conditions are shown to differ in that dehydration is an important factor in the chronic state needing correction during reheating. The effects of slow and rapid reheating are compared in Case 2, and it is suggested that the rapid method, certainly the choice in acute hypothermia, is probably to be preferred in all cases of hypothermia uncomplicated by frost-bite. A rapid method of reheating, using a warm bath, is shown to be practical even in a small ill-equipped fishing trawler, and if some similar device were fitted to sea-rescue craft many lives might be saved. Some aspects of heat production and heat loss in a Channel swimmer are discussed.

I am indebted to Dr. Kenneth Robertson for permission to publish Case 1, and to Dr. R. Goldsmith, of the Medical Research Council Laboratories, Hampstead, for his generous assistance with the preparation of this article. I am also indebted to Miss Florence Chadwick, without whose co-operation this article would not have been possible.

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"HEDGEHOG RINGWORM"

BY

MARY P. ENGLISH, M.Sc.
MARK HEWITT, M.B., M.R.C.P.

CLIFFORD D. EVANS, O.B.E., M.D.
ROBERT P. WARIN, M.D., F.R.C.P.

From the United Bristol Hospitals and the Royal Cornwall Infirmary, Truro

Apart from the report of Eddowes (1898), who described the case of a patient who had developed ringworm after contact with a hedgehog, but did not culture the organism, this association does not appear to have been noted until the report of Marples and Smith (1960) from New Zealand. These authors isolated an atypical strain of *Trichophyton mentagrophytes* from two patients, one of whom had been in contact with a pet hedgehog. Twenty-six hedgehogs were then examined and the same type of fungus was isolated from seven of these. The fungus was found to infect a guinea-pig and a human volunteer.

When, during a visit to this country early in 1961, Professor Marples described the fungus to one of us (M. P. E.), it was realized that here was the probable explanation for a number of hitherto unexplained cases of ringworm among our patients. In this paper we present the cases of 13 patients infected with "hedgehog ringworm."

Case Reports

Cases 1 and 2.—In September, 1960, a woman aged 44 (Case 1) attended the Bristol General Hospital with an eruption on the hands, consisting of a mixture of vesicles and pustules having the appearance of a secondarily infected pompholyx (see Fig.). She explained that she had been handling a family of young wild hedgehogs and, although the eruption did not suggest a ringworm infection, a scraping yielded a strain of *T. mentagrophytes* with an

unusual yellow pigmentation. The patient's eruption settled down after four weeks, but one finger-nail became infected: this cleared after four months on oral griseofulvin. Later her husband (Case 2) was also seen. He was said to have had a similar eruption on one finger which had cleared, but two finger-nails were still thickened and discoloured. Scrapings from these yielded the same fungus. The nail infection cleared in response to oral griseofulvin. Six months after the condition began one of the hedgehogs was examined and the same fungus was isolated from scales.

Case 3.—In early February, 1960, a woman was seen at Bristol General Hospital with an infiltrated ringed eruption on the left side of the chin of six weeks' duration. This gradually extended to a diameter of 6 cm. Scaling was minimal and the finding of a fungus in the scrapings was unexpected. In culture, the yellow pigmented strain of *T. mentagrophytes* was obtained. The eruption gradually cleared with the use of ung. acid. benz. co. *B.N.F.* after being present for two to three months. On inquiry in early 1961 it was discovered that she had been feeding a family of hedgehogs prior to the onset of the eruption.

Since 1958 scrapings from 10 patients residing in Cornwall have yielded this same yellow pigmented strain of *T. mentagrophytes*. After the recognition of its association with hedgehogs further inquiries were made in 1961.

Cases 4-13

In April, 1959, a boy aged 8 (Case 4) developed a scaling erythema involving most of the skin of the hands, with a demarcated edge on one thenar eminence: there were also scaling patches on the face and upper lip, and the fungus was isolated from scrapings. The eruption took some four to five months to clear. Just before the onset he had been playing with a dead hedgehog which he had attached to a piece of string. At about the same time the boy's mother (Case 5), aged 33, had scaling over the thumb, first finger, interdigital spaces, and adjacent part of the palm of the right hand, which was very similar to eczema in appearance. The same fungus was isolated. The eruption cleared after two to three months.

In April, 1959, a woman aged 41, living in Truro (Case 6), presented with a large red scaling patch on the right forearm which had been present for three months. It looked like a patch of eczema, but scrapings yielded the yellow strain of *T. mentagrophytes*. The eruption cleared up rapidly with local applications. Inquiries made in 1961 disclosed that this patient was often licked by her boxer dog, which commonly picked up hedgehogs and sometimes brought them home. Two years later, at our request, the patient

Eruption on hands in Case 1.

brought in one of the dog's recent victims, which was found to be infected with the same fungus.

In August, 1959, a Cornish family found three young hedgehogs behind a cattle grid: they rescued them, and the children and a young mother's help spent many hours playing with and fondling them. The boy, aged 3 (Case 7), developed an extensive red scaling eruption over the hands, arms, trunk, perineum, and thighs. The patches were well demarcated and pustules were present. The lesions had been present for two months when first seen. His sister, aged 7 (Case 8), had a red, scaling rash over the hands and forearms indistinguishable from eczema. The mother's help, aged 19 (Case 9), had red, scaling, patches on the palms, wrists, and forearms. Scrapings from the children were examined and the yellow pigmented *T. mentagrophytes* was isolated. In 1961 spines and scales obtained from the back of another hedgehog, a large bull, recently found by the same family, yielded an identical fungus on culture.

Three further patients—a girl, and a man and his wife—owned dogs which often caught hedgehogs and frequently licked their owners (Cases 10, 11, and 12). Two of these patients had red, scaling areas with well-defined edges confined to one finger, and the third had red, scaling patches on the hands. Scrapings from the man and girl were examined and yielded the fungus.

One case from Cornwall was seen in 1958 (Case 13), but it has not been possible to trace the patient for questioning about contact with hedgehogs. She had a red, scaling eruption with some pustules over the hands, from which the fungus was isolated.

Mycology

The first isolate of the fungus obtained by us (from Case 13 in 1958) was sent at the time to Dr. Jacqueline Walker, Mycological Reference Laboratory, London School of Hygiene, for her comments. Like Dr. Georg, to whom Marples and Smith sent their fungus, she identified it as *T. mentagrophytes* and remarked that she had received similar strains of this very variable species from other parts of the country. Morphologically the hedgehog strain differs from the normal only in that its macroconidia tend to be somewhat swollen and distorted. The difference in pigmentation of the reverse of the colonies is, however, striking. In normal strains (obtained characteristically from laboratory animals, pet rodents, and humans in contact with these or in indirect contact with wild rodents) the pigment may be various shades of pink, red, or brown. In the hedgehog strain there is no trace of these tints, the pigment varying from pale lemon to a clear, brilliant yellow in different isolates. All of the isolations obtained from hedgehogs, by Marples and Smith and by ourselves, have been of this yellow type; the red-brown strains have never yet been associated with this animal.

In the three infected animals examined the fungus was found only in the surface of the thick skin between the spines, and the latter were never infected. It was not possible to diagnose the condition by naked-eye examination of the hedgehog. The scaling present in the infected site has been seen in uninfected animals, and similarly the bluish fluorescence of some infected scales under Wood's light has also been observed in the absence of infection. In the only animal in which it was possible to examine the hairy areas, these sites were not infected, so that no comparison could be made with the observations of Eddowes (1898).

Discussion

This report of the isolation of a dermatophyte fungus from hedgehogs (*Erinaceus europaeus*) appears to be the

first for this country. Comparison of our isolates with one of those obtained by Marples and Smith in New Zealand leaves no doubt that they are of the same strain. This being so, it seems likely that some of the hedgehogs introduced into New Zealand from England from 1885 onwards (Wodzicki, 1950) were infected with the fungus, indicating that the disease was probably widespread in England at that time, 76 years ago. It is curious that (apart from Eddowes's (1898) report, based on microscopical evidence only) a disease of such long standing in this country should first be discovered in New Zealand, in descendants of animals of British stock.

Marples and Smith produced strong indirect evidence that the strain of *T. mentagrophytes* isolated from their patients was, in fact, contracted from hedgehogs, but the actual animals with which the patients had been in contact could not be obtained. On one occasion, involving two patients (Cases 1 and 2) we have been able to isolate the same fungus from patients and from the actual animal they were handling when they became infected.

It is interesting that those patients who denied direct contact with hedgehogs (Cases 6, 10, 11, and 12) all stated that they had dogs which were keen hedgehog hunters. Evidence for the indirect transfer of the fungus to man via dogs is provided by Case 6, where the organism was isolated from a hedgehog brought in by the same dog from which the patient suggested he might have contracted the infection two years previously. There is at present no indication of whether such cross-infection is due to the passive transfer of infected particles from the hedgehog, via the dog, to man; or whether the hedgehog fungus can actually set up an infection in the dog and it is from contact with this that human infections arise.

Clinically, patches of the eruption in four of the patients had well-demarcated edges suggestive of ringworm, but lesions in the remaining nine all had appearances more in keeping with a diagnosis of eczema; four of the latter cases also showed pustules which were thought clinically to be due to a secondary staphylococcal infection. The lesions in Case 1 (see Fig.) were so like those of infected pompholyx that on the patient's first attendance she was reassured that the condition was not a fungous infection and not related in any way to her contact with hedgehogs. It is likely that cases of infection with this fungus have in the past been misdiagnosed as eczema.

Infections of the nails by zoophylic dermatophytes, as occurred in Cases 1 and 2, are rare: we have found no others in the past seven years among 145 *T. verrucosum* infections and 56 *T. mentagrophytes* infections diagnosed in the area.

In view of our findings, and of Dr. Walker's statement that she had isolated a similar strain of *T. mentagrophytes* from scrapings received from other parts of the country, it is likely that ringworm of hedgehogs is widespread here as well as in New Zealand, and we feel, with Marples and Smith, that these animals form a hitherto unrecognized reservoir of infection for man.

Summary

From 13 patients seen in the Bristol and Cornwall areas since 1958 a fungus was isolated having the general morphological characteristics of *Trichophyton mentagrophytes* but with a yellow pigment in culture

Following a conversation with Professor Marples in 1961 it was realized that this fungus was the same as the one she had isolated from two patients and seven hedgehogs (*Erinaceus europaeus*) in New Zealand. It was then discovered that eight of our patients had had close contact with hedgehogs prior to the onset of their eruptions, and four had dogs which frequently caught hedgehogs; one patient could not be traced.

The fungus was isolated from one hedgehog with which two patients had been in contact, from another caught by a dog belonging to a patient who had been infected two years previously, and from a third found by a family which had also been infected two years before.

In four patients the eruption had a well-defined edge, typical of a ringworm infection, but in the other nine it was clinically indistinguishable from eczema. In four of the latter patients pustules were present. The finger-nails were infected in two patients.

It would seem likely that this dermatophyte is widespread in hedgehogs in this country and that hedgehogs introduced into New Zealand in 1885 were infected with it.

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ANALGESIA FOR FORCEPS DELIVERY

A TECHNIQUE FOR THE "SINGLE-HANDED" OBSTETRICIAN

BY

J. F. O'SULLIVAN, M.B., F.R.C.S.Ed., M.R.C.O.G.

Senior Registrar in Obstetrics, Tyrone County Hospital, Omagh

The dangers associated with general anaesthesia for emergency obstetric procedures have attracted much attention in recent years. The maternal death-rate directly attributable to anaesthesia has been estimated at about 0.2 per 1,000 operative deliveries (Morris, 1959). In addition, there are many more "near misses" which are never recorded. The emptying-time of the stomach is delayed during labour, hence the danger of pulmonary aspiration. The characteristic syndromes have been clearly described by Mendelson (1946).

Other forms of anaesthesia that preserve the glottic reflex may be used. Spinal anaesthesia is now employed in only a few centres in Britain, but in these it has been used successfully for forceps and breech deliveries (Sears, 1959). Local analgesia may be used in 60% of all forceps deliveries (Parker, 1956). This percentage can be further increased by the intravenous administration of pethidine, a narcotic antagonist, and a phenothiazine derivative (Scott and Gadd, 1957). This state of partial anaesthesia has been called hypoaesthesia by Crawford (1958) and ataralgesia by Hayward-Butt (1957).

Many variations in the technique of internal pudendal block analgesia have been described (Gate and Dutton, 1955; Moir, 1956; Donald, 1959; Huntingford, 1959). The most highly recommended local analgesic agent is lignocaine, 0.5 or 1%. Adrenaline 1:1,000 or hyaluronidase may be added to increase its effectiveness.

I found that internal pudendal block was not an entirely satisfactory procedure because many patients complained of pain as the local analgesic was being injected, although the actual delivery itself was quite painless. Later promethazine and "pethilorfan" were given intravenously before beginning the injection (O'Sullivan, 1960). In a short time it was obvious that the block was no longer necessary—local analgesia at the site of the episiotomy was all that was required.

Technique

The procedure is explained to the patient in detail. A 2-ml. ampoule of pethilorfan, containing 100 mg. of pethidine hydrochloride and 1.25 mg. of levallorphan, is mixed in a syringe with 50 mg. of promethazine hydro-

chloride and injected slowly into a vein. At least two minutes are spent in giving this injection. The patient gradually falls into a light sleep as the injection is being completed but awakens during a pain. She is then placed in the lithotomy position. A leisurely "scrub-up" is performed, as it is essential not to hurry the delivery or restlessness results. The ideal interval is ten minutes, but five minutes is adequate in many cases.

Vulval toilet is performed and towels are applied to the legs and over the abdomen. The bladder is emptied by a catheter. An infiltration of 10 ml. of 1% lignocaine is given at the site of the proposed episiotomy. Another towel covering the anus is clipped to those covering the legs. Some operators may find it advisable to inject a further 5 ml. of the anaesthetic solution subcutaneously in the labium majus on each side. This is especially helpful if the presenting part has to be rotated.

After coating the gloved hand with a liberal supply of antiseptic cream a careful vaginal examination is carried out. If the patient is a primigravida the episiotomy is performed before the obstetric forceps is applied. If she is a multipara the forceps is applied first. Gentleness is essential. The forceps is applied in the usual manner between pains and the delivery completed. In this hospital the placenta is always delivered by the Brandt-Andrews method. Ergometrine 0.5 mg. is injected intramuscularly at the end of the third stage. The episiotomy is repaired with catgut and nylon.

When the presenting part is at the outlet in the persistent occipito-posterior position, the forceps is applied to the vertex in that position and the delivery completed. A large episiotomy is usually required. When the presenting part is in the deep transverse arrest or the persistent occipito-posterior position, rotation of the head can be accomplished during pains. The rotation may be completed in a series of steps, a little further advance being made each time the patient bears down. This is performed by two fingers pulling on the sagittal suture or by tangential pressure on the occiput with two fingers or the half hand. As the rotation is performed during pains the presenting part is forced down each time after the advancement, so that it does not slip back. Delivery is then carried out between pains as described above.