

EVOLUTION AND TRANSMISSION OF TERMITE HINDGUT SYMBIOTIC PROTOZOA. G. H. Gile,
School of Life Sciences, Arizona State University, ggile@asu.edu.

Introduction: The cockroach lineage that includes termites and *Cryptocercus* is probably the first insect lineage to evolve wood-digestion capability. This capability was enabled by symbiosis with cellulolytic protozoa, which in turn enabled the evolution of true sociality in termites [1]. The protist/termite symbiosis was well established before the split of *Cryptocercus* and termites, dating back to roughly 200 million years ago [2]. Since that time, protists have broadly co-specified with their termite and *Cryptocercus* hosts, being vertically inherited through the mechanism of proctodeal feeding that ensures inoculation of the brood. Today there are between 500 and 1000 “lower” termite species and between a few and several *Cryptocercus* species, each of which harbors its own characteristic set of symbiotic hindgut protists.

Termite and *Cryptocercus* symbiotic protists belong to the major groups Parabasalia and Oxymonadida. These groups consist mainly of endobionts, mostly of termites but also inhabiting a broad range of other vertebrates and invertebrates. Parabasalia includes a handful of free-living protists. By far the most speciose and morphologically complex lineages occur solely within hindguts of lower termites and *Cryptocercus* [3]. These protists, in turn, form symbioses with diverse bacteria and archaea such that the termite wood digestion process is a multi-domain collaboration.

We will present progress toward understanding the overall diversity and evolution of termite symbiotic protozoa and how they contribute to the nutritional symbiosis of the termite. We use morphological and molecular approaches, including custom 18S amplicon sequencing and comparative genomics.

References: [1] Nalepa C. A. (2015) *Ecological Entomology*, 40, 323-335. [2] Bourguignon T. et al. (2015) *Molecular Biology and Evolution*, 32, 406-421. [3] Brugerolle G. and Lee J. J. (2000) *Illustrated Guide to the Protozoa* 1196-1250.