

Clinical science and the small intestine

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In Great Britain, gastroenterology was the last speciality to emerge from general medicine. This happened much later than in Europe and North America awaiting major advances both in the basic sciences and the development of new diagnostic techniques. Achieving access was the key needed to unlock the speciality, notably with endoscopy, biopsy, improving imaging techniques and revolutionary biochemical developments. One by one the different anatomical sub-divisions of the gut organs became accessible, the last bastion being as one might expect, the hitherto invisible, impalpable and particularly inaccessible small intestine. Many individual physicians and surgeons have made significant advances on a narrow front but to open up a new organ effectively needs a team of keen like-minded individuals, both clinicians and scientists, working and stimulating one another.

In Britain after the war there were few places where this could have happened and Hammersmith Hospital with the Royal Postgraduate Medical School was one of them. In gastroenterology remarkable progress was achieved, first the exploration of the liver under the direction of Sheila Sherlock, then the small intestine under the guidance of Chris Booth, and later the gut regulatory peptides and hormone secreting tumours by Stephen Bloom and Julia Polak. One individual is so important in building up the team providing drive, personality, ideas, administrative skills. These were present in full measure in Chris Booth, who also had other attributes which contributed much to the success of his team. His linguistic excellence brought Europe closer, his historical studies added perspective, and early contact with the Yorkshire moors gave him the outlook and enquiring mind of the naturalist. Furthermore, however busy he became administratively, throughout his whole professional life, he always retained personal clinical responsibility for patients. Progress is erected on foundations constructed by our predecessors and it is appropriate to pay tribute to their work.

Biopsy was the key discovery which opened up both the small intestine and the liver. It was Ian Wood in Melbourne who developed a suction biopsy technique with a guillotine cutting device which provided a full thickness specimen of gastric mucosa.¹ This was later modified for the small intestine by

Margot Shiner,² and followed by the introduction of the Crosby capsule.³ This opened the way for many emerging new scientific techniques which could be used for studying the small intestine including, histology and histochemistry,⁴ stereomicroscopy,⁵ the study of cell organelles by ultracentrifugation, biochemistry, (including cyclic-APC and the transport of sugars, proteins, water and electrolytes), enzyme estimations particularly in the brush border,⁶ histochemistry and immunohistochemistry,⁷ microbiology,⁸ electrical potential differences,⁹ tissue culture,¹⁰ and now molecular biology,¹¹ and there were other valuable spin-offs too. At last, the small intestine had taken off!

Nevertheless one remembers gratefully the early pioneers. The first major study on absorption in the intestine was undertaken by Professor Edward Waymouth Reid, the first Professor of Physiology at University College, Dundee, (where Chris Booth studied as a medical student). Reid was the first to use inverted segments of small intestine for absorption studies with special reference to physiochemical and electrical influences. He noted in 1902 that the absorption of glucose was stimulated by the addition of NaCl attributing his findings to a 'specific cell effect' possibly involving chemical excitation long anticipating the work on the sodium gradient effect.¹² One remembers also the first non-invasive absorption study in man with the introduction of the breath test by Professor Charles Dodds at the Middlesex Hospital in London in 1920 when he reported differences in the carbon dioxide level in the breath in patients with achlorhydria and also pancreatic disease.¹³ An interest in medical history is not merely and esoteric pastime but can be most rewarding for those who direct research!

Christopher Booth's life interest in the small intestine was clearly initiated by his early research work on the site of absorption of vitamin B₁₂ undertaken in the Department of Haematology, working with Professor D L Mollin and Dr I Chanarin and this led to his MD (St Andrew's) thesis *A clinical and experimental study of the absorption of vitamin B₁₂*, with the award of the Rutherford Gold Medal and to his appointment as gastroenterologist to the Royal Postgraduate Medical School. His work led to the identification of the new gut mechanisms associated with the megaloblastic anaemias. In 1966, he became

Chairman of the Department of Medicine and the following year Director of the MRC Intestinal Malabsorption Unit. The combination of the Medical School and the MRC unit enabled clinical scientists to mobilise in rapid succession the techniques provided by radioisotopes, histochemistry, immunology, microbiology and molecular chemistry to the elucidation of disorders of the small intestine.¹⁴ Much new information emerged on the sites and mechanisms of absorption of nutrients, water and fat soluble vitamins.¹⁵ Changes and mechanisms associated with intestinal adaptation after intestinal resection were studied with R H Dowling.¹⁶ Information about the subcellular localisation of absorptive functions of the enterocyte came from his collaboration with T L Peters.⁶ Early appreciation of the important role played by bacteria in the gut in both health and disease with its role in the blind loop syndrome and bile salt deconjugation were undertaken with S Tabaqchali.⁸ Chris Booth directed the work on coeliac disease himself with the help of many research fellows¹⁴ and these studies continued when he was appointed to the MRC Clinical Research Centre at Northwick Park.¹⁷ Virtually the whole gamut of small intestinal diseases particularly those with malabsorption came under study at some time. It must have been of great mutual advantage to work alongside S R Bloom, J M Polak, A G E Pearce, and their associates who were defining the hormone peptides which make the gut the largest endocrine organ in the body.¹⁸ In the 12 years of his time as Director, he had shown the full potential of the Royal Postgraduate Medical School in opening up the research on the small intestine about which so little had been previously known. From the names of his collaborators mentioned, and there were many more, it will be appreciated how many later achieved senior appointments in Great Britain or overseas. Such was the academic strength of the Postgraduate Medical School it was possible for the MRC unit to achieve in a few years, as much new scientific information as would have been possible only in several decades in most centres. This achievement added greatly to the reputation of British medicine overseas and is reflected in the number of overseas links established and honours which have been awarded to Chris Booth and his staff. It is a special pleasure to note the awards of the Dicke Gold Medal of the Dutch College of Gastroenterology, the Ludwig Heilmeyer Gold Medal from the German Society for the Advances in Internal Medicine and the Honorary Doctorates from the Universities of Paris and Poitiers.

The gastrointestinal unit at Hammersmith paved the way for other centres to develop clinical and scientific programmes applied to the problems of the

small intestine. Tony Dawson and his coworkers at St Bartholomews made important observations on the physiology of the absorption of nutrients in health and disease¹⁹ which have been vital for the development of optimal means of artificial nutritional support. These studies have been continued by David Silk at the Central Middlesex Hospital²⁰ where E N Rowlands, A M Connell and George Misiewicz undertook pioneering work on intestinal motility. In turn the centre for motility studies shifted to the London Hospital under the direction of David Wingate.²¹ Paediatrics in Britain has also played an important part in our understanding of the small intestine, initially through Charlotte Anderson in Birmingham and the late John Harries at Great Ormond Street and now through John Walker-Smith at St Bartholomews.²²

Advances in the study of immunology have led to the development of important research programmes in Crohns disease by Derek Jewell in Oxford;²³ in small bowel infestation by Michael Farthing at Barts;²⁴ and in food allergy and intolerance by Anne Ferguson in Edinburgh.²⁵

In Manchester Les Turnberg has built up a fine unit for the study of intestinal secretion and mucosal protection²⁶ while across the Pennines in Leeds Monty Losowsky has brought together the study of small bowel disease and clinical nutrition.²⁷ This link between the small intestine and nutrition was well understood by Chris Booth and is also to be seen in the early studies of coeliac disease undertaken by Trevor Cooke in Birmingham.²⁸ The sciences of gastroenterology and nutrition are two sides of the same coin. Health begins in the gastrointestinal tract with the right food and an efficient digestion. Shakespeare knew it 'Now good digestion wait on appetite, And health on both'.

This year the British Society of Gastroenterology has introduced a small bowel/nutrition section with Forum meetings within the society's programme. This is likely to improve the facilities for enteral and parenteral feeding throughout the country. Home management should be universally available for patients who require longterm nutritional support, a system which owes much to Professor John Lennard-Jones at St Marks and Miles Irving, Professor of Surgery at Manchester. Not only are patients being kept alive but also enabled to live life to the full.

Every district hospital, and particularly every teaching hospital needs a department to act as a focal point for nutritional assessment, management, education, and research. The need for this was well brought out in the working party report of the British Nutrition Foundation – 'Nutrition in Medical Education.'²⁹ I hope the new generation of gastroenterologists will rise to this exciting opportunity. Those

participating will not only be able to improve the quality of service offered by the hospitals they serve but also enhance awareness of the relationship between nutrition and health in the community. Importantly, it could much strengthen staffing prospects for gastroenterology in the future.

For the rising generation of doctors, the career of those who have reached the top can provide invaluable lessons. This is particularly true from looking back on Sir Christopher Booth's experience. First, how important it is for an aspiring gastroenterologist to have a sound training in general medicine. It is a tradition which began with Sir Arthur Hurst who founded the British Society of Gastroenterology in 1937. With the increase in specialisation in recent years, general physicians have virtually disappeared. Today, among all the specialists, it is the gastroenterologist who may be able to provide the best opinion on a difficult diagnostic problem! There are so many illnesses which manifest both in the digestive system and elsewhere in the body – the skin, the lungs, the brain, the vascular system, the endocrine organs. Gastroenterology has links with every organ in the body. In some countries training in techniques is still given too much priority over general experience. It is a fair comment that any gastroenterologist in Great Britain, however specialised he or she has become, is most unlikely to miss an important general diagnosis thanks to their early excellent general training. Few will have had a more exacting general experience as Chris Booth had in Scotland and in his early days at Hammersmith. Furthermore, for some years he had the continuing experience of those remarkable Wednesday morning staff rounds at Hammersmith. It is a lesson which must be understood by all today who wish to take up gastroenterology. Second, one must choose ones chiefs well! Chris Booth was fortunate in having such a perceptive chief in Professor Ian Hill in Dundee, who ensured that he had the opportunity of going to a first rate post-graduate training under the guidance of Sir John McMichael at Hammersmith. Third, the importance of some contact with the wider world particularly in another country before going to medical school. Chris Booth had a particularly tough wartime option, however, and no doubt needed all his share of luck to survive the hazards of life in the RNVR as a seaman and later a lieutenant. No doubt his exceptional skills in communications owe something to this earlier experience!

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