov., and we provide revised and type-based redescrptions of *A. neotropica* and *A. piti*.

The species were found in the framework of the German-Brazilian project "SOLOBIOMA, Soil biota and biogeochemistry in the Atlantic rainforest of Brazil. Evaluation of diversity and soil function under anthropogenic influence (Mata Atlântica, Paraná)" (Höfer *et al.* 2007, see also <http://www.solobioma.ufpr.br>). Ca. 19.000 hectares of degraded areas of high biological importance are currently being reforested in the Atlantic rain forest of southern Brazil (Ferreti & de Britez 2006). Soil biodiversity monitoring of the regeneration process and development of a site-specific classification scheme of the biological state of the soil are among the objectives of SOLOBIOMA (Römbke *et al.* 2005, in press). The Brazilian Atlantic rain forest is considered as one of the species-richest and at the same time most threatened ecosystems of the world (Myers *et al.* 2000).

Descriptions are based on observations of specimens *in vivo* and as stained whole mounts; special attention is given to variations among specimens. Two specimens did not fit any of the diagnoses, they are described separately as "*Achaeta* sp. 1", to be recognized formally if more material confirms the description. Several details concerning the general anatomy of the genus are useful for future comparative or phylogenetic studies. The character distribution in the material necessitated comparisons with type and other reference material from South America, most of which is dealt with here, too. Therefore this paper also serves as a guide to species of *Achaeta* presently known from South America. It is the first in a series on enchytraeid species found in the southern Brazilian Mata Atlântica.

Study site, material and methods

The study area (Fig. 1) is situated in the east-northeast bay of Antonina (25°14'38"S–25°22'01"S, 48°39'18"–48°42'16"W) and belongs to the municipality of Antonina in the littoral region of the State of Paraná. It is a private reserve named "Reserva Natural Rio Cachoeira", property of the regional NGO "SPVS", an acronym for "Sociedade de Pesquisa em Vida Selvagem e Educação Ambiental" (Society for Wildlife Research and Environmental Education). The reserve is located within the "Área de Proteção Ambiental (APA) Guaraqueçaba" (Environmental Protection Area of Guaraqueçaba), the largest continuous piece of Brazilian Atlantic Forest that remains today.