Hepatocystis in only 2 *Rhinolophus*, others may also have been doubly infected but with infections too low for us to detect. Gametocytes of *Polychromophilus* were seen throughout the year in *Miniopterus* and *Rhinolophus* which are permanently infested by the nycteribiids *Penicillidia fulvida* Bigot 1885 and *Nycteribia schmidlii scotti* Falcoz 1923. These bats are also fed upon by other blood-sucking arthropods. Numerous dissections of the cavernicolous *Anopheles caroni* Adam 1961 and *A. hamoni* Adam 1962 have only revealed sporogonic stages of *Plasmodium atheruri* and *P. voltaicum*. No Haemosporidan infections were detected in *Phlebotomus gigas* Parrot and Schwetz 1964, *P. mirabilis* Parrot and Wanson 1939, nor in the strebliids *Raymondia simplex* Jobling 1954, *R. seminuda* Jobling 1954 or *Raymondioides leleupi* Jobling 1954.

100 specimens of *Nycteribia schmidlii scotti* (Nycteribiidae) were teased out completely in normal saline but none was found infected. On the other hand a similar examination of only a small number of *Penicillidia fulvida* revealed sporozoites which we attribute to *Polychromophilus*.

P. fulvida is an ubiquitous species that lives on numerous species of frugivorous and insectivorous bats (Megachiroptera and Microchiroptera). It is never abundant even on its commonest host, *Miniopterus*, and on the average only 1 was found on every 4 bats; it is even rarer on *Rhinolophus* and *Hipposideros*. *P. fulvida* was found throughout the year. It readily leaves its host and passes from one animal to another among a group of resting bats in a colony. The infection rate and infection density of the *P. fulvida* we dissected was high: 1 out of 1 positive in September 1967 (captured on *M. m. minor*); 2 out of 3 in November 1967 (on *R. landeri*); and 4 out of 9 in October 1970 (on *M. m. minor*). Every positive fly was heavily infected.

The mean length of the sporozoites was 13 μm. They were sluggish, thick organisms with blunt extremities. In histological sections of the vector they were abundant in the salivary glands and ducts. Although no oöcysts were found in fresh preparations, in serial sections of nycteribiids we observed them mainly lying between the epithelium and basement membrane of the midgut. Some were lying in the haemocoele adhering to the gut or, rarely, were seen within the epithelium. The smallest oöcyst was rounded, and measured 31 × 10 μm. Mature oöcysts were ovoid, reaching 57 by 47 μm., with a regular or irregular outline, and were surrounded by a distinct membrane. They contained numerous sporozoites lying in parallel or helicoidal bands. They had small, rounded, nuclei of uniform size which stained bright red against the pale rose colour of the cytoplasm. Several irregular dense "chromatin" granules were seen in the oöcyst but not in the residual cytoplasm that was visible in the younger forms.

These sporogonic stages are similar to those of *Polychromophilus deanei* described by GARNHAM, LAINSON and SHAW (1971).

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Two types of schizonts of *Hepatocystis* sp., a parasite of insectivorous bats in the Congo-Brazzaville

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The microchiropteran bats in caves in the Kindamba region of the Congo-Brazzaville are hosts of 2 haemoproteids which we have identified as belonging to the genera *Polychromophilus* and *Hepatocystis*. To *Polychromophilus* we have assigned gametocytes observed in the blood of the bats throughout the year, as well as sporogonic stages found in nycteribiid flies collected from infected bats (see other demonstration): to *Hepatocystis* we have assigned gametocytes of particular morphology seen in 2 specimens of *Rhinolophus* collected in February, 1972, and schizonts in livers and lungs of 2 *Miniopterus m. minor* collected in February, 1967, and 2 *Rhinolophus* sp. collected in February, 1972.

The tissue forms differed greatly from those seen by MER and GOLDBLUM in bats infected with *Polychromophilus murinus*. Two types of schizonts were present both in the liver and lungs:

1. One seemed to be an "acute" form. It developed in the parenchymal tissues of liver and lung in cells with hypertrophied nuclei lying eccentrically within the schizont. In the liver of a *Rhinolophus,* the smallest form seen measured 21 × 17 μm. and lay in an hepatocyte. As they became older the outline of the hepatic schizonts became lobulate and the membrane filled with a colloidal substance. The regularly spaced nuclei of the parasites were rather large in the young schizonts but became small and round as they became older. The cytoplasm had a spongy appearance due to numerous small vacuoles. The largest form seen measured 123 × 92 μm. and was not quite mature. In the lungs we have seen only large schizonts which seemed to have a synchronous growth. In one *Miniopterus* they measured 70–100 μm. in diameter. Their outline was typically lobed, sometimes indented; they were filled with an eosinophilic substance with the borders clearly defined and very similar to that seen in some schizonts of *Hepatocystis perronae* Landau and Adam, 1972. The nuclei were small, relatively few in number and irregularly distributed, with areas free from nucleoli. The cytoplasm stained palely. In a second *Miniopterus,* about a dozen mature or almost mature schizonts were found in sections of the lungs. These were mostly elongate and the largest measured 93 × 50 μm. They were surrounded by a membrane which was thinner and stained less strongly than that of the immature forms. The numerous, tightly packed merozoites were small and round. A cellular reaction by the host was only noted once and this was a moderate reaction around one schizont in the liver.

2. The other type of schizont which lay in the blood vessels of the liver and lungs, are thought to be "chronic" forms. Immature stages were found in the liver of one *Rhinolopus,* and mature forms in the lungs of a second. The immature schizonts lay free in the lumen of the vessels. The actual schizonts measured from 9·0 × 7·5 μm. to 20·0 × 11·0 μm. and contained 35 to 85 nuclei. They lay within the host-cell which was itself surrounded by a ring of thick (4·5 μm.) strongly staining colloid. The nuclei of the host cells were between the parasite and the colloid. 2 mature forms were found which measured 27 × 17 μm. and 31 × 18 μm., and contained 45 and 63 merozoites respectively. They were in vacuoles surrounded by very thick (8 μm.) colloidal envelopes which also contained the nuclei of the host-cells. The merozoites were elongate, curved and large (11 μm. when cut longitudinally), with one end more pointed than the other. Their nuclei were central, round and compact. The cytoplasm stained pink.

Because of their large size, these merozoites seem unsuited to penetrate erythrocytes to form ring forms, and are probably destined to give rise to other tissue schizonts. Their site suggests affinities with the vascular schizonts of *Hepatocystis perronae* and of *Leucocytozoon* (DESSER et al., 1968) and like the latter, are perhaps the origin of relapses.

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Gametogony of *Isospora*-type coccidia

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A sexual cycle resulting in the production of disporocystic, tetrazoic oöcysts takes place in the intestinal wall of at least some of the hosts of *Toxoplasma* (HUTCHISON et al., 1971; JEWELL et al., 1972), *Sarcocystis* (HEYDORN and ROMMEL, 1972) and *Isospora.* Sporocysts may be excreted for considerable lengths of time and the longer patent periods seem to occur in the cases of forms like *Isospora hominis* and *Sarcocystis,* where there is evidence of gametogony within the lamina propria of the intestine (LAARMAN and VAN DER SLIK-VAN DER VEEN, 1961; MARKUS, 1972). Reactivation of *Toxoplasma* oöcyst production in the cat (where development takes place in the epithelium and the patent period is comparatively short), following infection with *I. felis,* has been reported (CHESSUM, 1972). Oöcysts are now known to be important in the transmission of *Toxoplasma* from naturally infected domestic cats (WALLACE, 1971) to other animals (MUNDAY, 1972) and man (FLECK et al., 1972). Isosporan oöcysts can appear in the faeces of man, *inter alia,* following the consumption of meat infected with *Sarcocystis* (ROMMEL and HEYDORN, 1972); and are shed in