Summary

A case of tinea circinata is described in a 10-day-old infant; the 19-year-old mother suffered from tinea capitis and tinea unguium. Three nurses attending the baby were infected.

Trichophyton sulphureum was isolated from the baby and from his mother.

Ringworm in infancy, tinea capitis in adults, and *T. sulphureum* infections are discussed and the literature is briefly reviewed.

The incubation period of *T. sulphureum* infections is discussed with reference to these cases.

REFERENCES

- Beare, J. M., and Cheeseman, E. A. (1951). *Brit. J. Derm.*, **63**, 165.
 Bereston, E. S., and Robinson, H. M., jun. (1953). *Arch. Derm. Syph. (Chicago)*, **68**, 582.
 Georg, L. K. (1952). *Publ. Hlth Rep. (Wash.)*, **67**, 53.
 — (1953). *Arch. Derm. Syph. (Chicago)*, **67**, 355.
 Howell, J. B., Wilson, J. W., and Caro, M. R. (1952). *Ibid.*, **65**, 194.
 King, W. C., Walton, I. K., and Livingood, C. S. (1953). *Ibid.*, **68**, 664.
 Kligman, A. M., and Constant, E. R. (1951). *Ibid.*, **63**, 493.
 Lynch, J. R. (1876). *Med. Press*, **21**, 235.
 Maschkilleisson, L. N. (1936). *Derm. Wschr.*, **102**, 765.
 Mullins, J. F. (1954). *Arch. Derm. Syph. (Chicago)*, **69**, 438.
 Partridge, B. M. (1952). *Trans. St. John's Hosp. Derm. Soc. (Lond.)*, p. 34.
 Pipkin, J. L. (1952). *Arch. Derm. Syph. (Chicago)*, **66**, 9.
 Radcliffe-Crocker, H. (1903). *Diseases of the Skin*, 3rd ed., p. 1218. Lewis, London.
 Reiss, F. (1954). *Brit. J. Derm.*, **66**, 239.
 Sabouraud, R. (1910). In *Les Teignes*, 1st ed., p. 287. Masson, Paris.
 Scully, J. P. (1952). *Arch. Derm. Syph. (Chicago)*, **65**, 633.
 Sharvill, D., and Talbot, J. M. (1954). *Brit. J. Derm.*, **66**, 214.
 Simon, C. R., and Schwartz, J. (1953). *Arch. Derm. Syph. (Chicago)*, **68**, 335.
 Walker, J. (1950). *Brit. J. Derm.*, **62**, 239.

TREATMENT OF ASCARIASIS IN CHILDREN WITH PIPERAZINE ADIPATE

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Great progress in the treatment of ascariasis was attained by the discovery of the anthelmintic properties of piperazine. Many of its derivatives—namely, the hydrate, citrate, and diphenylacetate—have been tried with a variable degree of success.

Treatment with piperazine hydrate was first described by Fayard (1949), who treated about 2,000 adult cases with two 1.5-g. doses of piperazine (corresponding to 3.5 g. of piperazine hexahydrate)—one in the evening and the other the next morning. Of these cases, 70–95% passed ascarides on the second and third days. As stool examinations were not carried out after treatment it is impossible to determine the exact cure rate in this series. White (1954) reported the successful treatment of three ascaris-infested children with piperazine hydrate. He used 68, 30, and 81 mg./kg. body weight a day respectively for seven to ten days. The worms were expelled on the second and third days. Brown (1954) treated 51 cases of ascariasis with a syrup containing piperazine hexahydrate, given for two to five days. He used 1 g. a day for children weighing less than 60 lb. (27 kg.). He reported 100% cure for those who were treated for five days, 87% cure for those treated for four days, 93% cure for those treated for three days, and 85% cure in those treated for two days.

Neurological side-effects, mostly in adults, have been reported following the administration of piperazine hydrate (White and Standen, 1953; Sims, 1953). These included giddiness, lack of co-ordination, sickness, inability to focus vision, and a sense of detachment. Furthermore, the wide use of piperazine hydrate is not quite practicable, because it is a strongly basic substance and its keeping qualities in solution are uncertain.

Brown and Serman (1954) treated 23 cases of ascariasis in children with piperazine citrate. Nineteen were cured after a single course of treatment, based on stool examination. The dose was determined on the hexahydrate content of the syrup employed.

Savaton-Pillet (1954) used the diphenylacetate salt of piperazine in treating 80 cases of oxyuris and ascaris infestation, and reported success in 73 cases with a dosage of 0.075 g./kg. body weight a day for seven days. This piperazine salt has the following disadvantages: (1) it contains 25% piperazine, so that the required dose is larger; (2) it has a distinct urinary odour, which renders it unpalatable to many patients; and (3) as a liquid preparation it is difficult to keep stable for storage.

Davies *et al.* (1954) have sought for a derivative of piperazine of low solubility, as such a compound might undergo slower absorption in the gut than the readily soluble hydrate, citrate, etc., thus avoiding the neurotoxic effects accompanying the use of the more soluble piperazine compounds. Piperazine adipate proved able to satisfy the pharmaceutical requirements considered necessary. Clinical trials in oxyuris infestation in man showed it to be completely effective and without any toxic side-effects. It was tried by Sloan *et al.* (1954), and proved an effective curative agent against a variety of helminth infections in domestic animals. Its main advantages over the hydrate are: (1) its anthelmintic effect is much greater than that produced by an equivalent weight of piperazine hydrate; (2) it is free of toxic side-effects; (3) it is stable on storage; (4) it has a high piperazine content; and (5) it has a pleasant acidulous taste and is free from odour.

While these trials were in progress O'Brien (1954) reported briefly two cases of young children whom he treated for oxyuris infestation and in whom ascarides were also present. He gave 300 mg. of piperazine adipate twice daily for six days, and in both cases the drug appeared to be strikingly effective.

Rearden (1954) also reported his experiences with piperazine adipate in the treatment of ascariasis in children and confirmed its efficacy. The dose used was 0.3 g. each day for each year of life in children up to 6 years—those over 6 were given 0.6 g. three times a day. Administration was continued for one week. All the children, save one, were completely cured.

Present Work

Piperazine adipate was used in a series of cases in order to determine the most effective dose and the number of days during which this dose should be administered in order to obtain complete eradication of ascaris infestation.

The series consisted of 85 children (47 males and 38 females) aged 1½ to 12 years, who were admitted to the Children's Hospital (Cairo University, Mounira, Cairo). The following investigations were carried out in every case: complete blood examination before and one week after treatment; blood pressure before, during, and after treatment; full examination of urine before and after treatment; and stool examinations before, and two days, four days, seven to ten days, and 14 to 30 days after treatment.

Ascaris ova were found in the stools in all cases; *ancylostoma* were also present in 13 cases; *Giardia lamblia* in four cases, and *Hymenolepis nana* in three cases.

The following three dosage schedules were applied: (1) 0.3 g. (one tablet) a day for each year of life up to 6 years, and 1.8 g. (six tablets) a day from 6 years upward. This was given to 25 cases. Five children received the dosage for seven days, six for five days, and 14 for three days. (2) 0.6 g. a day for each year of life up to 6 years, and 3.6 g. a day from 6 years upwards—that is, double the dosage administered to Group 1. Twenty-one cases, including two failures from the previous group, were treated for one day. Eleven cases, including four failures from the preceding cases, were treated for two days. (3) 0.75 g. a day for each year of life up to 6 years, and 4.5 g. a day from 6 years upwards. Thirty-five cases, including one failure from the second group, were treated for one day.

Treatment consisted solely of the administration of tablets of piperazine adipate as described above; no special diet was recommended during treatment. No pre-treatment measures were undertaken. The daily dose of the drug was given in three or four equal portions during the day, at four-hourly intervals, after meals. A mild saline purge was given on the day after the completion of treatment.

Results

Group Treated with Schedule 1.—The five cases treated for seven days and the six cases treated for five days were completely cured. Most of the worms were expelled on the second and third days of treatment. The worms were intact; some were still living. *Ancylostoma* infestation persisted in four cases. Twelve of the 14 cases treated for three days were completely cured, giving a cure rate of 85.7%. In one case the first stool examination two days after treatment still showed a few *ascaris ova*, but was subsequently negative. This patient passed only one *ascaris* worm on the fourth day from the start of treatment. Another patient passed many *ascaris* worms from the third to eighth day; stools, however, still contained *ascaris ova*. A second similar course was given seven days after the first course, but no worms were expelled and stools were still positive for *ascaris ova*. In two cases *ancylostoma* and *Giardia lamblia* infestations were not affected.

Group Treated with Schedule 2.—Of the 21 cases given the treatment for one day 17 were completely cured, including the two failures from the previous group, showing a cure rate of 80.9%. The same course was repeated after seven days in three out of the four failures in this series, and though they again passed *ascaris* worms the stools still contained *ascaris ova*. The fourth case in which the infection persisted passed 72 *ascaris* worms on the first and second days of therapy. In six cases *ancylostoma* and *G. lamblia* infestations were not affected. Among those treated for two days (11 cases) there was only one failure, the cure rate being 90.9%. The failure responded to schedule 3 dosage (see below). In two cases *ancylostoma* and *G. lamblia* resisted treatment.

Group Treated With Schedule 3.—All the 35 cases in this group were completely cured, including the resistant case which had previously received three courses. In seven cases *ancylostoma* and *Hymenolepis nana* were not affected.

Side-effects.—No toxic effects or side-reactions were noted in any of the cases, although some of them received repeated courses of treatment. There was no demonstrable effect on the kidneys, the circulatory system, or the blood picture.

Summary and Conclusions

A series of 85 children (47 males and 38 females), aged from 1½ to 12 years, suffering from *ascaris* infestation were treated with piperazine adipate tablets, each containing 0.3 g., according to the plan described.

As a result it can be definitely stated that piperazine adipate is a very effective and safe drug for the treatment of *ascaris* infestation in children. The recom-

mended schedule, especially for wide use, is a dose of 0.75 g. for each year of life up to 6 years and 4.5 g. from 6 years upwards, to be given for one day in four equal doses at four-hourly intervals, after meals.

Piperazine adipate was given in the form of tablets, which were easily taken by children. The tablets were administered whole in most cases, but in some it was necessary to crush them; this presented no difficulty. The tablets were not objected to by the children whether given whole or crushed.

The piperazine adipate used in these investigations was kindly supplied by British Drug Houses Ltd. as "entacyl" tablets.

REFERENCES

- Brown, H. W. (1954). *J. Pediat.*, 45, 419.
— and Sterman, M. M. (1954). *Amer. J. trop. Med.*, 3, 750.
Davies, M. T., et al. (1954). *J. Pharm. Pharmacol.*, 6, 707.
Fayard, C. (1949). *Thèse Paris*, No. 889.
O'Brien, D. P. (1954). *British Medical Journal*, 2, 246.
Rearden, J. (1954). *Ibid.*, 2, 872.
Savaton-Pillet, J. (1954). *Nouveautés méd.*, 3, 283.
Sims, S. R. (1953). *British Medical Journal*, 2, 1432.
Sloan, J. E. N., et al. (1954). *J. Pharm. Pharmacol.*, 6, 718.
White, R. H. R. (1954). *Lancet*, 2, 315.
— and Standen, O. D. (1953). *British Medical Journal*, 2, 1272.

Medical Memoranda

Ferrous Sulphate Poisoning with Gross Stricture of the Stomach

To illustrate the destructive effects following ingestion of ferrous sulphate pills, and to stress further the criminal negligence in leaving such pills within the reach of small children, the following case is briefly reported.

CASE REPORT

A male child of 20 months swallowed approximately 50 "fersolate" tablets and was admitted to hospital two hours later. An unrecorded proportion of the pills was recovered by immediate gastric lavage. There was repeated and severe haematemesis. The initial collapse was treated successfully by blood transfusion, but during the next few days there was a steady deterioration in the general condition, and it was not possible to maintain nutrition adequately by mouth because of repeated vomiting. When seen seven weeks after the onset of illness the child was found to be emaciated and dehydrated.

A barium meal showed a smooth tubular stricture affecting the middle third of the stomach (see Fig.).

The child was transferred to a paediatric unit in the hope of improving his nutrition and of preparing him for operation. Despite feeding by an intragastric tube, which was passed beyond the obstruction, and by the intravenous

route, there was a progressive decline, and at no time did he seem fit for surgery. A further barium meal showed progressive and irregular stricture formation. He died 16 weeks after poisoning.

The necropsy showed dense adhesions in the upper peritoneal cavity. A small pouch of healthy stomach proximally