Small-intestinal mucosal abnormalities in various skin diseases—fact or fancy?

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SUMMARY  Two-thirds of patients with dermatitis herpetiformis have been found to have a flat or convoluted mucosa but no special association has been found in the other dermatoses studied with structural alterations in the small bowel mucosa. The frequency distribution of the predominant and individual small intestinal mucosal features is the same in the patients in the present series with eczema, psoriasis, and rosacea as in the local control population. A predominantly convoluted mucosa has been found in the upper small intestine in 8% of these patients and in 8% of subjects without a rash. The presence of convolutions in patients with these dermatoses is merely a reflection of the incidence in the normal population of Newcastle upon Tyne. Different findings in the same skin disease in different parts of the country are explicable on the basis of variations in the normal mucosa between one geographical region and another.

The increased incidence of a convoluted mucosa in the north east of England requires further study to determine whether it is indicative of an increased incidence of the coeliac syndrome in the region, or whether it results from a minor population difference or a local peculiarity of diet.

In recent years it has become fashionable to examine the jejunal mucosa of patients with skin disease. This is hardly surprising in the light of the time-honoured association of rashes with malabsorption (Hillary, 1759; Manson-Bahr and Willoughby, 1930; Badenoch, 1960; Wells, 1962). Initially the search was for the flat mucosa of coeliac disease (Wells, 1962; Friedman and Hare, 1965). Its incidence is, however, extremely low in patients presenting to dermatologists with eczema or psoriasis and we ourselves have only found it twice in over 200 such patients (Shuster and Marks, 1970). The jejunal mucosa has now been examined in patients with eczema (Shuster and Marks, 1965), ichthyosis vulgaris, Brocq's ichthyosiform erythroderma, acrodermatitis enteropathica (Fry, McMinn, and Shuster, 1966), psoriasis (Shuster, Watson, and Marks, 1967), rosacea (Watson, Paton, and Murray, 1965; Marks, Beard, Clark, Kwok, and Robertson, 1967), pemphigoid (Marks and Shuster, 1969), subcorneal pustular dermatosis (Fry, Keir, McMinn, Cowan, and Hoffbrand, 1967; Marks and Shuster, 1970), and dermatitis herpetiformis (Marks, Shuster, and Watson, 1966; van Tongeren, van der Staak, and Schillings, 1967; Fraser, Murray, and Alexander, 1967; Fry et al, 1967; Verbov and Barkhan, 1967; Marks, Whittle, Beard, Robertson, and Gold, 1968; Bendl and Williams, 1968). The finding of abnormalities in the jejunal mucosa indistinguishable from those of the coeliac syndrome in two-thirds of all patients with dermatitis herpetiformis is obviously very significant (Shuster, Watson, and Marks, 1968) but the state of affairs in other skin diseases is less clear cut, and already there are, in the literature, apparently conflicting reports about the jejunal mucosa in psoriasis (Salem and Truelove, 1965; Shuster et al, 1967; Marks et al, 1967) and rosacea (Watson et al, 1965; Marks et al, 1967). In the course of the present paper the possible
reasons for these and other apparent discrepancies will be discussed and we shall describe our own findings in patients with a number of different dermatoses. As one of the main causes of the confusion has been failure to take into account variations in normal jejunal mucosal architecture in different geographical regions, our results will be compared with those in a control population from our own locality.

Patients

Two groups of patients were studied.

**TWENTY-EIGHT PATIENTS WITH DERMATITIS HERPETIFORMIS**

Some of these patients were included in previous reports (Marks et al, 1966; Shuster et al, 1968). Most of them presented with a rash and these were investigated consecutively. Also included in the group were a few patients with the disease specially referred from other hospitals. There were 20 men and eight women in all, and their mean age was 46 years. Whenever possible patients were studied before treatment was started but some were already taking dapsone. It is known, however, that the changes which occur in the small-intestinal mucosa in dermatitis herpetiformis are not due to this drug (Marks et al, 1966). Patients were not selected because of symptoms or signs suggestive of small intestinal disease, and indeed such symptoms and signs were present only in the minority. Of the patients, five had diarrhoea and eight a faecal fat excretion in excess of 5 g per day.

**TWO HUNDRED PATIENTS WITH OTHER DERMATOSES**

These patients had various dermatoses other than dermatitis herpetiformis (Table I). There were 122 males and 78 females and the mean age was 48 years. Wherever possible the patients were studied before treatment was started. Most of them were inpatients, admitted for treatment and investigation of the rash, who had generally severe and extensive eczema or psoriasis. They were approached consecutively at the time of their admission, and a jejunal biopsy was done in all those who were agreeable and able to swallow the biopsy capsule. A few of the subjects were outpatients who usually had less extensive skin diseases than the inpatients; the sole criterion for their selection was their willingness to take part in the investigation. The patients were not chosen because of bowel symptoms and only three complained of diarrhoea and one of pale, bulky stools. In 68 of the patients the faecal fat excretion was known, and in 17 of these it was increased, presumably as a result of dermatogenic enteropathy (Shuster and Marks, 1965) but again the finding of steatorrhoea played no part in the selection of patients for jejunal biopsy. A single patient with eczema who was known to have had coeliac disease since childhood was excluded from the study.

The percentage of skin surface involved by the rash at the time of the investigation was assessed clinically. Patients were put into one of three groups, those with erythodermaic eczema, psoriasis, or pityriasis rubra pilaris (100% surface involved); those with widespread rashes (80%-25% surface involved); and those with rashes of very limited extent, eg, eczema of the palms and soles or rosacea (<10% surface involved).

<table>
<thead>
<tr>
<th>Diagnosis</th>
<th>Number of Cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dermatitis herpetiformis</td>
<td>28</td>
</tr>
<tr>
<td><em>Other dermatoses (200 patients)</em></td>
<td></td>
</tr>
<tr>
<td>Psoriasis</td>
<td>55</td>
</tr>
<tr>
<td>Eczema</td>
<td>53</td>
</tr>
<tr>
<td>Rosacea</td>
<td>35</td>
</tr>
<tr>
<td>Pemphigoid</td>
<td>15</td>
</tr>
<tr>
<td>Lichen planus</td>
<td>9</td>
</tr>
<tr>
<td>Pityriasis rubra pilaris</td>
<td>5</td>
</tr>
<tr>
<td>Acne vulgaris</td>
<td>4</td>
</tr>
<tr>
<td>Acquired ichthyosis</td>
<td>3</td>
</tr>
<tr>
<td>Cutaneous arteritis</td>
<td>3</td>
</tr>
<tr>
<td>Non-specific erythema</td>
<td>3</td>
</tr>
<tr>
<td>Alopecia areata</td>
<td>2</td>
</tr>
<tr>
<td>Urticaria</td>
<td>2</td>
</tr>
<tr>
<td>Subcorneal pustular dermatosis</td>
<td>2</td>
</tr>
<tr>
<td>Ichthyosis vulgaris</td>
<td>1</td>
</tr>
<tr>
<td>Tinea corporis</td>
<td>1</td>
</tr>
<tr>
<td>Basal cell naevoid syndrome</td>
<td>1</td>
</tr>
<tr>
<td>Urticaria pigmentosa</td>
<td>1</td>
</tr>
<tr>
<td>Darier's disease</td>
<td>1</td>
</tr>
<tr>
<td>Idiopathic pruritus</td>
<td>1</td>
</tr>
<tr>
<td>Lichen sclerosis</td>
<td>1</td>
</tr>
<tr>
<td>Facial flushing</td>
<td>1</td>
</tr>
<tr>
<td>Neurotic excoriations</td>
<td>1</td>
</tr>
</tbody>
</table>

Table I  Diagnosis of patients with skin disease whose small-intestinal mucosa was examined

Methods

A jejunal biopsy was done in all patients. The biopsy was taken with a Crosby capsule (Crosby and Kugler, 1957). The position of the capsule was assessed by radiographs of the abdomen taken just before 'firing', and biopsies were taken between the first part of the duodenum and the first 20 centimetres of the jejunum. At a later date the x-ray films were reviewed in the first 100 patients with dermatoses, other than dermatitis herpetiformis, and the position of the capsule was recorded.

When the biopsy specimen had been removed from the capsule it was spread out mucosal side uppermost on a piece of cellulose sponge and fixed in 10% buffered formalin solution. It was later examined and photographed under a stereomicroscope. In four patients with psoriasis more than one biopsy was taken with the capsule at the same level within the upper bowel, and in
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<table>
<thead>
<tr>
<th>Cause of Death</th>
<th>Number of Cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>Myocardial infarction or coronary atheroma</td>
<td>19</td>
</tr>
<tr>
<td>Hypertension</td>
<td>9</td>
</tr>
<tr>
<td>Bronchopneumonia or acute bronchitis</td>
<td>7</td>
</tr>
<tr>
<td>Valvular disease of heart</td>
<td>5</td>
</tr>
<tr>
<td>Fractured spine or skull</td>
<td>3</td>
</tr>
<tr>
<td>Pulmonary embolus</td>
<td>2</td>
</tr>
<tr>
<td>Gastrointestinal haemorrhage</td>
<td>2</td>
</tr>
<tr>
<td>Dissecting aneurysm of aorta</td>
<td>1</td>
</tr>
<tr>
<td>Carbon monoxide poisoning</td>
<td>1</td>
</tr>
<tr>
<td>No cause found</td>
<td>1</td>
</tr>
</tbody>
</table>

Table II Necropsy examinations in 50 people who died suddenly and whose upper small-intestinal mucosa was examined

- one patient with pityriasis rubra pilaris an additional biopsy was taken from the ileum.

**Postmortem Material**

The small bowel was examined at necropsy in 50 people, 26 male and 24 female with a mean age of 64 years, who died suddenly and on whom a postmortem examination was carried out by the hospital forensic pathologist. The necropsies were consecutive ones and the causes of death are shown in Table II. No special precautions were taken to prevent postmortem autolysis. Short lengths of bowel just distal to the duodenojejunal junction were taken and they were opened before being placed in 10% buffered formalin solution for fixing. The specimens were later examined and photographed under the stereomicroscope. Not all areas of the mucosa were suitable for study, but in 48 of the 50 cases the surface pattern was sufficiently well preserved in places for an assessment to be made. Often the best preserved areas were on the crests of the mucosal folds.

**Classification of Small-Intestinal Mucosal Biopsy Appearances**

The terms as used in the present paper to describe stereomicroscopic features must be more clearly defined. ‘Fingers’ are long and narrow, and the ratio of width to thickness does not exceed 2:1. ‘Narrow leaves’ are long and narrow, and their width is between two and five times that of a finger. ‘Broad leaves’ may be straight or curled, and their length is often less than that of narrow leaves or fingers, but their width is between five and 10 times that of a finger. Narrow or broad leaves may be joined, but the term ‘joined leaves’ is confined to the fusion of broad leaves, which may sometimes form straight ridges or may sometimes curve. Their length is usually less than that of leaves or fingers. An angulated mucosal ridge in which there are at least two angles of 90° or less is a ‘convolution’. The depth of a convolution is usually considerably less than the length of a leaf or finger. The mucosa is described as ‘flat’ when no villi or convolutions are present.

These terms as described here are similar to those used by Stewart, Pollock, Hoffbrand, Mollin, and Booth (1967). The percentage frequency distribution was calculated for the predominant stereomicroscopic feature. In the case of the necropsy material, and the biopsy material from patients with diseases other than dermatitis herpetiformis, it was also calculated for all the individual features seen in each specimen. When more than one biopsy was taken from a patient and the appearances differed the first specimen only was used in the calculation of the frequency distribution.

**Results**

**Dermatitis herpetiformis**

The percentage frequency distribution of the predominant stereomicroscopic feature of the upper small-intestinal mucosa of patients with dermatitis herpetiformis is seen in Fig. 1 where it is contrasted with the predominant feature in the 48 necropsy specimens which were sufficiently well preserved for an assessment to be made. A flat mucosa was found in 36% of patients with dermatitis herpetiformis but in none of the control subjects (Figure 1 and Table III). A predominantly convoluted mucosa was found in 30% of patients with dermatitis herpetiformis and 8% of the control subjects (Figure 1 and Table IV). This increased incidence of flat and convoluted mucosae is highly significant.

**Other Dermatoses**

The percentage frequency distribution of the predominant appearance seen on stereomicroscopy of the upper small-intestinal mucosa in the 200 patients with various dermatoses is shown in Fig. 2, where these results are compared with those in the control group. There is no significant difference between the two groups. A flat mucosa was not seen. Convolutions were the predominant feature in 8% of both the patients with these various skin diseases and the control subjects. Figure 2 also shows the frequency distribution of the individual features seen in the two groups. Again these are very similar, although
in the control group there is a slight reduction in all features, presumably as a result of the less satisfactory preservation of surface architecture in some of specimens. Convolutions were present as one of the features in 24% of these patients and 21% of the control subjects: there is no significant difference between these results (Table III).

Convolutions were not associated with any particular dermatosis and were found as the predominant feature in some patients with psoriasis, eczema, rosacea, pemphigoid, pityriasis rubra pilaris, acquired ichthyosis, and alopecia areata. Figure 3 shows that there is no significant difference between the predominant, or individual, mucosal features in patients with psoriasis, eczema, or rosacea. Comparison of Figs. 2 and 3 shows that the results in these dermatoses do not differ from the results in the group as a whole nor from those in the control group. In psoriasis, convolutions were present in 26% and were the predominant feature in 7%; in eczema, convolutions were present in 27% and were the predominant feature in 9%; in rosacea, convolutions were present in 27% and were the predominant feature in 6% (Table III). In the control subjects convolutions were the predominant feature in a patient who had died from coal gas poisoning, another who had died from acute bronchitis, and two others who had died after myocardial infarction. Representative photographs of the different mucosal appearances are shown in Figure 4. The predominant mucosal patterns in the test and control groups are shown for the separate sexes and age groups in Figure 5. There was no obvious relationship between the mucosal appearance and age or sex. Convolutions were found as the predominant feature in 10% of the female and 6% of the male subjects, but this
Fig. 4 Photographic appearances of representative biopsy specimens seen under the stereomicroscope
(a) Flat mucosa from a patient with dermatitis herpetiformis (×50).
(b) Convoluted mucosa from a patient with pityriasis rubra pilaris (×27).
(c) Joined leaves from a patient with psoriasis (×50).
(d) Broad leaves from a patient with eczema (×50).
(e) Narrow leaves from a patient with eczema (×27).
(f) Fingers from a patient with dermatitis herpetiformis (×27).
of mucosal appearance, though not all patients with a convoluted mucosa had steatorrhoea; its incidence was greatest in the convoluted group. Table IV shows that there was no correlation between the predominant stereomicroscopic appearance and the extent of the rash.

In the four patients, in whom more than one biopsy was taken from the same level before treatment, in three of them there was a slight variation in the predominant stereomicroscopic appearance in the different specimens (Table V).

The patient with pityriasis rubra pilaris whose ileal mucosa was examined showed a predominance of narrow leaves at this site, although the biopsy taken from the second part of the duodenum showed a predominance of convolutions.

**Discussion**

**DERMATITIS HERPETIFORMIS**

The flat upper small-intestinal mucosa found in about one-third of the patients with dermatitis herpetiformis is identical in appearance with that found in patients with gluten-sensitive enteropathy. This, together with our findings that the enteropathy is at its worst proximally, that an inflammatory reaction can be induced by gluten-instillation, and that there is an increased familial incidence of bowel abnormality, suggests that there is a high proportion of patients with dermatitis herpetiformis who have the coeliac
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<table>
<thead>
<tr>
<th>Patient</th>
<th>Specimen</th>
<th>One</th>
<th>Two</th>
<th>Three</th>
</tr>
</thead>
<tbody>
<tr>
<td>M 36</td>
<td>Broad leaves</td>
<td>Broad leaves</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>M 20</td>
<td>Broad leaves</td>
<td>Narrow leaves</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>M 61</td>
<td>Narrow leaves</td>
<td>Narrow leaves</td>
<td>Broad leaves</td>
<td>—</td>
</tr>
<tr>
<td>F 41</td>
<td>Joined leaves</td>
<td>Broad leaves</td>
<td>—</td>
<td>—</td>
</tr>
</tbody>
</table>

*Table V* Predominant stereomicroscopic appearance in patients with psoriasis from whom more than one small-intestinal biopsy was taken at the same level

syndrome, probably as a result of a genetic predisposition (Marks and Shuster, 1968; Shuster and Marks, 1968 and 1970). Most observers have found that the enteropathy usually improves with gluten withdrawal (Fry, McMinn, Cowan, and Hoffbrand, 1968; Shuster et al, 1968; Marks, 1968b), although in our first patient it did not (Marks et al, 1966). The one exception to this finding is from Rubin's group (Brow, Parker, and Rubin, 1968) but they have not published their full data. The finding of a convoluted mucosa in one-third of the patients with dermatitis herpetiformis means that there is a higher ratio of convoluted to flat mucosae than in other forms of the coeliac syndrome, but this is explicable on the ground of severity, for in dermatitis herpetiformis the enteropathy is mild and usually symptomless, and in the others, by contrast, it is usually diagnosed in a relatively severe form when gastrointestinal and haematological manifestations occur. It might be expected that the high incidence of convolutions in our local control population would be a factor, but the incidence of a convoluted mucosa in those of our patients (from Newcastle) with dermatitis herpetiformis is very similar to the incidence in those from London (Fry et al, 1967; Marks, 1968b) where (in London) convolutions are not usually found in control subjects (Stewart et al, 1967).

**DERMATOSSES OTHER THAN DERMATITIS HERPETIFORMIS**

The frequency of the distribution of the predominant small-intestinal mucosal appearance and the individual surface features seen on stereomicroscopy in our group of patients with these various skin diseases is almost identical with that in our control group. When patients with psoriasis, eczema, and rosacea are considered separately the frequency distribution of both predominant, and individual, features differs very little from that in the group as a whole. Although the numbers of patients with other dermatoses are too small to establish the incidence of a convoluted mucosa in them, its incidence in the miscellaneous group they comprise does not differ from that in the control subjects or in the patients with psoriasis, eczema, or rosacea. These results then are in stark contrast to those in dermatitis herpetiformis.

Our present findings in psoriasis and rosacea are quite different from those already published both by ourselves and by others, and there is considerable disagreement between the different workers about the incidence of stereomicroscopic abnormalities in psoriasis and rosacea (Table VI). The responsibility for these discrepancies may be attributed to a number of factors: either errors of sampling, or failure to standardize technique or terminology, or the failure to choose a suitable control group.

**Errors of sampling**

There are three possible sources of error from sampling in these studies. First, it is possible that an unrepresentative biopsy specimen was taken as a result of variations in mucosal architecture within a given individual. Creamer and Leppard (1965) found that when large areas of small-intestine were examined at necropsy in a patient with the coeliac syndrome severe abnor-
malities were found on the crests of the mucosal folds, while the mucosa in the troughs was relatively normal. It seems probable that it is from the crests rather than the adjacent troughs that peroral biopsy specimens will be taken, in which case sampling errors should not arise as a result of this. Stewart and his colleagues (1967) found little variation in the appearance of the jejunal mucosa when multiple peroral biopsies were taken from the same level over different periods of time. Our own results show that many different features may be present in the same patient but our limited studies in patients from whom multiple biopsies have been taken at the same level (Table V) are in keeping with the work of Stewart’s group.

Second, errors will inevitably arise when incidence is calculated from the findings in a small group of people if that group is unrepresentative.

Third, errors will arise if the patients being compared, although suffering from the same skin disease, are not comparable in other respects. For instance little is known about differences in jejunal biopsy appearances at different ages and in the two sexes. Baker, Ignatius, Mathan, Vaish, and Chacko (1962) found finger-shaped villi in three foetuses in a geographical region in which convoluted mucosae were common in adults, and concluded that the abnormality was an acquired one, but factors other than increasing age per se could obviously have been responsible. It is known that in an adult the response of the flat mucosa to gluten withdrawal is less dramatic than in children with coeliac disease, and that even after several years on the diet the mucosa may not be completely normal (Stewart et al, 1967). It is possible, therefore, that other forms of mucosal damage are not easily reversed in adults and that such ‘scarring’ could result in a higher proportion of convoluted mucosae being found with advancing age. In our own series of patients and control subjects convoluted mucosae were found in both young and old alike, and there was no significant difference in men or women. Thus it seems unlikely that either small differences in age and the sex distribution in different series could affect results significantly.

It now appears that our own previous report of a high incidence of a convoluted mucosa in psoriasis (Shuster et al, 1968) was incorrect because it was based on too small a sample.

Failure to standardize technique
Techniques have only differed significantly in the chosen level of bowel from which the mucosal biopsy was taken. In some series the level was not stated, though the information might be expected to be important, as it has been said that joined leaves are more common in the duodenum than in the jejunum (Booth, Stewart, Holmes, and Brackenbury, 1962). In our own patients, while fingers and narrow leaves were found mainly in the jejunum, the level of the biopsy did not explain why the convolutions were found at all levels.

Failure to standardize terminology
There is no universally agreed terminology for the description of jejunal mucosal appearance and in some series the terms used are not defined adequately; few people, for instance, say what they mean by ‘convolution’. Again, in our previous publication on psoriasis (Shuster et al, 1967) we described mucosae in which convolutions, however few, were present, as ‘convoluted’, while Salem and Truelove (1965) and Watson et al (1965) confined the use of the term to cases in which the predominant mucosal pattern was convoluted. Most workers now classify mainly on the basis of the predominant mucosal appearance (Stewart et al, 1967). Our adoption of this method of classification, together with our more precise definition of the term ‘convolution’, is a further explanation of the difference in the incidence of a ‘convoluted’ mucosa in psoriasis in this and our previous study (Shuster et al, 1967).

Failure to choose a suitable control group
There have been very few studies of the jejunal mucosa in normal people and for this reason findings in patients with different diseases have been compared with those in control series already published. This is never very satisfactory and in the present series was particularly undesirable as there are in the literature reports of very different jejunal biopsy appearances in ‘control’ subjects from different centres (Table VII). For instance, while a convoluted mucosa is not uncommon in apparently healthy people in southern India (Baker et al, 1962), East Africa (Banwell, Hutt, and Tunnicliffe, 1964), Singapore (England and O’Brien, 1966), and Israel (Parkins, Eidelman, Perrin, and Rubin, 1966) it does not occur in ‘normal’ series reported from England (Salem and Truelove, 1965; Stewart et al, 1967), Scotland (Scott, Williams, and Clark, 1964; Girdwood, Williams, McManus, Dellipiani, Delamore, and Kershaw, 1966), or Norway (Buthol and Myren, 1968). The possibility that the normal appearances might differ from place to place within so small an area as Great Britain was little considered till recently (Marks, 1968a; Shuster and Marks, 1970). Such a possibility obviously needs very serious thought as, if variations exist, they could go a long way towards explaining the different descriptions reported from different parts of the country of the small-intestinal mucosa in psoriasis and rosacea (Table VI). In our previous study (Shuster et al, 1967) we compared our Newcastle patients with psoriasis with control groups from London and Edinburgh. Watson et al (1965) gave no account of their own controls and so presumably compared their patients with rosacea.
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<table>
<thead>
<tr>
<th>Series</th>
<th>Population</th>
<th>Age and Sex Distribution</th>
<th>Site of Biopsy</th>
<th>Terminology Used</th>
<th>Findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baker, Ignatius, Mathan, Vaish, and Chacko (1962)</td>
<td>25 southern Indians including normal volunteers and those with peptic ulcers and chronic infection</td>
<td>Not stated</td>
<td>First loop of jejunum</td>
<td>Not stated</td>
<td>24% 'convoluted'</td>
</tr>
<tr>
<td>Scott, Williams, and Clark (1964)</td>
<td>13 Aberdeen with abdominal symptoms</td>
<td>Not stated</td>
<td>Proximal jejunum</td>
<td>'Convoluted' only if whole surface convoluted</td>
<td>None 'convoluted'</td>
</tr>
<tr>
<td>Banwell, Hutt, and Tunncliffe (1964)</td>
<td>10 postmortem controls (Uganda Africans)</td>
<td>Not stated</td>
<td>Upper jejunum</td>
<td>'Convoluted' only if predominantly or all convoluted</td>
<td>20% 'convoluted'</td>
</tr>
<tr>
<td>Salem and Truelove (1965)</td>
<td>41 Oxford patients with irritable colon and anaemia</td>
<td>Not stated</td>
<td>Not stated</td>
<td>None with 'marked' abnormality</td>
<td>None 'convoluted'</td>
</tr>
<tr>
<td>England and O’Brien (1966)</td>
<td>14 Europeans and 10 Asians (Chinese and Indian) from Singapore.</td>
<td>Not stated</td>
<td>Upper 2½ feet of jejunum</td>
<td>'Convoluted' not precisely defined, 3% 'convoluted' in Asians only</td>
<td>None 'convoluted'</td>
</tr>
<tr>
<td>Girdwood, Williams, McManus, Dellipiani, Delamore, and Kershaw (1966)</td>
<td>41 Edinburgh hospital patients with diarrhoea, endocrine disturbances, etc.</td>
<td>Mean age 43, male/female 23/18</td>
<td>Jejunum</td>
<td>None 'convoluted'</td>
<td></td>
</tr>
<tr>
<td>Parkins, Eidelberg, Perrin, and Rubin (1966)</td>
<td>28 Yemenites, 6 Arabs, and 6 Ashkenazi Jews from Israel</td>
<td>Not stated</td>
<td>Not stated</td>
<td>No stereomicroscopy done but blunting and shortening of villi in Yemenites and Arabs but not Ashkenazi Jews</td>
<td>None 'convoluted'</td>
</tr>
<tr>
<td>Stewart, Pollock, Hoffbrand, Mollin, and Booth (1967)</td>
<td>50 London volunteers without evidence of gastrointestinal disease</td>
<td>Mean age 44, male/female 26/34</td>
<td>Lower duodenum or upper jejunum</td>
<td>'Convoluted' only if convolutions predominated</td>
<td>None 'convoluted'</td>
</tr>
<tr>
<td>Burhol and Myren (1968)</td>
<td>21 Norwegians in military service. Fit or with minor gastrointestinal symptoms only</td>
<td>Age range 19-24 years, all male</td>
<td>Proximal jejunum</td>
<td>'Convoluted' only if whole surface convoluted</td>
<td>None 'convoluted'</td>
</tr>
<tr>
<td>Marks and Shuster (1970)</td>
<td>48 necropsies in people dying suddenly in Newcastle</td>
<td>Mean age 64 years, male/female 26/24</td>
<td>Proximal jejunum</td>
<td>'Convoluted' only if convolutions predominated</td>
<td>8% 'convoluted'</td>
</tr>
</tbody>
</table>

Table VII Stereomicroscopic appearances in 'control' subjects

with a control group from outside Glasgow. Our present control series is obviously more satisfactory in this respect because it is drawn from the same small geographical region as our patients with skin disease. While it is inescapable that the control subjects who had come to necropsy were not normal, it is difficult to see how the events leading up to sudden death from a variety of causes, such as myocardial infarction or carbon monoxide poisoning, could themselves have produced convolutions in the intestinal mucosa. Thus we can say from Figs. 1 and 2 and Table III that a predominance of convolutions in the upper small-intestinal mucosa is not uncommon and that the presence of some convolutions is common in Newcastle upon Tyne, and we can only conclude that, in this respect, our normal population differs fundamentally from those in London, Edinburgh, and Oxford.

We do not know the explanation for the high incidence of a convoluted mucosa in the Newcastle region. It is known that a convoluted mucosa may occur in relatives of patients with the coeliac syndrome (Stewart et al., 1967) and it may be that our findings are a manifestation of an increased incidence of coeliac disease in the north east of England. The finding of a normal mucosa in the ileum of one patient with a convoluted duodenal mucosa whose ileum was examined points to a dietary factor such as gluten. Minor differences in genetic make-up within Great Britain may be associated with different mucosal patterns, but an environmental factor might still be required for the convolutions to become manifest.

It is now clear that our patients with psoriasis have a small-intestinal mucosa very similar to that of our normal population, the higher incidence of convolutions being a feature of the region. This is in keeping with the findings in psoriasis in London (Marks et al., 1967) and Oxford (Salem and Truelove, 1965) where convolutions do not appear to be seen in normal people or in patients with psoriasis. Similarly jejunal mucosal appearances in rosacea in Newcastle and London reflect differences in the normal local population and the same may well apply to the Glasgow series (Watson et al., 1965) although a few patients were selected for this series because they were known to have coeliac disease.

Thus it seems that the most important factor responsible for the differences in jejunal mucosal biopsy findings reported in certain skin diseases
in the past, both by ourselves and others, has been failure to choose a suitable control population because it was not appreciated that there were considerable population differences within Great Britain. This, together with the inadequate definition of the terms used, and the smallness of sample groups, accounts for most of the discrepancies including those between our own previous results and the present ones.

We must now conclude that in contrast to the findings in dermatitis herpetiformis the upper small-intestinal mucosa in psoriasis, rosacea, and eczema has no special structural features on stereomicroscopy and that when convolutions were found in these conditions they were a characteristic of the local population and not of the skin disease.

We cannot of course exclude the possibility that by using techniques other than stereomicroscopy it may prove possible to demonstrate some structural abnormality of the bowel in these skin diseases and perhaps the group of patients with ‘dermatogenic enteropathy’ (Shuster and Marks, 1965) is the most likely to repay further study in this respect. ‘Dermatogenic enteropathy’ is the malabsorption of fat and other substances induced by eczema and psoriasis. Its incidence and severity is proportional to the extent of the rash; it responds rapidly to topical treatment of the rash alone and may recur in successive attacks of skin disease (Marks and Shuster, 1965; Marks and Shuster, 1970). In patients with eczema and psoriasis who have dermatogenic enteropathy there is no particular stereomicroscopic feature associated, although the incidence of a predominantly convoluted mucosa is slightly higher in this group than in the patients with eczema and psoriasis as a whole (Fig. 7).

Our failure to find a completely flat mucosa in dermatogenic enteropathy simplifies the important differential diagnosis of this condition and the coeliac syndrome with a rash (Shuster and Marks, 1970). Although the latter condition has been the one most often quoted when malabsorption and a rash are discussed, from the dermatologist’s viewpoint it is in fact rare.

A question which may be asked is whether the prevalence of dermatogenic enteropathy in patients with extensive eczema and psoriasis in Newcastle upon Tyne is in any way associated with the high incidence of a convoluted mucosa in this region. This seems unlikely, especially as there is no correlation between small-intestinal structure and function in these dermatoses. In any case dermatogenic enteropathy has now been reported to be equally prevalent in Stoke-on-Trent (Kaimis et al, 1969).

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Small-intestinal mucosal abnormalities in various skin diseases—fact or fancy?


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