HUMAN INFECTION WITH *ISOSPORA BELLI* IN ENGLAND: A CASE REPORT

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PLATE XVI

HUMAN coccidiosis was first positively diagnosed in 1915 by Woodcock, who found five cases amongst soldiers recently returned to England from Gallipoli (Woodcock, 1915). Several further cases followed from Gallipoli in the years 1915–16 (Magath, 1935). A presumed laboratory infection at the London School of Hygiene and Tropical Medicine was reported by Garnham and Killick-Kendrick (1965). No other references have been found in the literature to the occurrence of isosporosis in the British Isles.

CASE REPORT

The patient was a 23-yr-old Englishwoman who between 12 Jan. 1971 and 1 Apr. 1971 accompanied a photographic expedition, starting from Algiers and from there travelling widely in West Africa. During the early part of the expedition she experienced one or two minor episodes of abdominal discomfort and loose stools, but her only definite illness was during February, when she had pyrexia with rigors over a period of 2 days. This was not associated with diarrhoea and no investigations were performed.

Eight days after returning to England she suffered from violent diarrhoea with the passage of fluid stools, accompanied by abdominal pain. She "felt awful" but recovered after 2 or 3 days. She was not feverish during this episode and neither blood nor mucus was noted in the stools. She did not attend her doctor until a week later when perfectly well.

The first stool specimen was received on 15 Apr. 1971. Macroscopically it was formed and normal in appearance. No pus cells, red cells, cysts or ova were seen on direct microscopy. After concentration by the formol-saline method, scanty oöcysts conforming to descriptions of *Isospora belli* were observed in unstained preparations (Faust, Russell and Jung, 1970). Charcot-Leyden crystals were also present. Careful search failed to reveal other intestinal parasites, and routine cultures for intestinal pathogens were negative.

The oöcysts measured on average $27\ \mu\text{m} \times 12\ \mu\text{m}$, were ovoid in shape with one narrower end sometimes showing a small micropile, and had a thin smooth cyst wall. Most of the oöcysts contained a single spherical mass (fig. 1), but some contained two sporoblasts (fig. 2). After allowing the stool to stand 1 to 3 days at room temperature, the majority of cysts had developed to the two-sporoblast stage and some now showed two sporocysts, each containing four elongated sporozoites (fig. 3).

Specimens were obtained at weekly intervals and by 7 May 1971 oöcysts had become exceedingly difficult to find. They were last noted on 21 May 1971.

DISCUSSION

The genus *Isospora* belongs to the sporozoal subclass Coccidia. There are numerous species parasitic in birds and animals and two principal species described in coccidiosis in man: *I. belli* and *I. hominis*.

Isospora have a wide distribution, particularly in the tropics, but with the exception of certain areas in the South Pacific, Brazil, Colombia and Chile, where it is moderately endemic, reports of human infection are uncommon. Mild outbreaks have been reported, usually

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amongst troops overseas. Sporadic infections have been reported in Europe and the USA, almost always in patients recently returned from abroad. An exception to its rarity in Europe would appear to be the Netherlands, where Manschot, Slegers and Meuwissen (1968) reported the finding of *I. hominis* in 8 per cent. of service recruits.

Brandborg, Goldberg and Breidenbach (1970), in a series of biopsies of small-intestinal mucosa from patients infected with *I. belli*, confirmed that the life cycle of the parasite is similar to that previously demonstrated only in animal species. After an unknown number of asexual divisions (schizogony) in the epithelial cells, differentiation into male and female gametocytes occurs and fertilisation results in oöcyst formation. Two sporoblasts develop from a single nucleated mass within the oöcyst, each becoming a sporocyst containing four crescent-shaped sporozoites capable of initiating schizogony again on release. The parasite is passed in the faeces as an oöcyst which is subsequently ingested in contaminated food or drink. The existence of an animal reservoir in addition to the human reservoir has been suggested but not proven.

Two species were distinguished by Wenyon (1926): *I. belli* which in freshly passed stools is unsegmented, or rarely in the two-sporoblast stage, maturing about 48 hr later, and *I. hominis* the sporoblasts of which have matured before evacuation and contain sporozoites. Several authors have questioned the existence of separate species. Henderson *et al.* (1963), as a result of their observations on 14 patients, thought that the stage of development was related to duration of infection, unsegmented oöcysts being found in the early stages, and increasing numbers of cysts showing two sporoblasts after 2 to 3 wk, until finally fully mature oöcysts were excreted. Three of their patients passed free sporocysts during the last few days. Zaman (1968) made careful morphological studies on six patients and found that although in fresh stools most of the oöcysts were at the one-sporoblast and a few at the two-sporoblast stage, sporulation began within 12 hr and was usually complete within 24 hr. In some instances the cyst wall had collapsed leaving two sporocysts attached to each other—a form usually ascribed to *I. hominis*. He concluded that this might sometimes happen before the stools were passed and, that *I. belli* and *I. hominis* are probably identical. In the infection described here, the numbers of oöcysts at the two-sporoblast stage appeared to increase at about the 3rd wk, but finally only a few somewhat degenerate unsegmented forms were found, and at no time was sporulation observed in freshly passed faeces. Thus, if two species exist, our patient was infected with *I. belli*.

Clinical evidence of infection is frequently absent or consists of a mild mucous diarrhoea only. The more severe cases described have been characterised by the passage of fluid stools with or without abdominal pain, nausea, fever and exhaustion (Jarpa Gana, 1966; Limbos and Fain, 1967). The episode may be over in a few days or continue for several weeks. Exceptionally infection seems to become chronic and the infection described by Harant *et al.* (1967) was thought to have originated in Algiers 8 yr before. Cahill and Tsai's patient in New York City (1968) featured grossly bloody stools, but this is rare, as are the rigors experienced in the two laboratory-acquired infections reported by Henderson *et al.* Eosinophilia in the blood and the presence of Charcot-Leyden crystals in the stools have often been noted but are not invariable features of isosporosis. Blood was not obtained from our patient at the outset, but a later specimen taken when oöcysts were still present in the stools showed an eosinophil count of only 38 per mm³. Steatorrhoea has been described as a complication. The six infections reported by Brandborg *et al.* had all been discovered in the course of investigations for steatorrhoea and no other aetiological factors were found.

The infection is usually self-limiting and no treatment has been clearly shown to influence its course. The sequence of events is agreed upon by most authors and is borne out by studies of laboratory-acquired infections (Henderson *et al.*; Garnham and Killick-Kendrick). Approximately 1 to 2 wk elapse between infection and the development of clinical symptoms, during which time no oöcysts are found in the stools, although Charcot-Leyden crystals may precede them. Symptoms may have ceased by the time the stools have become positive 2 to 4 wk after infection. Excretion of oöcysts may persist for several weeks or last only a few days, but the oöcysts are characteristically scanty and found only after stool concentration.

The experience of our patient conforms well with this sequence of events if it is postulated

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FIG. 1.—Oöcyst of *I. belli* containing one sporoblast. $\times 960$.

FIG. 2.—Oöcyst of *I. belli* containing two sporoblasts. $\times 960$.

FIG. 3.—Oöcyst of *I. belli* showing elongated sporozoites within the sporocysts. $\times 960$.

that infection was acquired shortly before leaving Africa: 8 days elapsed between her departure and the onset of symptoms, oöcysts were present in the stools when examined 2 wk after her return and persisted for a further 5 wk. It is possible that her illness may have been due to another agent and that the finding of *Isospora* was coincidental, but the sequence of events and symptomatology correspond closely with other case reports.

SUMMARY

A case of infection with *Isospora belli* is described in a patient recently returned to England from West Africa. It is thought to have been responsible for a diarrhoeal illness and is believed to be the first such case reported in this country since 1916, other than a known laboratory-acquired infection.

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