K13-associated endocytic structures in Toxoplasma are required for plasma membrane homeostasis rather than parasite growth

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Toxoplasma is a parasite that depends on nutrients provided by its host, but the processes through which this is achieved are largely unknown. We found a ring-like structure in *Toxoplasma* composed of proteins known to be important for endocytosis (DrpC, EPS15, the AP2 complex) and others that have not been implicated in this process before (K13, UBP1, Arf-GAP). This structure is present at the inner membrane complex (IMC) of the parasite in both mother and forming daughter cells, indicating that this structure is formed early in the development of the IMC and only makes contact with the plasma membrane during mature parasite formation. Live-cell imaging shows that this structure and its constituent proteins are stable features of the IMC. Depleting most of these proteins results in strong growth phenotypes, manifesting as extra-parasite cytosolic extensions within the parasitophorous vacuole, swollen parasites, and a failure of the rosette-like organisation of parasites. However, the replication rate was not significantly affected upon suppression of the structure's proteins. Our results show that while endocytosis is essential for the parasite's intracellular survival, its greater role in this parasite stage might be plasma membrane homeostasis rather than parasite nutrition.