We feel that some fundamental points should be mentioned. Contrary to popular belief, Hirschsprung's disease is not a uniform condition; both the clinical presentation and distribution of the nerves in the affected bowel are variable. The patients with severe early symptoms tended to have large numbers of nerves in the distal aganglionic bowel, and the least severe cases tended to contain the fewest nerves. The correlation was most apparent for cholinesterase-positive nerves in the circular muscle layers, and these nerves are thought to be responsible for the contracted segment of bowel often seen in this condition. Three of our patients did not show a contracted segment on barium enema; they also had fewer myenteric nerves than in the normal controls. The nerves in the aganglionic segment decreased in number in a proximal direction, and this is believed to indicate that most of the nerves have entered this part of the bowel from below.

The finding that the most distal ganglionic bowel does not have a normal innervation is most important. In the past tissue from this zone has generally been used as a control, and it is now shown to be unsatisfactory for this purpose. Inevitably it was found to contain fewer myenteric nerves than the control specimens, and in only three cases did more proximal ganglionic tissue resemble normal. The deficiency of nerves in the muscle tissue of the most distal ganglionic bowel suggests that it can exert only a poor propulsive force. The complexity of the myenteric ganglia was indicated by the variable distribution of the ganglion cells and of their enzyme content in the control specimens.

In summary we consider that bowel dysfunction in Hirschsprung's disease is due to at least four factors:
1. Absence of normal co-ordinated peristalsis, which creates an obstructive effect and is due to absence of ganglia.
2. Absence of relaxation reflexes in the aganglionic bowel adds to the obstruction, and it occurs despite the fact that large numbers of adrenergic nerves are often present in the muscle layers.
3. The strong uncoordinated motor activity is often present in the aganglionic segment. It further increases the obstruction and appears to relate to cholinesterase-positive nerves in the circular muscle.
4. A poor propulsive force is probably present in the most distal ganglionic bowel, owing to the deficient myenteric innervation, and this accentuates the more distal obstructive factor.

The clinical features of Hirschsprung's disease are therefore the consequence of complex variable defects which involve all the autonomic nerves in the muscle layers of the bowel wall.—We are, etc.,

J. R. GARRETT.
E. R. HOWARD.

An Aid to Cholangiography

SIR,—I would like to describe a very small variant of the usual technique for cholangiography which I have employed for many years with almost invariable success.

A ureteric catheter is introduced into the cystic duct in the usual way and a ligature put round it. No matter how tightly this ligature is tied the catheter is still freely mobile, owing to the fact that the cystic duct is amply lubricated by bile. A second ligature, stronger and twisted round the cystic duct just proximal to the first and tied over the ureteric catheter immediately before the latter enters the cystic duct. This fixes the catheter securely at whatever depth one requires, and there is no danger of it being subsequently dislodged.—I am, etc.,

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Which Dialysers?

SIR,—As Mr. A. E. Kulatilake and others (23 August, p. 447) have pointed out, the current widespread application of haemodialysis has been a result of the availability of the twin coil disposable co-ordinated dialysers. The trend is toward continuous dialysate production, using single-pass proportionating and monitoring systems, thereby obviating the need for the initial preparation of 100 l. or more of dialysate in tanks, which in varying degrees provide culture media for bacteria.

A practical point is that the arterial and venous lines are pre-supplied with the "disposable dialyser" manufactured by Ab Gmbrbo cannot readily be used with pump and monitoring systems other than the Gmbrbo machine. For example, when using the Lucas machine we had to revise the blood lines. In order to avoid the need for cutting and re-arranging these lines we have found it easier to use the Travonel arterial (U200R) and venous lines (U200C) with the aid of sterile disposable Y-pieces. These are readily made up from a plastic Y-piece (Portex LOX M.Y.I.), sections of 10 gauge Portex translucent vinyl tubing, together with two 3-femur adapters (Capon Heaton R91), which are autoclaved when assembled and packaged.

In their clinical evaluation of the disposable dialysers developed by Alwai, Mr. Kulatilake and his colleagues found that the dialysate was between 65 and 90 ml/min. at blood flow rates of up to 180 ml/min. This compares unfavourably with the urea dilysans of 80-125 ml/min. which we obtain with the "Ultra-flo 100" coil (Travonel OA65) using cellophane membranes at comparable flow rates. When "Ultra-flo 100" coils with cellophane membranes are employed, the efficiency is 95%, with greater efficiency is achieved and the differential in dialysate is even greater.

While recognizing the practicability of the flat-pack disposable dialyser with its avoidance of the need for a blood pump and its low priming volume, we believe that the coil dialyzer can enter this new era of dialysis, now that a container can be made which permits its use with single-pass proportionating and monitoring systems such as the Lucas machine.1 Our container improves the basic performance of the twin-coil dialyser by the addition of low-volume, high-flow dialysate recirculation. In consequence, the coil dialyser could be used for shorter periods of treatment and has the additional facility of allowing ultrafiltration. When the "Ultra-flo 100" with cellophane membranes is used the blood loss is of the same order as that with the disposable dialyser.

In view of the comparative high cost of the Gmbrbo disposable dialyser we wondered whether it would be feasible to wash out, sterilize, and reuse this component. In the light of the possibility of the removal of blood and blood products despite prolonged wash-out times. Sterilization could be achieved with formalin. This caused us to look once again at the coil dialyser which would operate at a considerable saving compared with the "disposable dialyser." The Gmbrbo dialyser is quoted at about £12, as compared with £8 5s. for the Travonel twin coil (UF100 with cellophane) and £9 4s. for the coil with cellophane membranes. Taking the example of a unit with 10 patients each receiving two dialyses per week, the weekly cost of dialysers alone would be £240 for the "disposable dialyser" and £165 for the twin coil system using cellophane and £184 using curophone. Thus an annual saving of between £2,912 and £3,900 may be expected from the system which we recommend.

Having tried both systems we currently advocate the continuing use of the twin-coil dialyser in a container with recirculation of dialysate, used in combination with a single pass proportionating and monitoring system. The Alwai disposable dialyser (Ab Gmbrbo) is an admirable concept and product, but regretfully an expensive one.—We are, etc.,

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J. D. GODDARD.
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M. F. SALEEM.

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REFERENCES
2. Kulatilake, A. E., and colleagues (23 August, p. 458) have pointed out the advantages of disposable dialysers. The Alwai disposable dialyser (Ab Gmbrbo) is an admirable concept and product, but regretfully an expensive one.—We are, etc.,

W. K. STEWART.
J. D. GODDARD.
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Drugs for Cardiac Arrhythmias

SIR,—One of the problems faced by the author of any review article must be the achievement of satisfactory balance between breadth and depth. The brief "Drugs for Cardiac Arrhythmias" (16 August, p. 402, and 23 August, p. 458) in the available length of article inevitably requires that the survey will perform err on the side of superficiality and generalization, and such superificality and generalization must be excused. Nevertheless, I must take issue on two points.

The section on digitalis toxicity contains detailed instruction about the precautions when using potassium chloride, alarming information about the hazards of trisodium edetate, and advice about the avoidance of D.C. shock in this context on account of its danger. In contrast, propranolol is accorded hal a sentence, with no advice about precautions and no warning of its hazards.