equilibrium between growth, activity, and appetite is set at a low level, owing to some factor affecting the last of these. Whether "undernutrition" of this nature could affect growth without effect on the surface fat, or with such small changes only as we have reported, is unknown; it is not the sole, and may not even be the prime, function of the surface fat exactly to make good deficits of intake.

There are, as already noted, long-term growth studies in progress, some of them on the general public. The practical value of these will depend in part upon the success with which the factors affecting growth are recognized at the time and their intensity is gauged. This is impossible in the case of non-dietary factors without working hypotheses regarding their *modus operandi*. Hence these considerable speculations. We would suggest, among such hypotheses, that such things as a varied and tempting diet, adequate sleep, and regular bowel habits, and similar attention to the fitness of the child, may affect appetite and therefore growth rate.

Summary

Recent published evidence on schoolboys' diets and stature has been reviewed. Possible reasons for the differences in stature which still persist are discussed, and a field study of a reconnaissance character is described.

The findings confirm the report by Weir (1952) that increase in growth rate is associated with slimmer physique.

Differences in physique between boys in an industrial area and others elsewhere are similar to the differences in boys of different socio-economic environment.

Boys with pallor were found on average to be lighter, confirming a part of Yudkin's (1952a) findings on the significance of pallor. Thin boys were found to be lighter and also shorter than others. The possibility that these findings mean that in some individuals growth is checked because appetite is inadequate is discussed in the light of American work.

Varied diets, as indicated by frequency of consumption of meat and fish, milk, and fruit, were found to be associated with higher weights.

There was a relationship, independent of the association between weight and diet, between weight and the standard of parental care, social class, and type of school.

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REFERENCES

- Beltram, A., and Bransby, E. R. (1950). *Monthly Bull. Minist. Hlth. Lond.*, 9, 177.
 Bransby, E. R. (1953). In press.
 — Burn, J. L., Magee, H. E., and MacKecknie, D. M. (1946). *British Medical Journal*, 1, 193.
 British Medical Association Nutrition Committee Report (1950). London.
 Cruickshank, E. W. H. (1951). *Food and Nutrition*, p. 405. Livingstone, Edinburgh.
 Ellis, R. W. B. (1947). *Edinb. med. J.*, 54, 269.
 Greenbaum, A. L., and McLean, Patricia (1953). *Biochem. J.*, 54, 407.
 Hubbell, R. B., and Koehne, M. (1934). *Amer. J. Dis. Child.*, 47, 988.
 Leitch, I. (1951). *Brit. J. Nutr.*, 5, 142.
 McMeekan, C. P. (1940). *J. agric. Sci.*, 30, 276, 387, 511.
 Macy, I. G., and Hunscher, H. A. (1951). *J. Nutr.*, 45, 189.
 Stuart, H. C. (1946). *New Engl. J. Med.*, 234, 666, 693, 732.
 Weir, J. B. de V. (1952). *Brit. J. Nutr.*, 6, 19.
 Widdowson, E. M. (1951). *Lancet*, 1, 1316.
 Young, F. G. (1945). *Biochem. J.*, 39, 515.
 Yudkin, J. (1952a). *Lancet*, 1, 239.
 — (1952b) *British Medical Journal*, 1, 1388.

ENTERIC PNEUMATOSIS

BY

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Enteric pneumatosis is characterized by the occurrence of gas-containing cysts, either sessile or pedunculated, arising in the submucous and subserous layers of the small intestine. They attain the size of a grape and tend to appear in local masses, which in turn may be multiple. They are classically more common on the mesenteric aspect of the bowel and are confined to the small intestine and proximal half of the large intestine.

These cysts are similar in appearance to lymphangiomas, having a thin translucent wall, and are composed of delicate connective tissue lined, at least partially, by endothelium and with evidence of giant-cell formation. The entire microscopical appearance supports the view that the longevity of these cysts is not so much the result of their own perpetuity as of continual replacement due to some influence not understood. The contents are gaseous, being composed mostly of nitrogen with smaller proportions of oxygen and occasionally carbon dioxide, hydrogen, and methane.

Theories on the Cause

Various theories of the evolution of this condition have been expounded, and Masson (1925) has examined these in some detail. It has been thought that these collections of gas are caused by gas-producing organisms, but experiments have failed to produce a similar condition. Further work has been done to investigate possible penetration of intestinal mucosa, associated with increase in intestinal pressure such as may occur in vomiting, coughing, or constipation, but this theory in turn has been disproved, as the cystic gas has not shown the same constituents as intestinal gas.

It is now accepted that this condition is in fact one of gaseous dilatation of lymphatic channels. Masson has investigated the causation of this phenomenon, and concludes that the fundamental pathology lies in lymph stagnation in tortuous or obstructed lymph vessels. He further states that absorption of carbon dioxide and lactic acid from the intestinal mucosa occurs into blocked lymphatics, and that this is followed by liberation of the carbon dioxide, and by diffusion of nitrogen, oxygen, and occasionally methane from capillaries; the resultant ratios of the gases being adjusted by the laws of diffusion governing the partial pressures of gases.

Masson and others have suggested that enteric pneumatosis occurs in association with digestive disturbances, and especially those due either to gastric or to duodenal ulceration, although the cause for this is not clear. Various other authors assert that it is associated with such conditions as intestinal tuberculosis, acute and chronic appendicitis, colitis, and many others, but these seem to be purely coincidental.

Koss (1952), in a review of the literature, has noted the clinical course of this disease. He asserts that the disease may develop within a relatively short time, as confirmed by operative findings. There is also considerable evidence to show that these cysts may disappear spontaneously, but certain complications have been noted. Pneumoperitoneum may occur owing to spontaneous rupture of the cysts, but intestinal obstruction seems to be the most likely complication. The obstruction may be precipitated by blockage of the bowel lumen by submucous cysts, by volvulus induced by a cyst mass, or by extrinsic obstruction due to pressure by cysts or adhesions arising as a result of the condition. Koss reported one case of intussusception due to gas cysts.

This disease has been described as occurring in the vagina during pregnancy, and the first, albeit inadequate, descrip-

tion of its occurrence in man is claimed by English authors to be that of John Hunter (1728-93) and by French authors to be that of Duverney (1648-1730).

In 1825 Mayer described a case occurring in the intestine and peritoneum of a pig, but the first full account of the disease in humans is attributed to Bang (1876); who found this condition at necropsy in a female who died of volvulus of the colon. In 1899 came the first report of the condition by Hahn, who found it in the living subject. Since that time, according to Koss, who has reviewed the available literature very fully, 213 cases have been reported, the vast majority from Central Europe.

A further case, reported below, shows the classical features as described, with the exception that the condition was found to be present in the distal colon—a rare site in a rare disease.

Case History

A married woman aged 49 was first seen in January, 1952, complaining of the passage of bright red blood inter-

mittently on defaecation and associated with diarrhoea and lower abdominal pain. The pain was not severe, but the whole syndrome had been present for 18 months. She had no other complaints apart from long-standing constipation before the onset of the present symptoms, and her weight was steady at about 11 st. (70 kg.). Her previous history contained nothing relevant—an appendicectomy at the age of 19 and hysterectomy at 39. She had been a chronic sufferer from asthma.

Showing filling defects in sigmoid colon and splenic flexure due to gas cysts.

She was admitted to hospital, and, apart from some deep tenderness in the left iliac fossa and a minor degree of haemorrhoids, nothing abnormal was found on either abdominal or rectal examination. Her blood picture was normal. Sigmoidoscopy was performed and the bowel was normal to 23 cm. At this level several polypoid masses were seen filling the lumen of the colon; these were sessile, and measured from 0.5 to 1.5 cm. in diameter. The surface was translucent and of a bluish hue, the appearance being more like that of lymphangiomatosis than polyposis. There was some evidence of recent haemorrhage from the surface of the cysts.

Examination by a barium enema showed rounded translucent filling defects in the sigmoid colon and the splenic flexure (see Fig.). It was decided to perform laparotomy to elucidate further the diagnosis and the extent of the involvement of the bowel.

On opening the lower abdomen the diagnosis was at once evident. Masses of gas cysts were found, involving 6 in. (15 cm.) of a redundant sigmoid colon and 4 in. (10 cm.) of the splenic flexure and distal transverse colon with a normal descending colon between. These cysts presented a similar appearance to that seen at sigmoidoscopy and were aggregated around the entire circumference of the bowel but stopping short of the mesentery. No other abnormality was demonstrated in the abdominal cavity. In view of the symptoms, it was decided to excise the distal colon, and this was performed with end-to-end suture of the transverse colon stump to the pelvi-rectal junction.

Convalescence was uneventful and the patient was discharged from hospital 12 days later free from symptoms. When seen at the out-patient department two months later she had fully recovered from her operation, and her bowel action was normal and her pain and bleeding had gone.

Pathological Report.—"The specimen consists of distal transverse colon, splenic flexure, and descending and sigmoid colon, and shows the typical submucous and subserous gas-filled cysts. The phenomenon of 'skipping' is well illustrated. Microscopically the cysts bear evidence of an endothelial lining with commencing giant-cell formation. No portal of entry for the 'air' has been demonstrated in the colon."

Conclusions

Enteric pneumatosis is a condition in which the intestinal lymphatic channels become blocked and distended by gas, producing multiple gas cysts both subserous and submucous in position.

The condition occurs mainly in men between the ages of 30 and 50, is accompanied by vague digestive and abdominal symptoms, and would appear to be subject to spontaneous resolution. Intestinal obstruction has been pointed out as the most likely complication.

The case reported above is of interest apart from the rarity of the condition in that barium enema and sigmoidoscopic evidence of the disease was found and had not previously been reported in the literature.

The distribution of the cysts in this case seems to differ from that of cases previously noted, and the all-important symptom of haemorrhage on defaecation led the patient to seek medical advice.

I wish to thank Dr. W. MacCullagh Wilson, of the Coventry and Warwickshire Hospital, for his help with the pathological investigation of the specimen.

REFERENCES

- Bang, B. L. F. (1876). *Nord. med. Ark.*, 8, No. 18, 1.
Hahn, E. (1899). *Dtsch. med. Wschr.*, 25, 657.
Koss, L. G. (1952). *Arch. Path., Chicago*, 53, 523.
Masson, P. (1925). *Ann. Anat. path. med.-chir.*, 2, 541.
Mayer, J. (1825). *J. pract. Heilk.*, 61, 67.

ULCERATIVE COLITIS AND CARCINOMA OF THE LARGE INTESTINE

BY

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That ulcerative colitis apparently predisposes to cancer of the colon or rectum seems now to be widely accepted. Upon the correct assessment of this risk the whole therapeutic policy towards the disease might well depend. I have been unable to find any report in which such cancer risk has been estimated, although there are many papers which record the occurrence of this complication of colitis.

The purpose of this communication is to report a further five cases of malignant disease of the intestine arising in the course of colitis, and to consider these cases, in conjunction with reports by other authors, in an attempt to estimate the cancer risk.

Clinical Material

Between January 1, 1947, and December 31, 1951, 154 patients with the diagnosis of idiopathic ulcerative colitis were admitted to St. Bartholomew's Hospital under the care of the physicians and surgeons and to the Gordon Hospital under Dr. E. R. Cullinan's care.