FIG. 1.—The complete instrument.

other hand, the circumstances are different for three main reasons: (1) many years may have elapsed since the inoculation, which in any case, if performed in infancy, is outside the patient's memory; (2) the patient may be unconscious; and (3) it is routine practice in many hospital receiving-rooms to give A.T.S. for all types of injury, even minor ones, in which the skin is penetrated. In the case of tetanus inoculation, therefore, it is exceedingly important that the record should be really permanent and on the person of the individual; the only way of satisfying these requirements is by tattooing.

To overcome the difficulty which tattooing involves of recording several inoculations given simultaneously it

FIG. 2.—Component parts

would be possible to adopt some form of standardized coding recognizable by all concerned, whereby a single letter or design could be used to cover these several immunities. Even this would not overcome the difficulty of recording subsequent inoculations, and clearly the number of letters which might be tattooed is for aesthetic reasons limited. For the important tetanus inoculation, however, the single letter T would be sufficient. It has been suggested that to use tattooing for this purpose is facetious, but perhaps this is one of those facetiae which deserve serious attention, for, as will appear, the process can be done easily and instantaneously at the time of the inoculation.

The desirable characteristics of such a tattoo are that it must be obvious when looked for and yet not conspicuous, and this immediately raises the question of position, for the site should be standardized, hidden, and yet easily available for inspection. The lateral aspect of the great toe, the inside of the lip, under cover of the ear over the mastoid, over the hip just below the iliac crest have all been canvassed as possible sites, but the latter position seems on the whole the most suitable. Clearly, if the method is adopted the site and side of the mark would have to be established at a national or perhaps even international level.

The Tattooing Instrument

For performing the tattoo I have devised and made the instrument shown in the photographs. It is about the size of a fountain pen and is in effect a spring gun which on being released drives a "bullet" (g) having needle points arranged in the form of a letter T through

a paste of dye for a predetermined distance into the skin. The best dye for this purpose is ordinary commercial lamp black mixed to a paste with a little water and sterilized by heat. The "bullet" itself, the needle-points of which alone penetrate the skin, can be sterilized by boiling or chemically by immersion in "dettol" in spirit. A little of the paste is applied to the cleaned skin of the area; the "bullet" is inserted into the muzzle of the gun (a), where it is held by a light spring (b), and the plunger (f) is withdrawn to its full extent. The gun is now applied firmly to the skin and the trigger (c) pressed. The tattooing is instantaneous and practically painless. Depth of penetration (usually 2-3 mm.) is controlled by adjustment of the screwed cap (d) and depends upon the thickness of the skin at the selected site and on the age of the patient. Extra bullets (with other designs if necessary) can be accommodated in the hollow head of the plunger (e). I have found that needle-points prepared from stainless piano wire by grinding give a better tattoo than the very highly polished and smooth commercial article.

FIG. 3.—Enlarged view of "bullet."

The tattoo, of course, consists of a series of dots arranged in the form of a T; is easily identifiable but not conspicuous, and, like all tattoos, is permanent. It is probable that a tattoo performed in infancy will stretch with the growth of the child, but, although sufficient time has not elapsed to observe if this is so, it seems unlikely that it will be enough to render the mark unrecognizable.

For the photographs I am indebted to Miss Turnbull, of the photographic department, Charing Cross Hospital.

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Medical Memoranda

Further Evidence of the Association between Mercury and Pink Disease

Warkany and Hubbard (1953) have presented impressive evidence of the association between pink disease and mercury. They have examined this problem from many aspects and quote a total of 97 references in the world literature. Despite this a considerable amount of scepticism exists (Naish, 1955; Farquhar *et al.*, 1956), mainly because a number of cases occur in which there is no evidence of mercury ingestion as judged by the

history and urine analysis. The following case strengthens the evidence incriminating mercury.

CASE REPORT

The patient was a 6½-year-old boy, the eldest of four children. His father suffered from a stricture of the oesophagus and used a mercury-filled bougie with which to dilate it. The rest of the family were healthy and there was no history of allergic disorders. At the end of March, 1956, the patient, his sister aged 5 years, and his brother aged 3½ years were found playing with the bougie in their bedroom, using it as a whip. Not surprisingly it suddenly ruptured, scattering the mercury over the bedroom carpet just as one of their parents entered the room. Most of the mercury was quickly collected and removed.

In mid-April (two weeks later) the patient began to lose his appetite and became listless and sleepy. About a week later his brother also lost his appetite and became peevish. Both lost weight, but the patient was clearly more severely affected. Photophobia and lacrimation became marked. He complained of pains in his legs, and his gait became floppy. Sometimes his schoolmates carried him part of the way home.

By the beginning of June sudamina appeared on his palms and soles, and later the skin started to peel. The brother, on the other hand, was showing some improvement by this time, and by mid-June had apparently recovered. He had been under the care of the family doctor during this time. The sister, the third member of the family who had been exposed, at no time showed any upset.

The patient was first brought to the out-patient clinic of Stirling Royal Infirmary on June 13, 1956, when the symptoms had reached their worst. His weight was 2 st. 12 lb. (18.1 kg.)—expected weight 3 st. 7 lb. (22.2 kg.)—and he was thin, pale, and miserable, with marked photophobia. The hands and feet were red and sweating, and the skin on the palmar aspects was peeling. The pulse was 140 and the blood pressure 125/90. Hypotonia was present. There was no disturbance of bladder or bowel function. The clinical picture was that of pink disease, and when it was mentioned to the father that there was sometimes an association with mercury he immediately recalled the incident with bougie. Other relevant findings on admission to hospital were: Urine, free of albumin and other abnormal constituents; haemoglobin, 10 g. per 100 ml.; no eosinophilia present; serum cholesterol, 170 mg. per 100 ml. X-ray examination of long bones gave no evidence of abnormality.

A 24-hour collection of urine was found to contain 188 µg. of mercury per litre. In view of this, treatment with dimercaprol was started. The dosage schedule was 50 mg. four-hourly for 48 hours; 50 mg. six-hourly for 48 hours; 50 mg. 12-hourly for eight days. Further collections were

made at intervals, and the mercury excretion rates per 24 hours are presented in the Chart. The first sign of improvement was an increase in his appetite, which became apparent three days after the onset of treatment. During the ensuing month all other signs and symptoms disappeared, and he had made a full recovery by the beginning of September, when he had gained considerably in weight. The most persistent symptom was the photophobia. Hydrocortisone eye ointment was used for a short period but had no effect.

COMMENT

In Great Britain it is rare for a child of 6 years to develop pink disease. Thus Fisher (1947) reviewed 65 cases seen at the Royal Manchester Children's Hospital between 1932 and 1945; the oldest patient being 4 years 2 months at the onset. In another series of 31 cases (Leys, 1950) the oldest was 3 years at the onset. Exposure to metallic mercury is also a rare event. The chance association of these two happenings is so slight that there can be little reasonable doubt that the mercury was responsible for the development of the disease two weeks later. This is further strengthened by the fact that his brother, who was later found to be excreting mercury in his urine in a concentration of 88 µg. per litre, developed a mild form of the disease. It has been argued that the presence of mercury in the urine and presumably in the tissues as well is merely incidental and not the cause of the disease, because teething powders were widely prescribed for fretful infants. As this boy and his brother were apparently well until two weeks after exposure this argument is invalid here. Neither had been given any drug in powder or other form for some time previously.

The increase in the amount of mercury excreted while on treatment with dimercaprol is in agreement with the findings of others (Andersen, 1951; Holzel and James, 1952; Warkany and Hubbard, 1953), as is the marked variation from day to day. It is difficult to believe that this small increase lasting only the 10 days of treatment could make a significant difference to the course of the disease. It would seem likely that the remission in the present case was spontaneous. Indeed, the brother had started to improve a few weeks earlier without treatment.

Most of the reported cases of pink disease have followed exposure to a mercurial salt either as a topical application or by ingestion. It is interesting that the brief exposure to the element itself in this case was sufficient to permit absorption of even the small amount present. Elemental mercury vaporizes sufficiently at room temperature to permit the absorption of toxic amounts (Hunter, 1955). It is likely that the sudden rupture of the bougie with widespread scattering of the metal encouraged this process, with contamination of the atmosphere.

My thanks are due to Dr. E. B. Hendry, of the Western Infirmary, Glasgow, for the estimations of urinary mercury and to Professor Graham for his interest in this case.

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