

Abstract

The presented thesis includes three related projects, that are linked by a common interest in the evolution of eukaryotic organelles and machineries that import proteins into these compartments. The first project considers the possibility of peroxisomes (eukaryotic organelles known in aerobic organisms) being conserved in two related anaerobic protists: a free-living amoeba *Mastigamoeba balamuthi* and a parasite *Entamoeba histolytica*. The most important hint for the presence of peroxisomes was the discovery of proteins that are homologous to known components of the peroxisomal protein import machinery. The second project aims to characterize the unknown protein translocase of the inner membrane (TIM) in the mitosomes (extremely reduced mitochondria) of an anaerobic protozoan *Giardia intestinalis*. We have discovered an important subunit of the mitosomal translocase (Tim44), which usually tethers the Hsp70/PAM (presequence translocase-associated motor) complex to the TIM translocon. The last project shows that the protein translocase of the outer mitochondrial membrane in trypanosomatids is related to a typical eukaryotic channel Tom40. This finding is important because the absence of Tom40 was previously considered an ancestral feature of trypanosomatids.