RESEARCH NOTES

CAPILLARIID-LIKE EGGS IN LIVERS OF BATS FROM INDONESIA

A common short-nosed fruit bat, *Cynopterus brachyotis*, was trapped in December 1971 at Sungai Beras, Kutai Regency, East Kalimantan (Borneo), latitude 0°55′ South, longitude 117°0′ East, elevation 70 meters, and a sheath-tailed bat, *Emballonura alectro*, was trapped in February 1971 at Hantakan, South Kalimantan (Borneo), latitude 2°38′ South, longitude 115°27′ East, elevation 50 meters (Fig. 1).

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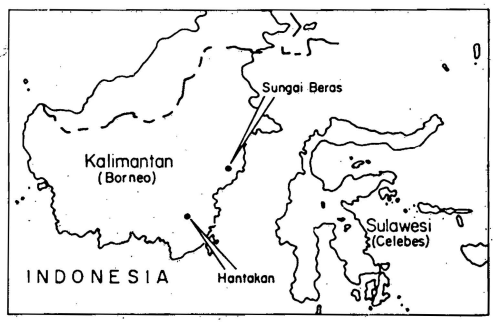

Fig. 1—Collection locations in Kalimantan (Borneo) of bats with *Capillaria* sp.

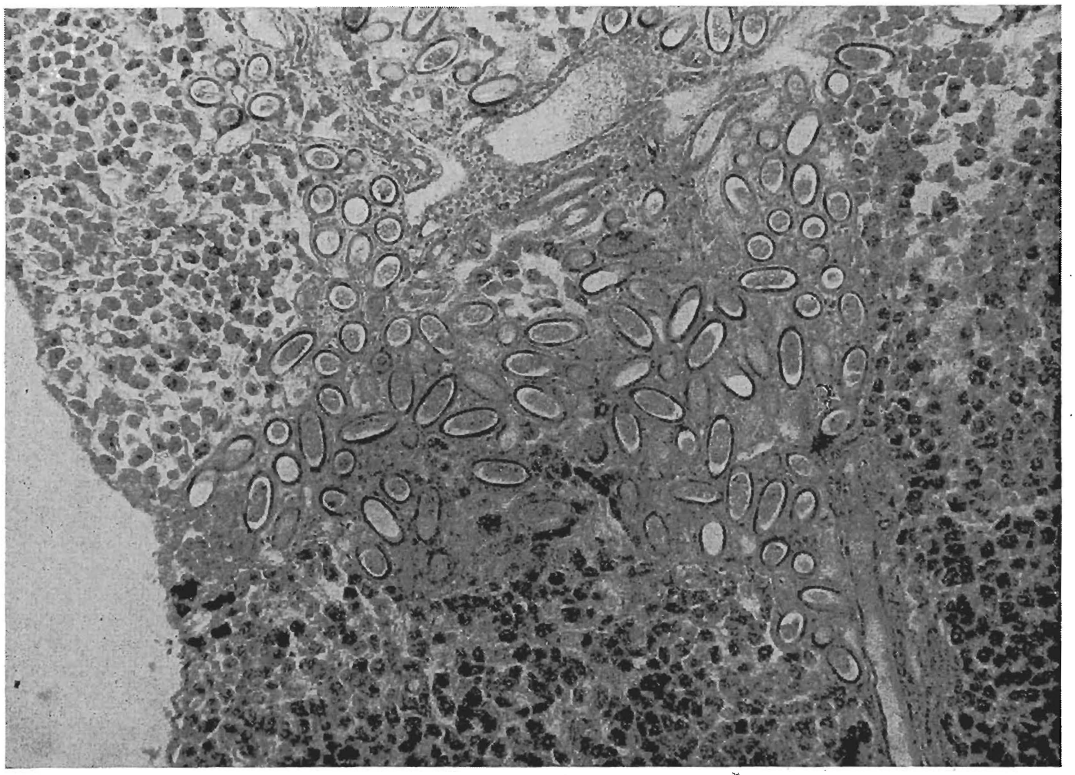

Fig. 2—*Capillaria* sp. eggs in the liver of *Cynopterus brachyotis*. Note the minimal reactive fibrosis. H & E, x100.

The livers of both animals were fixed in 10% formalin, embedded in paraffin, sectioned at 5 microns, and stained with hematoxylin and eosin.

Histopathologic examination of the tissue revealed many bipolar operculate eggs deposited in clusters, many of which had coalesced into groups of a hundred or so ova (Fig. 2). None appeared to be embryonated and no adults were present. The only inflammatory response elicited by the eggs was a mild granulomatous lesion consisting of a few plasma cells, lymphocytes and a sparse fibroblastic proliferation. Histiocytes, macrophages, giant cells, leukocytes and eosinophils were not present and none of the granulomas were encapsulated. A few egg-sized foci of minerilization were present among the eggs. Wisps of fibrosis connect the portal areas immediately adjacent to the egg clusters, and bile duct reduplication was minimal.

The ova that were seen in the liver tissue resembled *Capillaria hepatica* in general morphology. However, those from *Cynopterus brachyotis* were somewhat larger (length 56.1-67.7 microns, width 29.7-36.3 microns) and those from *Emballonura alectro* somewhat smaller (length 49.5-56.1 microns, width 26.4-29.7 microns) than *C. hepatica* ova. In addition, the radial striations were not as prominent and the outer shell was less distinctly pitted than the shell in typical *C. hepatica* eggs.

Capillariids have been reported from numerous insectivorous bats, but only from a few fruit-eating bats (Yamaguti, 1961; Skrjabin and Shikhobolana, 1970). The Indonesian bats may have become infected with a capillariid by ingesting either eggs or larvae from contaminated soil, plant and fruit, or by ingesting intermediate hosts such as insects. According to Ubelaker (1970) no one has ever described the life cycle of the nematode from bats and the authors believe this is the first report of a capillariid eliciting hepatic pathology in bats.

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SERUM HAPTOGLOBIN LEVELS IN PATIENTS WITH LIVER DISEASES*

Haptoglobin is the alpha-2-globulin which specifically combines with haemoglobin both *in vivo* and *in vitro* (Polonovski and Jayle, 1940, *C.R. Acad. Sci.*, *211*:517). It has been demonstrated that the haptoglobin levels were elevated in a wide variety of inflammatory diseases of tissue destruction (Jayle and Boussier, 1955, *Expos. Ann. Biochim. Med.*, *17*: 157; Allison and Blumberg, 1958, *Ann. Rheum. Dis.*, *1*:239). On the other hand a decreased serum haptoglobin level has been found in intravascular haemolysis, pernicious anaemia and liver cell failure (Jayle and Boussier, 1955, *Expos. Ann. Biochim. Med.*, *17*:157; Nyman, 1957, *Scand. J. Clin. Lab. Invest.*, *9*:168; Allison, 1958, *Proc. Roy. Soc. Med.*, *51*:641; Owen and McKay, 1959, *Brit. Med. J.*, *1*: 1454). Since the parenchymal cells of the liver are responsible for synthesis of serum proteins including alpha and beta globulins, there might be some alterations in the serum haptoglobin level of patients with hepatic diseases. We report here the serum haptoglobin levels in 52 patients with hepatic disorders in comparison with those of the normal subjects.

The studies were performed in 52 patients with liver diseases, such as infectious hepatitis, hepatoma and carcinoma of the liver, amoebic liver abscess and opisthorchiasis.

Serum haptoglobin levels were determined by a colorimetric method based on the perioxidase activity of the haptoglobin-methaemoglobin complex (Owen *et al.*, 1960, *J. Clin. Path.*, *13*:163). Values were expressed in terms of bound methaemoglobin, i.e., mg per 100 ml of serum.

Results of haptoglobin determinations for all patients in comparison with those of the normal subjects are shown in Table 1. There was a significant difference of the mean values in patients with infectious hepatitis, hepatoma and carcinoma of the liver and that of the normal subjects ($P < 0.01$). Of 35 patients with infectious hepatitis studied, 23 had serum haptoglobin levels lower than 40 mg per 100 ml. Five out of 6 patients with hepatoma or carcinoma of the liver also had low serum haptoglobin levels. The mean values of serum haptoglobin content in patients with amoebic liver abscess and opisthorchiasis were found to be within normal limits and only one patient from each group had low values.

Low serum haptoglobin levels have been reported in haemolytic anaemia (Allison and apRee, 1957, *Brit. Med. J.*, *ii*:137; Laurell and Nyman, 1957, *Blood*, *12*:493), pernicious

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Table 1

Serum haptoglobin levels (mg%) in normal subjects and patients with liver diseases.

	Total No. of cases	Case distribution at different haptoglobin levels							Heptoglobin level
		0-20	21-40	41-60	61-80	81-100	101-150	151-180	$\bar{X} \pm$S.D.
Normal subjects	200	0	0	36	43	43	76	2	91±27
Infectious hepatitis	35	9	14	9	1	2	0	0	24±23
Carcinoma of liver and hepatoma	6	2	3	0	0	1	0	0	34±28
Amoebic liver abscess	5	0	1	1	1	0	2	0	77±40
Opisthorchiasis	6	0	1	1	1	2	1	0	77±31

anaemia (Nyman, 1957, *Scand. J. Clin. Lab. Invest.*, **9**:168), and in hepatocellular failure (Jayle and Boussier, 1955, *Expos. Ann. Biochim. Med.*, *17*:157; Owen and McKay, 1959, *Brit. Med. J.*, *i*:1454). Results in the present study indicated that there was a low serum haptoglobin level in patients with hepatocellular damage, i.e., infectious hepatitis and hepatoma or carcinoma of the liver. This finding was in accordance with the result reported previously in patients with hepatitis and cirrhosis (Owen and McKay, 1959, *Brit. Med. J.*, *i* : 1454).

Low serum haptoglobin levels in patients with infectious hepatitis and hepatoma or carcinoma of the liver in the present study were probably due to the hepatocellular damage. Although haemolysis which has been reported to occur in acute viral hepatitis may be responsible for the low haptoglobin levels in these patients. Such haemolysis is most frequently associated with glucose-6-phosphate dehydrogenase deficiency of the erythrocytes (Raffensperger, 1958, *Ann. Intern. Med.*, *48*:1243; Salen *et al.*, 1966, *Ann. Intern. Med.*, *65*:1210). No evidence of haemolysis in these patients were detected during the course of this study.

Our results further indicated that determination of serum haptoglobin levels may be of value in assessing the degree and progress of the hepatocellular damage in patients with infectious hepatitis. As shown in Fig. 1, serum haptoglobin levels in these patients increased considerably during their hospitalization. These levels rose in parallel with improved liver function tests and clinical manifestations.

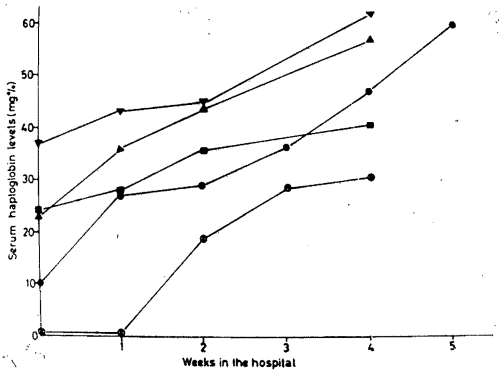

Fig. 1—Alteration of serum haptoglobin levels in patients with infectious hepatitis during hospitalization.

Study on the correlation between the liver function tests and serum haptoglobin levels in patients with infectious hepatitis and their applications in differential diagnosis of jaundice are in progress.

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