Other enterocytes were found to contain spherical sporoblasts, about 4 to 5 μm in size, containing a number of nuclei, flattened vesicles, and a large number of filaments 65 nm in diameter, almost randomly arranged within the cytoplasm (fig 3). These sporoblasts sometimes indented the host cell nucleus. Sporoblasts with more electron dense cytoplasm (2.5 $\times$ 3.5 μm) also contained several polaroplast bodies, suggesting a stage just prior to division and final spore formation.

Three genera of microsporans have been reported in man—*Nosema*,⁹ *Encephalitozoon*,¹⁰ and *Enterocytozoon*.⁶ The microsporid described here does not have diplo-karyotic nuclei like *Nosema*, nor does it develop within a parasitophorous vacuole like *Encephalitozoon*, nor are the spores of a similar size to those of the species *Enterocytozoon bienersi* (1.5 $\times$ 0.5 μm). The specific classification of this microsporan will need further investigation, but it is more closely related to *E. bienersi* than to the other two genera.

Electron microscopy was essential for the diagnosis of this parasite, and it is suggested that all intestinal biopsy specimens from patients with AIDS should be investigated by this technique so that we may learn more about this hitherto little known parasite.

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References

- 1 Matsubayashi H, Koike T, Mikata I, Takei H, Hagiwara S. A case of Encephalitozoon-like body infection in man. *Archives of Pathology* 1959;67:181-7.
- 2 Ashton N, Wirasinha FA. Encephalitozoonosis (Nosematosis) of the cornea. *Br J Ophthalmol* 1973;57:660-74.
- 3 Baker JR. *Parasitic protozoa*. London: Hutchinson University Library, 1969.
- 4 Dobbins WO, Weinstein WM. Electron microscopy of the intestine and rectum in acquired immune deficiency syndrome. *Gastroenterology* 1985;88:738-49.
- 5 Ledford DK, Overman MD, Gonzalvo A, Cali A, Mester SW, Lockey RF. Microsporidiosis myositis in a patient with the acquired immunodeficiency syndrome. *Ann Intern Med*

1985;102:628-630.

- 6 Desportes I, Le Charpentier Y, Galian A, et al. Occurrence of a new microsporidian: Enterocytozoon bienersi, n.g., nsp, in the enterocytes of a human patient with AIDS. *J Protozool* 1985;32:250-4.
- 7 Modigliani R, Bories C, Le Charpentier Y, et al. Diarrhoea and malabsorption in acquired immune deficiency syndrome: a study of four cases with special emphasis on opportunistic protozoan infestations. *Gut* 1985;26:179-87.
- 8 Canning EU, Lom J. *The microsporidia of vertebrates*. London: Academic Press, 1986.
- 9 Sprague V. Nosema connori n.sp., a microsporidian parasite of man. *Trans Am Microscopy Soc* 1974;93:400-2.
- 10 Pakes SP, Shadduck JA, Coli A. Fine structure of Encephalitozoon cuniculi from rabbits. *J Protozool* 1975;22:481-8.

Use of photocopier for recording pathological specimens

For those who are working in a surgical pathology laboratory, there is often a demand for photographic recording of gross pathological specimens. Polaroid photography gives good results but is expensive. Conventional photography is less expensive and gives prints of the best quality but some delay in getting the prints is inevitable. There are times when the requirement for the quality of reproduction is not critical—for example, when several blocks are taken from excised skin lesions or slices of large tumours and solid organs such as the liver, lungs, spleen, kidneys and pancreas, it is helpful to have a reasonably accurate pictorial representation of the gross specimen to mark the sites from which those blocks are sampled. A similar situation occurs when a stomach or a segment of the large bowel shows several mucosal lesions which are individually sampled. A rapid, cheap, and reliable way of producing a photographic print of acceptable quality is by the use of a photocopying machine. The slice of organ or tumour or the opened viscera, sandwiched between two plastic sheets, can be laid on the machine. Copying is then performed in the usual way. It is also convenient to use a photocopier to record the dermatoglyphics of abnormal fetuses. Apart from its low cost, an additional advantage is that the prints are on ordinary papers which can be easily filed with the other records. With the photocopier, the labour of putting in a scale when taking photographs of a specimen becomes unnecessary unless the machine is set to perform size enlargement or reduction.

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Role of immunocytochemistry in diagnostic pathology: information from necrotic tissue

The paper by Mason and Gatter¹ is a valuable summary of many aspects of the diagnostic applications of immunocytochemistry. I would just like to expand on its potential for gathering useful information from sub-optimal biopsy specimens. Their paper illustrates the preservation of immunoreactivity in crushed and distorted specimens. Another problem with tiny biopsy specimens is when the whole sample is necrotic. Reticulin staining will often show tissue architecture in these circumstances and permit a useful conclusion to be drawn. There is also often preservation of reactivity with antibodies against cytokeratins (such as CAM 5.2) or the leucocyte common antigen (CD45). Though great care must be exercised in reaching conclusions from necrotic samples, it is sometimes possible to separate lymphoma from carcinoma with more confidence than would be possible without antibody studies. Some bronchial biopsy specimens that have only shown necrotic material have also been shown to be composed of disorderly sheets of epithelial cells quite consistent with carcinoma. In the appropriate clinical setting it has been possible to proceed without recourse to a repeat biopsy. Not every necrotic sample will reach this but it is worth trying.

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- 1 Mason DY, Gatter KC. The role of immunocytochemistry in diagnostic pathology. *J Clin Pathol* 1987;40:1042-54.

Protein-bound vitamin B₁₂ absorption test

Dr Chanarin makes the unreference statement that the protein-bound B₁₂ absorption test has been interpreted as detecting a lack of intrinsic factor at a stage when the standard B₁₂ absorption test is normal. Although this possibility was considered in subsequent investigations have shown that the addition of intrinsic factor does not

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correct protein-bound B₁₂ malabsorption to normal, even in pernicious anaemia.³⁻⁵ Isolated protein-bound B₁₂ malabsorption is associated with achlorhydria⁵⁻⁷ and probably detects a lesser degree of gastric atrophy than that found in pernicious anaemia and in patients with atrophic gastritis with an abnormal Schilling test result.⁸ In the test B₁₂ is bound to an avid but artificial binder such as chicken serum. It is likely that the binder has to undergo peptic digestion before B₁₂ can be released and absorbed. Food B₁₂ is attached to an intracellular binder but is unavailable for absorption until the surrounding cellular elements have been digested. In this way protein-bound absorption tests mimic food B₁₂ absorption and approximate more closely to the physiological state than standard absorption tests in which B₁₂ is presented in a freely available form.

Chanarin questions the clinical value of these tests. We have found them of value in investigating patients with B₁₂ deficiency of no apparent cause who have a normal diet and a normal Schilling test result. We have identified 15 such patients, some with megaloblastic anaemia, and others have described patients with anaemia^{9,10} and neuropathy.^{4,9} These patients are presumably unable to produce enough acid/pepsin to release bound B₁₂ but are able to produce sufficient intrinsic factor to give a normal Schilling test result.

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References

- Chanarin I. Megaloblastic anaemia, cobalamin and folate. *J Clin Pathol* 1987;40:978-84.
- Doscherholmen A, Swain WR. Impaired assimilation of egg ⁵⁷Co vitamin B₁₂ in patients with hypochlorhydria and achlorhydria and after gastric resection. *Gastroenterology* 1973;64:913-19.
- Doscherholmen A, Silvius S, McMahon J. Dual isotope Schilling test for measuring absorption of food-bound and free B₁₂ simultaneously. *Am J Clin Pathol* 1983;80:490-5.
- King CE, Leibach J, Toskes PP. Clinically significant vitamin B₁₂ deficiency secondary to malabsorption of protein-bound vitamin B₁₂. *Dig Dis Sci* 1979;24:397-402.
- Cattan D, Belaiche J, Zittoun J, Yvart J, Chagnon J-P, Nurit Y. Role de la carence en facteur intrinsèque dans la malabsorption de la vitamine B₁₂ liée aux protéines, dans les achlorhydries. *Gastroenterol Clin Biol* 1982;6:570-5.
- Dawson DW, Sawers AH, Sharma RK. Malabsorption of protein-bound vitamin B₁₂. *Br Med J* 1984;288:675-8.
- Doscherholmen A, McMahon J, Ripley D. Inhibitory effect of eggs on vitamin B₁₂ absorption: description of a simple ovalbumin ⁵⁷Co-B₁₂ absorption test. *Br J Haematol* 1976;33:261-72.
- Ardeman S, Chanarin I. Intrinsic factor secretion in gastric atrophy. *Gut* 1966;7:99-101.
- Carmel R. Subtle cobalamin malabsorption in a vegan patient: evolution into classical pernicious anaemia with anti-IF antibody. *Arch Intern Med* 1982;142:2206-7.
- Streeter AM, Shum HY, Duncombe VM, Hewson JW, Thorpe MEC. Vitamin B₁₂ malabsorption associated with a normal Schilling test result. *Med J Aust* 1976;1:54-5.

Dr Chanarin comments:

The purpose of a new test is to provide new information of value in either a clinical or research context. It does not seem to me that this has yet been achieved with B₁₂ bound to chick serum. Binding to chick serum seems to make B₁₂ poorly available to controls as well as to patients. Evaluation of such a test requires in-depth assessment of patients in whom it is being performed. It is not enough to *presume* that there is not enough acid/pepsin; these and other factors that might influence a result need to be measured if the results of such a test are to be interpreted in a meaningful way. Nor is it enough to suggest that the chick bound B₁₂ test *probably* detects a lesser degree of gastric atrophy than that found in pernicious anaemia etc; demonstration of such a claim is a not inconsiderable undertaking.

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Book reviews

Blood Transfusion in Clinical Medicine. 8th ed. PL Mollison, CP Engelfriet, M Contreras. (Pp 1033; £49.50.) Blackwell Scientific Publications. 1987. ISBN 0 632 01649 3.

Publishers are not charities. Any book that reaches its eighth edition must be a success in financial terms and therefore popular. At the same time there is always a risk of laurel resting with only the need to maintain rather than create a readership, so it is important that any new edition should be compared with its contemporary competitors as well as its earlier versions.

The eighth quinquennial "Mollison", as before, is a comprehensive treatise on the transfusion of blood and blood products; the theory, the practice, and the complications. The original author has been joined by three others; two transfusion service consultants

and an anaesthetist. Areas now covered in more detail include plasma exchange, marrow transplantation, and leucocyte antigens. There is a whole chapter about the transmission of infection.

The book is up to date and includes references as late as 1987, and, generally, sets the same high standard as previous editions. There are occasional exceptions and omissions; the section on indications for marrow transplantation, for example, is a little stilted, but is perhaps not relevant to this book anyway. There are a dismissive two pages on the practice of autologous transfusion saying it is "rarely used", a claim that may no longer be true, and which perhaps reflects the understandably reactionary view that blood transfusion services rather than events have overtaken the authors.

Such minor disappointments are only worth mentioning because they are like squeaks and rattles in a Rolls Royce. Certainly the book still offers a rich source of

reference for serological queries, as it always did, and so maintains its unique place as a ward round and seminar argument settler. But competition is very fierce. The authors should bear this in mind as they work on the ninth edition which is doubtless already in preparation.

JS LILLEYMAN

The Patient and Decentralized Testing. Ed JP Ashby. (Pp 128; £25.) MTP Press Limited. 1987. ISBN 0 746 20036 6.

This small volume records the proceedings of a two day seminar, organized by ECCLS in Copenhagen in August 1986, which considered the problems posed by the technological advances that have made it possible to carry out an increasing variety of analyses beyond the confines of the conventional pathology laboratory. Included are overlap-