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CATTLE RINGWORM

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Although the transmission of ringworm from infected cattle to man can hardly have escaped the notice of farmers, the earliest observations recorded in medical literature were made at the end of the eighteenth century and in the early years of the nineteenth century. Ernst, a Swiss veterinary surgeon, described in 1820 the case of a young girl who was infected from a cow.

Gruby in 1843, and Malmsten independently in 1846 described the organism of *Tinea tonsurans*. Many dermatologists continued to deny the parasitic origin of ringworm, but it was accepted and confirmed by Bazin in France. In 1868 M'Call Anderson, of Glasgow, quoted Bazin's work at length and further confirmed the mycotic origin of ringworm transmitted from animals to man. Sabouraud (1894) soundly established the foundations of scientific mycology in his classic work on the dermatophyte and named species of *Trichophyton* transmitted from cattle and horses. He described the faviform trichophyta in 1893.

The Fungi of Cattle Ringworm

The nomenclature of the trichophyta remains confused, and there is no unanimity of opinion among mycologists concerning the identity or otherwise of certain species described in different laboratories. Moreover, some mycologists grant specific status to the variants and subspecies of other authorities.

So far as can be determined from the somewhat scanty literature, cattle ringworm in Western Europe and the United States is caused predominantly by two species of *Trichophyton*:—*Tr. mentagrophytes*, a small-spored ectothrix, and *Tr. discoides* (syn. *Tr. album*, *Tr. ochraceum*, *Tr. faviforme*), a large-spored ectothrix. Little information is available concerning the distribution and the relative incidence of the two species. Those veterinary textbooks that make any distinction between the species of *Trichophyton* usually give greater prominence to *Tr. mentagrophytes* and its variants and subspecies. However, Walker (1950) stated that *Tr. discoides* is the commonest cause of ringworm in cattle in Britain, and that although *Tr. mentagrophytes* infections are common in man they are contracted from a wide variety of animals—horses, sheep, dogs, rabbits, and mice, as well as cattle. Davidson *et al.* (1934) grew *Tr. mentagrophytes* from seven cows during a three-year period at the University of Manitoba. La Touche (1952) reported 24 cases of *Tr. discoides* ringworm from the Leeds area.

Similarly, recent reports from various areas in the United States (Fowle and Georg, 1947; Carney, 1949; Hoerlein, 1945; Jillson and Buckley, 1952) show a marked predominance of *Tr. discoides* infections, and in many of the reports this was the only fungus isolated.

Ringworm in Cattle

The incidence of ringworm in cattle is stated by some veterinary authorities to be high, but we know of no reliable figures. The incidence of the disease appears to vary widely in different parts of Britain, but it is far from uncommon in most rural areas and probably fluctuates greatly from year to year. Sylvest (1949) reported a rapid increase of ringworm infection in cattle in Denmark from approximately 1,000 infections for the year 1939 to over 8,000 for 1943. Calves are affected more often than older animals, which are less susceptible, unless they are in poor condition from disease or malnutrition (Hagan, 1951). The disease is uncommon in milch cows. Stall-fed cattle are more commonly affected than animals out at grass, and outbreaks of ringworm consequently occur, mainly in the winter months. Carrere, as long ago as 1838, before the cause of the disease was known, observed that the contagion might be spread by harness which had been in contact with the infected animals. Muende and Webb (1937) found colonies growing on faecal material in a stable.

It is now known that the fungus will survive for long periods in the debris around stables and for still longer periods on the woodwork of the actual building. Dark damp cowsheds are said to favour the spread of the infection, and infected cattle may recover rapidly without treatment when they are turned out to grass. It is not known whether this spontaneous cure is due to exposure to ultra-violet light or to improved nutrition. In the infected calf the lesions are most frequent on the face, commonly round the eye, on the neck, and around the tail. Broken and twisted hairs penetrate thick white or yellowish crusts composed of dried exudate and scales. The lesions are usually discoid and discrete. Experimental inoculation has shown that they first become evident about the eighteenth day after inoculation and are well established by the twenty-fourth day (Hoerlein, 1945). The eruption generally lasts from six to twelve weeks, the scabs falling off to leave scaly bald patches upon which the hair slowly grows again. If this normal course is disturbed, as is not infrequent, by rubbing and scratching, fresh outbreaks occur within the healed patches, and the condition may be prolonged for six to twelve months or even longer.

Incidence of Cattle Ringworm in Man

Here again no reliable figures are available. Our 39 cases were referred to various dermatological out-patient clinics in Glamorgan and western Monmouthshire over a three-year period (1950–3), during which time approximately 12,000 new patients were examined. A great many cases are undoubtedly treated by general practitioners, and others receive no medical attention. Ashton (1932) summarized the result of an inquiry made among 384 general practitioners in rural areas throughout England and Wales; 296 had seen cases of cattle ringworm (132 only rarely), but the annual incidence and the geographical distribution of these cases were not recorded.

Transmission to Man

The majority of patients give a history of direct contact with infected animals. Table I shows the source of contact with infection in this series. Of the three patients included

TABLE I

Adults		Children		
Farm Workers	Other Occupations	Living on a Farm	Father a Farm Worker	Recently Visited a Farm
23	3	5	1	6

under "other occupations," one was a driver of a cattle lorry, the second a miner with possible contact with pit ponies, and the third was open to risk in that his father worked on a farm. One case is omitted as the history was inadequate. It can be seen that mediate transmission is not uncommon in that one of the series was the daughter and one the son of a farm worker, but had not themselves visited the farm. Another patient was a child who had placed a calf's chain around her own neck. Others had apparently contracted the infection from gate-posts and trees against which infected cattle had rubbed themselves. A 5-year-old farmer's daughter presented with an extensive kerion-type infection of the scalp from which *Tr. discoides* was isolated. The same organism was isolated from the lesions on a calf from the father's farm. The child's father, knowing the calves to be infected, allowed her to look at them only through the byre gate, which had numerous smooth areas where the animals had rubbed their heads and necks. Scrapings were examined from various parts of the woodwork of the gate, but, as is often the case with this type of specimen, no organism was isolated.

Trauma sometimes determines the site of the lesions. The abraded epidermis perhaps offers particularly suitable conditions for the inoculation and initial growth of the fungus. Jillson and Buckley (1952) noted that a pre-existing skin lesion such as a contact dermatitis or herpes simplex may also serve as a locus minoris resistentiae.

The incubation period cannot often be accurately determined in farm workers with repeated contact with cattle. After trauma the lesions may appear within a few days. In the absence of trauma a longer incubation period is usual.

Age and Sex Incidence.—Five of the cases were in females and 34 in males. Table II shows the age incidence of our series. The figures are merely a measure of exposure to

TABLE II.—Age Incidence

Age	0-5	6-10	11-20	21-30	31-40	41-50	51-60
No. of cases	4	5	15	7	3	3	2

infection, and there is no definite evidence of any age or sex susceptibility. The age incidence suggests, however, that the older farm worker may have developed some immunity from previous attacks, is more careful in his avoidance of possible contact, or tends to treat himself and not consult his doctor.

Seasonal Incidence.—The maximal seasonal incidence during the winter months coincides with greater prevalence of infection in cattle at this time (Table III).

TABLE III.—Seasonal Incidence

Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
7	9	1	3	2	4	1	0	0	2	5	5

Distribution.—The majority of the lesions are on the exposed areas, particularly the scalp, face, neck, and arms, as is shown in Table IV. Of the nine patients with numerous infected sites, six had lesions of the face, neck, and scalp. Lesions on the trunk may be very extensive and by confluence may cover large areas. The four patients with

TABLE IV.—Sites Affected

Face and Neck	Scalp	Forearm, Wrist, and Hand	Lower Limbs	Upper Arm	Trunk	Multiple Areas
9	2	13	4	0	2	9

lesions only on the lower limbs had two of these in the region of the knee. Several of our patients presented numerous lesions on buttocks, lower abdominal wall, and thighs.

Clinical Picture

Lesions of four types are encountered.

1. *Agminate Folliculitis* (Sabouraud).—Sharply defined dull-red plaques studded with follicular pustules.

2. *Kerion*.—An oedematous boggy mass of discharging follicular pustules, the surface of which is often crusted. The inflammatory appearance of this type of lesion occasionally leads to unnecessary surgical intervention.

3. *Tinea circinata*.—Erythematous plaques without pustulation. The surface is scaly, the margin of the extending plaque is vesicular, and there is little tendency to central clearing. The lesion may enlarge peripherally to cover extensive areas.

4. *Granuloma of Majocchi*.—Irregularly grouped nodules covered by red but unbroken skin.

The vast majority of the lesions in our series fell into groups 1 and 3. The scarring and alopecia left by the kerion-type infection is usually only very slight in proportion to the original extent and severity of the tissue reaction. Kerions, or more rarely agminate folliculitis, may be accompanied by a papular dermatophytid of perifollicular distribution and, as in three of our cases, usually on the trunk. This generally disappears spontaneously within a week, and is said sometimes to be precipitated by the administration of penicillin or by overactive local treatment.

The type of lesion and its duration perhaps depend on the degree of sensitivity to trichophytin, but may also be modified by the site, by any pre-existing skin lesion, and perhaps by metabolic or endocrine factors, as is the case with certain other trichophyton infections (Rothman, 1949). Kerions seldom develop except on the hairy parts. The nature of the lesion may change fairly rapidly, the tendency being for the reaction to become more inflammatory—for example, *T. circinata* → agminate folliculitis or kerion. However, not all lesions evolve in this manner, and some may remain non-pustular.

We have twice observed an unusual mode of onset. One or more erythematous rings, weal-like and enclosing normal skin, have in the course of 48 hours become crusted, and removal of the crusts has revealed a typical kerion or agminate folliculitis.

The course of the disease is variable. The more inflammatory forms are self-limiting within a few weeks. *T. circinata* can persist for months if untreated. We have not encountered the granuloma of Majocchi, but this type of lesion also runs a prolonged course.

Mycology.—Cultural examination was undertaken only in random cases. *Tr. discoides* was isolated in all but two of these cases, from which *Tr. mentagrophytes* was grown.

Treatment

The more-inflammatory lesions require only symptomatic treatment. Irritating local applications should be avoided. Compresses of potassium permanganate (1:5,000) or mercury perchloride (1:2,000) are helpful, and manual epilation seems to accelerate cure. Occasionally the inflammatory reaction is very severe and the lesion is surrounded by an area of cellulitis. A short course of a sulphonamide is then preferable to penicillin, as, at any rate theoretically, the patient who is sensitive to trichophytin may also be sensitive to penicillin.

The less-inflammatory lesions require active treatment. Whitfield's ointment or one of the more recent fungicides should be applied. The risk of producing contact dermatitis with Whitfield's ointment or iodine, especially in children, should be remembered.

Discussion

Cattle ringworm is an unpleasant infection, distressing to the patient and sometimes leaving disfiguring scars, even though these are often less extensive than the severity of the reaction would lead one to expect.

A higher standard of hygiene in cowsheds, particularly the scouring of old woodwork and the application of disinfec-

tant solutions, might help to reduce the incidence of the infection in cattle. Early treatment of infected cattle would obviously lessen the risk to farm workers.

Summary

The literature on cattle ringworm and its transmission to man is reviewed. The disease is still frequent in some rural areas of Britain, but its real incidence is unknown.

Most infections in this country are caused by *Trichophyton discoides*, but *Tr. mentagrophytes* is responsible for some cases.

The records of 39 human cases observed in South Wales are analysed, and an account is given of the course and clinical features of the infection in man and cattle.

Treatment is briefly discussed. The acutely inflammatory infections are self-limiting, and the patient's discomfort is increased by irritating fungicides, which do not shorten the course of the disease and may produce a contact dermatitis.

Active treatment should be reserved for the less-acute cases.

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THE DOUBTFUL SYPHILITIC BLOOD TEST IN PREGNANCY

BY

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Blood tests for syphilis are now a routine procedure in almost all antenatal clinics in this country, but they are far less often carried out on expectant mothers attended by their family doctors. As a result, nearly all cases of infantile congenital syphilis seen nowadays are in infants of women who have not attended clinics. An exception to this is described below.

Of the pregnant women tested by the regional blood transfusion centres in six provincial cities in 1952, 0.35% were found to have a positive syphilitic reaction (Ministry of Health, 1952). The majority of these latter gave repeatedly strongly positive results or a definite history of syphilis, and obviously needed treatment for their own and their child's sake. Difficulty arises, however, in the occasional case in which there is a repeatedly weakly positive blood reaction unsupported by history or signs. Naturally, for psychological and family reasons, any suggestion of syphilis in a pregnant woman is to be avoided if possible, but delay in treatment may be fatal to the child. In a patient with weak serological reactions the decision has to be made whether the patient is a true though weak syphilitic reactor or a non-treponemal reactor. Rein and Kostant (1952) rightly state that

it is not safe to assume that standard serological reactions are of the non-treponemal type unless they are checked by a Nelson's treponemal immobilization test. And it is no exaggeration when Moore and Mohr (1952) say that the use of this test permits for the first time a definite answer to the question, "Does this patient have syphilis?" But, as Price (1954) pointed out, the test is so complex and time-consuming that to advise it in this country, where it is carried out in only a few laboratories, is a counsel of perfection, and a decision to treat or not may have to be made without it. Routine blood tests are usually done at the third or fourth month of pregnancy, and probably the earlier treatment is given the less chance there will be of foetal infection.

Before penicillin was in general use for the treatment of syphilis (and no other substance should be used nowadays) the clinician was faced in doubtful cases with the problem of subjecting the woman to a long course of dangerous injections with the arsenicals and bismuth, or of taking the risk of not treating her before delivery and, if the worst happened, of treating her and her syphilitic child post-natally (Stokes and Ingraham, 1939). But now that penicillin can be used—an entirely safe and effective form of treatment—it is essential that an "insurance" course should be given to all mothers who have the slightest serological suggestion of syphilis, unless they can be proved to be non-treponemal reactors (Rein and Kostant, 1952). That the signs of infantile congenital syphilis usually respond well to penicillin treatment must be admitted, but obviously it is better to treat the foetus *in utero*. Without treatment it might suffer permanent damage, die before term, or be born so marasmic that nothing would save it.

If treatment has to be given without a definite diagnosis beforehand, the problem should be explained to the mother so far as is possible. It can be emphasized that the aim is to protect the child against a remotely possible danger. Her own case and that of her husband can be investigated at leisure.

The following case is of interest as it demonstrates the danger of not treating a mother whose serological reaction is repeatedly weakly positive in the absence of a test which would prove the reactions to the standard tests for syphilis to be non-treponemal in nature.

Case Report

An intelligent woman aged 31, German by birth, but speaking good English and married to an Englishman, attended a London antenatal clinic from the time that she was four months pregnant. She gave a history of having been married previously to a German soldier who had been killed towards the end of the war and of having two healthy children, now aged 9 and 7, by him. She gave no history of disease suggestive of syphilis, or of injections, and said that she had had a blood test before she came to England as a displaced person after the war. She thought the result of the test was negative. At the antenatal clinic there were no signs of syphilis, and her blood test at 5 months was Wassermann doubtful, Kahn positive; at 6 months, Wassermann doubtful ("possibly false positive"), Kahn negative; and at 6½ months, Wassermann and Kahn negative. No further tests were taken, and she was delivered at term of an apparently normal male child. He appeared to thrive at first, but at 4 weeks he became restless, and had an enlarged abdomen and nose-bleeds. At 7 weeks he was admitted to a children's hospital obviously very ill with a blood-stained nasal discharge, a generalized rash, and a greatly enlarged liver and spleen. He was jaundiced and had oedema of the lower limbs. The Wassermann reaction and Kahn test were strongly positive, and x-ray examination