1:16). After the epidemic 89 (77%) had a four-fold titre rise. Of those under 20 years of age 46 out of 50 had positive titres after the infection. Clinical illness occurred in over 50% of infected subjects.

Five years later a follow-up study was done using 75-g oral carbohydrate load glucose tolerance test. Serum neutralizing antibody titres and two-hour plasma glucose levels were measured. Of the 136 persons under 25 years of age (M.= 65, F.= 71) the highest two-hour plasma glucose was 133 mg/100 ml. Persistence of positive titre levels was also documented since 77% of these subjects had a positive neutralizing antibody titre level.

Even though it was in the young diabetic that Dr. Gamble and his colleagues were able to show the strongest association with positive Coxsackie B4 titres we could not show that Coxsackie B4 infection caused a single case of diabetes, though the attack rate in the 136 under 20 years of age at the time of the epidemic was extremely high.—We are, etc.,

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- 1 Gamble, D. R., et al., *British Medical Journal*, 1969, 3, 627.
- 2 Gamble, D. R., and Taylor, K. W., *British Medical Journal*, 1969, 3, 631.
- 3 Hadden, D. R., et al., *British Medical Journal*, 1972, 4, 729.

Serotonin and the Mesenteric Circulation

SIR,—Dr. I. M. Murray-Lyons and others (29 December, p. 770) reported some unusual cases of gangrene of the small intestine in patients with carcinoid tumours of the small bowel and with raised blood levels of 5-hydroxytryptamine (5-HT). They found proliferative changes in the elastic tissue in the wall of the mesenteric vessels. Anthony and Drury,¹ reporting similar changes in the elastica in cases with small bowel carcinoid, postulated that some substance or substances produced by the carcinoid tumour caused the changes in the elastica, which in turn compromised the lumen and contributed to bowel necrosis in some cases. This hypothesis has not been proved directly. The elastica lesions have not been reproduced experimentally and the theory does not explain the presence of the elastica lesions almost exclusively in the mesenteric circulation.

In a recent laboratory investigation in dogs blood flow was measured with an electromagnetic flow meter simultaneously in the thoracic aorta, in the superior mesenteric artery (S.M.A.), and in the renal artery. An intravenous injection of 5-HT (0.03 mg/kg) caused a reduction in flow, which was most marked in the S.M.A. (fig.). The reason for this specific sensitivity of the mesenteric vascular bed to 5-HT is not known. Nor can it be stated with certainty that the human mesenteric circulation responds to 5-HT in a similar manner. However, this observation does suggest an alternative hypothesis for the aetiology of the elastica changes in the mesenteric vessels—that a continuously raised level of 5-HT in the blood may lead to a chronic increase in re-

Effect of intravenous injection of 5-HT (arrow) on flows (ml/min) and blood pressure (mm Hg).

sistance in the mesenteric circulation. The sustained increased resistance causes the degenerative changes in the elastica in the branches of the S.M.A. that in turn contribute to ischaemic necrosis in some cases of small bowel carcinoid.—We are, etc.,

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- 1 Anthony, P. P., and Drury, R. A. B., *Journal of Clinical Pathology*, 1970, 23, 110.

Serotonin Metabolism in Hepatic Encephalopathy

SIR,—We read with great interest the paper by Dr. A. J. Knell and others (23 March, p. 549) on disturbed serotonin metabolism in hepatic encephalopathy. Our interest in the metabolism of serotonin (5-HT) was aroused by a patient with cirrhosis of the liver who excreted large amounts of 5-HT and its precursor 5-hydroxytryptophan (5-HTP) in urine.¹ The hepatic metabolism of 5-HT in experimental cirrhosis was characterized by decreased formation of sulphate conjugates, increased synthesis of glucuronide and conjugates,^{2,3} decreased uptake of 5-HT by the liver,³ and deranged enterohepatic circulation of metabolites of 5-HT.^{3,4} Metabolism of 5-HT in the mucosa of the small intestine was disturbed only in the advanced stage of the cirrhosis, when the mucosa lost its ability both to store and metabolize 5-HT.³

A raised concentration of 5-hydroxyindole acetic acid (5-HIAA) in cerebrospinal fluid might well be related to increased excretion of 5-HT and 5-HTP in urine. According to our preliminary observations the storage and metabolism of 5-HTP in the small intestine mucosa of cirrhotic rats is disturbed like the intestinal metabolism of 5-HT. Thus an increased efflux of 5-HTP into the portal circulation may result in an increased transfer of 5-HTP to the central nervous system, where it is metabolized through 5-HT to 5-HIAA. This mechanism might be involved in the pathogenesis of the observed increase of 5-HIAA concentration in cerebrospinal fluid in patients with hepatic encephalopathy.—We are, etc.,

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- 1 Mustala, O., Kekki, M., and Pentikäinen, P., *Annals of Clinical Research*, 1969, 1, 197.

- 2 Pentikäinen, P., *Annales Medicinæ, Experimentalis et Biologiæ Fenniae*, 1970, 48, 135.
- 3 Pentikäinen, P., Kekki, M., and Mustala, O., *Scandinavian Journal of Gastroenterology*, 1969, 4, Suppl. 4.
- 4 Kekki, M., Mustala, O., and Pentikäinen, P., *Gastroenterology*. In press.

Laparoscopic Tubal Ligation

SIR,—I was extremely interested in the letter by Dr. K. R. Greene and others (6 April, p. 54). Only three days before that date and quite independently I did my first laparoscopic Pomeroy sterilization by virtually the same method as they described. I would confirm that it seems simple and safe and that a search of the literature suggests that it has not been tried previously. In thin patients with a mobile uterus there would seem to be no need for two lower quadrant incisions because a single midline stab 2-3 cm above the symphysis pubis suffices. It would seem that the main hazards of the procedure are likely to be haemorrhage due to tearing of the mesentery of the Fallopian tube and, if one uses two stab incisions, accidental puncture of the inferior epigastric vessels by the operating cannula—a complication which should be avoidable if one remembers the surface markings of these vessels. Both complications should be excluded before withdrawing the laparoscope. Neither would be as serious as bowel burns and either would be an indication for laparotomy, for which consent should always have been obtained.

In due course I too hope to report a large series of patients having a laparoscopic Pomeroy sterilization. It would seem important to make an early and full assessment of a technique which requires only ordinary laparoscopy equipment, permits tubal ligation and transection, avoids the hazards of diathermy, and is surprisingly easy.—I am, etc.,

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- 1 Greenhalf, J. O., and Roberts, H. R., *British Medical Journal*, 1971, 3, 304.

Death during Dental Anaesthesia

SIR,—I have read with interest Dr. J. G. Bourne's letter on this subject (16 March, p. 516), but I do not feel that he has adequately emphasized the fact that a young, healthy person died needlessly. The patient had an unrecognized faint during the intravenous induction of anaesthesia in spite of the presence of the cardinal sign of pallor. In spite of this pallor and while in the sitting position in the dental chair pure nitrous oxide was given. The anaesthetic was administered by an operator anaesthetist, a practice which is not supported by the Society for the Advancement of Anaesthesia in Dentistry.¹

While tragic errors of judgement have been made by most of us in the course of our professional careers we must realize that the price of liberty is eternal vigilance. I routinely anaesthetize the dental patient in the supine position, but this is purely because of the trend in dental ergonomics. I have never shared Dr. Bourne's anxiety about the sitting position and I never hesitate to use this position if the patient has, for example, a hiatus hernia or an abdominal