Abstract

of PhD. thesis named “Leishmania attachment in permissive vectors and the role of sand fly midgut proteins in parasite-vector interaction”, Anna Dostálová, 2011

This thesis focuses on the development of protozoan parasites of the genus *Leishmania* in their insect vectors, sand flies. It sums up results of three projects I was involved in during my PhD studies. Main emphasis was put on permissive sand fly species that support development of various species of *Leishmania*. Using a novel method of binding of fluorescently labeled leishmania promastigotes to the midguts *in vitro*, we studied the stage- and species-specificity of the binding. We demonstrated that *Leishmania* midgut binding is strictly stage-dependent, is a property of forms found in the middle phase of development (long and short nectomonad forms), but is absent in early forms occurring in within the blood meal, procyclics, and in final stages, metacyclics. Comparing the binding of several leishmania species, we showed the natural parasite is not necessarily the species that can always bind *in vitro* most efficiently to the midgut of its vector. In some cases, we even observed significant binding of *Leishmania* species that do not survive in the midgut of the particular sand fly species *in vivo*. We conclude that the specificity of *in vitro* binding alone is insufficient to explain overall vector specificity. In our second study we looked into the role of *Leishmania* surface phosphoglycans during parasite development in three sand fly species. We showed an essential role of *Leishmania major* surface lipophosphoglycan in its natural vector *P. duboscqi*, while we observed complete development of parasites devoid of lipophosphoglycan in two permissive vectors, *P. perniciosus* and *P. argentipes*. We also demonstrated that *P. duboscqi* is not able to support development of *L. infantum* and is therefore classified as a specific vector. Our results give important supporting evidence for the presence of a lipofosfoglycanindependent mechanism of attachment in permissive sand flies. In the third study, we focused on molecules expressed in the midgut of the permissive vector, *P. perniciosus*, which are most likely to be involved in interaction with transmitted parasites. We constructed, sequenced and analyzed two midgut specific cDNA libraries from sugar fed and blood fed female *P. perniciosus* and compared the transcript expression profiles. By detailed comparison of our findings with the published midgut transcriptomes of two other sand fly species we identified several features potentially important for their vectorial competence and shared by the two permissive vectors, *P. perniciosus* and *Lutzomyia longipalpis*.