cited above. Pigments absorbing in their oxidized states in *T. foetus* in the range 400 to 500 nm are the subject of a current investigation by electron paramagnetic resonance spectroscopy.

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Migration of Sporozoites of *Eimeria falciformis* var *pragensis* from the Absorptive to the Crypt Epithelium of the Colon

The first generation schizonts of several eimerian parasites develop within crypt epithelial cells, but the route taken by the sporozoites from the intestinal lumen to the crypt epithelium has not been determined for most of these parasites. Tyzzer et al. (1932, Am J Hyg **15:** 319–393) considered that sporozoites invaded the crypt epithelial cells directly from the lumen of the glands whereas Challey and Burns (1959, J Protozool **6:** 238–241), Van Doorninck and Becker (1957, J Parasitol **43:** 40–43), and Doran (1966, J Protozool **13:** 27–33) reported that sporozoites were transported through the lamina propria within macrophages.

We studied the migration of sporozoites of *E. falciformis* var *pragensis* (Cerna et al., 1974, Folia Parasitol **21:** 301–309) in Swiss white mice infected orally with 10^6 sporulated oocysts.

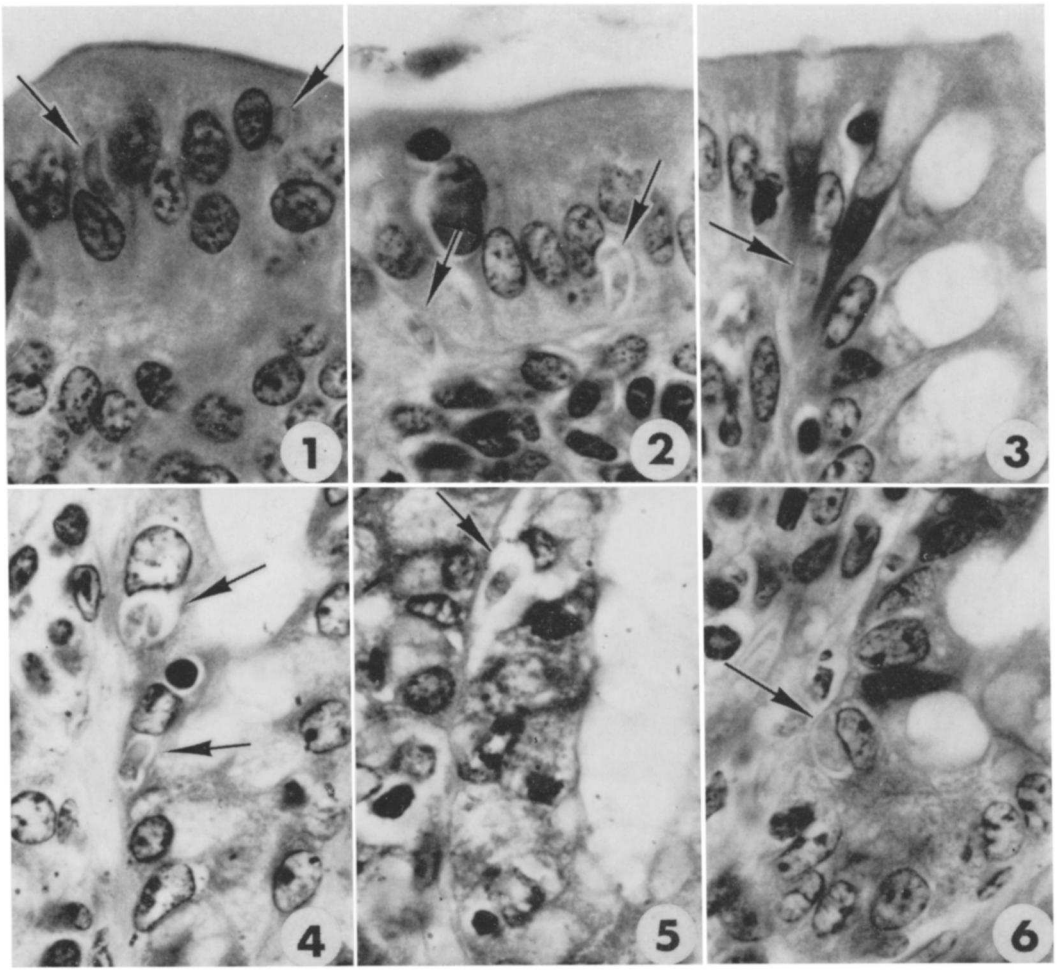
The number and location of sporozoites in transverse colonic sections of mice killed at 6, 12, and 24 hr postinfection (PI) are shown in Table I. At 6 hr PI, over 70% of the sporozoites were within absorptive epithelial cells. Although some sporozoites were found distal or lateral to the host-cell nucleus, most were situated between the nucleus and the base of the cell (Figs. 1 and 2). The few sporozoites seen in crypt epithelial cells were found in the distal portion of the crypts, close to the basement membrane (Fig. 3). In some instances it was difficult to determine whether the sporozoite was within an epithelial cell or between the basement membrane and the basal edge of the epithelium. All sporozoites that had been sectioned longitudinally were oriented with their anterior ends pointed toward the bases of the crypts. A few sporozoites were found below the basement membrane of the absorptive epithelium in the lamina propria.

At 12 hr PI, most of the sporozoites were no longer observed in the absorptive epithelium; they were evenly distributed throughout the distal two-thirds of the crypts. Sporozoites were invariably situated below the cell nucleus, close to the basement membrane. In most cases, the basement membrane was displaced laterally (Fig. 4). Occasionally sporozoites appeared to "bridge" adjacent epithelial cells

TABLE I. *The number and location of sporozoites of* Eimeria falciformis *var* pragensis *in the colonic mucosa of mice infected with 10^6 oocysts.*

Hours post-infection	Number of sporozoites*			
	Total	Absorptive epithelium	Crypt epithelium	Lamina propria
6	81 ± 28	58 ± 28	14 ± 9	11 ± 6
12	63 ± 32	17 ± 12	42 ± 18	9 ± 6
24	67 ± 30	3 ± 3	60 ± 27	4 ± 4

* Values represent the number of sporozoites (and trophozoites at 24 hr PI only) found in complete transverse histologic sections (6 μm) 4–5 cm distal to the ceco-colic junction. The values are expressed as the mean ± standard deviation from 5 mice.



FIGURES 1–6. Sporozoites (arrows) in the colonic epithelial cells of mice infected with 10^6 oocysts of *E. falciformis* var *pragensis*. Fixed in Bouin's and stained with H&E; × 950. **1–3.** Sporozoites are lateral to (**1**) or below (**2**) the nucleus of absorptive epithelial cells and less frequently in the distal part of the crypt (**3**), 6 hr PI. **4.** Sporozoites are located in the mid portion of the crypt within parasitophorous vacuoles, 12 hr PI. **5.** A sporozoite located at the distal one-third of the crypt appears to "bridge" adjacent epithelial cells, 12 hr PI. **6.** A rounded sporozoite (or trophozoite) located at the proximal part of the crypt, 24 hr PI.

(Fig. 5). In a few cases the host cell containing a sporozoite could not be identified as an epithelial cell with certainty.

At 24 hr PI, more than 85% of the sporozoites, some of which had become rounded and undergone nuclear division (trophozoites), were observed in the proximal half of the crypts (Fig. 6) where the first generation meronts developed (Mesfin and Bellamy, 1978, J Parasitol **64:** 696–705). The sporozoites and meronts were found within a distinct parasitophorous vacuole. Sporozoites were found only occasionally in the lamina propria within macrophages, and a few of these appeared to be degenerate. It was considered unlikely that these degenerate sporozoites were capable of developing into schizonts.

The sporozoites of *E. falciformis* var *pragensis* penetrated the absorptive epithelium of the colon and migrated to the proximal crypt epithelium either through the basal portions of epithelial cells or more likely along a path between the basement membrane and the basal layer of the epithelium. The migration of the

sporozoites observed in the present study differs from that reported for *E. tenella* where the sporozoites were considered either to have penetrated crypt epithelial cells directly from the cecal crypt lumen (Tyzzer et al., loc. cit.) or to have been transported by macrophages from the absorptive to the crypt epithelium through the lamina propria (Challey and Burns, loc. cit.). The sporozoites of *E. necatrix* and *E. acervulina* apparently were also transported by macrophages (Van Doorninck and Becker, loc. cit.; Doran, loc. cit.). Macrophage-bound sporozoites, seen within duodenal crypt epithelial cells of birds infected with *E. acervulina* (Doran, loc. cit.), were not seen in the present study. Infrequently, the identity of the sporozoite-containing cell was not determined because only a small portion of the sectioned nucleus was evident; however, these cells appeared to be morphologically altered epithelial cells rather than macrophages.

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Somatic Chromosomes of *Schistosoma mansoni**

The chromosomes of *Schistosoma mansoni* were described by Short and Menzel (1960, J Parasitol **46:** 273–287) using acetocarmine squashes, and more recently were redescribed in an abstract by Raghunathan (1976, Program and Abstracts, 51st Annual Meeting, Am Soc Parasitologists, page 26).

Disagreements between these two accounts make it desirable that we present here our results which are based on more current methods than those of the 1960 report.

The present observations are based on analysis of chromosomes of 20 late prophase and metaphase cells from sporocysts. The stock of *S. mansoni* came originally from Puerto Rico. Chromosome preparations were made from sporocysts of unknown sex from four infected snails (*Biomphalaria glabrata*). After treatment of the living snails with colcemid (0.5 μg/ml in 100 ml of well water for 15 hr), their digestive glands with parasite material were removed and a suspension made by triturating with a syringe fitted with a 19 gauge needle, in molluscan saline (without Ca^{++} and Mg^{++}). The suspension was treated with hypotonic molluscan saline (diluted 9:1 with distilled water) for about 30 min, then centrifuged and fixed in methanol acetic acid (3:1). After further centrifugation and addition of fresh fixative, chromosome preparations were made by placing several drops of the cell suspension onto wet slides, air drying and staining with Giemsa according to the method commonly used for karyotyping cell cultures.

The karyotype obtained (Fig. 1) consists of eight chromsoome pairs (2n = 16)— two large pairs of about equal size, three medium-sized, and three small pairs, as previously reported (Short and Menzel, 1960). When arranged in order of decreasing size, Nos. 1, 2, 3, 4, and 5 have subterminal centromeres; Nos. 6 and 7 appear submetacentric, and No. 8 metacentric. Chromosome 4 has a satellite in the short arm. Chromosome 1 varied in length in our material from about 9.5 μm at late prophase (Fig. 1A) to 4 μm at metaphase (Fig. 1B). Chromosome 2 was occasionally slightly longer than No. 1 and its short arm was usually longer. Nos. 6 and 7 were sometimes difficult to distinguish from each other.

* Since we submitted this note for publication, Grossman and Cain (1978, Program and Abstracts, 53rd Annual Meeting, Am Soc Parasitologists, page 102) described in an Abstract the two largest chromosomes of *Schistosoma mansoni* as telocentric and acrocentric; their results are more in agreement with this present report than with the earlier one (Short and Menzel, 1960).