This technique revealed that tachyzoites are highly motile despite their lack of flagella or cilia that other protozoa utilize[14] and they achieve this motility using an actin-myosin containing 'glideosome' in the parasite's inner membrane complex[15, 16]. Parasites do not gain entry into the host cell by simple phagocytosis but by actively penetrating the plasma membrane[17] involving the coordinated secretion of microneme and rhoptry proteins that form the 'glideosome' and 'moving junction' respectively[18–20].

Hakansson S, Morisaki H, Heuser J, Sibley LD: Time-lapse video microscopy of gliding motility in Toxoplasma gondii reveals a novel, biphasic mechanism of cell locomotion. Mol Biol Cell. 1999, 10: 3539-3547. Toxoplasma gondii is an opportunistic protozoan parasite that can infect nearly any nucleated cell in a wide range of warm-blooded organisms. This promiscuity contributes to T. gondii being one of the most widespread and successful parasites in the world. Electron microscopy of parasites with lasso-shaped mitochondrion reveals the presence of regions of close abutment between the outer mitochondrion membrane (OMM) and the inner membrane complex (IMC), in which the membranes retain a constant distance over stretches of 100 nm to 1,000 nm (11). The average distance between the OMM and IMC was calculated to be approximately 25 nm, which would suggest the presence of membrane contact sites (11, 12). Time-lapse video microscopy of gliding motility in Toxoplasma gondii reveals a novel, biphasic mechanism of cell locomotion. Mol. Biol. Cell 10, 3539–3597. doi: 10.1091/mbc.10.11.3539. PubMed Abstract | CrossRef Full Text | Google Scholar.

Huynh, M. H., and Carruthers, V. B. (2006). Toxoplasma MIC2 is a major determinant of invasion and virulence. (2010). Characterization of a novel organelle in Toxoplasma gondii with similar composition and function to the plant vacuole. Mol. Microbiol. 76, 1358–1375. doi: 10.1111/j.1365-2958.2010.07165.x. PubMed Abstract | CrossRef Full Text | Google Scholar. Montoya, J. G., and Liesenfeld, O. (2004). Toxoplasmosis. Toxoplasma gondii is a member of the phylum Apicomplexa, a diverse group of intracellular parasites that share a unique form of gliding motility. Gliding is substrate dependent and occurs without apparent changes in cell shape and in the absence of traditional locomotory organelles. Here, we demonstrate that gliding is characterized by three distinct forms of motility: circular gliding, upright twirling, and helical rotation. Time-lapse video analyses indicated that helical gliding is a biphasic process. During the first 180(o) of the turn, the parasite moves forward one body length at a rate of approximately 1-3 microm/s. In the second phase, the parasite flips onto its left side, in the process undergoing little net forward motion.