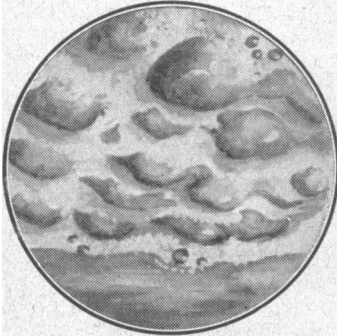


the appearances were much the same. There was still much pus-like mucus between the folds (see Fig.).

In April, 1945, he was investigated at the Central Middlesex Hospital. A barium-meal examination by Dr. Golding showed an enlarged stomach with much resting juice and a narrow pyloric canal. Gastroscopy showed much the same appearances as before. For the rest of 1945 and the early part of 1946 he remained fairly comfortable on a light diet. He washed out his stomach periodically. His weight was generally around 9 st. (57 kg.). Occult blood was found on many occasions. By October, 1946, he had deteriorated markedly. He was thin and apathetic. Visible peristalsis was noted and a mass was palpated in the pyloric region. Gastric lavage and intravenous infusions improved his condition. Gastroscopy on November 5, 1946,



Gastroscopic appearances in primary sarcoma of the stomach.

by Dr. Avery Jones showed the mucosa to be everywhere thickened and hyperaemic. On the lesser curve were patches almost like granulation tissue. The diagnosis was either a severe chronic gastritis or a low-grade infiltrating new growth.

Laparotomy was at last agreed to and was performed on November 22, 1946, by Mr. Hugh Blauvelt. A new growth was palpated in the pyloric region. The liver and peritoneum seemed normal except for some adhesions round the duodenum. A partial gastrectomy was performed and the patient made a satisfactory recovery. A course of deep x-ray treatment was given, and when last seen in December, 1953, he was fit and well.

Histological section showed a neoplasm composed of uniform round or ovoid cells with numerous mitoses and a delicate pericellular argyrophil reticulum—that is, a reticulum-celled sarcoma.

### Discussion

**Diagnosis.**—In the present case adherence to the original diagnosis of severe gastritis as well as the patient's refusal of operation delayed surgical intervention considerably. More often it is clear that a new growth of the stomach is present, and then carcinoma is probable, since only 1 to 2% of gastric neoplasms are sarcomas. Differentiation can be made for certain only by histological section, and this is desirable in apparently inoperable cases of carcinoma, since should they prove to be sarcomas recovery is possible.

**Clinical Details.**—Pain is the chief symptom, and is a dull constant ache and unlike the periodic pain of ulcer. In contrast to carcinoma of the stomach, it affects young people (mostly under 50), and nutrition and haemoglobin levels are well maintained. Hydrochloric acid may be present. Occult blood is a constant finding. The growth is generally away from the pylorus and so does not usually cause obstructive symptoms as does carcinoma.

**Gastroscopy.**—The present case gave the appearance of a very fierce gastritis with giant red folds and much yellow adherent mucus between them. Persistence of such a picture should raise the suspicion that a new growth is present, particularly if the appearances are localized. The mucosa is usually unbroken, but superficial ulcers may be found (Paul and Parkin, 1944).

**X-ray Examination.**—The lesion can generally be shown to be away from the pylorus, in contrast to carcinoma, but a positive diagnosis is hardly likely. In none of the 34 cases collected by Snoddy (1952) was a correct diagnosis made radiographically.

**Prognosis.**—Of the 474 cases collected by Snoddy (1952) 50 (or 10.5%) survived for more than five years. This is very much better than in carcinoma of the stomach, in which disease Cooper (1941) reported only 4 (or 1.5%) five-year cures in a series of 264 cases. The type of sarcoma has a bearing on prognosis, since the small round-celled sarcoma has a better outlook than the other types. In addition, a sarcoma causing an ulcer or polyp is more likely to be diagnosed early than when it causes simply a diffuse infiltration.

### Summary

A case of primary reticulum-celled sarcoma of the stomach is reported. Gastrectomy was performed four years after the onset, and the patient was alive and well seven years later—that is, 11 years after symptoms began. The gastroscopic appearances are described.

My thanks are due to my wife for the gastroscopic drawing.

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## DISADVANTAGES OF THE RECTAL SWAB IN DIAGNOSIS OF DIARRHOEA

BY

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The rectal swab has been so much recommended as the specimen of choice in bacillary dysentery (Cruickshank and Swyer, 1940; Yannet *et al.*, 1942; Hardy *et al.*, 1942; Humphreys, 1944; Ferris and Fortune, 1944; Hynes, 1953) that its use has extended to less suitable diagnostic fields, although most laboratory workers now realize its limitations (Parker, 1953).

The swab is ideal for collecting material from an amoebic ulcer in the lower part of the colon through a sigmoidoscope; and, introduced into the rectum, it is a practical method of screening rapidly several hundred people (as, for instance, in residential institutions) when seeking carriers of known bacterial species, provided immediate cultivation is done.

The method goes a long way towards preventing substitution of specimens and cross-contamination by receptacles, but it is open to several objections and does not yield so high a percentage of positive results of all kinds as do whole faeces. In particular it is not satisfactory for use by practitioners in the general diagnosis of diarrhoea unassociated with widespread outbreaks of a known infection.

### Rectal Swab in Diagnosis of Diarrhoea in General

It is self-evident that the choice of a swab specimen, while permitting a bacteriological investigation (the reliability of which is discussed), excludes any macroscopic, microscopical, or chemical examination of the faeces, but it is perhaps not so generally realized how important these examinations may be.

Many specimens "negative" bacteriologically show abnormalities whose recognition is helpful clinically; and, indeed, some of these, such as worms, melaena, steatorrheas, and the characteristic green stool of underfeeding in infancy, may be obvious at sight. Simple microscopy yields much information in return for a very small outlay of time and materials, and would be justified if it

did no more than identify the parasite *Giardia intestinalis*, which we have found responsible for a number of severe cases of diarrhoea in adults.

The results of examining specimens of faeces sent to the Edmonton laboratory from 3,183 consecutive index cases illustrate the extent to which a complete faecal examination gives more information than can be obtained from rectal swabs. (These results will be more fully analysed in another paper. They refer to a two-year period from October, 1951. Index cases are first cases of diarrhoea from new addresses.) In this series of 3,183 specimens of faeces from cases of diarrhoea in patients of all ages which were examined by bacteriological, microscopical, and simple chemical methods, no abnormality was found in 1,605. Of the remaining 1,578 specimens, recognized pathogenic bacteria were isolated from 723, organisms of doubtful pathogenicity such as paracolon bacilli were identified from a further 229, and the remaining 626 specimens all showed abnormalities which could be demonstrated only by microscopy or simple chemical methods, for which the rectal swab is quite unsuitable. Thus protozoa and helminths were found in 213, pus (cause not found) in 186, excess fat globules in 152, red blood cells in 41, and occult blood in 34. That is to say, almost 20% of the specimens of faeces in this series showed abnormalities which could not be expected to have been demonstrated in rectal-swab specimens. A few cases of ulcer, cancer, colitis, and diverticulosis were found in this group.

To turn now to the use of swabs in bacteriological diagnosis, there is no bacteriological reason for preferring the rectal swab in infections which do not involve the rectum. In 1948 Shaughnessy *et al.*, in the United States of America, demonstrated the inadequacy of the rectal swab in salmonella diagnosis. They also examined a series of 189 typhoid contacts and found only three positive by swab, as compared with 7 by faeces. In each series the best results were obtained after saline purgation. Results may be further improved by emulsifying the faeces in saline before plating on solid media (Kroger, 1951).

A further class of organisms exists for which no comparative figures are available; this includes the paracolons, Friedländer's, and other members of the *Bacterium* group, as well as *Cl. welchii* and *Bact. coli*. For reasons of convenience swabs are often used in cholera work, but it is not suggested that they give better results than the faeces.

Swabs have been found satisfactory by Wright and Roden (1953) and others for the isolation of types of *Bact. coli* giving rise to gastro-enteritis in hospitals and nurseries, though a comparison of swab and faeces isolations has not, so far as I know, been published; but in this laboratory, which receives specimens from cases scattered in their own homes, some swab failures have been followed by the successful isolation of O 55 and O 111 types of *Bact. coli* from the faeces. This may have been due simply to inadequate swabbing or delay before culturing, but it serves to emphasize that in general practice whole faeces should be examined.

#### Rectal Swabs in Diagnosis of Sonne Dysentery

During an epidemic of Sonne dysentery in North-east London in 1950-1 it was repeatedly observed here that cultures from swabs were negative, though *Shigella sonnei* was isolated from faeces from the same patient, sometimes on the same day. No patient had a positive swab result coupled with a negative faeces culture. Cultures were made directly on Leifson's deoxycholate citrate agar, and also indirectly via selenite F broth (Leifson, 1935, 1936; Hobbs and Allison, 1945). This broth increased the number of successful isolations from faeces though not from swabs, and its advantage was much greater in convalescent than in acute cases. Direct plating was not discarded, because very occasionally *Sh. sonnei* grew on the primary plate but failed on the subculture from selenite. This occurred only when specimens had been collected during the first day or so of diarrhoea. Occasionally, too, growth failed or

colonies were dwarfed on the plate while selenite isolation was successful. This happened when stools were fluid and very alkaline or very acid, and neutralization or dilution of such stools would overcome the difficulty. (Observation by J. H. Cowlard, working in this laboratory.)

Our experience that swabs can be very unreliable is shared by workers in other laboratories, and it therefore seems worth while to consider further the relevance of the published findings in favour of the swab to the circumstances of diagnosis in general practice.

The rationale for the use of swabs in large-gut infections is sound. Organisms producing inflammation visible through the proctoscope are more concentrated in the mucus of the wall than in the contents of the lumen of the rectum. It follows that to have any advantage over a faeces sample the swab must rub the bowel wall.

The general use of these swabs followed the publication in 1940 by Cruickshank and Swyer of a comparison of the results of faeces and swab culture in a group of children admitted to hospital suffering from acute Sonne dysentery. Swabs were taken expertly and cultured without delay on MacConkey's medium. Of the cases in which the organism was isolated from the swab the faeces cultures were positive in only 64%. About this time, however, Irons *et al.* (1939) showed that the isolation of dysentery bacilli was much more successful if deoxycholate citrate agar was used instead of MacConkey's agar, and this was confirmed by Anderson and Cruickshank (1941).

From 1940 to 1944 the swab was recommended by other writers. Papers by Yannet *et al.*, Hardy *et al.*, Humphreys, and Fortune and Ferris are often quoted, but only Yannet *et al.* (1944) and Fortune and Ferris (1945) included comparisons. They showed that, though the swab gave a 15-30% increase in isolations of *Sh. shigae* and *Sh. flexneri*, it had no advantage over the faecal specimen in their small number of cases due to *Sh. sonnei*. They worked with speculum swabs from acute cases cultured immediately on to solid media. Swabs collected in general practice, on the other hand, are subject to delays in transit to the laboratory and may not have been inserted deeply enough to begin with. Better bacteriological results have been obtained recently with serum-impregnated swabs and by placing swabs into Stuart's transport medium immediately after collection (Moffett *et al.*, 1948; Cruickshank, 1953).

*Delay.*—Fairley and Boyd (1943) emphasized the difficulty of culturing dysentery bacilli from old cases and from old specimens, and referred to the increasing proportion of failures if faeces were kept more than an hour or two, because of the diminution with time of the number of viable bacilli.

*Drying.*—Spicer (personal communication) has found that partial drying has a lethal effect upon *Sh. sonnei*. At cold and room temperatures he found that a reduction of the relative humidity to 30-50% produced a marked fall in the proportion of organisms viable after 24 hours. Even at a normal relative humidity (of 75-80%) the fraction surviving at the end of a week was very small. Much longer survival can occur in whole faeces, provided that containers are stoppered to prevent evaporation. *Sh. sonnei* has been cultured from faeces kept eight weeks on the laboratory bench, but, although some strains survive for weeks, others die within a few days (personal observations).

*Selective Media.*—The use of selective media that enable scanty bacilli to be found by the culture of faecal samples very much larger than can be collected on a swab has greatly improved cultural results. Citrate rosolic acid broth, a modification of Leifson's deoxycholate citrate agar, was introduced by Brodie in 1942; and in 1944 Jamieson *et al.* stated that 36% of the positive results from bacillary dysentery convalescents were obtained solely by this enrichment method. Selenite F fluid medium, first described by Leifson (1935, 1936), was recommended for the isolation of salmonellae by Hobbs and Allison (1945). Subsequently it was found to be useful in the cultivation of *Sh. sonnei* (personal communication from Dr. H. D. Holt); and in

1952, in an unpublished lecture, I described how I obtained a 26% increase in the positive isolations of *Sh. sonnei* from post-acute cases by using this medium to supplement Leifson's deoxycholate citrate agar medium. Since then Armstrong (1954) has published results demonstrating similar advantages (21–31%) in the use of the selenite medium. Cultural improvements of this order make it probable that, were a fresh comparison to be undertaken, swabs would show little if any advantage over the faeces for the isolation of *Sh. sonnei* even if the swabs were correctly taken and cultured without delay.

### Conclusion

Faeces and not rectal swabs should be the specimens of choice in the diagnosis of diarrhoea. For this purpose swabs are not adequate. The swab has a place in the investigation of outbreaks of known bacillary dysentery in institutions with laboratory facilities on the spot, but should be regarded as a preliminary to be followed, if possible, by a fuller examination of the faeces.

When considering arguments of convenience it should be remembered that the onus of collecting faeces can be placed on the patient's family, whereas rectal swabbing requires the time and skill of a qualified person.

My thanks are due to Colonel H. J. Bensted for his help during the preparation of this paper.

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The World Health Organization has published a booklet giving interpretations and instructions for coding causes of death, supplementary to those contained in the *International Statistical Classification of Diseases, Injuries, and Causes of Death*, 1948. This booklet is Addendum 1 (H.M.S.O., 1s.). Its aim is to interpret and clarify rather than to amend the classification, and in so doing to keep to what is believed to have been the original intention of the classification, avoiding changes in meaning or assignment except where they were necessitated by inconsistencies between notes or instructions or between the tabular list and the index. The booklet contains: (1) Lists of amendments to the tabular list and the index in relation to specific code numbers. (2) Supplementary rules for selection of causes of death where the certificate is not clear about which of several stated causes is the underlying cause. (3) Amendments to the intermediate and abbreviated lists. (4) Corrections of typographical errors in Volume 1 of the classification. The 1948 classification is to undergo next year a restricted revision containing these amendments, but it is not intended that the revised classification should come into use before 1958, and it is unlikely to be published for some time.

## SEVERE LOCAL AND GENERAL REACTION TO INSULIN ZINC SUSPENSION AND SOLUBLE INSULIN

BY

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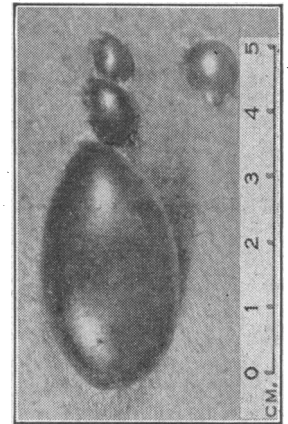
AND

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A man aged 47 suffering from diabetes mellitus with ketonuria was admitted to hospital on March 31, 1954, for stabilization. He had never before been treated for this condition and there was no significant past or family history. Physical examination revealed only moderate obesity, although he had lost 17 lb. (7.7 kg.) in weight in the preceding four months. Treatment was started on January 31, 1954, with insulin zinc suspension and a diet containing 140 g. of carbohydrate. On February 5 a change to soluble insulin was made as his glycosuria and ketonuria persisted. By February 10 he was satisfactorily controlled by 30 units of soluble insulin morning and evening. All injections of insulin were given subcutaneously into his right upper arm.

During the morning of February 11 he complained of a tender irritant lump in his right upper arm together with general malaise, nausea, anorexia, and heartburn. He had vomited once during the night and had slept badly. He was not feverish, and examination showed an area, approximately 5 by 3 cm., of reddening of the skin on the outer side of his right upper arm with induration of the subcutaneous tissues. On the 12th a change to insulin zinc suspension, 60 units, was made and a single injection was given into the left upper arm. By the early afternoon a local reaction had developed at the site of injection which was similar in size to that observed in the right upper arm on the preceding day. The next day insulin zinc suspension, 60 units, was injected into the left thigh and was followed later that day by a similar local reaction. On February 14 soluble insulin, 30 units, was injected subcutaneously into the left thigh, morning and evening; local reactions of great severity followed—the entire left thigh became greatly swollen and tender, and bullae, the largest of which measured 4.5 by 2.5 cm., appeared at the site of the injections (see photograph). At the same time the patient experienced an exacerbation in his symptoms of general malaise.



Bullae at site of injections.

Treatment with promethazine hydrochloride, 25 mg. six-hourly, was started, and further injections of soluble insulin were given into the subcutaneous tissues of the anterior abdominal wall. The initial injections were followed by local reactions of little severity, and by February 18 injections of soluble insulin were unattended by any reaction and he again felt well. Treatment with promethazine hydrochloride was discontinued on the 17th, and on the 19th injections of insulin zinc suspension were started again, and have continued to the time of writing without incident.

### Comment

General reactions to insulin are not common. Jorpes (1949) quotes Allan and Scherer (1932) as stating that only