

Cumpston, a former Director-General of Health, from whose book (Cumpston and McCallum, 1927) I have extensively quoted.

Summary.

The mortality in Australia over the years 1908 to 1945 from infections of the bowel has been analysed. There has been a great fall in the mortality from typhoid fever over this period; it is now a quite minor cause of mortality. Gastro-enteritis and the dysenteries were formerly a great cause of mortality at all ages, especially in infancy, but are now a cause of fewer deaths. Cholera and typhus have not been important causes of death in Australia over the period of the survey.

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EFFECTS OF SHOES ON FOOT FORM: AN ANATOMICAL EXPERIMENT.

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AMONG the common ailments which afflict the foot of civilized man, many can be traced to modern footwear. The study and treatment of such ailments often do not come to the attention of the medical profession and are left to a separate profession of skilled auxiliaries, the chiropodists. The qualified chiropodist plays an important part in the treatment of these conditions, but as important aetiological factors are beyond his control, his measures are mainly palliative and are often not entirely successful.

Foot disorders due to badly designed footwear and outside the chiropodist's scope often confront the orthopaedic surgeon with difficult problems. There is no doubt that the surgeon can do much to correct foot deformities and that he does prescribe special footwear; but little attention has been given to the study of the shape and construction of footwear generally, with a view to preventing the common ailments or defects which are precipitated by the wearing of conventional footwear.

The investigation here described was therefore carried out to see what light could be thrown on this important problem.

The plantar aspect of the weight-bearing foot, as seen in infants, or in adults who have not used footwear, has a substantially triangular outline (Figures I and IIA), with almost linear medial and lateral borders and an arcuate anterior border (interrupted lines, Figure I). The posterior angle is truncated by a large radius. The modern woman's shoe differs strikingly from this (Figure IIB), and its effect on the foot after many years' wear might be regarded as a partial adaptation of this part of the human organism to a constricting environment. Though some feet resist this environment more successfully than others, and the degree of constriction varies a little with the choice and fitting of shoes, on the whole the tendency is to convert the original triangular plantar aspect into a quadrangular one, mainly by breaking the medial border in the region of the metatarsophalangeal joint of the hallux (Figure

IIC). The toes, originally divergent as the rays of a fan (Figure IIIA) and with spaces between them, become convergent, overlapping, and crumpled. The reinforced toe-region of the shoe (whether the superficial toe-cap is present or not matters little) ensures the rigid compression of the toes, whilst the softer vamp yields, as indicated by the interrupted lines in Figure IIB, so that relative splaying of the metatarsus accentuates the quadrangular effect. (The little toe, even in aboriginal feet, is often excepted from the general divergence, and may be adducted or curved a little towards the other toes.)

Among unshod peoples, deformities of congenital, traumatic and other origin do, of course, occur, and so far as the hallux is concerned they may in some instances resemble deformities of the shod, but this is very uncommon. Such rarities have been the refuge of those who deny that modern conventional footwear deforms the feet and have been magnified by enthusiastic defenders of present fashions. However, among the white races, and also among coloured races living in white communities and wearing modern shoes, acquired foot deformities are the rule, and they are worse in women than in men and

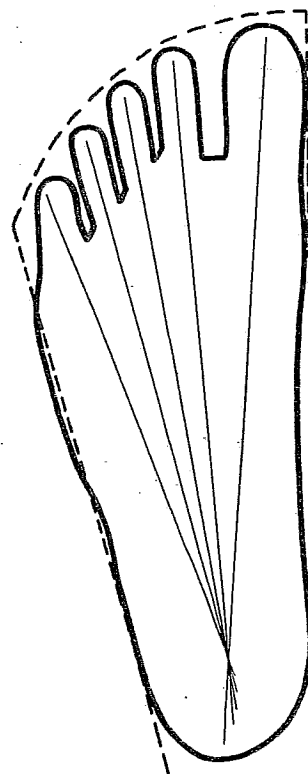


FIGURE I.

Plantar aspect of weight-bearing, undistorted foot showing substantially triangular outline.

increase with age. Thus it is found that a substantial proportion of the aged are more or less disabled by foot troubles which mar the evening of their lives. Recent surveys of the feet of school children indicate that the children of today are heading for the same misery (Figure IIB).

It is customary to throw the blame on the public, to exhort them to buy "sensible" shoes, and to call for the training of shoe fitters. To those who can see the issue in all its simplicity, this is a pathetic state of affairs; no amount of measurement of feet with impressive apparatus, "scientific" training of shoe fitters, and use of X-ray equipment can compensate for the gross discrepancy between the triangular outline of the plantar aspect of the natural foot and the unrelated pointed, tapering or rounded outlines of modern shoes.

The present experiment was based on the assumption that modern shoes distort the feet, and was designed to throw light on the possible reversibility of such distortion. If fashionable shoes have deformed our feet, perhaps the wearing of "naturally" shaped shoes may permit some degree of return towards the original foot form, and thereby reverse or prevent progression of pathological effects, or at least alleviate their symptoms.

Such shoes perhaps would not at first have a universal appeal, but even among women there are large groups who would appreciate them almost immediately. Busy housewives who work in house and garden in slippers and

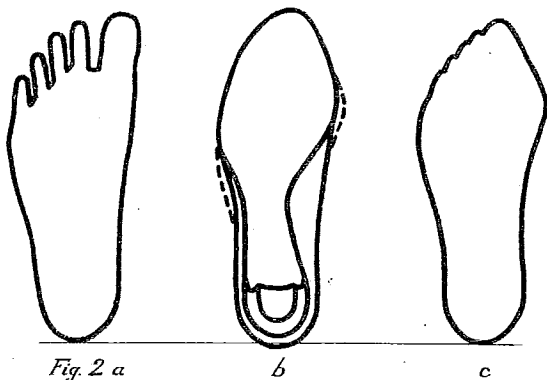


FIGURE II.
a: Plantar aspect of undistorted foot. b: Plantar aspect of conventional shoe. c: Plantar aspect of foot distorted to fit into "b".

other ill-shaped substitutes in an attempt to escape from the discomfort of their more elegant shoes would welcome a practical, comfortable shoe for the working day, preferring to follow the dictates of fashion only when occasion demanded. Many middle-aged men and women without

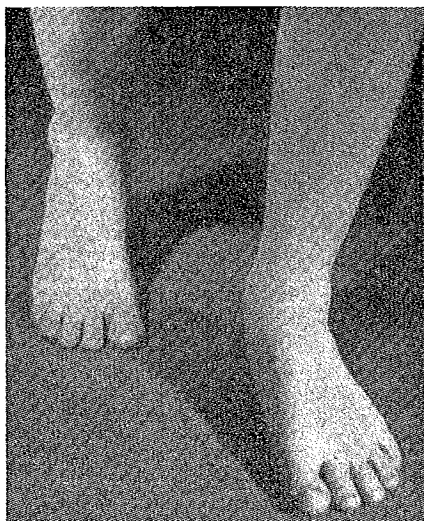


FIGURE IIIA.
Reproduced with the permission of the Director of the British Boot, Shoe and Allied Trades Research Association. Unspoilt feet are shapely and attractive but 150 school children had to be inspected before this boy was found.

doubt want only comfort and useful service from their footwear, and would ignore present fashions if such shoes were available.

Materials required for this experiment were firstly "civilized" feet and secondly shoes of a suitable size, which are not made "to measure" or "to fit" in the conventional

sense but rather to the shape and proportions that would fully accommodate natural feet, such as aboriginal feet. Whilst the first of these materials was readily available, the second was not, as neither shoe manufacturers nor modern bespoke shoemakers made them. Special lasts therefore had to be constructed for this experiment.

These lasts were given a substantially triangular plantar aspect. They were not made "to measure" in the bespoke shoemaker's sense, but merely of suitable length and of

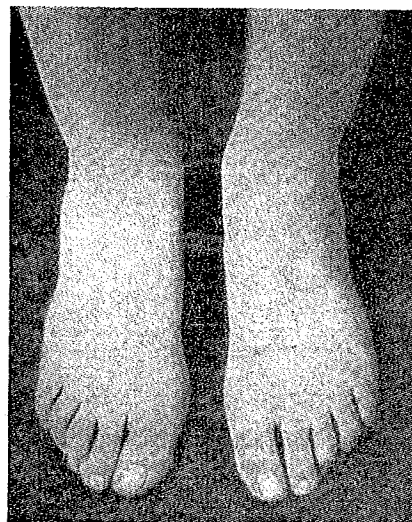


FIGURE IIIB.
Reproduced with the permission of the Director of the British Boot, Shoe and Allied Trades Research Association. This is typical of most children's feet today, but it need not be. Big toes bent over; other toes crooked and crowded and unable to do their job properly; corns on little toes.

average shape and width, in order that the results of this experiment, if favourable, might attract the interest of such shoe manufacturers as might be ready to take advantage of a demand by certain members of the public for rational footwear.



FIGURE IV.
Shoes of "natural" shape, designed specially for the experiment.

Several pairs of shoes (Figure IV) were made on these lasts and have been worn for three and a half years to the exclusion of all other boots, shoes, slippers and sandals. X-ray photographs of the feet were taken on the day of the permanent change-over in August, 1948; first in con-

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ventional shoes (Figure VA), then immediately in the new shoes (Figure VIA). It will be noticed that although the new shoes provide adequate space for the toes to assume their natural divergent position, they retain the convergent arrangement to a considerable extent.

By checking the external appearance of the feet against an ordinary photograph taken at the time, it was noticed that no remarkable change occurred for many months. The wearer of these shoes underwent no treatment to his feet by physiotherapy, and carried out no exercises save the spontaneous exercise that occurs in walking. It is proper to mention here that he was aged thirty-seven years, and rapid skeletal changes were therefore hardly to be expected. However, by November, 1950, some distinct change was noted, and an X-ray picture then taken showed that the toes had become less cramped. The experiment was concluded with final X-ray films taken in April, 1952 (Figure VIIA), in a pair of shoes made on the same lasts.

The most pronounced change is that seen in the position of the hallux of the right foot; its valgus tendency has been corrected and there is now a clear gap between the soft tissues of the great and second toes. The left hallux, though it had less valgus tendency originally, has not improved so much; the osteo-arthritis changes in its metacarpo-phalangeal joint already shown in the earlier X-ray films are unaltered. Spread of the smaller toes has improved only to a slight extent. Figures VB, VB and VIIb are tracings from the foregoing X-ray films, showing the measured metatarso-phalangeal and interphalangeal valgus angles of the hallux.

Whilst the main concern of this study was with the gross objective effects obtained on the outline of the anterior part of the foot, other effects were noted, and one was unexpected.

The volunteer for this experiment had always been subject to excessive foot perspiration, and had onychocryptosis and epidermophytosis of the nail of the right hallux of several years' standing. Excessive perspiration ceased immediately in the new shoes, the epidermophytosis eventually cleared spontaneously, and the onychocryptosis, though still present to a degree, ceased to be troublesome. This unexpected benefit may be due to the fact that in these shoes the toes have more room to move, perspiration is not occluded between the toes, and maceration of the skin no longer occurs. The *hallux rigidus* on the left was a cause of pain for several years, which had become so severe on long walks that the subject was about to reconcile himself to a more sedentary existence, when he found that as soon as he started to wear the new shoes the condition became painless.

It is suggested that the medical profession might encourage the wearing of shoes of the type here described as a relief from conventional footwear, in an attempt to control the incidence of the discomfort and deformities and other conditions consequent upon the continuous wearing of badly designed footwear.

It is regretted that this work was somewhat limited in scope, and incomplete in that other possible common causes of foot distortion, such as the wearing of tight socks, were not dealt with.

Summary.

Shoes designed in accordance with the triangular plantar aspect of the natural foot were worn for a period of three and a half years.

Skeletal distortions acquired by thirty-five years' use of conventional footwear showed appreciable tendency to self-correction during this experimental period.

Painful *hallux rigidus* became painless, onychocryptosis became symptomless, and excessive foot perspiration ceased.

Acknowledgement.

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MENTAL SYMPTOMS IN POISONING WITH ATROPINE AND ITS DERIVATIVES.¹

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ATROPINE POISONING is not infrequent, but cases in which mental symptoms dominate the picture are quite rare. It is our aim in this article to discuss the clinical syndrome with special reference to cases reported in the literature and to our own case.

Mode of Absorption.

Atropine and its derivatives may be absorbed through the gastro-intestinal tract, by subcutaneous injections, by inunction through the unbroken skin and by application to the eye in the form of eye drops.

Reviewing the recent literature with regard to mental symptoms caused by different ways of ingestion of atropine, we found the following cases.

Cases Recorded as Due to Application to the Eye.

1. Mélièr's case (1935) of a seventy-four-year-old woman showing acute confusion, excitement and hallucinations after instillation of 1% atropine eye drops.
2. Duggan's case (1937) of acute confusion after the instillation of 1% atropine eye drops.
3. Belz's case (1949) of a child intoxicated from atropine in collyrium.
4. Fleury's and Marx's case (1949) of intoxication following the use of an eye wash with atropine solution.
5. Hopkins and Robyn-Jones's case (1937) in which the symptoms appeared three days after a washout with atropine during iridectomy and were characterized by acute confusion with vivid visual hallucinations and persecutory delusions.

Cases Recorded as Due to Ingestion Through the Gastro-Intestinal Tract.

1. Hamilton and Sclare's case (1947) after the taking of 10 minims of liquid extract of belladonna equal to 1/15 grain of the alkaloid. The mental symptoms were characterized by confusion, agitation and visual hallucinations.
2. Minors's case (1948), in which five children were poisoned after eating raisin-like fruits of deadly nightshade. They became delirious, restless, grimacing and hallucinated. The symptoms appeared in four hours and lasted for two days.
3. Carter's case (1940), in which a patient swallowed five drachms of liniment corresponding to one and three-eighths grains of alkaloid. He developed mental symptoms in ten hours and recovered after spinal drainage.
4. Taylor's case (1934) of death after one drachm of liniment of belladonna had been taken by mouth by mistake.
5. Gratten's case of recovery after a wine glass of liniment had been taken.

Cases Recorded as Due to Subcutaneous Injection of Atropine.

1. Welbourn's cases (Hamilton and Sclare, 1947) after premedication with one-sixth of a grain of atropine by

¹ Read at a meeting of the Section of Neurology, Psychiatry and Neurosurgery of the New South Wales Branch of the British Medical Association on June 5, 1952.

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