Trends in Parasitology | Parasite of the Month

Cryptosporidium parvum

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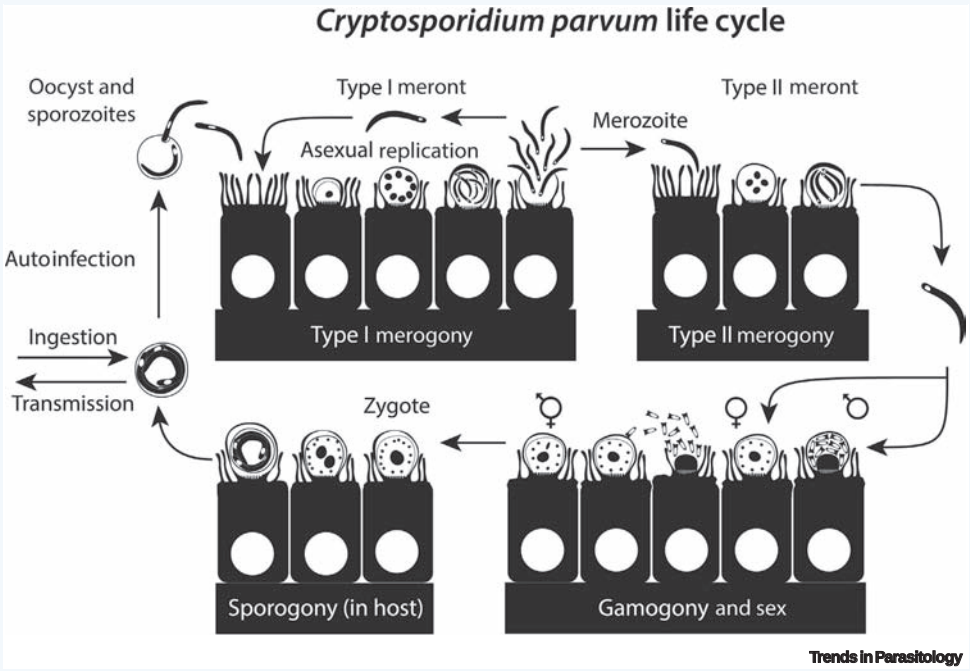
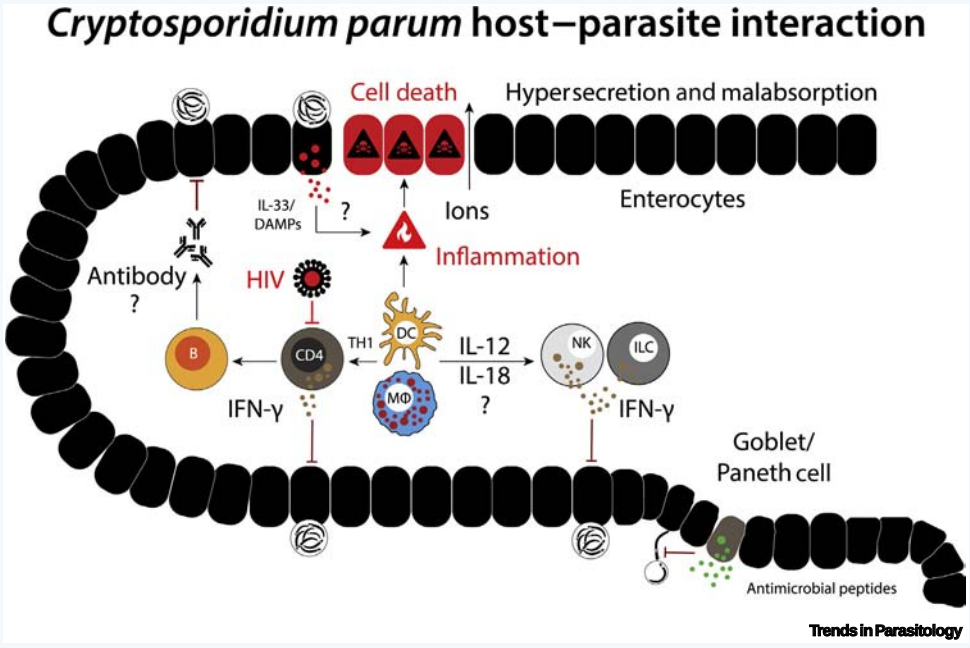


Cryptosporidium is a leading cause of diarrheal disease in young children and untreated AIDS patients in resource-limited countries worldwide. Transmission occurs via the fecal–oral route, and sources of *Cryptosporidium* infection include contaminated water or food, or contact with infected people or animals. Upon ingestion of the infective parasite oocysts, motile sporozoites emerge and invade epithelial cells of the small intestine where they develop in an intracellular but extracytoplasmic niche. *Cryptosporidium* completes its complex life cycle in a single host, with both asexual and sexual stages present in the intestine. Replication of the parasite, and the resulting immune response contribute to the development of severe, watery diarrhea in infected individuals. Currently, there is no vaccine, and only one drug (nitazoxanide), which has limited efficacy in those most susceptible.



KEY FACTS:

Human infections are caused by *C. parvum* and *Cryptosporidium hominis* but transmission of multiple additional species occurs locally.

Zoonotic *C. parvum* strains appear genetically distinct from anthroponotic strains.

C. parvum invasive stages resemble those of other apicomplexans, but invasion and intracellular development show important differences.

C. parvum has a minute genome (9.1 Mbp encoding 4020 genes), lacks an apicoplast and mitochondrial DNA, has greatly reduced metabolic capabilities, and relies on host metabolism.

Recent advances: genetic engineering, cryopreservation, culture in organoids, tractable life cycle, phenotypic screens delivered potent drug leads, a natural mouse model to study protective immunity.

DISEASE FACTS:

Cryptosporidiosis is a major cause of global child mortality, particularly under the age of two.

With advanced water treatment, outbreaks are still frequent due to oocyst resistance to water chlorination.

The main disease symptoms are severe watery diarrhea, nausea, vomiting, and wasting.

Chronic infection causes villus blunting, nutrient malabsorption, and stunted growth.

Infection results in protective immunity, albeit not sterile and not in a single infection. T cells are required to clear the infection, and interferon-γ is a key mediator of parasite restriction.

TAXONOMY AND CLASSIFICATION:

SUPERPHYLUM: Alveolata
PHYLUM: Apicomplexa
CLASS: Conoidasida
ORDER: Cryptogregarinorida
FAMILY: Cryptosporidiidae
GENUS: *Cryptosporidium*
SPECIES: *C. parvum*

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Resources

www.cdc.gov/parasites/crypto/index.html
https://cryptodb.org/cryptodb/

Literature

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