

**On the motions of the human feet and the means of preserving them  
unimpaired : being the philosophy of shoemaking / by James Dowie.**

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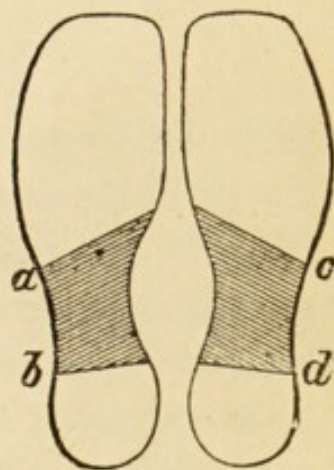
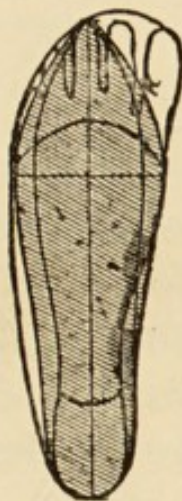
# MOTIONS OF THE HUMAN FEET

AND

THE MEANS OF PRESERVING THEM UNIMPAIRED ;

BEING

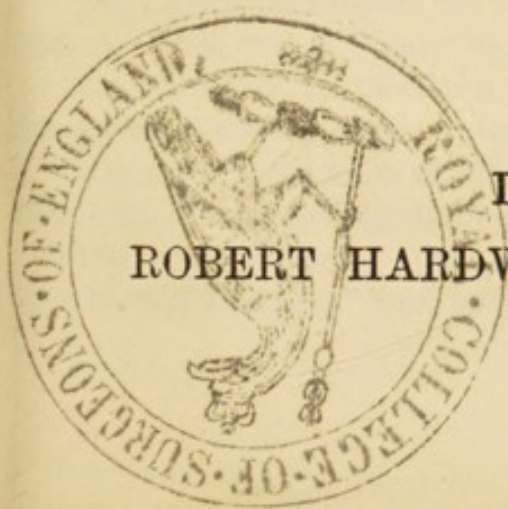
## THE PHILOSOPHY OF SHOEMAKING.



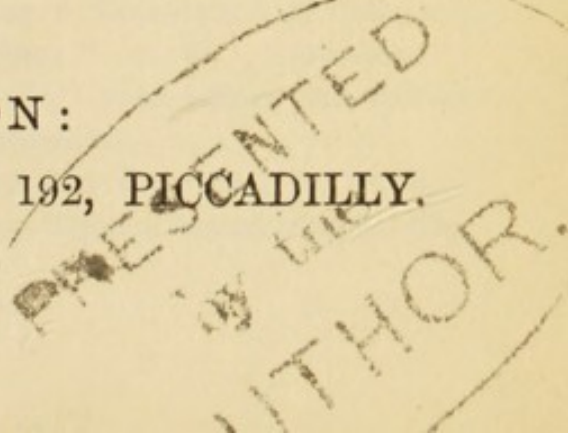
BY JAMES DOWIE,  
AUTHOR OF "THE FOOT AND ITS COVERING" ; ALSO, "REMARKS ON THE  
LOSS OF MUSCULAR POWER."

"The value of the human foot is not sufficiently estimated."

FERGUSSON.



LONDON :  
ROBERT HARDWICKE, 192, PICCADILLY.



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## P R E F A C E.

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**T**H E very favourable and flattering reception with which my previous efforts\* have been received by all classes of the community, but especially by the Medical Profession, in my humble endeavours to combine Science with Practice in clothing the human feet so as to preserve their natural functions unimpaired, has induced me to again venture to submit a few remarks which bear more particularly on one view of the subject not hitherto sufficiently noticed, or at least not dwelt upon to the extent that its importance demands—namely, the necessity of considering that both feet are required to form the pedestal of the body. The true positions of the tripod bearings and the bilateral symmetry of the pedestal can only be thus obtained without distortion and injury to the

\* See Papers read before the Royal Scottish Society of Arts in the years 1835 and 1839, and at greater length in 1861.

“The Foot and its Covering,” comprising a Translation of Camper’s most valuable essay on the “Best form of Shoe.” 2s. 6d. Hardwicke.

“Remarks on the Loss of Muscular Power,” read before the British Association at Cambridge in 1862. 6d. Hardwicke.

“The Proper Clothing of the Human Foot, the First Step in Physical and Mental Training,” read before the Social Science Association in 1862.



peculiar structure, and development of a finely-formed arched foot. Nearly all civilized nations must have overlooked this fact when they constructed shoes to wear on either foot, and yet to fit neither; and even when made right and left, they retained much of the same form which has been handed down to us in works of art, such as in Chelsea and other china figures, and in many of our statues in modern times. The evil of this is illustrated in the centre vignette on the title-page, which I have taken from Dr. Camper's essay referred to. This diagram shows how the great toe must be diverted from the straight line in such a shoe, thereby depriving each foot of the abutment to the arch, and producing a flat foot, with all its attendant weakness, want of elasticity, and suffering, in addition to the absence of beauty of form. If the following remarks shall have the effect of directing attention to the subject in an artistic or sanitary point of view, I shall have accomplished my wish.

JAMES DOWIE.

455, STRAND, LONDON.



## THE PHILOSOPHY OF SHOEMAKING.

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THE acknowledgment in the columns of the Medical press,\* “ That the value of the human foot is not sufficiently estimated,” is one to which I subscribe on professional grounds. I allude more particularly to the difference between the value of sound and unsound feet in standing or walking ; to the improper foot-gear generally patronized and worn ; and to the objectionable mechanical means used in the curing of distortions, lameness, &c. The subject is of the highest importance in many respects. It stands much in need of ventilation, and in this paper I shall endeavour to investigate very briefly the following three divisions of it, viz. :—(1), The tripod bearings of the foot ; (2), The function of the instep ; and (3), The free, unimpeded circulation of the fluids of

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\* See *Lancet*, 16th July, 1864, Lecture VI., by William Fergusson, Esq., F.R.C.S., F.R.S., delivered at the Royal College of Surgeons of England, in June, 1864.



the lower extremities, these subjects appearing to me deserving of special notice at the present time.

I shall illustrate each by a few normal and abnormal cases, selected out of the many that have come under my own observation and experience as a shoemaker during the last forty years.

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### THE TRIPOD BEARINGS OF THE FOOT.

The architectural structure of the human foot is, in principle, that of a portion of a groined arch of unequal longitudinal and lateral span, resting chiefly upon three piers,—the heel, and the balls of the great toe and little toe. The longitudinal span is from the heel to the ball of the great toe, and the lateral span from the longitudinal one just mentioned to the ball of the little toe. The balls of the second, third, and fourth toes, and the balls of the five digital extremities, also rest upon the ground, forming eight additional bearings to each foot; but they appear rather to have a secondary than a primary function, if I may so speak, like that of abutments to the two principal bearings above mentioned. Nearly the same thing may be said of the fleshy parts of the sole, between the bearing of the little toe and that of the heel, more especially in supporting a heavy weight when standing on one foot. But from the triangle which these bearings form,



they substantiate the principle of a tripod as pointed out by Dr. Camper long ago, in his work on "THE BEST FORM OF SHOE."

There is evidently illustrated in this structural economy of the foot a grand design of its GREAT CREATOR, that requires to be more closely attended to in the clothing than is generally done, in order to preserve the extremities in health and usefulness. This is true at every age, but more so in early life, when the foot is growing, than at any after period.

As a question of form, the two feet should be examined together, as in fig. 1, in order to perceive the bilateral symmetry and beauty of the whole organism, each foot when taken singly being only a half. Thus, when standing upon both feet, close to each other, the body then rests upon two tripods, or upon six bearings—two situated laterally, and four longitudinally.



Fig. 1.

The former are the two little toe-bearings, and the latter the two great toe and the two heel bearings, and the respective bearings and parts of one foot correspond in form and size to those of the other. The position, however, is a painful one to stand long in, and therefore it cannot be considered natural. This is manifest, for the legs and thighs are not in a vertical position, and therefore they cannot support the greatest weight with the greatest



case. The natural position is evidently when the two legs and thighs are parallel, and the pelvic and ankle articulations equidistant, the heels being turned inwards and the toes outwards, so that the four lines formed by the four interior bearing-points—the two heels behind and the balls of the two great toes in front—make a rectangle, or a right-angled parallelogram, as in the annexed diagram (fig. 2). The two triangles formed by the three

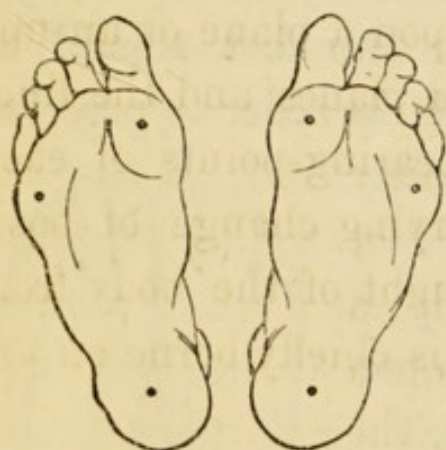


Fig. 2.

bearings or points on each outline are scalene. The position in the diagram is therefore, perhaps, the natural one, when standing upon both feet. But be this hypothesis as it may, the position is evidently one that exhibits in a very high degree

the beautiful normal form and bilateral symmetry of the two feet, while it farther accords with the economy of muscular power in standing, the right-angled parallelogram being the figure of greatest stability in mechanical science.

In standing upon a plane surface, whether on one or both feet, the tripod bearings (three or six, as the case may be) are also in one plane. This is self-evident; but in standing upon an uneven surface, the conditions are more complicated, for the heel-bearing rests upon, or rather forms one plane, while



the two anterior bearings make another, so that there are two planes involved, the one anterior, and the other posterior; or, more practically speaking, the one the heel, and the other the tread. The geometrical position of the three bearing-points of each foot, and the measure of the lines and angles which they form, are also different from what they are when standing on a plane surface, and this divergence will be according to the unevenness of the ground.

In walking, whether it be upon a plane or an uneven surface, the heel and tread planes, and the lines and angles which the tripod bearing-points of each foot form, undergo an ever-varying change of position; while, in passing the weight of the body from the one foot on to the other, it is chiefly borne on the anterior or tread plane.

In clothing the foot, the sole of the boot or shoe may be considered the pedestal to the ever-changing mechanism of the living statue, as above shown; so that, like the natural covering of the sole of the foot itself, viz., the skin, the movements and positions of the anterior and posterior planes of the one—the sole of the boot—should correspond and harmonize with the ever-varying movements and positions of the anterior and posterior planes of the other—the sole of the foot.

Thus in walking, shortly after the nude heel begins to rise from the ground, the heel-plane, if



produced, would intersect the tread plane or anterior sole longitudinally in the direction of the middle toe; whereas, when at the highest point, or just before the weight of the body is thrown off in the direction of the other foot coming up to take the lead in advance, or as when standing upon both tiptoes, the heel-plane then intersects the sole transversely across the instep; and between these two positions in rising and falling, the line of intersection of the two planes, heel and tread, is different at every intermediate position, the number of positions being indefinite. In going up a steep hill, again, the heel-plane bends upwards, so that it does not form a line of intersection inwards, but outwards (these positions will be shown and explained under figs. 4, 5, and 6).

As it is with the nude sole of the foot, so must it be with the sole of the boot; for the lines of intersection of the two planes, heel and tread, must be similar before the normal health and usefulness of the former—the foot, can be preserved, or restored when in an abnormal condition.

In order that the sole of the boot shall comply with the ever-varying position of the tripod bearings and natural movements of the foot, I engraft between the heel and tread an elasticated piece of leather, as represented by the waist *a, b, c, d*, in the annexed diagram (fig. 3), which allows both the anterior and posterior planes to bend and intersect inwards or outwards, and to twist laterally, so as to intersect



longitudinally, as described in the preceding paragraph. In addition to the freedom of its normal functions, which the pliant elastic waist thus secures to the foot, it also increases the durability of the sole, by obviating the grinding action experienced on the tread when the sole is rigid throughout.

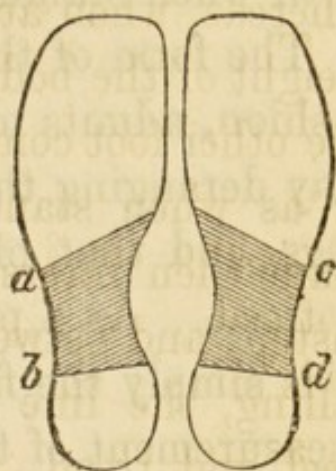


Fig. 3.

For the purpose of determining the true position of the tripod bearings of the foot upon the sole of the boot, more especially the anterior two at the balls of the great toe and little toe, I take an outline of the sole of the foot upon paper in measuring. So absolutely necessary is this, that, in order to secure a proper fit, the outlines of both feet require to be taken, as the right foot is often not exactly the same as the left; and although the difference may be so small as to be imperceptible to the naked eye, yet it must nevertheless be carefully attended to in fitting each foot. The medical reader will readily perceive, from this observation, that the common plan of taking the length and breadth of the foot with a few girths only in measuring is faulty, and not sufficient to indicate the true position of the tripod bearings. I found out the truth of this when I first began to study the anatomy and mechanism of the human foot from a shoemaker's point of view; and my non-medical readers cannot fail to see its



full force from the accompanying diagrams, and an appeal to their own nude feet, if closely examined both when standing and walking.

The form of the sole, considered as a question of fashion, admits of no little diversity, without in any way deranging the true position of the tripod bearings, and that of the eight subsidiary ones already noticed. As a professional question of shoemaking, it is simply the fitting of the last to the outline and measurement of the foot, and then working the heel, toe, and waist as the fashion of the day or the taste of the customer may order. The three points next to the tripod bearings that call for special attention in fitting the last are the peculiar form and dimensions of the heel, and those of the great toe and little toe. If a proper fit is secured for each of these, a good workman can as readily make the heel, waist, and toe of one form as of another.

In clothing the growing foot of the child and youth, very great attention is requisite in order to promote the normal development and true position of all its eleven bearings. An equal degree of care requires to be exercised on the part of parents and nurses in teaching children to stand and walk uprightly upon their tripods. The oft-quoted precept of Solomon relative to the training of the rising generation is as applicable here, in a physical sense, as it is in one social, moral, and religious ; indeed the social, moral, and religious duty renders the physical



imperative. In support of these conclusions nothing more requires to be said ; unless it be added, by way of parenthesis, that the corrective authority of the family doctor is often more frequently required and given than reduced to practice ; for it is certainly a blot on the character of the age that so many "innocents" are to be seen limping about in our streets and play-grounds, with apparently none to sympathize with them, under all the distorting cruelties which they in every rank are called upon to endure. We are taught from childhood to sympathize with Chinese women ; but ought we not, as Dr. Camper observes in his work on "The Best Form of Shoe," already quoted, to extend that sympathy towards ourselves, more especially our little ones ?

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#### THE FUNCTION OF THE INSTEP.

The instep is a very complex piece of mechanism, and has as complex a function to perform. Its work may be said to be of a fivefold character, as follows :—

First. Besides the large amount of elastic tissue that enters into the structure of its numerous articulations, to prevent concussion of the bones, not only of the foot, but also of the whole body, the



antagonistic action of the muscles is auxiliary to the same purpose. The truth of this is very forcibly illustrated in the case of a person walking with a wooden leg ; for however well it may be padded with cork, india-rubber, or the like, the whole body experiences a shock every time it is placed upon the ground.

Second. The instep makes the limb an elongating lever. The wooden leg is a lever ; and like the other, the natural one, it may be amply supplied with elastic material both at the foot and at the stump ; but it does not elongate and shorten as the process of walking demands : consequently, it fails to perform the function of the other in these respects. The ankle, knee, and hip joints bend so that the muscles which actuate them can shorten the limb, and restore it to its former or natural length. But they make the limb a shortening lever, not an elongating one. The muscles that actuate the instep elongate the limb, and then restore it to its normal length—a very different function.

Third. The instep, in walking, raises the body, and allows the other foot to pass it freely ; and then it throws the body forward on to the foot thus planted in advance, with a much greater economy of muscular power than when the work is done by the ankle, knee, and hip joints alone.

Fourth. It is the instep that changes the heel



and tread-planes in the ever-varying positions which they occupy in walking.

Fifth. The instep is chiefly instrumental in going up-stairs, up-hill, in running, jumping, and dancing, charging with the bayonet, pitching sheaves in harvest, &c., &c. It would take a world of detail to do the instep justice in all the duties which it performs.

The following woodcuts, figs. 4, 5, and 6, will assist in illustrating the principal functions of the instep, and also the manner the planes of the tripod bearings intersect each other.

Fig. 4 shows the position of the legs and feet in going obliquely up an incline, with the left side towards the hill.

The inside of the right leg is towards the inclination, but the outside of the left

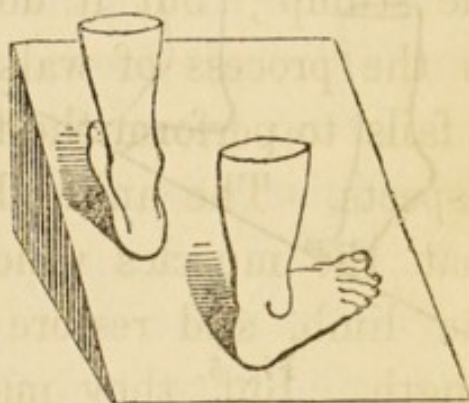


Fig. 4.

one, and both make an acute angle with the slope of the ground ; whereas, when standing erect, as in fig. 2, upon level ground, they make a right angle. Both heels are off the ground, the weight of the body being borne on the tread-bearings. It follows, therefore, from these data, that the bearings of the great toe and little toe of each foot are upon one plane, viz., the surface of the incline or hill, and that the bearings of the heels are each in another plane ; consequently the posterior or heel-plane of each foot



intersects the anterior or tread-plane obliquely in the direction of the toes, but that the intersection of the right foot differs from that of the left.

These conclusions will readily be understood from the diagrams; but to comprehend this and the other two positions practically to the greatest advantage, the reader should examine his own nude feet and legs under all the positions in which he can place them.

Fig. 5 represents the position of the feet and legs in going directly up-hill, the step being that of the left foot foremost, and the right one hindmost. The heels are again off the ground, so that the weight of the body is borne as formerly, but the heel and tread-planes in this



Fig. 5.

case intersect transversely, those of the right inwards across the instep in front of the toes, but those of the left one outwards behind the tread. Fig. 6 shows the position of the right foot and leg in standing on tip-toe, the heel-plane intersecting the tread-plane inwards transversely across the instep, but in front of the toes. The same data apply to the left foot in the same position as when standing on both tip-toes.



Fig. 6.



The diagrams also illustrate the extreme difference that takes place in the curvature and elongation of the span of the arch of the foot, the left foot, fig. 5, showing the minimum degree in the height of the arch, but the maximum length of the span, and fig. 6 the maximum degree of height, but minimum of length. Thus from actual measurement the height of the arch, taken in the line between the heel and great toe bearings of the gentleman, an engineer, whose feet are represented by fig. 2, when in the position of the left foot (fig. 5), was four-eighths of an inch ; when standing with the toes at ease, both feet being upon the ground, the height was five-eighths ; when the arch was braced up by the toes, as in standing upon one foot, the height was six-eighths ; and when in the position (fig. 6), the height of the arch was fully an inch and a quarter or ten-eighths. The length of his foot is eleven inches, taken as shown (fig. 2) with the arch braced up by the toes—the height of the arch being then six-eighths, and proportionally less or more for the others.

In applying the data which the diagrams illustrate to the daily experience of all classes, the more prudent plan is to leave the reader to exercise his own judgment in the matter. The three positions, it will be seen, are extreme cases, but the very same principles would have illustrated, had the feet in figs. 4 and 5 been upon level ground, and the heel in fig. 6 only raised half the height shown in the



diagram. In short, the data illustrated are of general application, but more especially to those whose pursuits in life are mostly performed on foot, and prove how absolutely necessary it is to attend closely to the movements of the instep and tread-bearings in the clothing of the feet and limbs, in order to preserve health and usefulness.

The form and dimensions of the instep, both longitudinally and laterally, are very various in different individuals, and often not in proportion to the size of the body, or even to the length of the foot from heel to toe. Much of this is evidently primarily due to mode of life and kind of clothing; and secondarily to hereditary descent, or from parents to their children; for some families and races have finely-arched feet, others have comparatively flat feet, while a third class have insteps in various intermediate degrees of development between the former two extremes. The feet of our Celtic population, for example, are better arched than those of our Saxon. The foot of the Negro, again, is very different from most of the other races in the angularity of the heel, as well as in the curvature of the arch. In short, there are not two races of men whose feet are exactly alike.

A finely-arched foot of medium length is obviously the normal type. The flat and intermediate examples are, on the contrary, departures from the beautiful symmetry of nature. The clothing and



cultivation of the former I shall notice in this place; but for the sake of brevity, and to avoid repetition, the latter will be noticed under *impeded circulation* from improper foot-gear.

In infancy the free use of the toes is essentially necessary to the proper development of the arch of the foot. The five digital bearings form in walking, and in supporting a heavy weight when standing, abutments to the tread-piers of the arch. This is their function when in the enjoyment of their natural freedom, for they grasp the ground under them, as it were, thereby shortening the span of the arch, increasing its strength, and augmenting its height. Thus fig. 2 shows the toes in the attitude of bracing up the piers of the arch, &c. This is very conspicuously exemplified in going barefoot up a steep hill, and it may be further observed that such exercise and training, coupled with the bracing air and highly tonic food of the Highlands of Scotland, may in some measure account for the finely-arched feet of the clans in the olden times, when going barefoot in early life was the fashion, and when the natural produce of the hills was the common diet of all. Such being the case, it furnishes a very instructive practical lesson as to how the growing foot should be trained in order to develope its normal beauty and usefulness, and also how it should be clothed at every period of life.

The free use of the toes and instep is also essen-



tially necessary to the development of a finely-formed brawny leg. This is not only requisite as regards the muscles, but also as regards bone and nerve. In support of this, Sir Charles Bell says, in his *Anatomy*, "That the whole apparatus of bones and joints being constituted in accurate relation to the muscular powers, it is preserved perfect by exercise; the tendons, the sheaths by which they are restrained, and the mucous bursas containing the lubricating fluid, can be seen in perfection only when the animal machinery has been kept in *full activity*." This passage, and the two farther on, I quoted in my paper read before the Royal Scottish Society of Arts; and to this paper I had the honour to receive the following letter from Sir Charles, dated 6, Ainslie-place, Edinburgh, 4th April, 1839:—

"MR. DOWIE,—Sir: In what you have quoted from my *Anatomy* you are correct. The foot has an internal play which should be preserved. On the full and natural motion of the foot depends the shape of the leg."

Dr. Arnot, also, in the new edition of his "*Physics*," page 155, says, "That men lose not a little of the strength and command of their lower limbs by being condemned to use too small or too rigid shoes cannot be doubted; and the fact is not of small importance to a military people, for the result in battle of a charge where bayonets clash must depend almost as much on the strength of the



legs as of the arms." The writings of both sacred and profane authors may also be quoted, showing that the facts of the case have been noticed from time immemorial. Thus—"The feeble knees," Job iv. 4; "My knees are weak through fasting," Psalm cix. 24; "All knees shall be weak as water," Ezekiel vii. 17. On the other hand, Theocrates says :—

The time for action's when the knees are strong ;

and Horace :—

And whilst the knees are vigorous.

Now in all these examples the cause of the weak knees is that which produces a relaxed or atrophied state of the muscles of the limbs, *and the cause of the strong and vigorous knee, that which produces the brawny leg.*

Much does not require to be said in proof of these conclusions. Thus, as the instep has to raise, support, and lower the weight of the body at every step in walking, it follows that the number of steps in the journey, multiplied by the weight of the body, gives the total amount of work done by it in a given time. Such being the Herculean task, how essentially necessary is it that the work should be fairly and evenly distributed, so that no individual muscle, ligament, or bone shall perform more than its own share. This is more particularly the case with per-



sons who have to bear burdens under circumstances that relax the muscles, such as soldiers, who have often to carry their accoutrements under a burning sun, with perhaps an empty stomach. Indeed, in all industrial occupations where the work is performed on foot, the instep has to support more than the body, and for the most part under a relaxed state of the tissues towards the close of the day. In the case of children, more especially when they first begin to walk, the weight of their bodies is greater in proportion to the strength of their muscles than when the feet and limbs have attained to maturity of growth. To provide for this, Nature has made them shorter ; but then this shortening of the elongating lever increases the number of steps in a given distance. Hence one reason why they are so soon over-fatigued, and why they are so unable to bear up under anything that has a tendency to relax the tissue. The patriarch Jacob was evidently alive to the full force of both these conclusions relative to the disproportion of the weight of the body to the strength of the muscles, and the relaxing effects of an eastern sun, when he refused to comply with the request of his brother Esau, at their meeting of reconciliation, when he said, "The children are tender, and if over-driven one day will die. I will, therefore, lead on softly, according to the foot of the children to endure," as the passage is rendered, according to the marginal reading, Genesis xxxiii. 13, 14 ; and to



this day the example of the Hebrew patriarch is highly instructive.

In the physical training movement in connexion with schools sufficient attention is not being paid at the present time to the feet of children. This is more especially manifest when we consider the improper way in which they are generally shod ; the fact that exercise in the rigid foot-gear worn often does more harm than good ; and when we further bear in mind how much of their usefulness and comfort in after life depends upon the use they can make of their feet and legs. The lower animals furnish mankind with an instructive lesson in this respect ; for they, in accordance with a governing law which the Great Creator has implanted in them, physically train themselves in early life for the various pursuits they have afterwards to follow. Many of the finest figures of speech in the Sacred Scriptures are taken from this source. Thus frequent allusion is made to the manner lambs skip and gambol on the top of every eminence to which they can climb. Thus,—“ The little hills skipped like lambs ” (Psalm cxiv. 4) ; again the expressions, “ I bare you on eagles’ wings ” (Exodus xix. 4) ; and “ As an eagle stirreth up her nest, fluttereth over her young, spreadeth abroad her wings, taketh them, beareth them on her wings ” (Deut. xxxii. 11), allude to the affectionate manner the eagle teaches her young to fly, by taking them on her wings, and then, after bearing them away



from her nest, by darting from under them, and thus leaving them to support themselves, and if the wings of the young eagle are unable to bear up the weight of its body, which is generally heavy, the watchful parent with maternal solicitude immediately darts in below her falling offspring and bears it back in safety to her nest, and by repeating this interesting method of physically training the wings of her young, she never fails eventually of learning them to fly. The ancient heathen poets likewise mention the operation of the same law. Thus we have the oft-quoted lines of Virgil as an example, —

—— Butting with adverse horns  
The kids sport wanton ——

A similar law is implanted in the breasts of children, and manifests its governing force at a very early period, for they exercise not only their feet and legs if unrestrained, but also their arms and lungs in order to cultivate their natural growth and usefulness ; unfortunately for them, however, how often is this law rendered nugatory in consequence of their tender feet being imprisoned in shapeless rigid shoes, and “silence sad” imposed upon their lisping tongues by ignorant parents, who do not comprehend the consequences their unnatural conduct thus entails upon their offspring !

In all public training schools, therefore, the proper clothing of the feet of the children is the first work that should be attended to by teachers, as this may



not unaptly be termed the foundation of the system ; for if the toes and instep are pinched in shapeless rigid shoes, the lungs and hence the whole circulation will also be affected. And at home children should enjoy every freedom in the exercise of all their functions, in accordance with the laws of Nature.

The peculiar mechanism and movements of the instep, heel, and toes in walking merit a separate notice, in order to understand fully their requirements in their clothing. Thus the body has a libratory motion, both vertically and laterally, so that the line of progression is curvilinear ; in other words, it consists of a series of curve lines, so united that the chord of each curve line forms the length of a step. What the mathematical nature of this curved line may be, I shall not presume to say ; but as the function of the boot ought to coincide with that of the foot, it follows that the movements of the latter require to be closely attended to in the clothing, as the sequel will show.

Walking is effected partly by the gravitating weight of the body thrown forward, and partly by muscular action. Thus, when standing on one foot, the line of direction or gravitation falls within the sole, but during the process of progression it is kept between the two feet ; so that when one foot is raised from the ground, and stretched forward, the body has a tendency to fall to that side, as it were, but is prevented, and carried forward upon



the foot that is resting upon the ground ; because the limb of this foot, including the instep, forms an elongating lever, and because the ground under its tread is the principal fulcrum. In this manner the body is carried obliquely in a curve line, both vertically and horizontally, to the foot planted in advance. The vertical curve which the body would thus describe, if left to itself, would be that of a parabola ; but the muscular action of the limb prevents this, so that the vertical curvature is not parabolic. Again, horizontally or sideways, the body would move in a right line obliquely from one foot to the other ; but the continuous action of the muscles of the limb and instep deflects it from a right into a curved line, or a very close approximation to a curved line. This is done alternately by each limb, so that the two curved lines, right and left, unite, forming one curved line. In the driving of this curved line, both limbs, right and left, are alternately engaged. If, therefore, the muscular action of each is called a force, and the two, two equal forces, the hypothesis involves the doctrine of a parallelogram of forces, in which the diagonal would be the line of progression. This, however, although it illustrates a principle, is nevertheless, like the greater portion of elementary teaching, mere speculative theory, and not a true exposition of practice ; for in biped progression the weight of the body is borne on one foot, while the other is being brought up from behind, and planted



in front—the direction of gravity being between the two all the time ; consequently, the doctrine of a parallelogram of forces, or rather of a series of parallelograms, is involved in the mechanical movements of each limb and foot at each step. And besides, in this, as in all similarly constructed mechanism, there is also involved the doctrine of central action ; so that, if the numerous levers comprised in the complete system are assumed to be moving freely and uniformly on their fulcra, then cycloidal curves would be described both vertically and horizontally. But here again, as in the case of the parabola and zigzag right lines, the muscles interfere, so that neither the problem of the horizontal curvature, nor that of the vertical curvature, can be solved by any cycloidal rule. Farther into the details of the curved line of human progression I shall not go at present. Enough has been said to show the medical student that as yet it is far from being exhausted, and that, in the mechanical movements of progression, right lines are the exception, and curved ones the rule.

In this very general and imperfect outline of the mechanical movements of the lower extremities and body, the reader will readily perceive the important function which the instep performs in walking ; likewise the very large proportion of the work that is done by the interior part, or great toe-bearing, and the consequent necessity of affording freedom to the great toe in clothing. He cannot fail also to observe



that rigid sole leather, from heel to toe, is wholly incompatible with the natural movements of the feet and limbs, more especially those of the instep and great toe. The twofold object I had in view, of inserting an elastic waist between the heel and tread, must likewise appear manifest, and how essentially necessary such a waist is, so as to cultivate a finely-arched foot in early life, and a healthy, useful one at mature age. One use of the waist has already been noticed, viz., to accommodate the ever-varying positions of the tripod bearings in walking. But in doing so, it also allows the uppers to accommodate the heel, instep, and toes, so as to enable them to perform their respective functions normally, comparatively speaking. All clothing, of course, even the stockings, less or more interfere with the natural movements of the feet. From experiments made with a strong Army Blücher boot, having an elastic waist, it required one and a half pound weight to bend the heel upwards or downwards, whereas it took no less than twenty-eight pounds to bend an Army pattern Blücher boot of the same strength of material having a rigid waist, such as is now worn by the private soldiers and non-commissioned officers of the British army. It would, however, take more than twenty-eight pounds to bend the waist of some of the Wellington boots now in common use, such as are worn by the metropolitan police. Of course, to bend the waists of such boots is impracticable, for it



is equivalent to upwards of fifty-six pounds fastened to the nude heels, viz., over twenty-eight pounds to each heel—a retarding force with which no modern Hercules could walk freely. How, then, is progression performed in such foot-gear, and at what expense of tear and wear to nerve, muscle, and mind? for the intellectual powers are affected as well as the physical. This is one of the many questions involved, to the practical solution of which I wish to turn the attention of the Medical Profession. Moreover, an elastic waist can be made to wear out the strongest material used in the heel and tread at less than the above degree of flexibility, represented by one and a half pounds. The waist, for example, of a pair of boots worn by Dr. Rae, while travelling for four months consecutively in the Arctic regions, is bent with one pound.\* Generally speaking, as customers

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\* In reference to these boots, Dr. Rae says, in a note to me, dated 20th December, 1860, “A pair of your elastic-soled boots, which I wore on my recent visit to Greenland, were in every respect the most comfortable walking boots which during a long experience I have ever worn. I tried them over all kinds of rough ground, among rocks, in ascending and descending hills, and among snow; and in every case found them answer admirably. On uneven ground the elastic sole was of more especial benefit, as it wholly saved the foot from being chafed, as is very usual with boots made of stout leather. As you have the boots I allude to, their appearance will speak for itself, as regards the rough work they had to go through.—Believe me, yours, &c.,

“JOHN RAE.”



become experimentally acquainted with the greater durability of elasticated leather, as compared with ordinary sole leather, and the manner in which it increases the durability of the ordinary sole leather at the tread, they order more flexible waists and thinner soles.

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#### THE FREE, UNIMPEDED CIRCULATION OF THE FLUIDS OF THE LOWER EXTREMITIES.

IF suitable provision is made in the clothing for the natural use of the tripod bearings and instep, the free, unimpeded circulation of the fluids will also be preserved. If this is done, the arterial blood will be sent to the capillaries as required for the reparatory processes, the venous blood will be withdrawn, and the refuse matter (unfit to be returned into the circulation) discharged by the excretory ducts, of which refuse matter a very large amount is daily thrown off from between the toes. And besides blood-lymph and the juice of the flesh, there is the more subtile circulatory electric fluid, of which, perhaps, the less said the better in our present state of knowledge. Still, facts must not be altogether overlooked; for Liebig informs his readers that as some of the above fluids have an acid reaction, and others an alkaline reaction, and as there is only a thin membrane between them, there consequently exists in



the fluid economy of the extremities, as in those of the rest of the body, all the conditions of a continuous electric current. Whatever, therefore, may be the peculiar function of this electric current in the chemical laboratory of Nature relative to the reparatory, circulatory, and excretory processes, it also will be normally performed if the feet are properly clothed. As Sir Charles Bell observes, in his work on Anatomy, already referred to—"The natural exercise of the parts, whether they be active or passive, is the stimulus to the circulation through them, exercise being as necessary to the perfect constitution of a bone as it is to the perfection of the muscular power."

When, however, the shoe pinches anywhere, thereby preventing wholly or in part the natural movements of the foot, the condition of the fluids is very different, and the result the numberless cases of atrophy, distortions, and impaired general health which daily come under the notice of the shoemaker. The above distinguished authority gives a striking illustration of a case of atrophy in the contrast between the lower extremities of an Irish reaper and those of an English peasant. Thus, "Exercise unfolds the muscular system, producing a full, bold outline of the limbs, at the same time that the joints are knit small and clean. Look at the legs of a poor Irishman travelling to the harvest with bare feet; the thickness and roundness of the calf show



that the foot and toes are free to permit the exercise of the muscles of the leg. Look again at the leg of our English peasant, whose foot and ankle are tightly laced in a shoe with a wooden sole, and you will perceive, from the manner in which he lifts his legs, that the play of ankle, foot, and toes is lost, as much as if he went on stilts, and therefore are his legs small and shapeless."

This unfortunately applies to more than our peasantry, if it does not apply with greater force to the upper than to the lower classes at the present day. The patriarch Jacob appears to have been fully sensible to the fatal consequences of foot-sore children; but it is very questionable if persons occupying similar positions in society in our own day discharge with equal fidelity the sacred duties which devolve upon them, or are even equally well informed as to how many of the diseases inflicted on fallen humanity in modern times are traceable to improper shoeing. Certain it is, speaking generally, that the subject is not sufficiently attended to, for the suffocating smell of some feet, the excruciating pain felt in the handling of them when being measured, and complained of when walking, prove that the fluids within are even, if possible, in a worse state than external appearances sometimes indicate. It may be truly said, using a popular expression, that such feet require to be in a "*different world*" from that in which they are at present imprisoned.



The malady, if I may so speak, is evidently a national one, and the cure must lie in better information. The soundness of this can hardly be called in question, for it were difficult to believe that any reasonable person acquainted with the beautiful external symmetry and internal mechanism of the human foot, would distort his own extremities in the manner now so commonly done, impairing at the same time his general health, and stamping indelibly upon his offspring hereditary maladies which cannot be described.

Cases may be divided into two classes: first, distorted toes, deranged tripod bearings, &c.; second, distorted instep, or the breaking up of the arch of the foot, producing what is termed "flat-foot" in extreme examples.

As a practical illustration of the former, the accompanying three woodcuts (figs. 7, 8, and 9) are

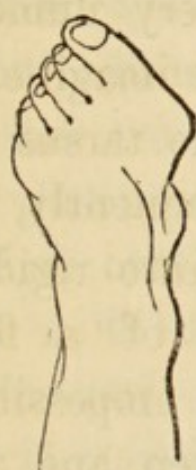


Fig. 7.

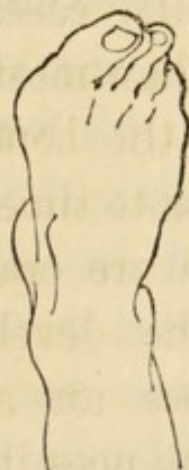


Fig. 8.

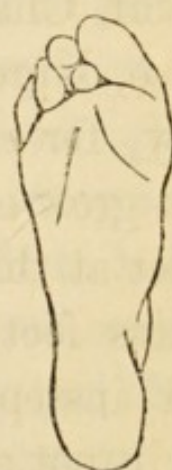


Fig. 9.

given. The latter class will be understood without diagrams. Fig. 7 represents the anterior part of a



cast of a distorted foot sent to me by a customer, a medical man in one of the midland counties. The case is one of his patients, and the distortion was attended with impaired health. The great toe rests upon its edge, being turned round nearly the quadrant of a circle, placing the nail to the outside. Fig. 8 represents a less deformed but more common example, one which came under my own experience as a shoemaker at an early period. The figure itself appeared in my paper in the *Edinburgh New Philosophical Journal*, No. 52, in the year 1839, and the case very forcibly impressed me with the absolute necessity of an improved method of clothing. Fig. 9 shows a distorted foot of this class, which has been almost thoroughly cured by the wearing of my elastic-waisted boots : general health not impaired.

Of the second class, viz., distorted insteps (including those of atrophy referred to in the quotations from Sir Charles Bell), cases are very numerous, more so, I presume, than most people imagine. In infancy, for example, the bones of the tarsus often do not grow equally as to time ; consequently, when the feet at this period are crammed into rigid and shapeless foot-gear, the development of a finely-arched instep becomes an absolute impossibility, while in not a few instances it is broken, and a flat foot formed ; others suffer less, and the result is an improperly-formed arch. In a great many cases the neglected child goes over its tripod bearings, more



frequently to the inside than to the outside ; more so, perhaps, with girls than boys. Again, when the foot has attained to maturity of growth, the instep is atrophied ; articulating ligaments, bones, and muscles are reduced both in volume and strength—hence are easily broken up, and the arch flattened. Cases of this kind are common amongst agricultural labourers, soldiers, and police. Dr. O'Leary, inspecting surgeon of recruits for the Artillery at Woolwich, told me that of the number of men who presented themselves for examination as recruits, eighty per cent. of them had bad or distorted feet from improper foot-gear worn by them in earlier life. Corpulent people, and those of a weakly constitution, who have daily to stand much on their feet for long periods of time, also suffer much from breaking down of the arch of the foot, and the diseases that follow.

It will be more in harmony with my subject, and doubtless, also, more acceptable to my readers generally, if I now turn from the dark to the bright side of the picture, viz., from deformities of the above classes to their cause and cure. First, to their cause, by wearing improper foot-gear ; and, secondly, to their cure, by the simple means of proper clothing—foot-gear that preserves health and symmetry where they exist, as well as restores usefulness and beauty in very many cases where they have been lost ; and, in the third and last place, to the urgent necessity of



public opinion being plainly outspoken at the present time in reference to the clothing of the feet of our volunteers, our army, navy, police, letter-carriers, and other public servants, on sound principles, so as to guarantee health and usefulness in time of need.

With regard to the first of these propositions, I shall, for the sake of practical illustration, take fig. 2 and fig. 9 as a case. The former is an outline recently taken, and the latter that of the same foot when the gentleman first began to wear my boots, some ten years ago. He is a strong, active man, rather thin than corpulent, but has full, fleshy pads under his tripod bearings, which gives the outline rather an opposite or corpulent appearance. The point of the second toe, as will be seen from the diagram (fig. 9), was squeezed downwards and inwards, while its middle joint rose upwards. The points of the great toe and little toe met the point of the middle one, over the second and fourth, as will also readily be understood from the diagram. The lateral arch was also injured, the metatarsophalangeal bearing of the middle toe being pressed down, and that of the little toe rather up. Consequently there were corns on the balls of the great toes, middle toes, and little toes, and upon the upper surface of both little toes. He was, as a matter of course, off his tripod bearings to the outside: he lost both the nails of his great toes. The corns are now gone from the balls of the great toes and little



toes, and nearly also from those of the middle and upper surface of the little toes. The great toes are nearly completely recovered, the only divergence being that the first joint and nails are not so straight as they originally were, although equally healthy and well formed. The middle joint of the second toe is not yet wholly down, that toe appearing rather shorter on the drawing (fig. 2) than it should be, as the medical reader will readily perceive. The gentleman now walks fair upon his tread-bearings, wearing the sole of his boots first through in the middle; but he still wears down the outside of the heels, but not near so much as formerly, and is determined eventually to set his posterior bearings also fairly to the ground. He wears either right and left or digitated stockings, giving the preference now to the latter, and considers such of the highest importance in training injured feet, so as to restore them to their normal symmetry and usefulness. The development, curvature, and strength of the arch of the foot have also been greatly improved.

The deformity represented by fig. 9, the gentleman tells me, was begun by his wearing in early life rigid-soled lace-up boots, rights and lefts, made, he says, "exactly on what has recently been fallaciously termed Dr. Meyer's principle, the shape of the sole given in his pamphlet, 'Why the Shoe Pinches,' being greatly in vogue amongst those of



the middle and upper classes who wished to be in the height of fashion about forty years ago, when he resided in the north. They were," he further adds, "nicknamed by the common people 'Ram's-horns,' from their extreme curvature as compared with those then worn by themselves." The uppers, for every-day wear, were of strong cowhide; the boot was made on a last, the sole of which was convex, both longitudinally and laterally, at the tread; consequently, the inside of the sole of the boot was dished liked the mouth of a spoon. The sole at the tread was too narrow for the little toe-bearing, the broadest part of the tread being too far back, or close to the heel; consequently, the little toe was squeezed up off its natural bearing.

This will readily be understood from the annexed diagram (fig. 10), which represents the foot as shown (fig. 2), and placed upon Dr. Meyer's sole, the dotted lines being a *fac-simile* taken from his pamphlet (fig. 22, page 40).



Fig. 10.

"Subsequently," he continues, "the abnormal extravagance of the 'Ram's-horn fashion' gave way to the bilateral style of the toes of shoes now in vogue, and as it was in Paris in Dr. Camper's time, which brought the point of the great toe round to that of the middle one," as shown (fig. 9).



The deformities shown in figs. 7 and 8 are similarly accounted for, generally speaking.

The second class of deformities, viz., the flattening and injury of the arch of the foot, is produced by the rigidity and curvature of the sole under the instep. First. For example, the rigid sole of the boot checks, and not unfrequently wholly restrains, the free play of both the external and internal machinery of the arch, thereby producing atrophy and general weakness; and second, the longitudinal convexity of the inner sole breaks down the weakened arch. Technically, this convexity is termed "*the spring of the last, or sole,*" as the case may be. It is almost invariably greater at the exterior side than is the concavity of the sole of the foot above; consequently, at every step in walking, the under-side of the arch of the foot receives a stroke, as if this continuous hammering was purposely intended to force up the keystone, thereby bringing the whole architectural structure down so as to form a flat foot!

In my work on "The Foot and its Covering," comprising a full translation of Dr. Camper's work on "The Best Form of Shoe," this will be found explained at considerable length, and I must refer my readers to that work for details as to the objectionable shape of the last on which such shoes are made—a shape which cannot be obviated so long as the sole of the shoe is made of rigid leather throughout, because the "*spring*" is absolutely necessary to enable those



who wear such curved soles to walk, or rather to rock, from one foot on to the other, on the principle of a rocking-lever, or "walking on stilts," as the late Sir Charles Bell very forcibly illustrates this unseemly, jolting, abnormal process of progression.

With regard to the style of the last, as it should harmonize with the normal symmetry of the foot, it ought obviously not to be subject to the caprice of fashion. This is unquestionably one of those fundamental principles which ought not on any account to be departed from in practice. It is equally true, whether studying the health of the foot from a medical point of view, or the clothing of the foot from a shoemaker's point of view; for, were last-makers to abide by this rule, conforming their workmanship to the natural beauty of the foot, it would do much to keep fashion within her own legitimate sphere of action.

As to the remedy or method of curing both these kinds of distortions, it is effected simply by affording in the clothing free play to the numerous parts of the foot, including the fluids, which perhaps may be termed the *principle of leaving Nature to work her own cure*.

In cases of the first class, viz., the curing of distorted toes, fig. 2, compared with fig. 9, shows a practical illustration of what has been done by wearing boots made of a proper shape. Unfortunately, under this head, fashion interferes, and I am con-



sequently obliged to make the shape of the toe of the boot according to orders ; but, during the whole of my experience, reaching nearly forty years, fifteen in Edinburgh, and twenty-five in London, I have always had a large number of customers who were willing to have the natural shape of their toes preserved.

In curing cases of the second class, viz., injured insteps from wearing rigid soles, fashion has been in favour of my elasticated waist, *i.e.*, a FINELY-FORMED ARCH. It follows that all who have worn my boots during the last thirty years in Edinburgh, and twenty-five years in London, have had their feet less or more restored to their natural symmetry. It will be necessary for me, therefore, to divide the whole into three classes, in order to enable me to give an example in illustration of each.

*First*, children, who were previously shod, having a steel or iron plate in the boot under the arch ; *second*, the case of an atrophied and weakened instep slightly flattened, but otherwise comparatively sound ; and *third*, a foot so lamed as to be obliged to apply for medical advice.

In the *first* example my mode has always been to lay aside the steel plates, and to wear boots with elasticated leather waists, made of a form so as to afford an elastic yielding support under the instep, instead of the rigid waist and steel as before. By thus affording gentle exercise and training to the



weakened parts, they soon regain their normal symmetry when not otherwise diseased. I have met with a great many examples of this kind amongst the children of European parents born in India, but sent home to be educated in this country. This plan of clothing injured feet of this kind, I may add, has met with the approbation of the medical men, both of London and Edinburgh; and I may be allowed to instance the late Sir B. C. Brodie, Bart., who honoured me with the shoeing of his patients of this class.

Of the *second* example I have already given an illustration, viz., fig. 2 and fig. 9—the feet of this gentleman having been slightly flattened. They are now much better arched, and what merits special notice is the interesting fact that all the articulations are, in the language of Sir Charles Bell, already quoted, “knit small and clean;” in other words, his boots require to be higher at the instep, but of less dimensions in every other respect than previously. Others increase in size. The change which takes place in this respect, as to the size of feet, puzzles many of my customers, who are apt to blame the shoemaker, and not *their* feet, until the matter is explained to them; but it will occasion no mystery to the medical reader.

The *third* example is a clergyman of the Church of England. He holds the appointment to a society, the duties of which require his personal visitation in



succession to the respective parishes in connection with his Church. From some cause he found his feet to give way; so much so that he was obliged to apply for advice. He had been recommended to wear a calico bandage of two yards long bound tightly round the arch of one foot that was more injured than the other, and over this an elastic stocking. He also wore boots laced in front, made with an extra rigid strong waist, put together with wooden pegs; the soles turned upward at the toe, and having high heels. In addition to all this, a piece of whalebone, or stiff leather, was placed on the inside of the quarter of the boot leg, thereby rendering the whole a rigid leathern box. After wearing these articles some time, he found his feet becoming daily worse and worse, till at length he was obliged to intimate to his friends his inability to perform his duty, and intention reluctantly to resign his situation. One of his friends, however, and another clergyman in the Church, to whom he had named his intention, advised him to try me, as they had received benefit from the use of my elastic boots. He accordingly consulted me in May last. I at once removed his boots, elastic stocking, and bandage, put on him a pair of front-lace boots, having the elasticated waists, which, when laced tight, braced up the arch, allowing at the same time free play to the instep, toes, and heel. I met him a few days after in the street, when he stopped me, and said "he felt his



feet in another world." After a fortnight's wear he wrote to me, May 13:—"I am very thankful to say that my foot is gradually, but surely, improving." In a second letter, dated 4th August, he says, "I hope soon to write to you at greater length; suffice it for the present to say that I regard you as one of my greatest earthly benefactors."

From this very imperfect review of these three classes the medical reader will see that the whole merit of my plan is simply to take away all hindrances to a free and perfect movement of the whole foot and ankle, and thus leave Nature to work her own cure.

I now come to my last proposition, the shoeing of volunteers, soldiers, and police, on sound principles. "The marchings-out and the marchings-in" are certainly telling in the highest degree beneficially as to the health of the former, with one solitary exception, viz., *the poor feet*. To volunteers, the physical training of the feet and limbs is of the greatest importance, from the sympathy that exists between them and the eyes. When the feet are imprisoned in rigid leather, the steadiness of the hand and accuracy of the sight in firing are both affected: hence the practical conclusion. To this the Volunteer Medical Service most unhesitatingly subscribe, and therefore it is but reasonable to hope that their thoughts professionally will be practically turned to the subject, and an effort be made to liberate im-



prisoned feet from the thralldom of rigid sole leather and its consequences.

The Army Medical Service have a much more difficult part to perform. The ear of the volunteer is open to his medical advisers, but it is otherwise with the rank and file of the British Army, whose feet are as yet cruelly and arbitrarily cobbled by the War Office. If ever there was a period in the military history of the country when the physical training of soldiers' feet took the form of a national question, it is the present ; for every advance now being made in the rapid progress of military science has its increasing demands upon the activity of the feet and legs. But, instead of cultivating the development of muscle, health, and strength, is it not notorious that our Government is actually moving in the opposite direction, from bad to worse ? The military foot-gear of the Romans in the time of Hadrian was actually superior to the foot-gear of the British soldier at the present day. The statue of Hadrian in the British Museum shows how faithfully the natural form of the foot was preserved of old, and the attention which the Romans paid to the physical training of the extremities, they being experimentally so familiar with the fact of how much the success of their arms depended upon it. In this respect we are even a long way behind our Gallic neighbours. During the French war Marshal Saxe recommended soles for the French army to be made in the Roman fashion ; and at the present day I am told



the French soldiers are actually wearing such foot-gear. We, on the contrary, are continuing the old abnormal process of atrophying and weakening the limbs of our soldiers, when we should be increasing their strength and usefulness, so as to be prepared and in readiness for the hour of danger, come when it may. Our men are neither able to make so effective a charge with the bayonet, nor to ascend a steep hill for the purpose of storming the entrenchments of the enemy with such strength and alacrity as they might, were they but well and duly shod. In marching, our soldiers were behind those of France at the battle of the Alma, and also in the taking of some of the Russian strongholds at Sebastopol, during the Crimean war.

Is it not, therefore, high time to inquire how much of these and all similar shortcomings is due to rigid sole leather? The answer is manifest, for the army pattern Blücher boot is like a heavy steam-hammer applied by the War Office to the under side of the keystone of the arch of the soldier's foot, so as to break it up, thereby reducing the physical strength of the man to a minimum. In the military arrangements of the age is there to be found a sacrifice so anomalous as this in a national sense? During the early part of the present century, when the boots for the soldiers were supplied by the Colonels of the Regiments, the pattern was straight, not right and left. It was a low-priced boot of in-



ferior material and workmanship, consequently the result in wear was short and uncomfortable, as the soldiers' feet forced the boots out of shape and wore ill accordingly; but the feet suffered less than now, when the boots are of better material and workmanship, but still made on a wrong principle. The feet now suffer more by the greater rigidity of the boots; for although there may possibly be more sizes still, there is only one shape for the Army pattern boot for Celt and Saxon, black soldier and white, for all climates and all seasons—enough to make common sense blush.

If it is the function and duty of the Army Medical Service, as doubtless it is, to reject recruits whose feet have been injured by wearing improper foot-gear, is it not also the function and duty of this Service to examine every pattern boot, and to reject patterns that would lame the soldier, and thus unfit him for the arduous task of active life when called upon to perform it? To this there can only be returned one plain affirmative answer.

There is a good reason why the selection of the principle on which the pattern boots should be made ought to be vested in the Army Medical Service, as stated in the conclusion of the last paragraph. It is this, viz., the extra labour which the present objectionable foot-gear throws upon them, by greatly increasing the number of soldiers upon the sick-list. Were they, on the contrary, responsible



for the pattern, they would be to blame for all consequences arising therefrom. What may be the amount of this extra labour in a campaign is a practical question, in whose solution they are themselves doubly interested with the general public. It is one which I believe cannot be answered satisfactorily at present, there having been no army record kept in the last wars of "*foot-sore soldiers*," from imperfect foot-gear—maladies of this class being too commonly erroneously ranked amongst those sometimes termed "*unavoidable*." But that the increase of soldiers on the sick-list, and extra labour involved, far exceed general credence, is unquestionable.

Instead, however, of consulting their medical officers, and carrying into practice their counsel, and of being guided by the voice of experiment in the wear of my elasticated sole boots, our Government, strange to say, has long rejected—1. The very doctrines taught by the Medical Service in our principal military colleges ; 2. The counsel of some of their most distinguished medical officers ; while, what is worse, 3. On one occasion, during the time when General Sir George Brown was deputy adjutant-general at the Horse Guards, the Report of a military board of officers, of which General Sir Alexander Woodford was chairman, which had been appointed by his Grace the late Duke of Wellington, commander-in-chief, to report on the wear and other distinctive qualities of my boots, was positively *falsi-*



*fied*, apparently to justify a continuance of the present objectionable system of shoeing the British soldier.

A proposition, containing such sweeping censure upon the Government, requires to be confirmed by circumstantial evidence. I shall, therefore, substantiate each of the above three charges separately.

First. Sir George Ballingal, Professor of Military Surgery in the University of Edinburgh from the year 1836, used a pair of my boots to illustrate his lectures on “The Clothing of Soldiers,” and recommended their adoption in the army. In confirmation of this, I shall quote his letter to me on the subject, dated Edinburgh College, 30th July, 1842:—

“I hereby certify that my attention has been turned to the ease and comfort in walking afforded by Mr. Dowie’s shoes, which I have personally experienced; that I have for several years past exhibited them in the Class of Military Surgery, and have pointed out to the students (when lecturing on the clothing and equipment of the soldier) how much these shoes are calculated to promote the natural play of the foot, and to facilitate his marching. I may further add, that several of my friends, both military and medical officers, have tried these shoes on my recommendation, and have reported favourably of them.—GEORGE BALLINGAL, M.D., Professor of Military Surgery.”

Professor Tuffnell, in the year 1855, addressed to me the following letter:—



“Mr. Tuffnell, Regius Professor of Military Surgery, Royal College of Surgeons, Dublin, is desirous of having a pair of Mr. Dowie’s Regulation Boots, the same as he is making for some of the Militia regiments, to exhibit to the class of students attending his lectures.

“Mr. Tuffnell begs Mr. Dowie to send them over to him to the Royal College of Surgeons, Dublin, together with any certificates or commendatory letters he may have.

“Dublin, October 19th, 1855.”

As requested, I forwarded to Dr. Tuffnell a pair of my common “ammunition boots,” on the 24th of October, 1855.

And further, in reference to this point, I may state that, on the discontinuance of the Military Surgery chairs in Edinburgh and Dublin Universities, and the establishment of the Army Medical School at Fort Pitt, since removed to Netley, Professor Tuffnell had forwarded to Fort Pitt a collection of patterns of clothing and accoutrements which he had made, amongst which were the very pair of boots referred to in his letter, and which are now in the possession of the distinguished Dr. Parkes, who uses them to illustrate his lectures in the branch for which he has been specially appointed to teach, namely, how the soldiers should be fed and clothed so as to preserve health, strength, and efficiency; and in his work on “Practical Hygiene



for the Army," he makes favourable reference to the Elastic Waist, in the following words, page 363:—  
"This bends easily with the foot, and thus all muscular effort necessary for overcoming the resistance of the rigid waist is gained for progression."\* And in a foot note he says, "Mr. Dowie has the credit of writing a very sensible work on 'The Foot and its Covering,' some years ago, in which he incorporated Camper's well-known and philosophical treatise on the Foot. To Mr. Dowie must certainly be given the credit of having again directed attention to this point. Other works have lately been published,—  
'Why the Shoe Pinches,' a translation of Dr. Meyer's work; and an excellent work on 'The Foot and Hand,' by Humphreys, of Cambridge."

On the second charge, while I can produce many valuable documents to bear me out, I shall content myself with one letter from a most distinguished and old-experienced Army medical authority, Dr.

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\* The amount of this resistance was shown by me in a paper read before the British Association, at Cambridge, in 1862, to be 28lbs. with the rigid waist, and under 3lbs. with the elastic one—what relative proportion this resistance bears to the locomotive powers of progression of a soldier, I shall not venture to say, and shall at present leave the solution of this problem to those whose duty it is to preserve the efficiency of the soldier. As this loss on even one day's march must be considerable, what must it be in a long campaign? But I venture to affirm that in proportion to the absence of this resistance the boots wear a much longer time; indeed, from experiments made in reference to this particular point, a saving in shoe leather would be effected, which in the aggregate would amount to no less a sum yearly than £40,000 for the British Army.



David Maclagan, Physician to the Forces, addressed to me, dated Edinburgh, August 4, 1842:—

“ My attention was first drawn to Mr. Dowie’s improvement in the construction of boots and shoes in 1839, when it was submitted to the Royal Scottish Society of Arts, of which I was then a member of Council. After careful examination I was much impressed by the soundness of his views in reference to the anatomical structure of the human foot, and by the success with which he had adapted his boots and shoes to the maintenance of its natural and unconstrained movements.

“ I have since that time had sufficient personal experience in the use of Mr. Dowie’s shoes, as well as knowledge of the result of their use by others, to justify me in expressing the conviction that their adoption in the army would at all times, but especially on a march, materially lessen the fatigue and add to the comfort and efficiency of the soldier.

“ DAVID MACLAGAN, M.D., F.R.S.E.,

“ Physician to the Forces.”

Third. My boots, after a fair trial, by official order of the late Lord Hill, dated “ Horse Guards, June 18, 1838,” and several favourable reports thereon, were “ sealed as an army pattern by command of Field-Marshal his Grace the Duke of Wellington, dated Horse Guards, July 2, 1849.”

The reader will perceive that the period of trials extends over ten years, thus leaving only four years



of my patent unexpired. During this time my boots were much opposed by General Sir George Brown, then Deputy Adjutant-General, who said that *they were too much luxury for soldiers!* They were highly commended by the several reports, and by the report of the Board of General Officers, but the contrary was stated in official letters from the Adjutant-General's Office, and the Report of the Board was falsified in order to prevent the boots being "sealed" as a pattern for the army. This is acknowledged by the Secretary to the Board, dated "Office for Military Boards, Whitehall, 6th April, 1852;" and also by the Right Hon. the Secretary for War, the Hon. Fox Maule, in the House of Commons, in May, 1849. This fact that the report was falsified may be considered in the light of a testimonial in their favour, and that my invention and improvements were good, else there was no need of making any untruthful statement to declare them otherwise. To give the whole of the misconduct of the officials at the Horse Guards and War Office would, however, be incompatible with my present paper. The statement of facts already quoted from the Parliamentary Records is amply sufficient to prove my third charge. Further details will be found at length in the Parliamentary papers themselves, viz., No. 170, 1852; No. 469, 1853; and No. 252, 1854—commencing 18th June, 1838, and ending 24th March, 1854, extending to seventy folio pages.



Before passing on to my next proposition I must not omit to mention two things. First, when my boots were "sealed" as an "army pattern" I had the monopoly of a patent—a very great objection in the eyes of not a few—but the patent has expired some time ago, so that that objection, if it ever amounted to anything, no longer exists. Second, that it has always appeared a strange anomaly to me that the Commander-in-Chief of the Army, or his Adjutant-General, should be allowed to override the Crown, as they have done, by preventing the soldier from wearing my boots; for the Crown, in granting me a patent, pointedly ordains that all in authority under the Crown shall neither hinder, nor molest, nor obstruct me in making and vending my foot-gear, and any subject of the Crown from wearing the same—not surely excluding the soldier. Moreover, when I applied for a renewal of my patent, on the express ground that the Government had wasted ten years of the fourteen given by the Crown, the Attorney-General consented; but the President of the Judicial Committee of the Privy Council demurred, stating that he did not see cause to recommend Her Majesty to grant a renewal, as it might interfere with the military authorities adopting the improvement in the army; and now, when the improvement is public property, the poor soldier continues to be denied its benefit! How can this be reconciled?

The position of the policeman is very similar to



that of the soldier, neither having a mind he can call his own in the clothing of his feet. In other words, neither have the privilege of an appeal to their respective medical officers relative to the cruelties they are called upon to endure in the wearing of improper foot-gear. Is this right in a country which boasts so proudly of its civil liberties? The ear of those who cannot recognize at a distance the heavy, hammering footsteps of the policeman upon the pavement must be dull indeed. Now, what do Government officials mean by all this noisy hammering, practically speaking? Not surely the breaking up of the pavement, and the giving to thieves a timely warning to be off out of sight! What then? The breaking up of the keystone of the arch of the foot. Such at least is the ultimate effect produced. Hence the reason why so many policemen suffer from lameness of this description. Can anything be more discreditable to our metropolitan and other large manufacturing and commercial towns, or to the country at large? Were the Government to give proper foot-gear to this service, and then to attach to the heel of each policeman a weight of twenty-eight pounds, the anomaly would not be half so bad; for in this case the policeman would doubtless "ride at anchor," somewhat to the amusement of more than the "roughs," but then the nation would not be brought in guilty of laming for life a public servant.



Dr. Meyer, in his pamphlet, "Why the Shoe Pinches," objects to the practice of taking an outline of the foot, as I do, and have done for more than thirty years, in measuring. He also misrepresents, in a very unbecoming manner, Dr. Camper's work on "The Best Form of Shoe," which I have translated into English, and fails to acknowledge the writings of A. C. Celsus, and other authorities quoted by Camper, apparently to give a colouring to his own plans and erroneous method of designing the shape of the sole of a shoe. Besides, he indirectly extends very uncharitable reflections towards Dr. Hamilton, Sir Charles Bell, Sir Benjamin Collins Brodie, Bart., Dr. Arnot, and others of the medical profession who have written on the subject in modern times, and to whom I lie under many very great and lasting obligations for information. Such being the character of Dr. Meyer's pamphlet, I feel called upon publicly to give it a formal reply, so far as it enters upon the education and professional duties of the shoemaker.

First. Speaking of the propriety of taking the outline (page 38), Dr. Meyer says: "It proceeds on the principle that there are primary differences in the structure of the feet. This is an error." "For healthy feet the drawing is superfluous: it is sufficient to have the length and breadth." And in a third sentence he adds, "The true form of the foot is never attained by such a drawing. It is



usually taken from a foot enveloped in a tightly-fitting stocking ; and in this case the direction of the great toe is always oblique.”

Dr. Meyer has here fallen into a twofold error. Every sound foot, for example, no doubt has three tripod bearings, viz., 1. The heel ; 2. The ball of the great toe ; and 3. The ball of the little toe. The position of these bearings is, however, very different in different feet. The lines and angles which they form are also consequently different. The breadth may be taken at the little toe, but that does not give its true place upon the sole ; and by overlooking this fact in his design, Dr. Meyer consequently pinches the little toe by placing its tread-bearings too far back, as shown in fig. 10 ; or, as the reader will perceive from the annexed woodcuts, composing the outline of a sound foot (fig. 11), and the outline of the sole of a shoe (fig. 12), both taken from his pamphlet, “ Why the Shoe Pinches,”—the former being in it (fig. 3), and the latter (fig. 22).

The second error has reference to the narrow-toed stocking. From this it appears Dr. Meyer is not experimentally acquainted with right and left and digitated stockings ; and further, with how simple an affair it is for the shoemaker



Fig. 11.

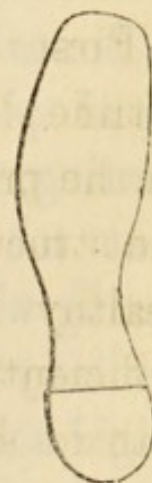


Fig. 12.



to pull the toe of the narrow-toed stocking forward, so as to give freedom to the toes. Query : why did he not invent an inner covering to fit, first, his foot ; and second, his shoe ? Why did he overlook the fact, that if the stocking pinches, as he affirms it does, the shoe itself, however well-shaped, would not afford a relief to the pinched toes ?

Second. The mechanical data on which he bases the shape of the sole are not correct. He says, for example, that a line passing through the heel-bearing and that of the ball of the great toe is in a line with the axis of the great toe and metatarsal bones, and that in walking "*the foot unrols itself from the ground*" along this line. Neither of these conclusions is sound. The former I shall dispose of in this place ; the latter under erroneous method of progression.

When the foot is closely examined from a mechanical point of view, it will be found that each of its numerous bones has its own axis, and that there are not two axes, either parallel or in a line. Again, the bones of the toes and metatarsus have a slight lateral play, as well as a vertical one ; so that, granting, for the sake of argument, that those of the great toe are vertically in a line with the heel-bearing when in one position, then they cannot be so in any other position. Again, I have shown that a rigid sole diverges the axes of the bones of the foot ; consequently, if those of the great toe and its



metatarsus are in a line with the heel-bearing when rigid soles are worn, they cannot be so when elastics are worn, or when the foot is sound and free from injury. But besides this refutation of Dr. Meyer's fallacious theory of the direction of the axes of the bones of the foot, I have shown that in walking the tread-bearings occupy different positions and planes, as shown in the diagrams (figs. 4, 5, and 6); the depth of the arch in one position, for example, being only half an inch, as in the left foot (fig. 5); whereas in another it is fully an inch and a quarter, as in fig. 6. With such differences, the absurdity of the dogmatical and mechanical data laid down by Dr. Meyer for the trade to follow, must appear self-evident to all acquainted with the rudiments of applied mechanics to shoemaking; for were our steam-engines constructed in such a loose, faulty manner, they would soon bring our tall chimneys and princely buildings about the ears of our manufacturing classes.

Third. As to progression, the theory of unrolling the foot in a line from heel to toe, each foot alternately, is evidently the old, oft-refuted, fallacious one — *the cart on two wheels*. How Dr. Meyer should have fallen into this old absurdity is not for me to surmise. In my work on "The Foot and its Covering" I have given a general *exposé* of this fallacy, and it would be superfluous to repeat what I have there said, or even to give an outline of it, as I have



already shown that right lines are the exception, and curved ones the rule, and that the foot does not roll, even when it is laced into a rigid-soled boot, there being a grinding twist on the tread.

Fourth. In reference to Dr. Camper's work on "The Best Form of Shoe," Dr. Meyer says:—"Camper's suggestions attracted considerable attention, but his plans found little or no encouragement, because they were so very impracticable, and, above all, because of the very clumsy form of shoe he recommended. May my little work be found more practical."

Dr. Camper, in his work, does not give the drawing of a shoe which he recommends, as Dr. Meyer has done. He discusses the natural form and proportions of the length of the foot and toes, and in his fig. 8 gives an outline of a sound one in accordance with the best-informed authorities quoted on the subject, as shown, and which I have placed on the title-page of this work; and to show the manner the toes were deformed in his time, he places that outline upon the sole of a narrow-toed shoe, copied from "the latest Parisian fashion," as he tells his readers; and had Dr. Meyer followed the example of his more talented predecessor, of thus placing his sound foot (fig. 3) upon his sole (fig. 22), as I have done (fig. 10), or even placed them beside each other, as in figs. 11 and 12, he would not have fallen into the error of pinching the little toes in the manner he has done.



Dr. Camper further says:—"The Dutch peasantry are in the habit of making a differently-shaped shoe for each foot; that is to say, they always make the sole right and left. They cut it of the form of the sole of the foot, which is most sensible, as it agrees exactly with the natural form of our feet." He also says:—"In regard to ease in walking, and excellence of the article, I have to commend a young master-cordwainer of the Hague." His directions are general, and in reference to the sole he says:—"The sole ought always to be as broad as is possible, consistently with a becoming appearance."

For further information I must refer the reader to Camper's work itself. The above is sufficient to show how contrary to fact Dr. Meyer's statement is, and how unmerited the reflection it casts upon Dr. Camper. If the sole of the shoe, when shaped in accordance with the natural form of the foot, as fig. 11, is to be designated by Medical Authority "CLUMSY" and "IMPRACTICABLE," and the sole of the shoe, when shaped abnormally, so as to pinch the little toes, as fig. 12, is to be termed "in unison with the claims of elegance," as stated in the preface to the pamphlet "Why the Shoe Pinches," as if its author could improve Nature, then unquestionably Dr. Camper is wrong, and Dr. Meyer right. But the very reverse of this being the truth, the conclusion is very different, for it is this caprice of



fashion or false taste in holding up anything and everything but the natural shape of the foot as being "in unison with the claims of elegance," which is the fundamental cause of all the misery now experienced from distorted feet ; and therefore the first step in the work of a thorough general reformation is to do away with this false taste, and thus let well alone, viz., the foot to grow as Nature designed it.

Fifth. Dr. Meyer, in his claims to originality in the form of the sole, which he gives in his pamphlet with so much dogmatical confidence, lays himself still more open to criticism. He should have borne in mind the saying of Solomon—"There is no new thing under the sun." It would not be difficult to prove that since the days of the patriarch Jacob there has not been a single period in which soles shaped according to the natural form of the foot have not been made by shoemakers, and that since the days of Hippocrates medical men have, at every period, in like manner written against the contrary practice of distorting the feet by improper foot-gear. I have already shown how closely the Romans attended to this form, which is evidently that aimed at by Dr. Meyer himself, although he has not, as a shoemaker, been successful in carrying it out. Dr. Camper, as I have already shown, acknowledges the fact in his time as the exceptionary practice, while he asserts *sabots* and sandals were the first kind of foot-gear worn, and that they were shaped in accord-



ance with the form of the foot. Coming to my own experience, the late celebrated Dr. James Hamilton, of my native city, Edinburgh, studied practically the physical training of his feet. He wore thin shoes, broad-toed, so as to afford free play to the toes and tread-bearings. At the instep or waist the sole was reduced to the breadth and thickness of a shilling, purposely to allow the natural change of position to the tripod bearings. To have his shoes always free from perspiration, or anything injurious to health, he had a large stock—some twenty-one pairs—so as to have as many changes as circumstances demanded. And what is more deserving of special notice, this eminent physician, in accordance with the doctrines taught by himself, Sir Charles Bell, and other medical men, used to exercise his feet and limbs daily in all the ways necessary for their proper physical training, so that when seventy years of age and more he walked with the elastic step of a man of twenty, and with limbs that had lost nothing of their symmetry.

Dr. Hamilton's "Opera-sole shoes" (as they were technically termed by the trade) afforded me an instructive practical lesson, for I saw that something stronger and more durable was needed to meet the daily requirements of the general public. Accordingly, after several years' experimenting, and no little expense, I succeeded in the manufacture of the elasticated leather I now use in the waist. To test the durability of this new fabric, I put aside a few



pairs of boots and shoes, which I have still beside me ; and these not only prove the elasticated leather to be as sound as when first used, but also the form of the boots I then made, a form which corresponds to the outline and tread-bearings of the foot, as represented in fig. 3, which is an exact outline of the soles on a reduced scale. Some of the boots thus preserved were not new ones, so that they afford, both to me and those who wore them, tangible proof of the unjustifiable pretensions of Dr. Meyer, when he begins, in 1860, to teach shoemakers how to shape the sole.

In the year 1835 I read a paper before the Royal Scottish Society of Arts, on my improvements, for which they awarded me their honorary medal ; and it is only doing justice to the medical profession of Edinburgh for me further to state that from them I received every assistance and much valuable advice and instruction. Indeed, I owe the form of the soles, as shown in the outline, fig. 3, to one of them at that date, for it was shaped in accordance with mathematical drawings given to me by the late Dr. Walter Adam, son of the distinguished author of "The Roman Antiquities," who first turned my attention to the true form of a sole required by the human foot—a method of drawing that is free from the objection into which Dr. Meyer has fallen relative to the axes of the bones of the foot and the tripod bearings ; and what impressed me very forcibly at the time was an experiment, which the Doctor told



me he tried with a brass hinge at the waist of a pair of shoes, so as to allow his heel to rise, and the instep thus to perform its vertical movement. Of course the experiment was a failure, the articulation of the instep being on the principle of a "universal joint," and not a common hinge. Similar plans had been tried in the French clogs, the hinge being placed under the balls of the toes ; but it was found that the snow in winter and the mud and clay in wet weather filled the opening of the hinge, thus causing the sole to curve more upward at the toe, rendering walking more difficult.

This principle, after fifty years, has been again revived in what is styled the Hythe Boot, with the same objection ; an improvement has been made in this by alternate bands of leather and vulcanized rubber, leaving less opening for snow or mud. Neither of these, however, make provision for the altered position of the tripod bearings, by the arch flattening and the foot elongating, causing friction by internal motion of the foot within the boot, producing blister, chaffing, and foot-soreness.

The late Sir Charles Bell also gave me the outline of his own nude foot, pointing out the true form of sole it required. This drawing was mislaid when I left Edinburgh for London in the year 1839, and I regret to say has not since been recovered, or I should have given a woodcut of it. Before leaving Edinburgh, in the year 1839, I read a second paper



before the above society, which appeared in their printed Transactions of the time, and from which I have taken the woodcut, fig. 8, as already acknowledged. The paper was translated into German and Russian, and amongst my continental customers a large number are German. Dr. Meyer may not have seen my paper either in English, German, or Russian, nor have heard anything about my boots, and therefore I do not blame him for not acknowledging what I have done; but the facts, nevertheless, tell against him, proving that he is a long way behind in the march of improvement; and that he, further, is not sufficiently versed in the history of shoemaking to lay claim to originality of design in the style of the sole. In Dr. Camper's time elasticated leather was not invented—at least, to the best of my knowledge—or I presume he would have acknowledged its merits; and, with regard to the form of the sole, he was too well informed in the history of shoemaking to lay claim to the discovery which Dr. Meyer has done of the requirements of the human foot!

Such is my reply to the errors into which Dr. Meyer has fallen in his work, "Why the Shoe Pinches." *First*, I have shown that his objections to shoemakers taking the outline of the foot are contrary to the requirements of the trade, an outline being essentially necessary to determine the true position of the bearings upon the sole. His remarks under this head in reference to stockings have been



proved contrary to fact, and a long way behind the age. *Second*, His mechanical data for shaping the sole have been shown to be fallacious. *Third*, The doctrine which he teaches, that "the foot unrolls itself from the ground" in the line of the axis of the bones of the great toe and its metatarses, is the oft refuted proposition of "the cart with two wheels," than which it were difficult to imagine anything more ridiculously absurd. *Fourth*, His attack on Dr. Camper's work, on "The Best Form of Shoe," also falls to the ground as untenable and unmerited in the highest degree. *Fifth*, His claims to originality in the form of the sole have been shown to be unfounded, such being an old affair and antiquated, while the form of the sole which he has designed is itself objectionable, inasmuch as it pinches the little toe, and otherwise does not correspond with the drawing of the sound foot which he himself has given. In short, Dr. Meyer must study the history of shoemaking and the internal and external anatomy of the human foot more closely, before he again commences to teach shoemakers "Why the Shoe Pinches."

To cultivate an artistic acquaintance with the natural beauty and functions of the human foot is one of the grand propositions of the present day. Much has been said about the beauty and mechanism of the hand, but comparatively nothing about the foot in either of these respects, although equally deserving of attention. This is all the more to be



regretted, inasmuch as some of the leading characteristics that distinguish man from the lower animals are to be found in the structural economy of his feet, such as his erect position in standing, so graphically described in the oft-quoted lines of Ovid, relative to the formation of man *in the image of the all-ruling God* :—

Whilst other creatures towards the earth look down,  
He gave to man a front sublime, and raised  
His nobler view to ken the starry heaven.

This erect attitude is maintained by the peculiar mechanism of the foot already described under the tripod bearings and function of the instep.

Dr. Humphray has justly observed, in his work on "The Human Foot and Hand" (page 3) that the form of the human foot constitutes one of the great characteristics whereby man is distinguished from the lower animals. As an instrument of support and of locomotion, it excels the foot of any other animal.

It evinces its excellence by enabling man to stand upright in a way that no other animal can do ; and so efficiently does the foot accomplish this, and perform the task of carrying the body, that the hand is set at liberty to minister to the will. Thus is the foot instrumental in giving us an advantage over other animals, and in enabling us to provide the means of defence ; and thus it aids us to carry out those wondrous works which are second only to the marvellous results of creative power.



We are accustomed to regard the hand as the great agent by which all this is attained, and we are apt to forget how much it is indebted to the foot. We do not reflect that, if the foot of man presented no distinguishing peculiarity, the hand, like the corresponding part in other animals, would be compelled to share with it the task of carrying the body, and could therefore not be devoted to the various offices which it is now free to perform. Little right has the hand to say to the foot, "I have no need of thee;" and in page 91 he says, in reference to the "distinctive characters" of the foot:—"Its compactness and strength, the height of the plantar arch, the shortness of the toes, are, like the size of the calf, most marked in the higher members of the human family—in those, that is to say, who are gifted with the highest intelligence. Thus the formation of the foot is found to have a correspondence with the formation of the head, and may, like it, be, to a certain extent, taken, as I have before remarked, to be an index of intellectual as well as of physical conformation of man, which is here exemplified, and which is maintained throughout the frame, as a subject of extreme interest, and as one which has not attracted the attention of anatomists and ethnologists so much as it deserves."

We, on the contrary, of the present age, generally speaking, are by imperfect shoeing destroying the "distinctive characters" of the foot, thereby impair-



ing the original image in which the body was created, morally and intellectually, as well as physically !

In this respect we are obviously far behind the inhabitants of the early ages of the world. This is manifest from ancient history, both sacred and profane. Amongst the Hebrews, for example, and other Oriental nations, much of this acquaintance with the natural beauty of the foot no doubt arose from the sandals they wore, showing off the external anatomy of the nude foot to greater advantage ; for were the same kind of foot dress to become the modern fashion in England, the vast majority in fashionable circles in our own times would feel ashamed to show their feet in broad daylight. How few could say with Solomon, " How beautiful are thy feet in sandals, O prince's daughter ! " or with Homer, in his description of Juno's dress, when she was about to captivate Jupiter, with amongst other things the beauty of her feet, when he says :—

Last, her fair feet celestial sandals grace— !

for we should have to read deformed and ugly feet instead of " beautiful " and " fair " ones. In short, we have only as a thinking intelligent community to make ourselves acquainted with the facts of the case, to become satisfied with the soundness of the proposition and the practical solution it demands of all classes.

In conclusion, have we not now got to an age of the world when distorted feet, from wearing shapeless



and imperfect foot-gear, ought to be allowed to die out a natural death? From the time of A. C. Celsus to the present day, medical men have now and then spoken out against the abnormal practice of shoeing; and it is certainly high time that the medical press of every civilized nation under the sun were advocating with stirring assiduity the claims of all classes to be shod in accordance with their own comforts and the laws of nature, to say nothing of the boasted utilitarian pretensions of the period in which we live. Dr. Arnot, in his *Physics*, already referred to, says:—"It is a whim of unreasoning fashion which holds that the human foot, as given by Nature, is improperly large, and requires to have its growth controlled by the use of tight shoes. Persons who act on this notion often have painful corns and bunions on their feet, and distorted toes, &c., as effects of the pressure; so that the act of walking is rendered a torment. There is the farther evil that the general health and spirits, and the bodily appearance and carriage, are seriously damaged from want of the due amount of walking exercise in the open air." In a note from Sir James Clark, Bart., the eminent physician to her Majesty, dated Bagshot Park, 28th February, 1861, he says:—

"The preservation of the feet in a sound state is of much more consequence to the general health than is generally believed; and there is no doubt that most of the disorders and deformities of the foot are



owing to the erroneous form of the shoes, more especially in early life. No one ought to have corns or twisted toes." In teaching medical men when visiting their patients, Dr. Blundell, in his lectures on obstetric medicine, page 300, gives the following quotation from Dr. Mackintosh's unpublished lectures as a rule, viz. :—" You must be in a comfortable situation yourself, so that nothing may distract your attention : if your shoe pinches, therefore, take it off ; if your feet are cold, warm them ;" and the reason why is manifest, for otherwise the economy of Nature's laws is thwarted.

Again, a most distinguished statesman, who is well known for the shrewdness of his observations on everything, said to me, in reference to our foot-clothing—" We do not get boots to look at : we get boots to walk in." On another occasion, relative to fashionable shoes—" No man can work with his mind or with his body if his feet are pinched." Two maxims which should be household words by all who wear shoes. What said the greatest soldier the world has yet seen—the Duke of Wellington—on the shoeing of the soldier? " What is the first requisite for the soldier?" asked a friend of His Grace one day ; " A good pair of shoes," said the Duke. " What next?" " A spare pair of shoes." " And what then?" " A spare pair of soles." What higher, what further testimony is wanted? The late lamented Prince Consort, in one of his



speeches, said : — “ IT IS OUR BOUNDEN DUTY TO STUDY THE LAWS BY WHICH THE ALMIGHTY GOVERNS THE UNIVERSE.” And the rationale of the precept obviously comes home with telling efficacy to the physical training and clothing of our feet and limbs. And further, it comes home with tenfold force to the cultivation of the intellectual faculties ; for it is now an established fact, that when the feet suffer, the general health and powers of the mind are also impaired. Children and youth make less progress in their education ; apprentices get on slowly in their respective callings ; servants of every kind are unable to do what they otherwise would ; in short, the whole industrial fabric of society, when improperly shod, is out of working order. How great, then, is the responsibility of governments, teachers, and all in authority ! — of shoemakers, of the medical profession, who are the conservators of the public health, and whose bounden duty is obviously to preserve the human foot in its normal beauty against all usurpations to the contrary ! But most of all, how great is the personal interest and public responsibility of LITERARY MEN, more especially those in connexion with the periodical press, who have daily to watch the pioneering efforts being made in every branch of science and art in relation to the welfare of society ; for if suffering from the effects and consequences of improper shoeing, they are neither in a position to do justice to themselves, their sub-



ject, nor to those for whom they write. In their case "distorted feet" may figuratively be read "deranged intellect." No class, therefore, is more deeply interested than they are in the study of the natural beauty of the human foot, and in proper clothing to preserve and protect it in the enjoyment of all its normal functions. For it is only by attaining to this consummation that they can stimulate in the highest degree the general progress of industrial enterprise and domestic happiness.

THE END.