(c) *Total Nucleated Cell Count*.—Suspension diluted 1/10 in three pipettes, each of which was used to fill a separate counting chamber.

Number of cells counted in the three chambers 67, 65, and 73 respectively. Mean number of cells counted = 68.

Dilution factor = 1/25

∴ Total nucleated cell count = 1,700/c.mm.

Coefficient of variation of this count:

$$= \sqrt{\frac{100^2}{n} + \frac{4.6^2}{n_c} + \frac{4.7^2}{n_p}}$$

Where n = the number of cells counted.

n_c = the number of counting chambers used.

n_p = the number of pipettes used.

$$= \sqrt{\frac{100^2}{205} + \frac{4.6^2}{3} + \frac{4.7^2}{3}} = 7.96\%$$

∴ Standard Deviation = 136

Calculations:

(i) The percentage of P. + M. of total nucleated cells:

$$\left(\frac{\text{i.e., } a \times b}{100}\right) = \frac{51}{100} \times 35.1 = 17.9$$

The standard deviation of this product is obtained from the formula:

$$\sigma = \sqrt{\sigma a^2 \cdot \sigma b^2 + \sigma a^2 \cdot \bar{b}^2 + \sigma b^2 \cdot \bar{a}^2}$$

where $\bar{a}$ is the mean percentage of erythroblasts which are P. + M. and σa is its standard deviation, and $\bar{b}$ is the mean percentage of total nucleated cells which are erythroblasts and σb its standard deviation.

$$\text{i.e., } \sigma = \sqrt{\frac{(10.7^2 \times 11.7^2) + (10.7^2 \times 35.1^2) + (11.7^2 \times 51^2)}{100}} \\ = 7.2$$

(ii) The number of P.+M./c.mm. (i.e., $\frac{a \times b}{100} \times c$)

$$= \frac{17.9}{100} \times 1700 = 304.$$

The standard deviation of this figure

$$= \sqrt{\left(\left(\frac{7.2}{100}\right)^2 \times 136^2\right) + \left(\left(\frac{7.2}{100}\right)^2 \times 1700^2\right) + \left(136^2 \times \left(\frac{17.9}{100}\right)^2\right)} \\ = 124$$

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NORWEGIAN SCABIES

BY

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In September, 1950, some female patients in the dermatological and tuberculosis wards at University College Hospital complained of itching spots. These wards were next to each other and were staffed by the same nurses. Intensely itchy scratched papules were scattered over the waist, buttocks, and thighs, while one patient had papules on the arms and a few vesicles on the palms. On the whole the eruption suggested scabies, but we could not find burrows in any of the cases, nor was there any trace of mites on scraping areas of skin and examining the scales microscopically.

Within a few days seven nurses had complained of itching. They all showed scattered scratched papules on the arms, and some of them on the thighs. Again after careful examination it was impossible to make a certain diagnosis in the absence of burrows and with the atypical distribution of lesions. It was decided to treat patients and nurses for scabies, and indeed there was a satisfactory response to paintings with emulsion of benzyl benzoate.

During October other cases occurred in these two wards, the total affected being 12 ward patients, 17 nurses, 1 ward maid, and 2 medical staff. By this time three cases had been seen with typical scabious burrows in which the acarus was found.

Thus we were confronted with an explosive outbreak of scabies confined to two wards, where both patients and nurses were affected, and in which most of the cases were atypical. At this point Dr. W. Freudenthal drew our attention to a similar puzzling epidemic of highly infectious scabies that had occurred at Breslau in 1927 (Hahn, 1928), where the source of infection was eventually found to be a case of Norwegian scabies that had not at first been recognized. In looking for a case of this kind we remembered a woman with a scaling dermatosis in which the diagnosis was uncertain. She had been in the dermatological ward from August 31 till October 18, 1950, when she had been transferred to a ward for chronic sick at St. Pancras Hospital. This patient was re-examined and was found to be swarming with scabies mites, the scaling and density of parasitization fitting the picture of mild Norwegian scabies.

Within the next few days several old ladies in the ward at St. Pancras Hospital complained of itching. They were found to have scratched papules on the waist, thighs, and buttocks, and a few had lesions on the arms, but burrows were not seen. Nurses were found to be affected with extremely itchy papules on the arms. When the source of infection had been removed, no fresh cases appeared among the nursing staff, but during the next two months further cases gradually incubated among the patients in that ward. In fact, every patient who had been in the ward at the time when the case of Norwegian scabies was untreated became infected. The total was 24 ward patients, 10 nurses, and 1 ward maid. Burrows were found in two of the cases that had incubated scabies very slowly, but the rest were atypical and showed no burrows or lesions of the wrists and fingers.

According to *Time* (June 16) there has been great public interest in the United States in the new drug isonicotinic acid hydrazide. The Food and Drug Administration has now authorized the general use of the drug on any doctor's prescription, and so great has been the public demand that Macy's, the well-known store in New York, advertised in the *New York Times* that they were able to supply it.

Throughout the epidemic in the two hospitals one was struck by the different distribution of lesions in nurses and bed patients. The nurses were affected on the arms, while the patients showed lesions on the waist, buttocks, and thighs. Many of the patients had no direct contact with the source of infection, and it seems probable that nurses picked up infected scales on the arms and transferred mites to other patients in the process of lifting and turning them.

Case Report

A married woman aged 67 was admitted to University College Hospital on August 31, 1950, with a widespread scaling dermatosis. The rash started two years before admission, with blisters and cracks on the hands. Itching had spread over the body, and generalized scaling had been present for at least a year. She gave a history of having been in contact with scabies three or four years earlier, but treatment had not been carried out on account of other illnesses. She had suffered from rheumatoid arthritis for over 30 years. In 1930 a hysterectomy was done, since when there had been abdominal pains, loss of weight, and depression. For the past two years she had been confined to bed on account of her skin condition.

Examination revealed an emaciated old woman with deformity of the joints of the wrists, knees, elbows, and fingers from old rheumatoid arthritis. Her weight was 75 lb. (34.5 kg.). She was extremely depressed and miserable, and complained of itching and of a feeling of water running over the body. There were dusky redness and slight infiltration of the skin of the lower part of the trunk and buttocks, with fairly profuse scaling. Scaling of the scalp, ears, and neck was present, and the scalp hair was sparse. The hands showed patches of dry crusting, and there was a heaping up of horny debris under some of the nail plates. The lymph nodes in axillae and groins were enlarged but painless, and the liver was palpable. Examination of the blood showed: haemoglobin, 76%; red cells, 3,700,000 per c.mm.; white cells, 12,000 per c.mm. (polymorphs 45.4%, lymphocytes 13%, monocytes 2.5%, eosinophils 39%); Wassermann reaction, negative; serum albumin 3.1%, serum globulin 4.2%.

The condition was thought to be a seborrhoeic dermatitis or possibly a reticulosis. The patient refused to allow a biopsy of skin or gland to be done, and the correct diagnosis was not made until a search for a scabies carrier was made.

Scales from all parts of the body and from the scalp, and horny material from under the finger-nails, were found to contain numerous mites, eggs, larvae, and nymphs. There were no burrows, vesicles, or pustules. Mr. G. Owen Evans examined material from this case at the Department of Zoology, British Museum, and reported: "These mites are morphologically indistinguishable from *Sarcoptes scabiei* var. *hominis*."

Treatment was started on October 24. A daily warm bath was given, followed by the application of equal parts of ung. sulphur. (B.P.) and ung. balsam. peruv. (B.P.C.). The scalp was treated with a lotion consisting of mesulphen 25 parts, arachis oil 25 parts, and lime water 50 parts.

Within three weeks there was marked improvement. The scaling disappeared and the skin gradually returned to normal. There was some gain in weight and an improvement in mental attitude. The lymph nodes became smaller and the eosinophilia disappeared. After two months the patient was able to walk and her mentality was much improved. Scalp hair had grown well, and the skin was normal apart from pigmentation.

Discussion

Norwegian scabies (scabies crustosa) is a very rare form of scabies, first described by Danielssen and Boeck (1848) in Norway. Occasional cases have been reported from all

over the world, but very few have been seen in England. Beatty (1913, 1915) recorded two cases in Ireland. Dowling (1930) presented a case at the Royal Society of Medicine in London. Calnan (1950) recently recorded four cases in mongols in a hospital for mental defectives. H. J. Wallace (1950, personal communication) recognized two cases in mongols in a colony for mental defectives. Ingram (1951) describes a case that had given rise to a ward epidemic of scabies.

The clinical picture of Norwegian scabies is entirely different from that of ordinary scabies. The extent and distribution of lesions are variable, but in a well-developed case there is widespread scaling with dusky redness and some infiltration of the skin. These changes are most marked over the lower part of the trunk, the limbs being less affected except at the extremities, where the most characteristic lesions are seen. There is great heaping up of horn on the hands and fingers and sometimes on the feet; and this dirty hyperkeratosis and crusting is adherent, and has been likened to pumice-stone. Over the joints of the fingers and creases of the hands there are deep fissures in the horny crust, and horny debris accumulates under the nail plates. Scaling may extend on to the neck, face, and scalp, where the hair may be greatly thinned. In some cases very thick crusted plaques have been present on the body.

Skin sections show the thickened horny layer to be galled by the mites in various stages of development or, as Boeck puts it, "C'est un petit monde, une génération sur une autre." The Malpighian layer of the epidermis is also thickened and there is usually a chronic inflammatory reaction in the dermis.

The lymph nodes are enlarged and there is a blood eosinophilia of the order of 10% to 35%. Itching is not a constant symptom.

The condition has often escaped diagnosis for several years, being mistaken for seborrhoeic dermatitis, atypical psoriasis, or generalized erythrodermia of reticulosis. The diagnosis depends upon finding numerous mites with ova, larvae, and nymphs in crusts and scales from all over the body. There may be no burrows or vesicles.

The next point about this extraordinary form of scabies is its great contagiousness. Slight contact with the patient, as in nursing or medical examination, is enough to pick up mites. In describing a case of Norwegian scabies it is usual for the dermatologist to confess to having been infected from his patient before making the correct diagnosis, and I am no exception.

Cases of Norwegian scabies have been the source of several hospital epidemics. Hahn (1928) recounts an experience identical with our own. Merklen *et al.* (1948) describe an epidemic of itching in which 25 ward patients, all the nurses and internists connected with the ward, and six out of ten externists were affected. Pailheret (1935) also describes a hospital epidemic of atypical scabies from a similar source. Zoon and Mali (1949) record five cases of crusted scabies, from some of which patients and staff were infected, but here ordinary scabies developed; and in the hospital epidemics described by Dubreuilh and Sainte-Marie (1924), Gaté *et al.* (1936), Golay (1940), Hissard *et al.* (1949), and Ingram (1951), while the great contagiousness of Norwegian scabies is stressed, the secondary cases were typical of ordinary scabies.

The extraordinary parasitization of the skin in Norwegian scabies is comparable to the state of affairs in sarcoptic mange of animals, and it is not surprising that at one time these cases were thought to be of animal origin. The great infectivity and the atypicality of contact cases might lend further support to this view. However, the mites in Norwegian scabies are morphologically *Sarcoptes scabiei* var. *hominis*, and the evolution of Norwegian scabies from ordinary scabies has often been recorded. Although contact cases may be atypical, the infection persists if untreated, unlike animal scabies in the human, and eventu-

ally burrows will be found in some of them. The burrow is never formed by animal varieties of scabies during their transient infestation of man.

It is almost unknown for Norwegian scabies to occur in the physically or mentally normal subject. Severe malnutrition, vitamin deficiency, and debilitating disease have been considered as contributory factors. Backhouse (1929) investigated endemic scabies among natives of New Guinea, and found severe crusted forms with massive infestation in those debilitated by dysentery, tuberculosis, and chronic beriberi. On the other hand, the four mongols described by Calnan (1950) and the two seen by H. J. Wallace (1950, personal communication) were not undernourished and were in a reasonably good state of general health. Calnan emphasized the absence of itching in his cases, and it seems probable that a failure to scratch effectively is the main factor in the evolution of this type of case. Organic nervous disease, mental defect, psychotic depression, or the apathy associated with malnutrition may each in its own way allow the parasite to go unchecked by scratching. Zoon and Mali (1949) drew attention to nervous disease in their cases of Norwegian scabies, one of which had senile dementia, another had severe debility, another was an imbecile, and a fourth had taboparesis. Syringomyelia was present in the cases described by Hahn (1928) and by Prakken and van Vloten (1949). Mellanby (1943) points out that the number of mites in the average case of human scabies is quite small and that scratching serves to keep it down.

In the absence of scratching there is unrestricted multiplication of the mites in the horny layer of the skin. There follows a chronic inflammatory reaction and the horny layer in particular is thickened. Lymph nodes draining the affected skin are enlarged and the general reaction of the host is indicated by the eosinophilia and by the high titre of transferable antibodies to extracts from the scabious scales (Prakken and van Vloten, 1949).

It seems possible that the unrestricted increase of the mites in the thickened horny layer may lead to a temporary change of biological habit, so that the egg-laying female mite no longer forms a discrete burrow in a case such as ours, nor does she do so in contact cases for some generations.

Summary

Sixty-seven cases of scabies, mostly atypical, occurred among patients and nursing staff of two hospitals.

The epidemic was traced to a case of Norwegian scabies, which is described.

This rare variant of ordinary human scabies is discussed with reference to the factors favouring such massive infestation and great infectivity.

I wish to express my thanks to Dr. W. N. Goldsmith for permission to publish this case and for his valuable help in the preparation of this paper.

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OVARIAN DYSFUNCTION AND HEPATOCHOLECYSTOPATHY IN ASSOCIATION WITH RETRODISPLACEMENT OF THE UTERUS

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We wish here to draw attention to the well-known condition of displacement of the uterus with which menstrual disorders such as amenorrhoea, dysmenorrhoea, menorrhagia, metrorrhagia, etc., coexist, and with which not infrequently a cystic follicle and/or a cystic corpus luteum as well as a polycystic ovary may be associated. This primary displacement of the uterus, which very often may be due to endocrine deficiency (pituitary, suprarenal, thyroid) and resultant infantilism, may partly explain the menstrual disorders, as both have a common origin.

The anteverted and/or anteflexed infantile uterus may respond more or less favourably to treatment with oestrogens, as their hyperaemic action, which can be combined with dilatation of the cervix, results in many cases in a decrease of the dysmenorrhoeal symptoms. Sometimes this may be followed even by pregnancy. Cystic follicles, on the other hand, may also often disappear after short-wave diathermy. Repeated failure, however, of the various methods of treatment will seriously embarrass the gynaecologist, who may, as a result, try a series of pointless endocrinotherapeutic experiments.

Advantages of Ventrofixation

The retroflexed and/or retroverted uterus, either primary or secondary, represents, on the contrary, a very different condition, and therefore permits of a different treatment, as by ventrofixation it is possible to correct the abnormal position of the uterus. As is well known, this retrodisplacement causes a persistent backache and lower abdominal pains—symptoms which, we think, are a clear indication for ventrofixation. In our department, Bumm's modification of Doléris's method is used as a rule in these cases. This operation consists in suturing both the round ligaments—not together, but behind the rectus muscles, according to their natural topography, in almost the same way as in Gilliam's operation—following with suture of the vesico-uterine fold at the rear surface of the uterus.

This last modification has three main advantages: (a) By its use it is possible to correct retroflexion, which cannot be achieved by ventrofixation of the round ligaments alone. (b) By a suitable setting of the sutures both tubes can be put in their normal position, and thus tubal patency is often re-established. (c) It closes up the central vesico-uterine hole which is formed between the ventrofixed round ligaments, the abdominal wall, and the uterus, thus eliminating the danger of a volvulus. For the same purpose we further modified this kind of suture by also closing the two lateral holes which are formed by the ventrofixed round ligaments with the above suture of the vesico-uterine fold.

Ventrofixation also allows, where cystic follicles, cystic corpora lutea, or a polycystic ovary are present, either puncture or removal, if necessary. Polycystic ovaries, in our