

Hepaticystis

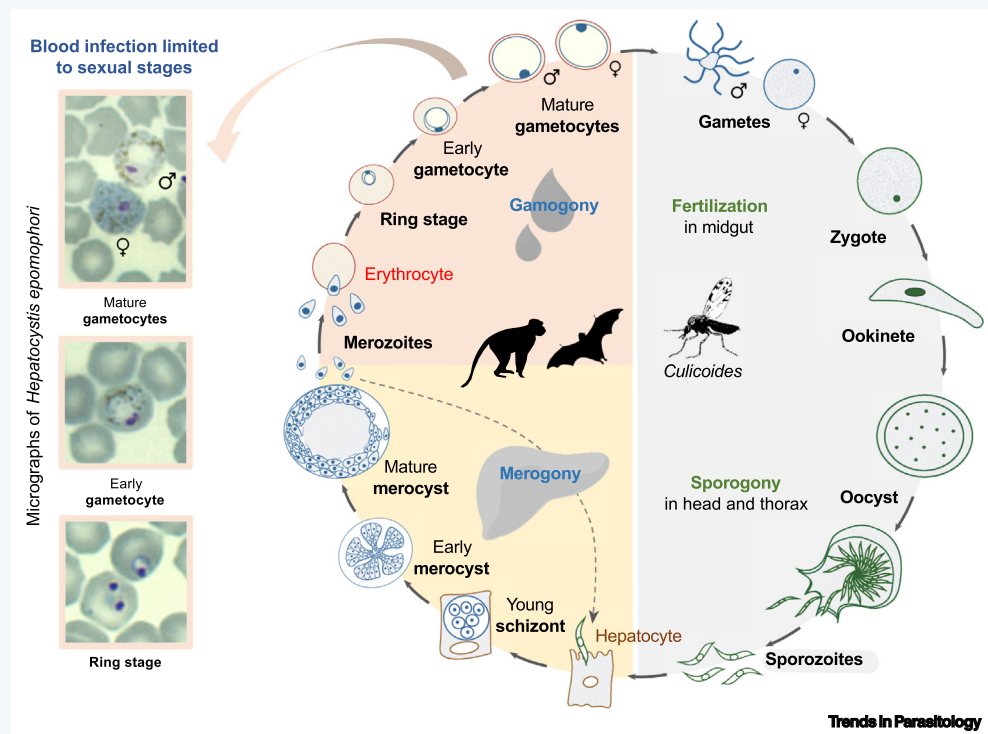
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KEY FACTS::

Hepaticystis is phylogenetically nested within (paraphyletic) mammalian *Plasmodium* clades.

Vector *Culicoides adersi* has been confirmed for primate-infecting species *Hepaticystis kochi*; experimental infection of *Culicoides nubeculosus* was reported with *Hepaticystis* of Australian bats.

Liver merocysts differ in size and structure among *Hepaticystis* species and mature within 2 months.

Merozoites are discharged into sinusoids, while a small proportion likely reinvades hepatocytes for a secondary merogony.

Ookinetes penetrate the midgut and transform to oocysts in the thorax and head of *Culicoides*. Sporozoites accumulate in the hemocoel.

Three genomes in the nucleus (19.95 Mb encoding 5341 genes), mitochondrion (6.6 kb), and apicoplast (27 kb).

Adaptations to the *Culicoides* vector are recognizable in the genome/transcriptome.

DISEASE FACTS::

Infections rarely cause disease, but anemia has been documented.

Cyclical fevers do not occur as blood stages are limited to gametocytes that do not provoke cytokine responses.

Liver merocyst maturation leads to cellular infiltration and inflammation, followed by granuloma formation.

Hemozoin pigment is deposited in liver and spleen.

Identification of apparent selection of resistance alleles in the promoter region of the Duffy blood group antigen/chemokine receptor DARC in *H. kochi*-infected monkeys.

TAXONOMY AND CLASSIFICATION:

PHYLUM: Apicomplexa

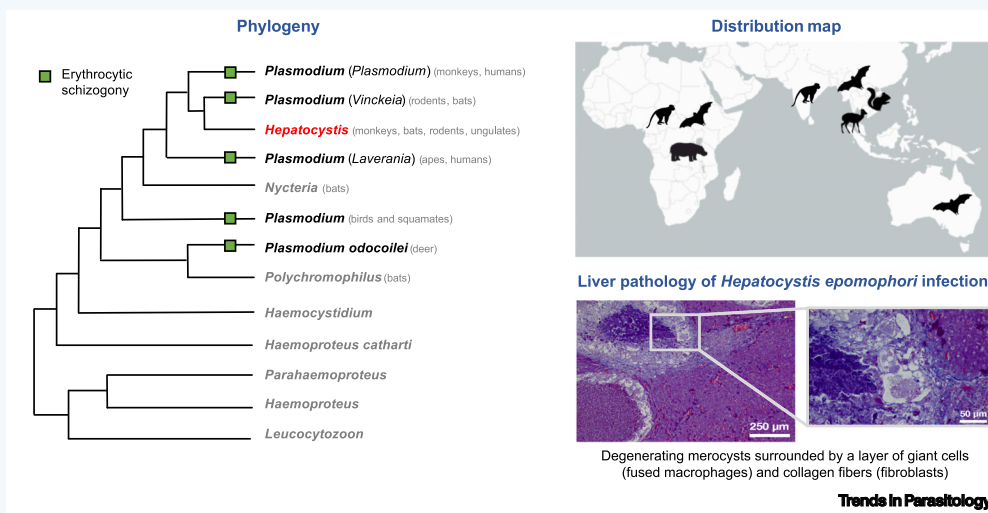
CLASS: Aconoidasida

ORDER: Haemosporida

FAMILY: Plasmodiidae/
Haemoproteidae

GENUS: *Hepaticystis*

Hepaticystis parasites are the closest relatives of *Plasmodium* species of mammals. They infect monkeys, bats, squirrels, and ungulates in Africa, Asia, and Australia. A prevalence of up to 100% has been documented in fruit bats and monkeys. Twenty-five morphospecies have been described, and cross-species transmission, divergent *Hepaticystis* lineages, and species complexes are reported in primate and bat hosts. Biting midges (*Culicoides*) are the only known vectors. In the vertebrate, merogony occurs exclusively in the liver, resulting in formation of macroscopic merocysts. Merozoites invade erythrocytes and transform directly into sexual gametocytes, thereby omitting asexual replication and associated health conditions. Gametocytes can persist for several weeks and fertilize after a bloodmeal in the *Culicoides* midgut. The *Hepaticystis* genome features unique gene families, a low number of *Plasmodium* interspersed repeat (*pir*) genes, and an absence of the reticulocyte-binding protein family.



Acknowledgments

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Resources

www.ebi.ac.uk/ena

<https://github.com/adamjamesreid/hepatocystis-genome>

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