

A practical essay on the club-foot, and other distortions in the legs and feet of children, intended to show under what circumstances they are curable, or otherwise : with thirty-one cases that have been successfully treated by the method for which the author has obtained the King's patent, and the specification of the patent for that purpose, as well as for curing distortions of the spine, and every other deformity that can be remedied by mechanical applications / by T. Sheldrake.

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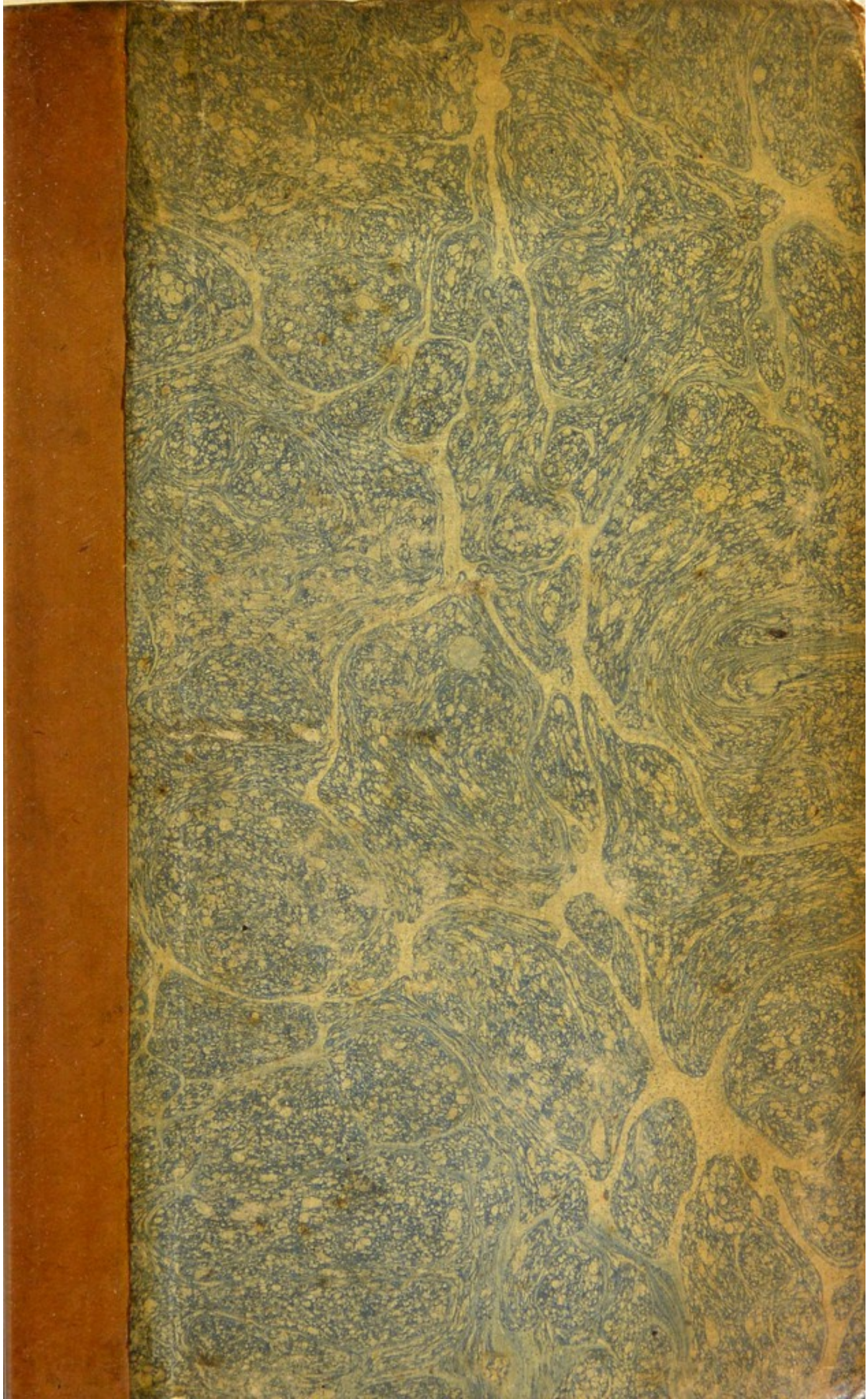
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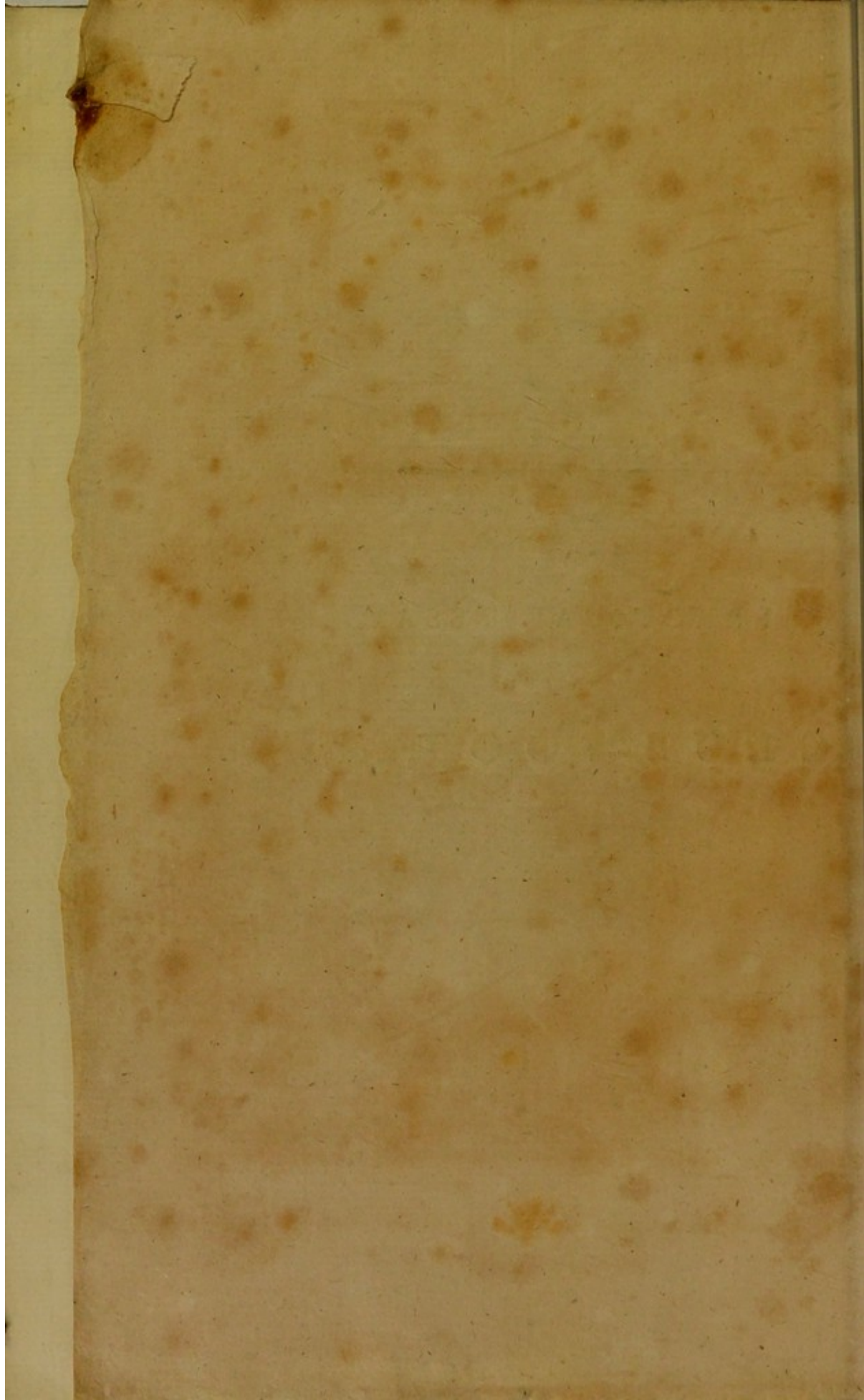
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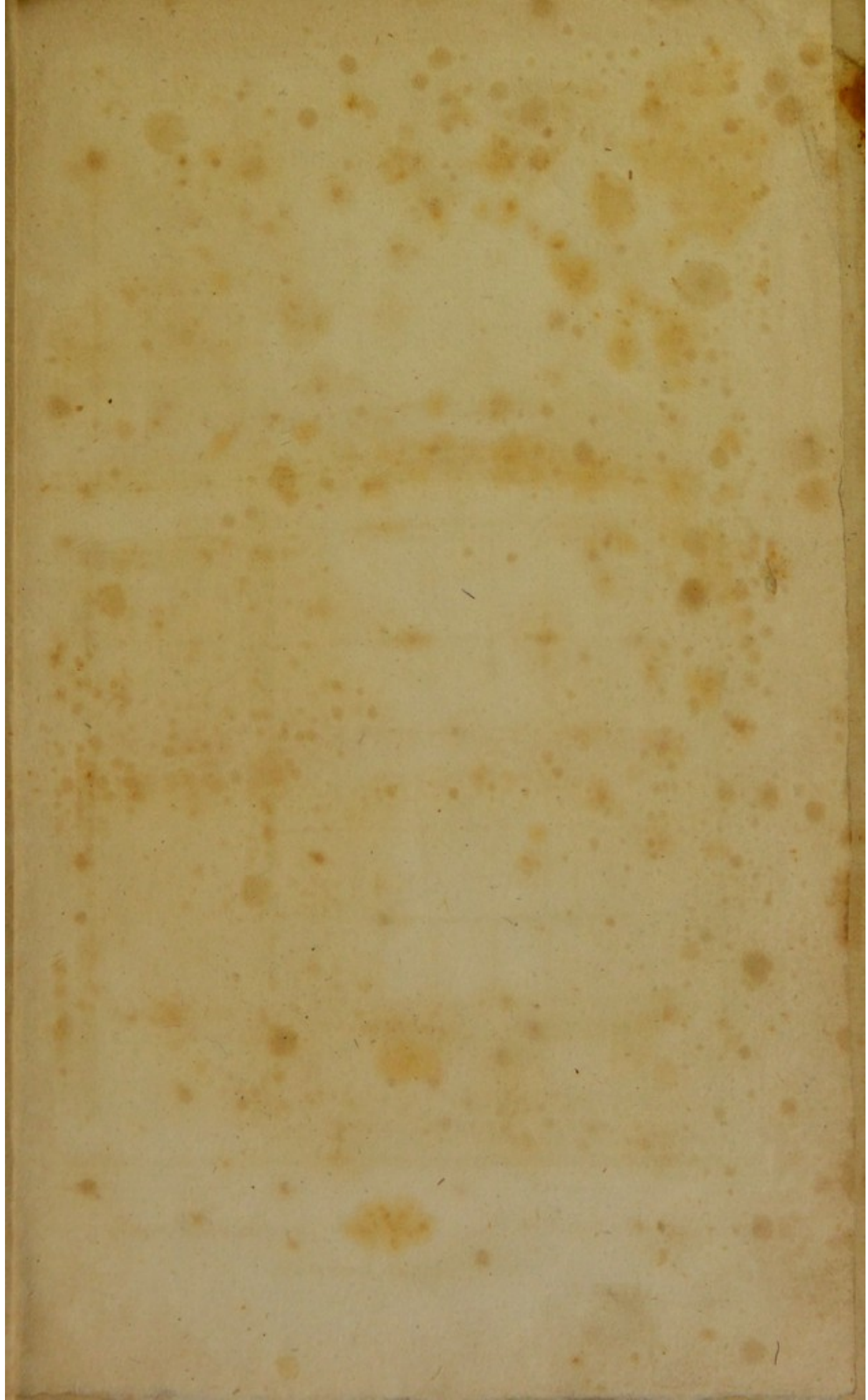
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A
PRACTICAL ESSAY
ON THE
CLUB-FOOT, &c.







Truss Maker to the Westminster Hospital, & Marylebone Infirmary

N° 50, STRAND, LONDON.

A
PRACTICAL ESSAY
ON THE
CLUB-FOOT,

And other DISTORTIONS in the LEGS and FEET
of CHILDREN, intended to shew under what
Circumstances they are curable, or otherwise;

WITH
THIRTY-ONE CASES

That have been successfully treated by the Method
for which the AUTHOR has obtained the KING'S
PATENT,

AND

The SPECIFICATION of the PATENT for that
Purpose, as well as for curing Distortions of the
Spine, and every other Deformity that can be
remedied by mechanical Applications.

BY

T. SHELDRAKE,

TRUSS-MAKER TO THE WESTMINSTER HOSPITAL,
AND MARY-LE-BONE INFIRMARY.

LONDON:

Printed for Messrs. MURRAY and HIGHLEY in Fleet-Street;
MEYLER at Bath; and GILBERT in Dublin; and Sold at
the AUTHOR'S House, No. 50, Strand.

1798.



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TO
WILLIAM LYNN, Esq.
S U R G E O N

TO THE
WESTMINSTER HOSPITAL;

AS A
T E S T I M O N Y
OF THE
F R I E N D S H I P

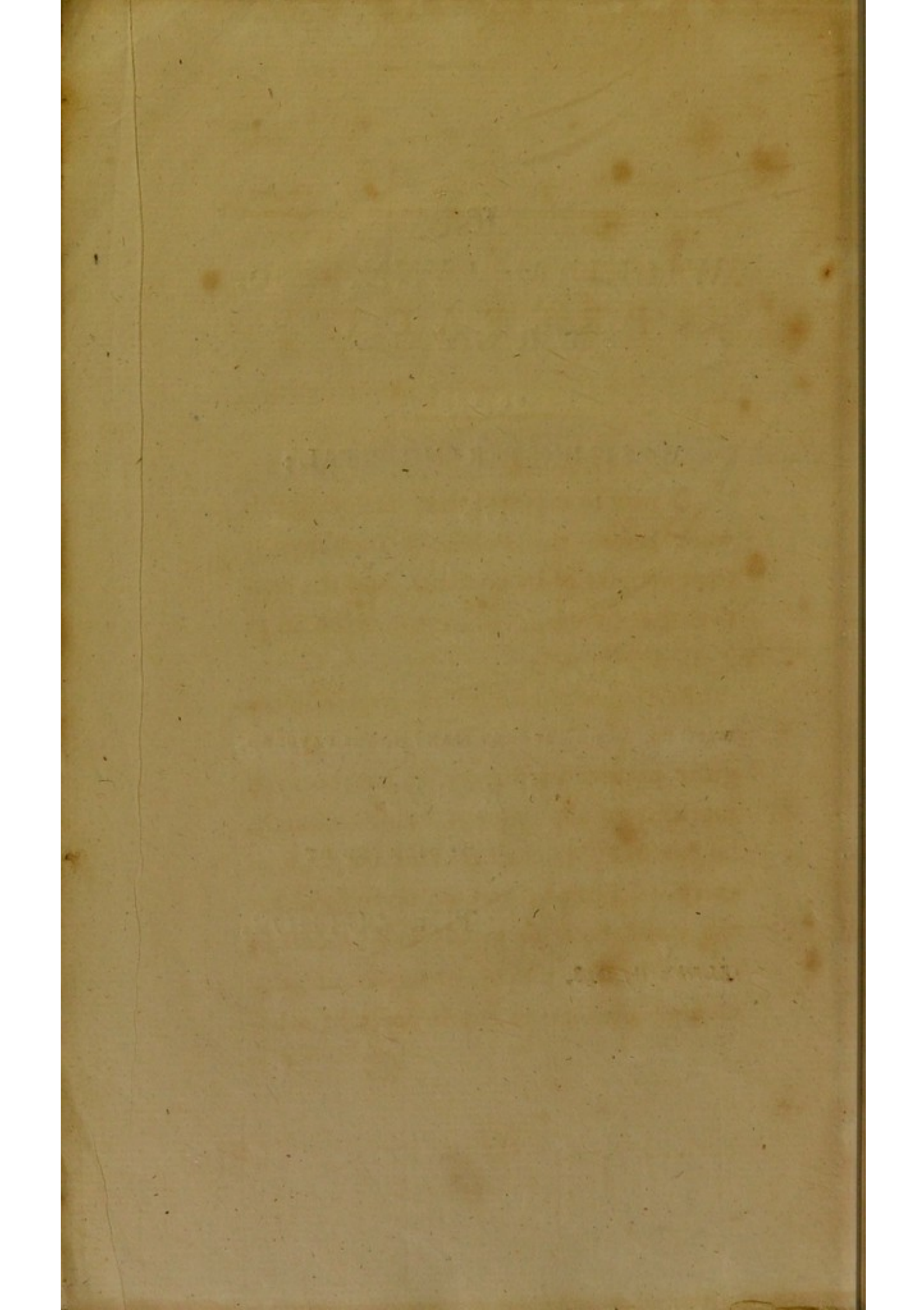
WITH WHICH HE HAS BEEN MANY YEARS FAVORED,

T H I S E S S A Y

IS DEDICATED BY

T H E A U T H O R .

March 25th, 1798.



P R E F A C E.

It may be expected that, in laying this work before the Public, I should give some account of its contents, and the motives that have induced me to publish it.

As the treatment of the diseases it relates to, has never formed part of the regular practice of surgery, it has been, if practised at all, followed indiscriminately, by ignorant mechanics and empirics of every description; and, on no subject, has the world been so grossly and repeatedly duped by the absurd pretences of that class of people; so much so, that who-
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ever

ever shall attempt to publish a rational and successful method of treating these diseases, will render essential service to a very numerous class of patients, if he succeeds; but he cannot expect to do so, unless he can establish his facts beyond the possibility of contradiction, and explain them so as to avoid the imputation of empiricism.

The situation in which I was bred, having given me numerous opportunities of seeing these diseases, in all their varieties, and of seeing they were always treated in a way from which little benefit was derived, naturally directed my mind to the subject; and the nature of my professional education and pursuits, during the last twenty years, having enabled me to consider them in a way that had escaped the observation of others, and to make numerous experiments, in hopes of being able to cure them; I at last succeeded in some cases, in
an

an eminent degree. An account of these cases was published several years ago; and the attention that publication excited, procured me numerous opportunities for pursuing my enquiries on this subject, the result of which will be found in the ensuing pages.

In my observations on distortions of the legs of children, I endeavoured to explain what had been attempted by others, in order to ascertain, with more accuracy, what might be hereafter done by myself. The present work is a continuation of, and perfectly distinct from, and not merely a new modification of the former.

It contains the history of some cases which were placed, with unlimited confidence, under my care, and in which I was, *therefore*, perfectly successful. And, as I knew I must encounter the scoffs of incredulity,

dulity, the doubts of scepticism, and the insinuations of those who might be envious of my success, I had the precaution to request, that they might be shewn to Gentlemen in the profession of Surgery, whose knowledge, judgment, and integrity, were unquestionable, and who would, therefore, always ascertain whether what I attempted was rational, and what degree of success attended my efforts. The unbiassed opinions of these gentlemen are added to the history of each case, and will form a mass of incontrovertible evidence to the truth of the facts.

In the course of practice of some extent, I have been consulted by persons at a distance from London, who from various circumstances, limited their stay in town, to time that was insufficient to effect a perfect cure; by others who could not come to London at all, I have been sent for to
7 their

their residence, where my stay was necessarily limited. In such cases, after having performed the most essential operations, it was necessary that I should leave the patient to the care of those, who I may, without arrogance, say, had not experience equal to my own. In some of these cases, the ultimate success has been complete; in others, it has not. I have related these cases with candour; and, as I prove that in all those which were under my absolute controul, the success was complete, I may expect it will be believed, that in such of these as were not completely cured, the failure is to be attributed to those circumstances that prevented me from attending them.

As it is now certain that, under some circumstances, these diseases may be perfectly cured, it is equally certain that, under others, they are incurable. It is always

desirable to ascertain, *a priori*, what probability there is, that we shall succeed in any case we may undertake. As I have reason to believe, that many of these cases are curable, at later periods in life than has been commonly supposed by those who would believe that any of them might be cured at all, I have endeavoured to shew, by an enquiry into the progress of ossification in the distorted parts, and the difference between the form and action of the muscles, in the natural and in the diseased state, under what circumstances these diseases are curable, or otherwise. Those, whose knowledge or information enable them to understand this part of the animal economy, will determine, how far I have succeeded in my undertaking, in this respect.

The method of cure must be continually varied, according to the different circumstances

stances of each case; for this reason, it could only be practicable to explain the general principles, which, I hope, has been done in the most satisfactory manner. In order to obtain a patent, it is necessary to specify, in the clearest manner, every particular of the invention. It is, perhaps, not easy to explain a subject like this, so as to make it consistent with legal definitions; but as it was necessary this should be done, I not only consulted gentlemen eminent in the law, but some medical friends, in whose opinions I have much confidence, and who had seen some patients under my care: in consequence, I had the satisfaction to be told by the former, that every thing had been done that the law could require, and by the latter, that every part of the invention was explained, so as to be perfectly intelligible to a professional man. This being the case, I thought it most advisable to print the Specification complete, as the best illustration

illustration of the method of cure, which it is the object of this essay to recommend in these, and every case of distortion, to which it can, with propriety, be applied.

Such are the contents of the work I now submit to the Public, with a full reliance that, whatever degree of notice it may be found to merit, it will finally obtain from that tribunal, to which every attempt to be useful to mankind, will always be applauded or censured, as it deserves.

T. SHELDRAKE,

No. 50, Strand.

POSTSCRIPT.

HAVING employed near twenty years on the subject of this Essay, and brought it to the state in which I now lay it before the Public, I may be excused for feeling a degree of honorable anxiety, that no mistake or misconduct of any one who, being totally ignorant of the subject, shall *venture* to practise the method of cure now recommended to notice, may be attributed to myself. It is necessary to mention this, because there exists a person, so insignificant, as to be, personally, beneath all notice, and so atrocious as to impose, when an opportunity offers, himself upon the incautious, as the author of my works, and even deny my existence, when by so doing he can hope to substitute himself in my
stead ;

stead ; as the following, and many other instances I could produce, will shew.

A Gentleman, to whom I am well known, recommended a patient with distorted feet to be put under my care. The father told him he had done so. At the end of twelve months, the child was no better, and, upon examination, the surgeon found the means that had been used so different from those he had seen me apply in similar cases, that he required a meeting, at which, to his great surprize, he found not myself, but a person of the same name, that he had never before heard of. This *honest fellow* was immediately discharged, and the child is now under my care.

A Gentleman in Dublin had sent his son to London, to be placed under my care ; he afterwards requested a friend, who was coming over, to call on me and see the child.

child. This Gentleman was led, by an advertisement, to suppose I had removed to a different part of the town. Upon application there, he could hear no account of his friend's child, and was told, there must be some unaccountable mistake, as there was no other person of the name in London. Upon referring to his pocket-book, he found my address, and the mistake was rectified.

The first was a fraud on the patient, for sake of the profit that might be derived from the case; the second was mere villainy, without even that motive to excuse it. The perpetrator has taken uncommon pains to induce me to chastise him publicly, in hopes of deriving some advantage even from that disgraceful kind of notice; but as I know his principles and motives, I shall not gratify them any farther.

Having mentioned these circumstances, I shall only request, that those who may wish to apply to the author of this work, will particularly attend to the address on the Title-page, &c. and observe that in whatever other part of the town they may find the same name, they will find a person who is totally ignorant of the subject, though, perhaps, not unwilling to take advantage, like those I have already mentioned, of any mistaken application to him.

AN

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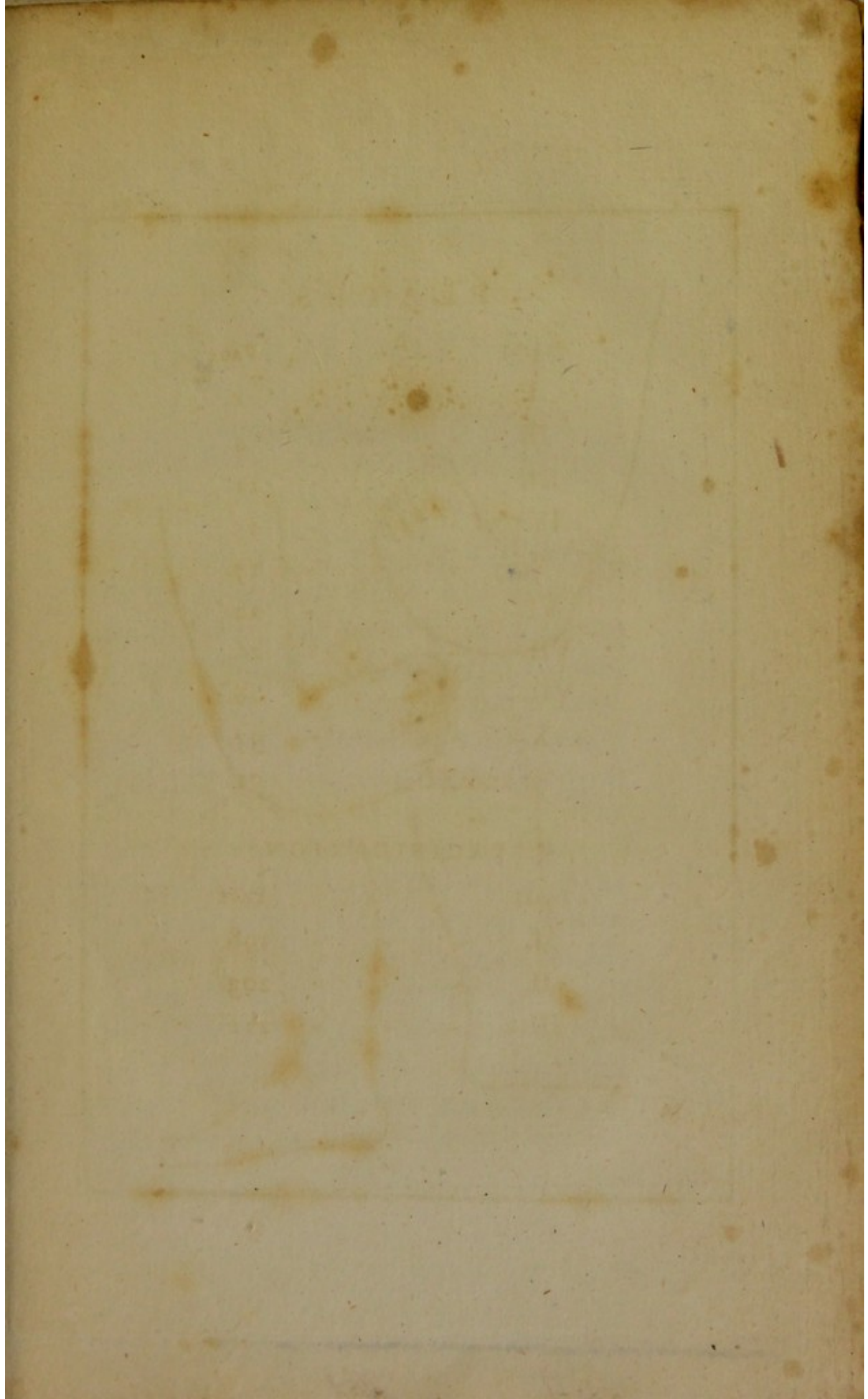
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AN
ESSAY
ON THE
CLUB-FOOT, &c.

CASE I.

May 1st, 1796. A Son of — WELLS, No. 40, Monmouth Street, was born with two club-feet: the next day he was taken to the Westminster Dispensary in Gerrard Street, and, by Mr. FORD, recommended to me. The bones of the left leg were perfectly straight; the heel drawn upwards; the astragalus drawn inwards, so much that the inner angle could not be felt, and that part of it that should have been the outside of the foot was nearly at the bottom; the os cuboides was much distorted, with respect to the astragalus; and the metatarsal bones distorted in the same degree, with respect to the cuboides and cuneiform bones. The gastrocnemii and tibialis posterior were permanently contracted to such

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a degree, that the foot was perfectly rigid. The right foot only differed from the left, by being something more flexible. The appearance of both is correctly represented in the annexed Plate, *Fig. 1. and 2.*

May 11th, I began my operations; and proceeded uniformly and regularly, according to the principles I have elsewhere described, without any untoward circumstance, till July 8th, when I took off my bandages; the feet were then as represented by *Fig. 3. and 4.* There was no appearance of the original malformation, nor any appearance of tendency to return to it; I therefore considered the cure to be complete, and sent the patient to be examined by Mr. FORD, from whom I received the following note.

‘ Mr. FORD presents his compliments to
 ‘ Mr. SHELDRAKE, and has had great satisfaction in seeing the child of Mr.
 ‘ WELLS, who appears to him perfectly
 ‘ cured of the distortion of his feet.’

‘ Golden Square,

‘ July 12th, 1796.’

As

As this case was taken up so soon after the birth, and had been treated with complete success, in Mr. FORD's opinion as well as my own, it appeared a proper one to determine what danger there may be of a relapse, in such cases, after the feet are apparently cured. To ascertain this point, I directed that he should be brought to me in three months, after I had discharged him. It then appeared, that no permanent distortion had taken place; but, in consequence of the child's efforts to use his legs, from weakness in the capsular ligaments of the foot, and want of power in some of its muscles, there was a considerable tendency to the original distortion. I could, without difficulty, place the feet in their natural situation; but if left to themselves, the continual exertions of the child, in learning to walk, would, in time, have produced a permanent distortion, similar to the original deformity: I therefore took him again under my care, and at the end of two months, discharged him to appearance perfectly well; nor has he since had any relapse. At the time I am writing

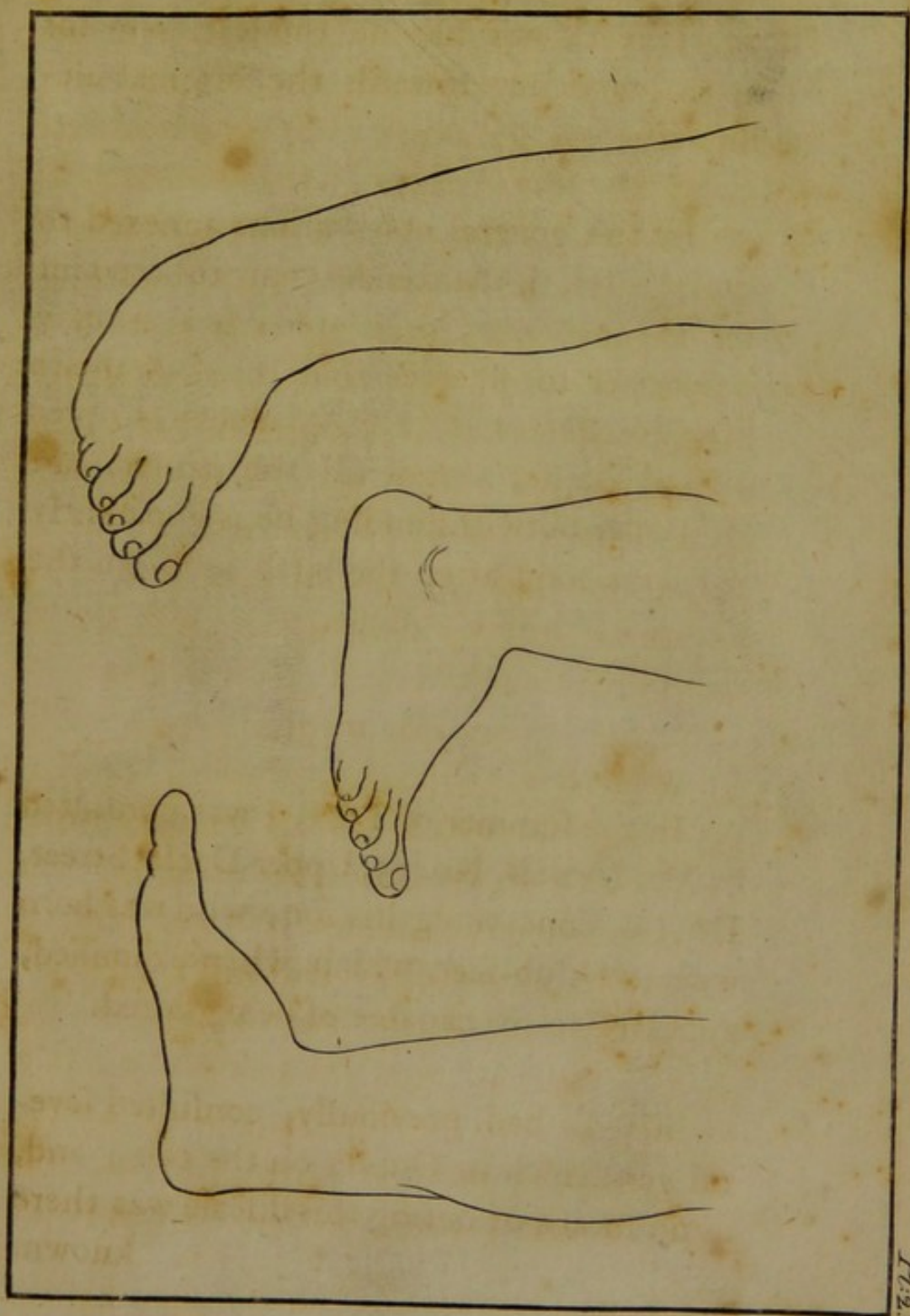
this, he is ten months old; he stands firmly on his feet; nor has he the least remains of, or tendency towards the original deformity.

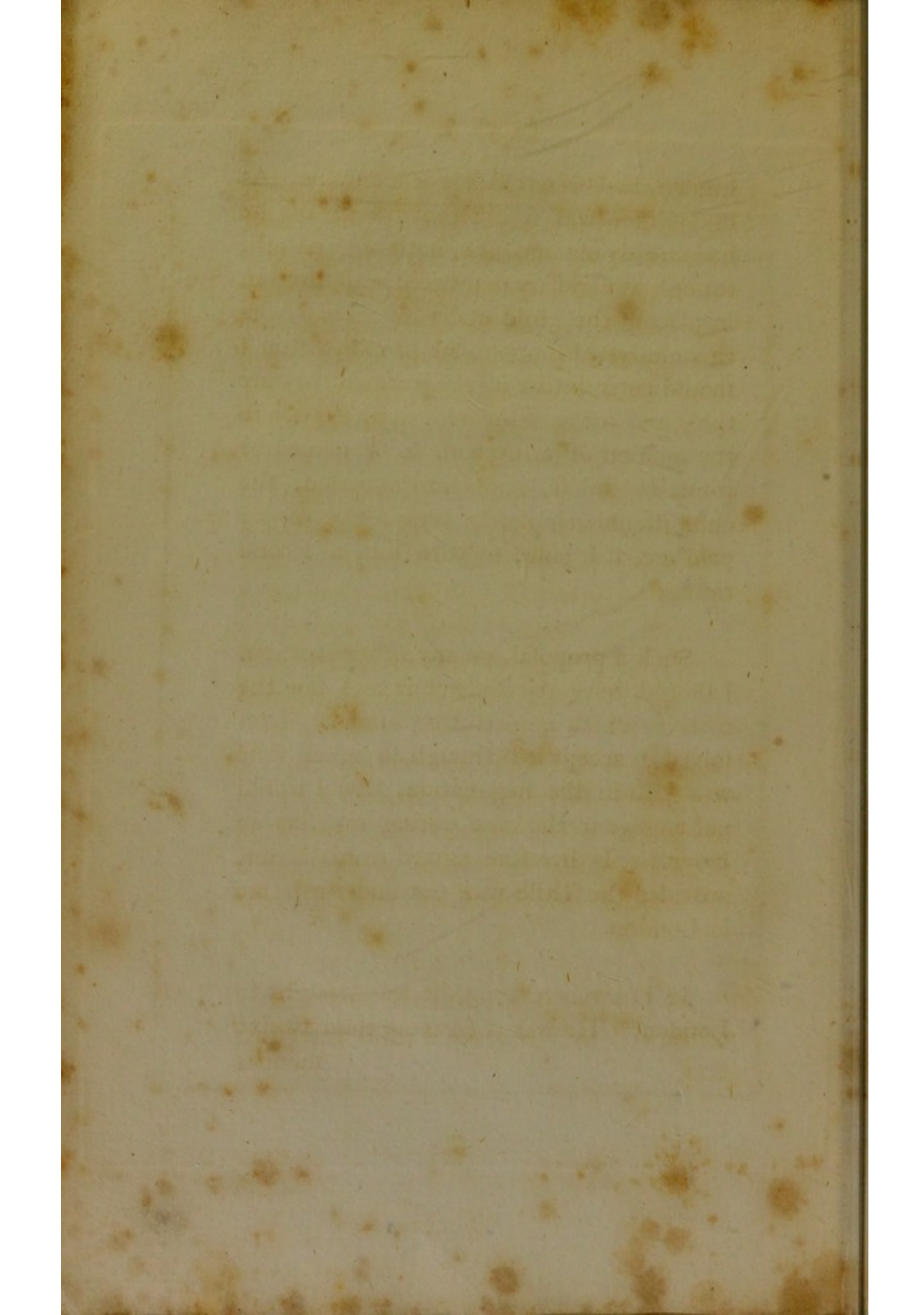
In the general observations annexed to these cases, I shall endeavour to account for this tendency to relapse: *here* it may be proper to observe, that this case shews how necessary it is to attend closely, to prevent a relapse, almost till the patient can go alone, notwithstanding he is apparently cured as soon after the birth as is in the nature of things possible.

C A S E II.

In the summer of 1795, I was consulted by Mr. LYNCH, No. 55, Upper Dorset Street, Dublin, concerning his son, who was born with two club-feet, which, when examined, appeared to me capable of being cured.

Mr. L. had, previously, consulted several gentlemen in Dublin on the case; and, as no means of curing this disease was there known,





known, had been told it was incurable. As my opinion was so different from those he had already obtained, he, naturally enough, thought it necessary to proceed with caution, in placing the child under my care : from this motive, I suppose, he proposed that I should enter into a legal agreement to cure the child for a stipulated sum, subject to the opinion of a surgeon, to be named by himself; and if, at a future period, the child should relapse, to return the money paid me, if I failed to cure him a second time.

Such a proposal, on any other occasion, I should have rejected; but as I saw the motives which induced him to make, I resolved to accept it; though so much time was lost in the negotiation, that I would not engage in the cure during my stay in Ireland: I therefore agreed to his terms, provided the child was put under my care in London.

In December, 1795, he was brought to London. He was then more than twelve months

months old ; his feet were nearly alike, and were perfectly rigid ; one of them is exactly represented in the annexed *Pl. II.* My operations were immediately begun. The child's health soon began to decline, it was said, from change of climate : Mr. WILSON of Bedford Street was, on that account, desired to attend him ; and we were soon convinced, that his ill state of health was occasioned by every kind of misconduct in his nurse. To such a length was this carried, that none of Mr. W's directions were attended to ; and we saw him verging towards the grave, without a chance of rescuing him, unless he was previously placed with another nurse.

This no one was impowered to do ; and as much time was necessary to obtain such authority from his parents, it was agreed to suspend my operations till he could be removed, and his health be, in some degree, restored.

He had been so much reduced by ill treatment from his nurse, that it was the
end

end of March before he was sufficiently recovered for me to attend him. I then recommenced my operations, and every thing went on favourably, till his feet were perfectly reduced to their natural form. When I saw the measure was proper, I desired Mr. LYNCH to have the child examined, according to his own proposal. He, for that purpose, referred us to Mr. PEARSON of Golden Square, with whom I had, at that time, no personal acquaintance; and who, after examining the child, gave the following opinion.

‘ Golden Square, July 30th, 1796.

‘ I have examined the feet of Master
 ‘ WILLIAM LYNCH, this day, and have the
 ‘ satisfaction of attesting, that the de-
 ‘ formity is so far removed, that the child
 ‘ walks evenly and firmly; nor should I
 ‘ have remarked any particular deviation
 ‘ from the natural appearance, if I had not
 ‘ previously known his situation.

‘ I am of opinion, that the child will
 ‘ enjoy the perfect use of his feet, and that
 ‘ no

‘ no appearance of the former curvature
 ‘ will remain, when the child has acquired
 ‘ more strength. Proper attention, for a
 ‘ certain time, will be absolutely necessary,
 ‘ in order to give security to the advantages
 ‘ he has gained.’

‘ JOHN PEARSON, *Surgeon.*’

It was with much satisfaction I received this opinion from Mr. PEARSON, as it exactly coincided with that which I had previously given of the case. I then desired Mr. LYNCH to determine whether he would take the child home, with such instructions as I thought necessary to give for his future safety ; or leave him in London, where he might be under my observation : he very properly chose the latter.

I was then going a journey, which would prevent me from seeing him almost two months. The only circumstance that required attention was want of power in the peroneii muscles, and which could only be obtained by keeping the feet bound, for a length of time, in a proper position, as will be more fully explained in my general observations.

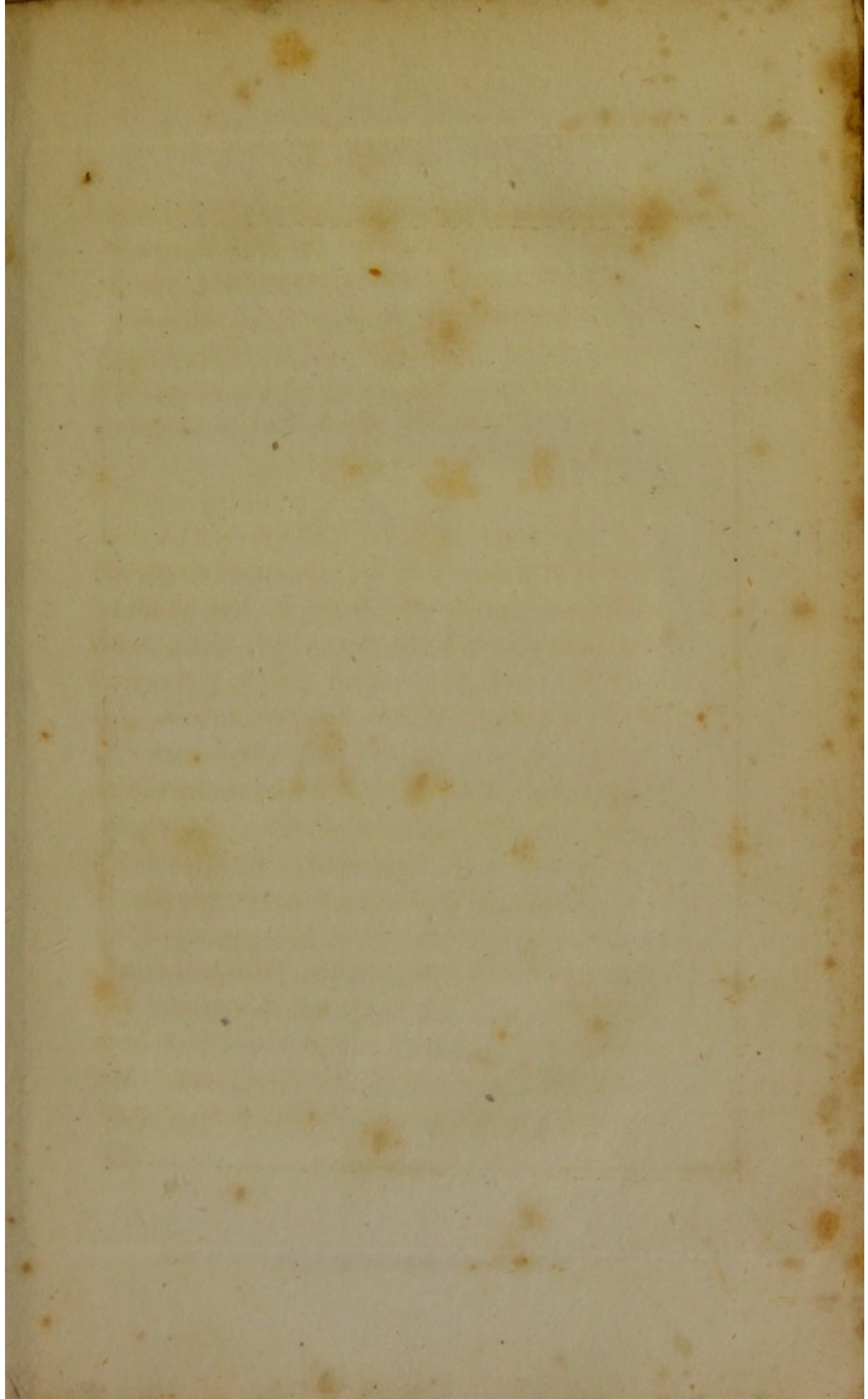
observations. The means I use for this purpose are simple ; the nurse had continually seen me apply them ; she had been remarkably careful of the child, and was willing to do every thing in her power to serve him : this was, therefore, a fair opportunity to determine, how far it would be safe to leave a child, after his feet were reduced to the natural form, and before they had acquired their full strength, to the management of a person, unacquainted with the true state of the parts : as the means to be used for keeping them well are so simple, that most people who see them applied are apt to suppose themselves able to do it effectually, I, therefore, after giving her every instruction that was possible, left him in her care, with as much confidence as the nature of the case would admit.

When I saw him, after my return, it was evident the feet were weaker, and farther from their natural state than they were three months before ; I therefore took him again under my care, and in

less than a month, again brought them into the state described by Mr. PEARSON. He continued mending ever since, till he became perfectly well.

I have annexed a view, in its present state, of that foot which had been previously drawn when deformed.

The general circumstances of this case will be accounted for in another place; here, I would infer from it, the necessity of attending to the feet of children, who have not been cured at the earliest period of life, *after they have been perfectly reduced to their natural form*, and until they can walk, in every respect, firmly, without any assistance, or possibility of relapsing. I would, likewise, infer, that there is little probability, that this attention can be effectually given by any, who are not professionally and practically acquainted with the subject. It will not, perhaps, be advancing too much to say, that if this child had been removed from my care soon after Mr. PEARSON saw him, he would have relapsed into



Pl. 3.



into the same condition, however careful the nurse or parents might have been to prevent it; and that relapse would have been imputed to the imperfection of my method of cure; but as he is, it is a compleat proof, that this deformity may be perfectly eradicated.

C A S E III.

A DAUGHTER of Mrs. JONES, Rush-Green, Lewisham, was born with one club-foot, and, by Mr. DAVIES, Surgeon, at Lewisham, was referred to me.

November 8th, 1796, when she was about two months old, this child was put under my care. The foot was, in some degree, flexible, and exactly resembled the annexed figure (*Pl. III.*) but the most remarkable circumstance of this case was, the situation of the foot, with respect to the leg, as the astragalus formed a most acute angle with the bones it was articulated with, insomuch that if the child had then been placed on its feet, the end of the fibula would almost have

touched the ground. My usual method of treatment was pursued ; but, from the inconvenience of bringing the child to me in town, it was almost three months before the foot was so far well, as to enable me to discontinue my attention.

As every circumstance of this case was favorable to the attempt, I resolved to ascertain, whether there was any danger of relapse, when these feet had been cured in early infancy, and left without bandages, before the child was of age to walk. When the foot seemed perfectly well, I took away all the bandages, and it appeared to retain its position, and all its powers, as well as the other foot ; but at the end of a fortnight, it appeared to relax a little : I, therefore, applied bandages, to secure it in its proper position for another month : they were again removed, and it was more than a month, before any tendency to relaxation appeared. Bandages were again applied for two months, and removed a third time : the child was then able to stand, and walk imperfectly when held ;
she

she stood as evenly and firmly on this, as on the other foot; but after some time, when not standing, the foot seemed to tend a little towards its former position; I therefore finally determined to keep it properly bound, till the child walks alone, towards which period she is advancing, as fast as any child of her age can be expected to do.

Cases like this, where only one foot was affected, are best calculated to prove what can be done towards a perfect cure; because the foot which has not been affected, and in the natural state, would be perfectly similar, will always afford, by comparison, a certain proof of the progress that has been made. This case seems to prove, that though such deformities may certainly be cured in a short time, during early infancy, it will often be necessary, and therefore always prudent, to keep such feet restrained to their natural position, till the patient is able to walk alone. From whence this tendency to relapse arrives, will be discussed in another place; I shall, therefore,

therefore, refer to the general observations on this deformity, for farther information on the subject.

As Mr. DAVIES saw this child occasionally during the progress of the cure, I have added his opinion on the subject. I have, likewise, given one view of the foot, before it was cured, and another representing its present state (*Pl. III.*)

‘ The above case, so accurately described by Mr. SHELDRAKE, was one of the most complete of *club-foot* that ever came under my observation ; the perfect cure of which must speak highly in favor of the mode of treatment made use of in remedying this dreadful deformity. The child, from being a cripple, now makes use of that foot, in every respect, as well as the other ; and will, I doubt not, walk as free from lameness, as if it never had been affected. Having witnessed the whole progress of the cure, it is but justice to say, the means applied appear to me the best adapted, the most certain,

‘ and





‘ and expeditious in their effect, of any
 ‘ I have ever seen or heard of.

‘ M. DAVIES.

‘ Lewisham,
 ‘ August 2d 1797.’

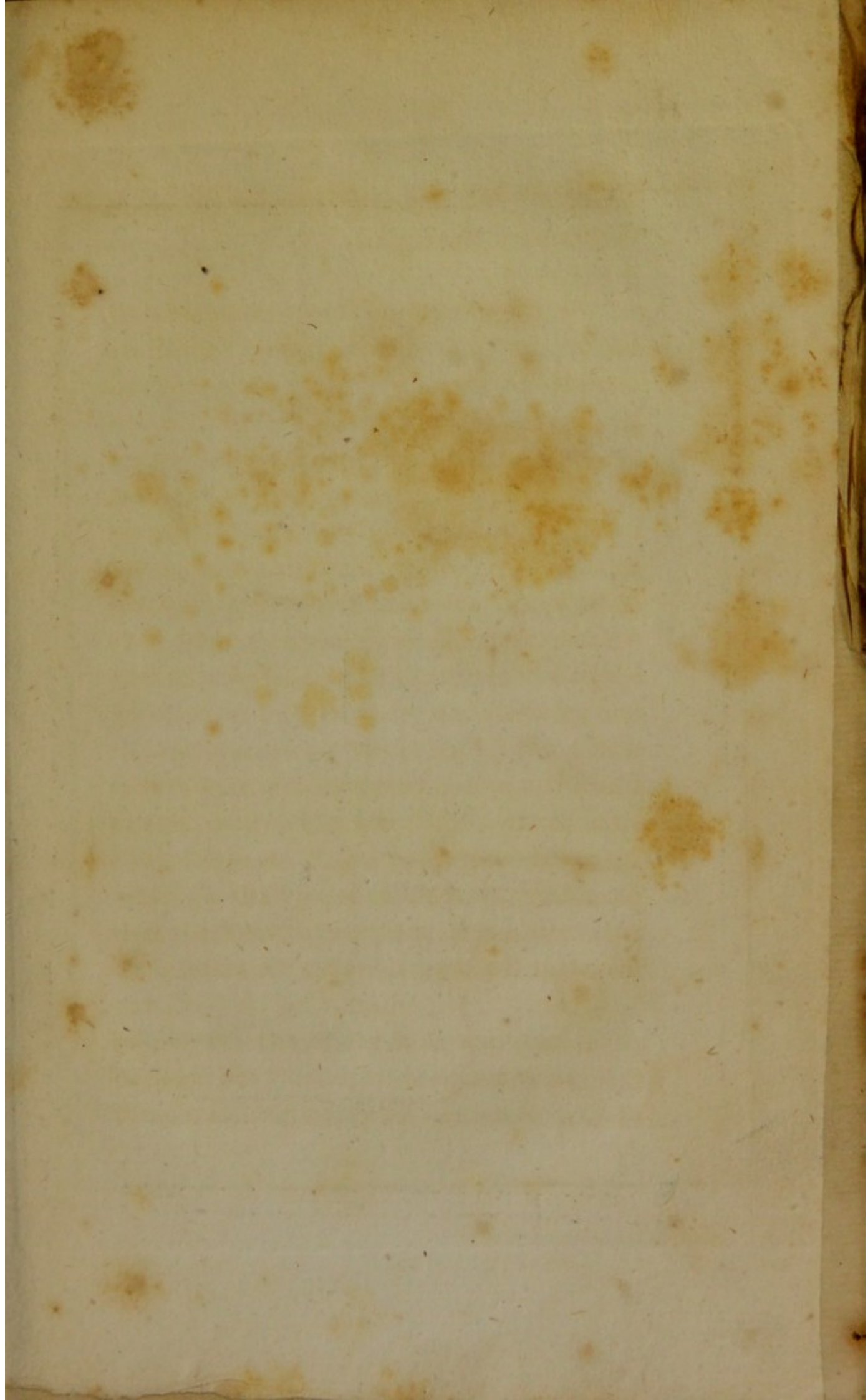
C A S E IV.

February 13th, 1797, Mr. PORTER,
 Surgeon, Tottenham-Court Road, desired
 me to see the Daughter of a Gentleman in
 his neighbourhood, who was born with
 two club-feet. The child was a few days
 old; (the appearance of both her feet is
 correctly represented in the annexed *Pl. IV.*)
 both were, in some degree, flexible, but
 the right was the most rigid; the defor-
 mity was principally confined to the bones
 of the tarsus; the astragalus, particularly
 of the right foot, formed a most acute an-
 gle with the bones of the leg, infomuch
 that the cavity between them could be
 compleatly felt on applying the finger; the
 os cuboides, &c. likewise formed an acute
 angle with the astragalus, and the cavity
 between *them* was equally perceptible; but
 there was little distortion in the toes. The
 left

left foot was similar; but not so much deformed as the right.

As there was no reason to doubt of success in this case, the child was fully confided to my care. As my usual method of treatment was followed, and no inconvenience occurred during the progress of the cure, it is only necessary to add, that in about two months, the feet were perfectly reduced to their natural form; but as there was an evident necessity for continuing the use of bandages, they were applied for two months longer. At the end of this time, the feet seemed perfectly well; the bandages were therefore discontinued. Soon afterwards, she was inoculated for the small pox, from which, in due time, she recovered; but, in about two months, shewing occasional signs of weakness, it was determined to continue the bandages till she was able to walk alone.

I have added a representation of the feet, at the present time, and the opinion of Mr. PORTER, who saw the child, occasionally,





caſionally, during the time of my attendance.

‘ SIR,

‘ Having been witneſs to the cure, as
‘ above related, which you have given with
‘ correctneſs, I hold it incumbent on me,
‘ to acknowledge your ſuperior judgment
‘ in the management of deformity, ariſing
‘ from miſſhapen bones. Indeed it would
‘ be injuſtice to your ſkill, did I not de-
‘ clare, I ſhall prefer your direction and
‘ mode of treatment, to any perſon I have,
‘ as yet, ſeen or heard of.

‘ I am, Sir,

‘ Your very humble ſervant,

‘ ROBERT PORTER.’

‘ Tottenham-Court

‘ Road.

C A S E V.

A GENTLEMAN in the county of Clare,
was deſirous of putting under my care, one
of his ſons, who was born with diſtorted

D

feet.

feet. From the account transmitted to me, I believed they were curable; and, as insuperable obstacles prevented him from coming to London, it was at length agreed, that I should meet him in Dublin, stay with him a stipulated time, and then leave him, with such instructions as could be given for his future security.

In consequence of this determination, I first saw him, August 13th 1796. He was then about two years old; a remarkably strong, healthy child; and so active, it was with much difficulty he had been kept from walking till my arrival. His feet were so much turned in, that the soles lay completely against each other their whole length. If he had been permitted to go on his feet, in a short time, the external angles would have been on the ground, and the feet every way proportionably distorted. They were both very rigid; but the right, both in point of form and rigidity, was much worse than its companion. The annexed figures, (*Pl. V.*) perfectly represent their appearance at this time.

I immediately began to reduce them, by the process I have already described in other cases ; and proceeded so much more rapidly than I expected, that before the end of two months, the feet were perfectly reduced to their natural form. They were easily kept in that form, by the instruments I applied for that purpose ; and in this condition he could walk about with much activity, either in the go-cart, or holding by the hand of an attendant ; so that no doubt could be entertained, that he would recover the perfect use of his legs, if due care was taken to preserve him in the state I had now placed him.

I cannot sufficiently regret the circumstances that forced me to lose sight of this child, before he was placed beyond the possibility of relapsing towards his former state. But it was necessary I should return ; he could not be sent with me ; all that could therefore be done, after having placed him in a situation much better than his family expected to see him, was to give the best instructions that were practicable, to enable

his attendants to preserve the advantages that had been gained.

It must be remarked, that as the age of the patient, the degree of the deformity, and the limited time I was to stay, were all unfavourable circumstances. I was stimulated to make every exertion possible, consistently with those circumstances, to effect a cure: I therefore proceeded, as rapidly as I could with safety, to reduce the feet to their natural form; and had the satisfaction to succeed, without any inconvenience, in less than two months. But this proceeding left the feet peculiarly weak; the muscles had not gained their natural power; it therefore required particular attention to keep them in their proper position, till that strength was obtained. Having provided for this attention, as well as our relative situations would admit, I was permitted to take my leave.

Upon comparing this case with Master LYNCH's it will be evident, that the greater deformity, as well as more advanced age of
 5 the

the patient, were unfavourable circumstances; yet the event in each was the same: the feet were reduced to their natural form; nothing farther was necessary (to use Mr. PEARSON's expression) than certain attentions, to preserve the advantages that had been gained. Master LYNCH was permitted to remain under my observation, till those attentions were no longer necessary, and he became perfectly well, and had the complete use of his feet, in every respect: this child was removed from my observation; of course the subsequent attention was to be paid by those who had, no doubt, equal inclination to do him justice, but certainly not equal experience with myself. Could he have been permitted to remain with me, there is no doubt that the cure would have been perfectly complete; but, at present, I have no authority to say it is so. I have since been informed, he continues to walk with the instruments I supplied him with; but his feet are not so perfect in appearance as they were at the time I left him. The annexed (*Pl. V.*) represents the original state of

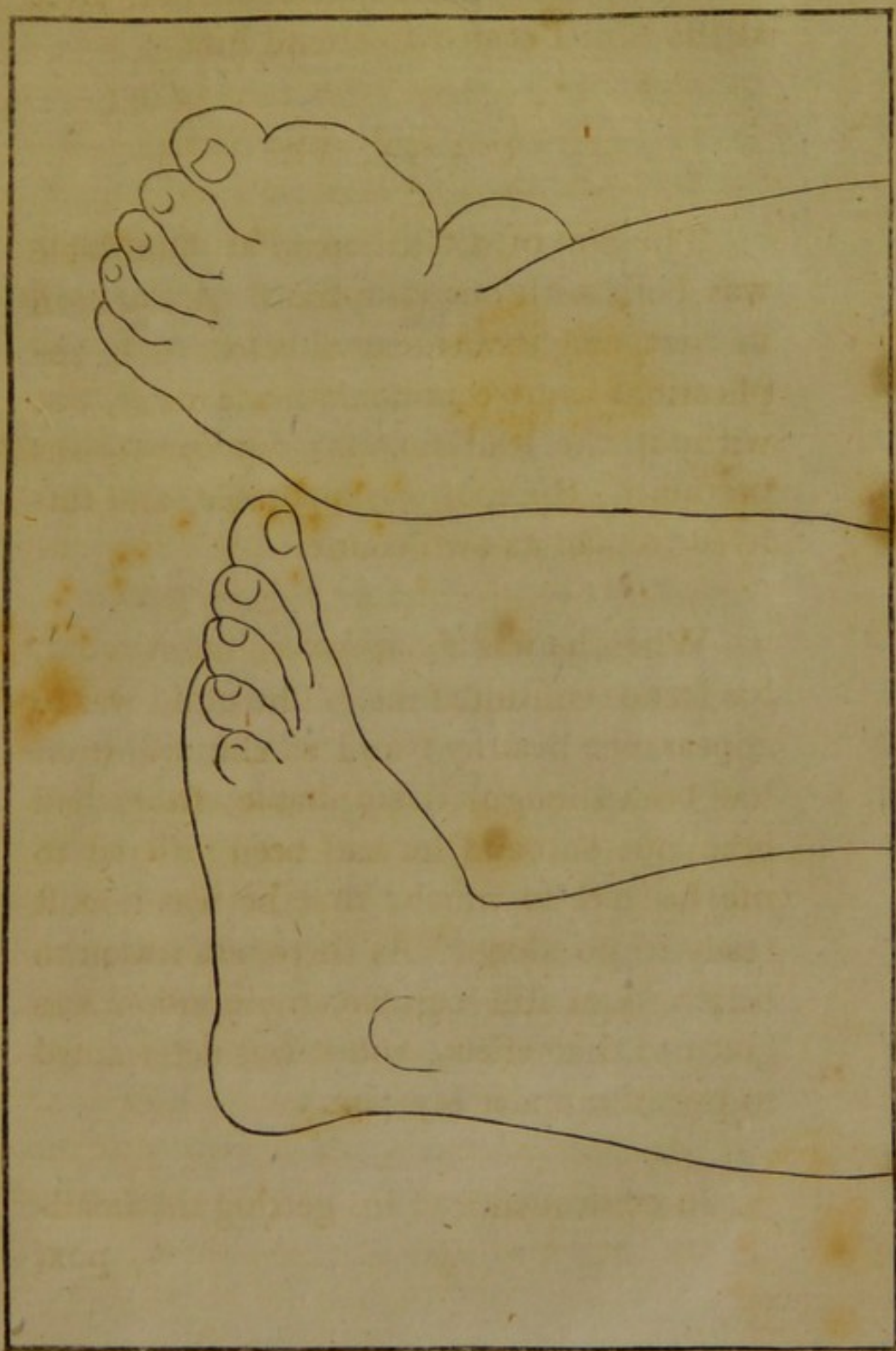
of the disease, and the appearance of his feet at the time I ceased to attend him.

C A S E VI.

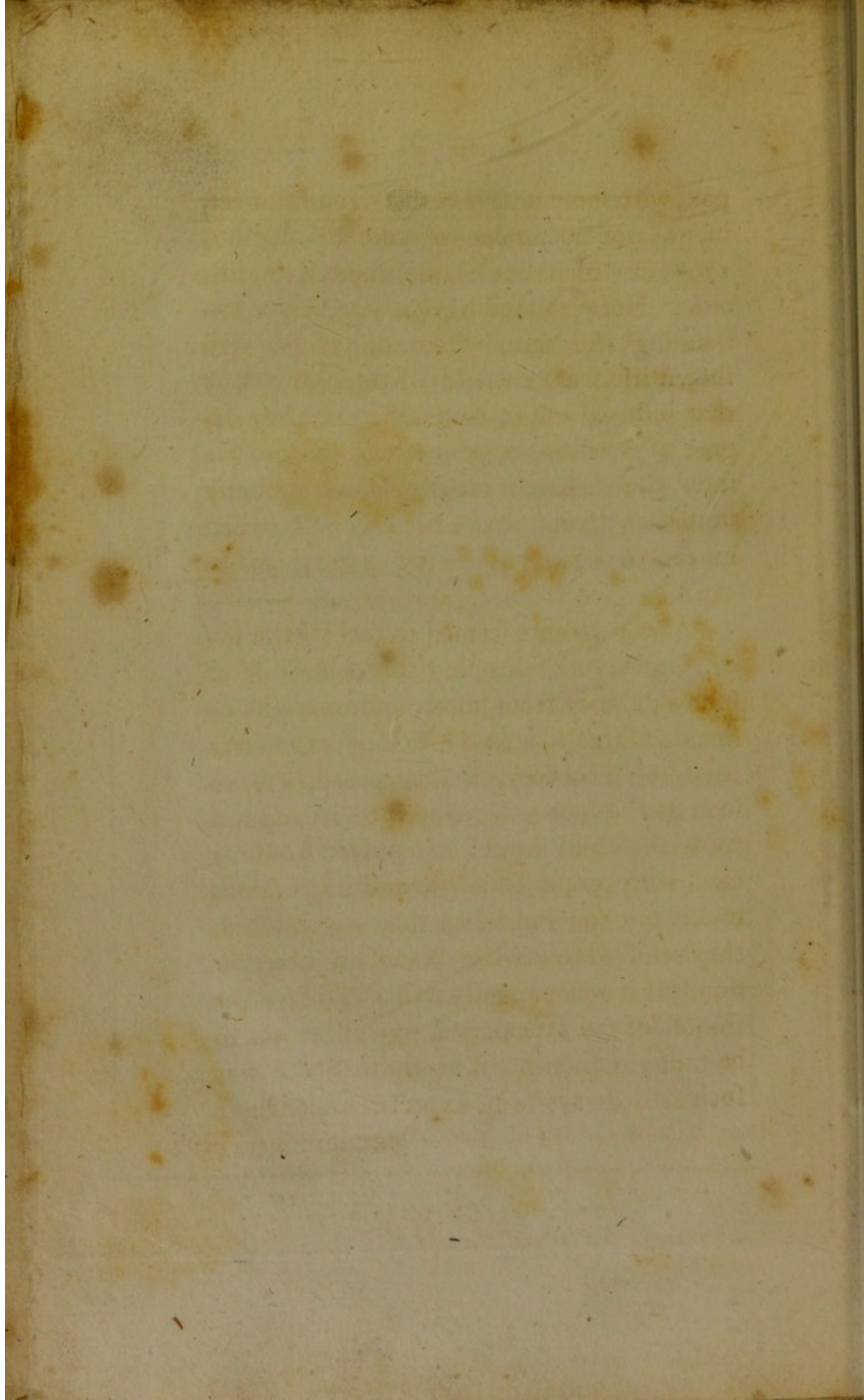
The Son of a Gentleman at Dunstable was born with one club-foot. A Surgeon in that neighbourhood directed such applications as are commonly made use of, but without the least success; whence it was presumed, the foot was incurable, and suffered to take its own course.

When he was about sixteen months old, his father consulted me. The child was to appearance healthy; and as the distortion had been thought irremediable, shoes had been put on, and he had been suffered to use his feet so much, that he was almost ready to go alone. As there was reason to believe him still curable, my opinion was given to that effect, and it was determined to put him under my care.

In consequence of his getting the small-pox,



Pl: 6.



pox, with some unfavourable circumstances, he was not put under my care till April 2, 1796; at which time he was nineteen months old. Notwithstanding his age, notwithstanding the scrophulous disposition had shewn itself after the small-pox, in a way that induced me to think the necessary degree of pressure *might* produce disagreeable fores, the cure went rapidly on, without any unpleasant circumstance till May 25th, when his foot was reduced to the natural form.

As the parents seemed to feel all the inconveniencies of keeping this child long at such a distance from home, and were unwilling that I should attend him longer than was absolutely necessary, it was agreed, that so soon as the foot was reduced to its natural form, the child should be removed from my care, with proper bandages and instructions to keep it so; but when that was effected, they resolved to leave it under my observation, till it was perfectly well. To save the trouble of my attendance, the child was to be brought to me. The consequence was such as is always to be expected under these circumstances;

circumstances ; I had no controul over the nurse ; the parents were at a distance, and she brought the child whenever she thought proper ; which instead of once or twice a week, as I directed, was once in three or four weeks, and at others once in as many months ; in the intermediate time, she did with him as she thought proper. If any thing is to be thought surprizing in this case, it is, that any benefit could be derived from any mode of treatment so followed ; yet the foot continued to preserve its form, and the child obtained the use of it, though by no means so perfectly, and so soon, as if it had been properly taken care of.

When he was finally removed from my observation, the foot had perfectly regained its natural form ; he stood and walked as well upon that foot as on the other ; but when he was not standing upon it, there remained a little debility in the peroneus longus, which I have always seen removed by continuing the bandages. Directions were given to that effect, and the foot is now well.

Every

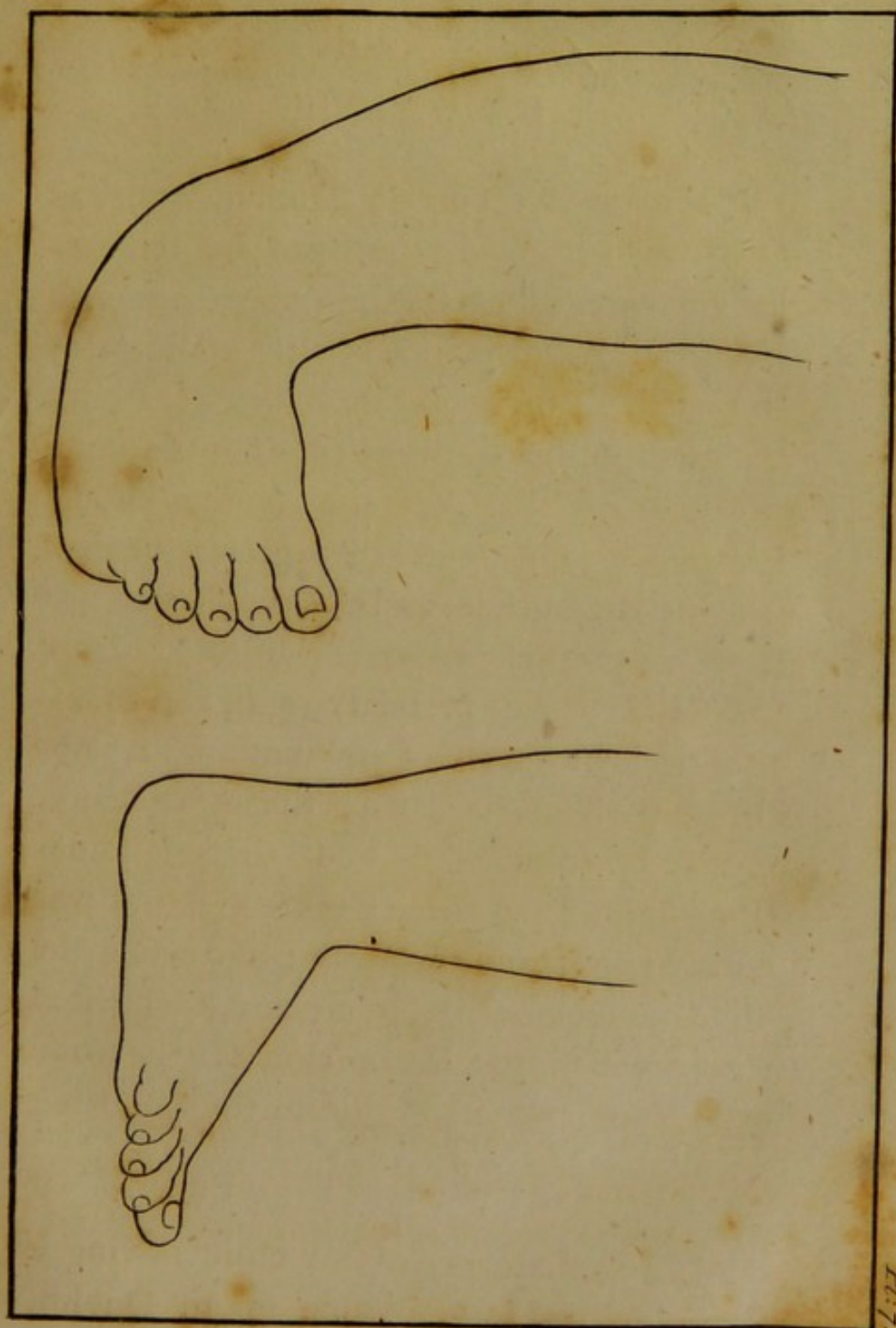
Every one who sees adults with club-feet, is sensible that the legs, as well as the feet, are less than the legs and the feet of people of equal size, who do not labour under that deformity; and if a man has one club-foot, *that* leg is always smaller than the other: whence it has been argued, that this disease is originally a malformation of all the parts, and therefore, not to be remedied. This question will be fully examined in another place; it is here to be observed, that this child was large of his age; and as there was an evident difference in the size of his legs at the time he was put under my care, I ascertained, by measurement, that the distorted leg was half an inch less in circumference than its fellow. At the time I lost sight of him, they were exactly the same size.

I have annexed two views (*Pl. VI.*) of this leg, one in its original, the other in its improved state.

C A S E VII.

DURING my visit to Dublin, 1796, a Gentleman from Wexford put his son under my care. The child was above a month old, and had the right foot considerably distorted. The bones of the leg were strait; but the foot bent inwards, so that the superior part of the astragalus, which should have been joined with the leg, was perceptibly on the outside, and the whole foot was exactly as represented in the annexed Figure (*Pl. VII.*): it was perfectly rigid, and to appearance, incapable of any motion. As nothing particular occurred during the cure, it may be sufficient to add, that in something more than three weeks, the foot was reduced to its natural form; and when the child was removed from my care, I requested the parent to give his opinion of what had been done, which he did in the following terms:

‘ In consequence of my child having a
 ‘ turn in his foot, I came up to Dublin,
 ‘ from





' from Wexford, and applied to Mr. SHEL-
 ' DRAKE, the 7th of September, who under-
 ' took to cure it. I now certify, that in the
 ' course of twenty-three days, he made a *per-*
 ' *fect* cure of it. The annexed, No. 1, is the
 ' draft of the child's foot when I applied to
 ' him, and now the foot is as the draft,
 ' No. 2. And, during the whole time it
 ' was under his care, I can testify, that the
 ' child was not in the least pain, nor never
 ' was disturbed more than if dressing or un-
 ' dressing.'

' Signed, &c.

' Dublin,

' 30th September, 1795.'

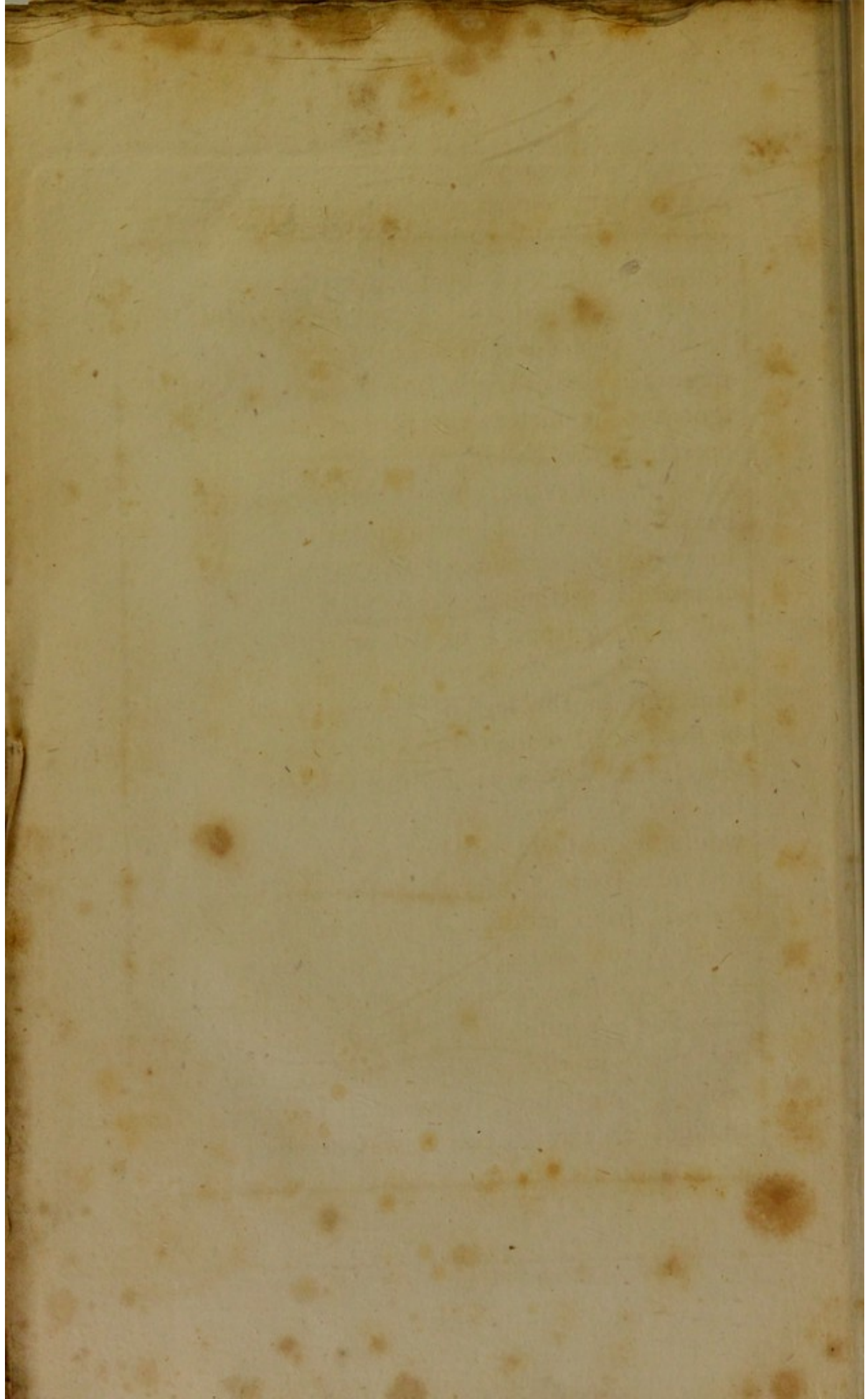
It is incumbent on me to add, that
 when I ask any Gentleman for a written
 opinion on such an occasion, I wish it
 should convey his unbiassed sense of the
 case. Such was my conduct on this occa-
 sion; but it is necessary to add, that the
 expression, a *perfect* cure, must be understood
 to mean, that the foot was perfectly reduced
 to its natural form in that time. There
 was remaining that degree of debility in
 the muscles, which always does remain,

and requires attention for some time afterwards to remove. As it was inconsistent with my situation, as well as his, that the child should remain *so* long under my care, it was agreed, that I should give bandages and instructions to keep the foot in order, till it was out of danger of a relapse. I did so, requesting that, if any untoward circumstance should happen, I might be informed of it, in order to remedy it if possible; but as I have never heard of it since, I have good reason to presume the child perfectly recovered.

C A S E VIII.

IN August, 1797, Mr. KENNY, Usher's Quay, Dublin, desired me to see one of his children. It was then three months old; and had been born with the left foot clubbed, as represented in the annexed (*Pl. VIII.*) It had been put to nurse in the country, and from neglect, reduced to the lowest state of existence: it was covered with a cutaneous eruption, and had many large sores in different parts of the body. Had such an ob-
ject





ject been presented to me, in the ordinary course of business, I should have refused to do any thing with him, until his health was re-established; for, as there seemed to be little probability that he would live, it might, in case of death, have been said, by ignorant or malevolent people, that my operations had hastened, if not actually occasioned that event. But as my stay in Ireland was necessarily limited, and, in case his health was reinstated, there was no other chance of getting his foot cured, Mr. K. was very desirous I should make the attempt. As there were two large sores on that part of the leg my bandages were to be fixed on, I requested to know, from the Gentleman who attended the child, if he thought the necessary degree of pressure would be productive of bad consequences? to which I was answered in the negative. I then, from motives of personal safety, asked if the eruption I saw was not the itch? in answer to which I was told, Mr. — said it would come to be the itch, if not cured in time. These answers, and other circumstances, convinced me that caution, on every account, was necessary; I, there-

I, therefore, proposed that the child should be shewn, to ascertain its present condition, to any eminent surgeon in Dublin; that it should then be put under my care, I engaging, during my stay, to reduce the foot to its natural form; and when I had done so, the child was, upon my requisition, to be shewn to the Gentleman who had previously seen him, and upon his confirming my opinion, my attendance was to be at an end: but as I well knew there was danger of such a foot, under these circumstances, relapsing, I was to leave a proper bandage, with instructions necessary for his security. This plan was agreed on, and the necessary steps taken in consequence.

I immediately began my operations, having due regard to the feeble state of my patient. By the care and skill of Mr. —, he gradually recovered his health; and, by the process I have already detailed in other cases, in about six weeks the foot was perfectly reduced to its natural form. I then requested, that the examination, previously agreed on, might be made; but Mr. K. declared,

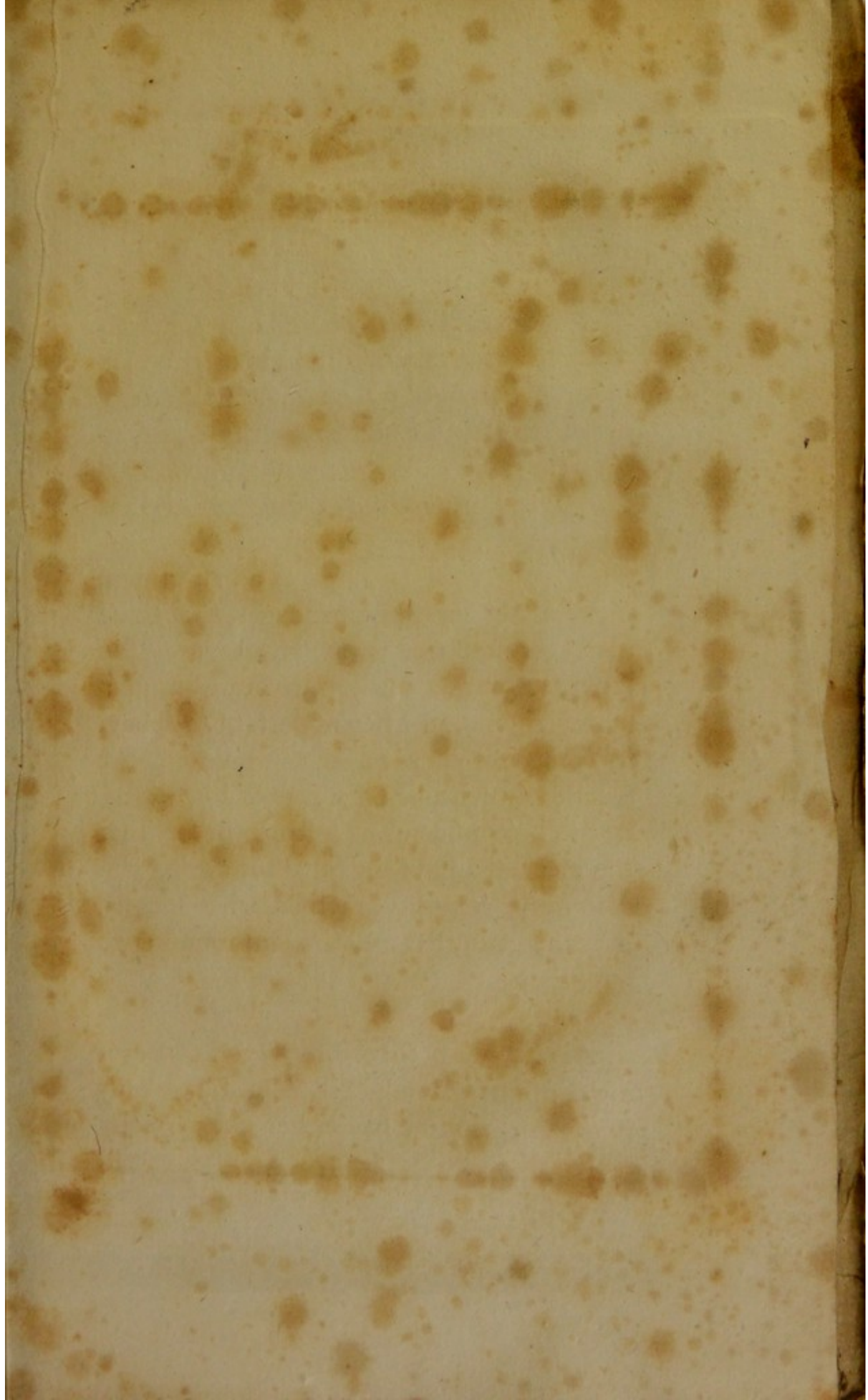
clared, *he* thought it unnecessary, as he was perfectly satisfied with *my opinion*. I continued to see the child, occasionally, for a fortnight longer, when I took off all my bandages, and made a drawing, to represent the *appearance of the foot at that time*. As I had not lately seen Mr. K., though frequently at his house, I wrote to inform him of my intended departure, and requested an interview, which he deferred to the last hour of my intended stay in Dublin; and then, to my great surprize, constituted himself judge of the case, declared he was afraid the child might *relapse*, and, in that case, he should send him to be under my care in London.

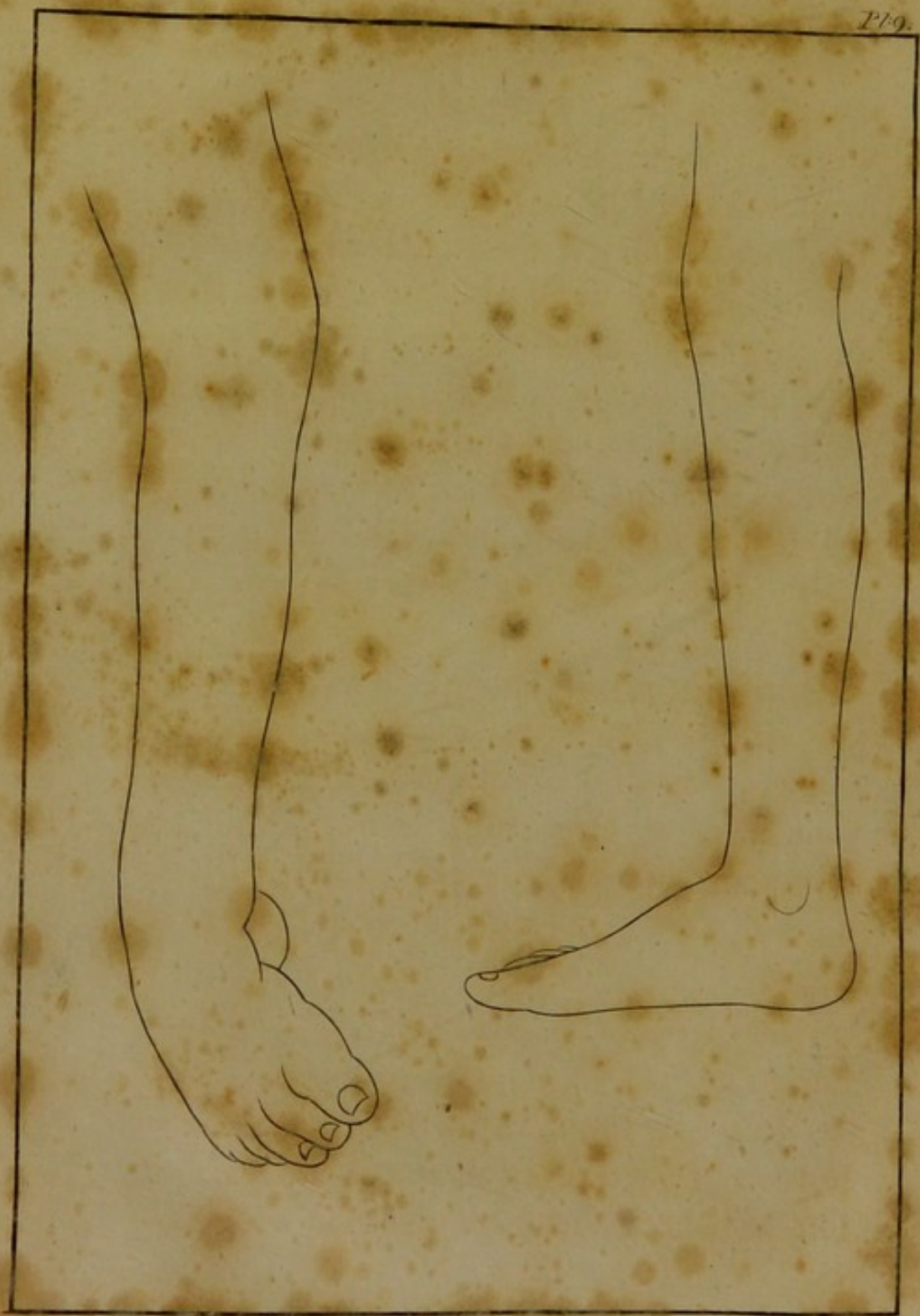
On my afterwards pressing him, by letter, on the subject, I received evasive and contradictory answers. 1st. Mr. K. said, the foot was not then well. 2d. The *nurse* said, the foot is growing better; and another boot, as he is pleased to call it, will compleat the cure. And at last, *five months after my leaving Dublin*, Mr. K's opinion was formally transmitted to me, stating, that he
 7 thought

thought the child's foot was not then well.

It will easily be seen, that I have no means of ascertaining the facts of this case (after I lost sight of it) in a satisfactory manner. It will therefore be sufficient to observe, that as it got well in as short a time as any other child of the same age has done, notwithstanding there were two running sores, each as large as a half-crown, immediately under the bandages, that those bandages produced no inconvenience to the child, and that those sores healed as soon as similar ones, in different parts of the body, in consequence of medicines given by the Gentleman who had the care of his health, it is to be considered as a strong proof, that the method I have invented for curing this deformity, may be practised with success, in many cases that are very unpromising to appearance.

As I have no positive information concerning the present state of this child, I have only to observe, that he has either got perfectly well,





well, by keeping the foot bound as I directed, or that, in consequence of neglecting that precaution, he has relapsed, in some degree, towards his former situation. If the wretched condition I first saw him in is considered, and if it is considered too that he was continued with the same nurse that brought him into that situation, his recovery might justly be called a miracle: but whoever reflects on the circumstances of Mr. K. evading the proposed examination, while I was present, and even not chusing to send me, in a satisfactory and regular manner, till after the expiration of five months, the opinion of the Gentleman who was to examine him, will conclude with me, that the child continued well for some time after my departure, and then, from mismanagement, or other causes, has perhaps deviated, in some degree, from that situation.

C A S E IX.

July 12, 1797, Mrs. PAWSEY, Mary-le-bone Street, consulted me about her son, of whom she gave the following account.

count. He was three years old, was born straight, and had been healthy, in every respect, till the age of fourteen months, when he had a severe fit of illness, and, in consequence, was so much debilitated, that he seemed to have lost the use of all his limbs. From this condition he recovered gradually, except that a small degree of weakness remained in his right foot: this increased, and the foot progressively turned inwards, till it became as represented in the annexed (*Pl. IX.*) She was advised to try the common leg-irons, which she procured to be made by a relation of mine. No benefit was derived from the use of them; and after repeated alterations, during eighteen months, he candidly acknowledged, he could not make them do better; and as no benefit had been derived from the use of these things, *he* knew of nothing else that could be of service to the child. She then consulted Mr. CRUIKSHANK, who recommended her to me.

At this time, the foot was not only distorted, as represented in the Plate, but
both

both the knees were bent inwards, in consequence of distortion in the foot. The foot, however, was the principal object of attention; in something less than two months it was so far reduced to its natural state, that it could be placed in the natural position; from which the second figure, in the annexed Plate, was drawn: the knees were likewise attended to, and, in five months, were perfectly restored to their natural state; the foot, however, remains extremely weak, and must be so a long time before it recovers its natural powers. This is one of those cases which prove, that much deformity, and of the worst kind, may arise from circumstances apparently trivial. It proves too, that the application of the things commonly called leg-irons, is of no use in these cases, except to amuse the parents, by seeming to do something to relieve, while the disease may proceed, almost as rapidly as if left to itself: for there can be no doubt, that if a proper method had been adopted at first, the foot might have been cured in a few months, and the knees not have been distorted; but, from the wretched management of this

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case,

case, during so long a time, the foot was so much debilitated, that it will require the constant attention of a year or more, before it can be perfectly restored to its natural state.

C A S E X.

IN July, 1797, Mr. FARR, Surgeon, at Dunstable, in consequence of having seen the child of a Gentleman at that place, who had been under my care, (vide Case VI.) consulted me about a patient of his, who was in a similar situation; and, in consequence of my advice, he was brought to town, and put under my care. September 13th I first saw him: he was about seven months old; the left foot had been distorted before the birth, and no attempt had been made to relieve it. In appearance, and every other circumstance, it so exactly resembled the 7th Case in this work, that I thought it would be unnecessary to engrave my drawings of this.

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The cure went rapidly on, and without the least untoward circumstance, till the 21st of October, when the foot was perfectly reduced to its natural form. I wished to have him longer within my observation ; but as it was inconvenient for the parents to be from home, they therefore determined to remove him, taking precautionary bandages, to prevent a relapse. These were to be applied, under the inspection of Mr. FARR, to whom I communicated the necessary information, and afterwards received the following opinion respecting the case.

‘ S I R,

‘ I hope you will have the goodness to
 ‘ excuse my not answering your letter soon-
 ‘ er, as I happened to be from home when
 ‘ Mrs. ——— called upon me, and their
 ‘ living some distance, prevented me from
 ‘ seeing the child so soon as I wished. I have
 ‘ carefully inspected the child’s foot, and
 ‘ am extremely happy in saying, that I
 ‘ think it a case that will do you great cre-
 ‘ dit, as I have not the least doubt, from the
 ‘ appearance of it, but the child will be
 ‘ perfectly

‘ perfectly free from any deformity. You
 ‘ may depend on my strictly attending to
 ‘ the directions laid down ; and shall, at all
 ‘ times, be happy in recommending you to
 ‘ any case that may fall under my care or
 ‘ knowledge.

‘ I am, Sir,

‘ Dunstable,

‘ Yours, &c.

‘ October 29th, 1797.

‘ CHARLES FARR.’

C A S E X I.

September 11, 1797, Mr. PORTER of Tottenham-Court-Road, sent me the child of a person in that neighbourhood, that had been born with one club-foot. It was about three weeks old at the time I saw him, and the foot, in its general appearance, resembled the last case.

The same method of treatment was pursued for about two months, when it appeared to be quite well ; but as the child was within my reach, I continued bandages on the foot for another month, when it appeared so well, that I hoped there could
 be

be no farther occasion to make use of them.

In about a month, however, the foot seemed to relax towards its former position; I therefore again applied the necessary bandages, with a determination, that they should be continued till the time that the child will be able to walk.

The result of this case is an additional proof of the opinion I have always been disposed to entertain, that when the foot of a young child has been distorted in this manner, it should not be left at liberty, till it is able to walk; as the inequality in the action of the muscles of the foot, will always give a strong tendency to resume the distorted form, unless prevented by proper bandages, till the child walks, when only, it may be said, to be secure from a relapse.

CASE

C A S E XII.

IN September, 1795, a Lady in Dublin consulted me, respecting her daughter, of whom she gave the following account.

She was then near three years old ; she was born with one club-foot, for which nothing had been done for some time ; but at length a Gentleman, who had acquired some vague notions of my method of treatment, undertook to cure it, but in the attempt he produced very high inflammation, swelling in the whole limb, and a considerable degree of fever, in consequence ; he was, therefore, obliged to desist, until those effects of his operations had ceased. His succeeding attempts produced the same bad consequence, during almost a year that they were continued. It was then proposed to cure the foot, by partially dividing the tibialis posticus and gastrocnemii muscles, to the contraction of which the distortion was attributed. So inconsistent is this idea, with the nature of the disease, and the proposed operation so little connected with rational

tional surgery, that I should deem it improper to be mentioned, if I had not known the same operation performed in another case, and, as it might be expected, without being productive of the least benefit. This operation was not submitted to, but another Gentleman was consulted, who, to complete the catalogue of absurdities, proposed to cure the foot by eroding the superior parts of it with caustic, which by contracting those parts, was to counteract the contraction of the gastrocnemii, &c. &c. and thus reduce the foot to its proper form!!!

Neither was this submitted to, or any thing else done, till I saw the child. Upon examination, the deformity appeared strictly confined to the foot; the connection of the astragalus, with the bones of the leg, was in its natural state; the bones of the tarsus were much distorted, particularly the os cuboides, which projected, apparently, much beyond the rest; the toes were much turned inwards; and she stood directly upon the outside edge of the foot. As she

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could now go alone, the defective form and action of the foot had caused both knees to bend inwards ; and there was reason to believe, both deformities would continue to increase.

As experience had not, at that time, authorised me to say, a child of her age could certainly be cured, and as the attempts that had been made in this case had been so perfectly unsuccessful, I could not, with propriety, pronounce this child's foot to be curable ; and, without such assurance, the parents were unwilling to put her under my care for that purpose. But the distortion of the knees certainly might be cured ; it was therefore resolved to do nothing to the foot, but to do every thing possible to remove the distortion of the knees ; for which purpose I prepared the necessary instruments.

During the ensuing winter, I saw cases, which induced me to believe that this, and many similar cases at a much later period in life, might be cured. Upon representing
 7 this

this to Mrs. —, she determined to put her daughter under my care, during my stay in Dublin, in the summer of 1796. Upon my arrival, I found the curvature of the knees was diminished; but the foot remained, to appearance, in the same state as when I saw her the preceding year. My operations were immediately begun, and continued unremittingly for two months, without the least inconvenience to the child; and at the end of that time, the foot was so far cured, that it could be completely placed in its natural position, and had acquired its natural form: but there being a superabundant portion of skin on the superior part of the foot, in consequence of the alteration in its form, and the muscles which lie in that direction being consequently weak and incapable of acting in the natural way, it was indispensably necessary to bind the foot in its proper position, till the necessary degree of power was acquired. For this purpose, as well as to complete the cure of the distortion in the knees, I prepared the necessary

instruments ; and after giving full directions for the use them, took my leave.

I have since been informed, by letter, that the distortion of the knees is perfectly removed ; and the foot so far recovered, that she has laid aside the instruments, and merely wears a stiff shoe, which keeps the foot in perfect good order.

C A S E XIII.

IN the Summer, 1794, a Gentleman in Dublin desired me to examine his son, then between three and four years old. He had been at nurse, in the country, with a woman, who strenuously denied all knowledge of any accident that could occasion the situation of his foot at that time, which she said became gradually distorted, and she was not able to ascertain when it began.

The right foot was bent upwards and outwards, so that, when he stood upon it,
the

the little toe could be brought nearly into contact with the fibula, and the end of the tibia almost touched the ground ; but when he did not stand upon it, it fell into its natural situation. The father assured me, that foot had been as perfect as the other, from the birth till the time he was put to nurse. The nurse asserted, he had never met with any accident, or complained of pain or uneasiness, which he certainly did not do at the time I saw him. It seemed as if the ligaments, which connected the bones of the foot, had been violently strained or lacerated on the inside, and the muscles connected with them, in consequence, had lost their power ; for he could not direct his foot into any particular position, when desired to do so. It is probable, that the cause of this, whatever it might be, was concealed intentionally ; and it was evident, that no rational attempt could be made, to do more than support the foot, in a position that would enable him to walk upon it, nearly in its natural situation, and, without straining it more, leave the rest to nature. This is what I undertook to do ; construct-
ed

ed an instrument for the purpose, gave proper directions for the use of it, particularly that it should be worn continually, and then took my leave.

In 1795, I saw him again. My directions had been implicitly followed; and he had so far recovered the use of his foot, that, with a little attention, he could walk fairly and evenly upon it, and point the toe in any direction, when desired; but when going carelessly, his ankle bent under him, as formerly, but not so much as at first. As so much good had been done by the plan he had followed, and no improvement in it could be suggested, I advised that it should be strictly persevered in.

In 1796, I again made enquiries after him, and was told by his father, that he was at a considerable distance in the country, that he had left off the instrument, and his foot was perfectly well. As the nurse's account of the beginning of this distortion is certainly not credible, I shall say nothing on that part of the subject; but

as

as I have truly described the situation of this child, at the time I first saw him, as well as the subsequent alteration that took place, I may be permitted to offer such remarks as those circumstances suggest.

Were the capsular ligaments lacerated, or only violently strained? As it is difficult to conceive that a child's leg should be so injured, as to lacerate the capsular ligaments of the foot, without rendering surgical assistance indispensably necessary, which certainly was never obtained, it is not probable, the ligaments were lacerated in this case. But the child might get a violent strain, or similar accident, the nurse might conceal from the knowledge of the parents; and the child might be suffered to walk on his foot, already injured and neglected, till all the mischief took place that has already been described.

The fact I wish to impress on the Reader's mind, from the history of this case is, that extension of the ligaments, to as great a degree as can possibly take place in any club-

club-foot, may be remedied by the efforts of nature, assisted by keeping the foot judiciously bound, for a length of time, in a proper position, whence it is to be inferred, that no club-foot is to be considered as incurable, merely on account of such an extended state of the ligaments.

C A S E XIV.

I HAVE lately been consulted, concerning a young Lady, of whom the following account was given. She was born, in every respect, perfectly straight, and continued so till the age of five years, when she had a violent fever, and afterwards lost the use of all her limbs. From this state, she seemed to recover slowly, except the left foot, which continued weak, and had a tendency to turn inwards. Several gentlemen were consulted, who said it was only a little weakness, which in time would go off of itself: but it continued to increase; and it was at last determined to try a leg-iron, which was procured, and, as is too frequently the case on similar occasions, so
carelessly

carelessly applied, that if it was calculated to do any service, no benefit was obtained from the use of it. In this way she went on, from bad to worse, till the time I saw her, when she was sixteen years of age. The foot was as rigid, and as much deformed, as if it had been so from the birth. Considering the time this had been coming on, and the alteration that naturally takes place in all the bones of the foot, between the age of five and sixteen years, there was no reason to suppose it possible to cure, or even diminish the deformity in this case: I therefore contented myself with applying a leg-iron, constructed in the best manner, so as to support her, as effectually as possible, in her present situation. I have since seen her, and find her instrument applied in the same negligent manner as formerly, and the foot evidently worse than when I saw her first.

C A S E XV.

A SHORT time since, I was consulted by a Lady, who gave the following account of herself. She was twenty-three years of age, and five years ago, after a

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severe

severe illness, she lost the use of one of her hands, and one foot. The hand afterwards recovered: the leg was wasted, flaccid, and, for a time, incapable of voluntary motion; it slowly recovered, so far as to enable her to walk, with the assistance of crutches and a leg-iron, which she had very badly constructed at Bath; but the foot turned inwards, and became, in every other respect, like the common club-foot.

As there remained much flexibility in the foot, and the distortion did not commence till after she was eighteen years of age, it did not appear to me, that such an alteration had taken place, in the state of the parts, during those five years, as to preclude the possibility of effecting a cure. I have not seen or heard of her since.

I have related the above cases as they were described to me; because it is important, that such facts should be known, as, if they make a proper impression, they tend to preserve others from similar misfortunes. As the treatment of such cases has seldom been the object of surgical attention

tention, the extensive knowledge and influence of old women, &c. &c. has been allowed to operate in its full force, and undoubtedly been productive of much mischief. If any person of this description, has known one case of this kind, the history of which they really were acquainted with, they generally assume, that all others, similar in appearance, have arisen from the same cause. As many distorted feet certainly become so, previous to the birth, a prejudice has very generally been adopted, that it is impossible for such distortion to take place at any period afterwards. Many cases, within my knowledge, prove the reverse of this position; but I have selected the two already related, to shew the falsity of the notion, that a child who has only a little weakness in its ancles or knees, will get well, without assistance, as it grows up; a notion, the indulgence of which has occasioned the neglect of many a deformity that might have been cured in the beginning, and thus permitted it to become incurable, and made the sufferer a cripple for life.

OF THE
*Circumstances which render the Club-foot
curable, or otherwise.*

IN my observations on distortion of the legs of children, I endeavoured to establish the following facts ; viz.

1st. That species of club-foot, with which children are frequently born, may be perfectly cured, provided the cure is undertaken before the child begins to walk.

2d. It is not impossible, that many cases may be perfectly cured, if undertaken after the patient has walked : though this must depend upon circumstances, in particular cases, which cannot be foreseen, and therefore was not advanced as a general fact.

3d. If the cure is not attempted till the bones are completely ossified, it cannot be effected ; and, in many cases, the deformity cannot be alleviated, though the exertions

exertions of art may be necessary to prevent it from being increased.

Whoever has read the preceding cases, will, perhaps, be disposed to allow the facts above stated are now completely demonstrated; and, if they peruse the annexed specification of my patent, they will perhaps allow too, that the method I have invented is capable of curing every distortion it shall be skilfully adapted and applied to, provided there is no circumstance in the case which render it physically impossible that a cure should be effected. These points being settled, it only remains to enquire, what circumstances will, in any case, constitute an absolute and insurmountable impediment to the performance of a cure; and what circumstances will render a cure uncertain, or otherwise. When this has been done with tolerable accuracy, we cannot be much at a loss, to form a rational prognostic on the event of any case that may come under examination.

In order to do this, it will be necessary
to

to ascertain what is the difference, in point of form and powers, between the parts affected by the deformity, when in their natural and in their diseased state, and what are the progressive alterations which take place in those parts, during their removal from the natural state to that which constitutes the disease; and, *vice versa*, in all the variety of circumstances in which it comes before us. And, as in most cases, this distortion takes place before the birth, and in many at a time remotely antecedent to that period, it will be necessary to begin our enquiries, at least as far back as it is presumed the disease originates. This retrospection, necessarily directs our enquiries to the formation of some parts of the foetus, though not of the foetus itself, and induces the necessity of mentioning some facts which are generally known, and which it would be otherwise unnecessary to mention here, but that it is proper to leave as few circumstances unnoticed, or to be taken for granted, as the nature of the subject will admit.

A respectable

A respectable * author has said, ‘ It is
 ‘ not easy to explain, in their natural order,
 ‘ the various parts of which the human
 ‘ body is composed; for they have that
 ‘ mutual dependence upon each other, that
 ‘ continual circle of action and re-action
 ‘ in their various functions, and that in-
 ‘ tricacy of connection, and close depen-
 ‘ dence, in respect of the individual parts,
 ‘ that, as in a circle, there is no point of
 ‘ preference, from which we should begin
 ‘ to trace its course, there is, in the human
 ‘ body no function so insulated from other
 ‘ functions, no part so independent of
 ‘ other parts, as to determine our choice.
 ‘ We cannot begin without hesitation, nor
 ‘ hope to proceed in any perfect course;
 ‘ yet, from whatever point we begin, we may
 ‘ so return to that point, as to represent
 ‘ truly this consent of functions, and con-
 ‘ nection of parts, by which it is com-
 ‘ posed into one perfect whole.’

The application of this opinion to the
 objects

* Anatomy of the Bones, Muscles, &c. by JOHN BELL.

objects of this enquiry is so apposite, that it would be difficult to deviate from it, in any respect, without proportionably rendering those objects more obscure, instead of illustrating them ; I shall, therefore, I trust, be excused for making it the rule for my conduct, in prosecuting this enquiry.

Every one who sees a club-foot can tell it is a distortion, or at least a deviation from the natural state of the limb ; but the anatomist, who wishes to understand the disease, will endeavour to examine, separately, the state of the bones, the ligaments, and the muscles, and when he is acquainted with the particular state of all those parts, he will consider them as combined in one whole, and by this method, will be enabled to form a more correct idea of the disease, than by any other method he can pursue. I shall, for this reason, direct my inquiries, to the bones, the ligaments, and the muscles, in order, beginning with the first.

OF

OF THE BONES.

WHENEVER I have been consulted on these distortions of the feet, I have found an idea generally prevail, that the disease is incurable; but after I have explained the reasons which induced me to form a different opinion, the probable rectitude of that opinion has been admitted, with this qualification, "*if taken in time; for while a child is young, the bones may be easily moulded to any shape we please.*" Now, though the bones of young children may easily be bent by disease, or by other causes, the conclusions drawn from that axiom, and applied to the deformity in question, must lead to false ideas of the disease; for, in the earliest periods of life, when the bones are softest, and of course easiest bent, they are not at all affected in feet that have this deformity, of course their pliability, real or supposed, is entirely out of the question: and, when the bones are really deformed, and the perfect cure, consequently, depends upon altering the form of those bones, they are so far advanced in hardness, as, in the common opinion, to be incurable. Thus a false

I doctrine

doctrine is built upon the misconception of facts, and the consequence will be, if those facts are not clearly understood, that the prevalence of the doctrine founded on them will occasion many cases to be neglected, till they are incurable; because it has been believed, they become incurable much sooner than they really are so.

Taking up this subject, as I did, when the disease was believed to be, in its nature, incurable, it became me to be peculiarly cautious of advancing more than I was prepared to prove: I therefore only advanced an opinion, founded on facts within my knowledge, that, as it was not originally occasioned by malformation of bones, it was certainly curable, in every case, before that period at which the malformation of the bones begins, *i. e.* after the * *ossification is complete*. Succeeding facts have justified the propriety of my opinion; they have gone

* In saying '*after the ossification is complete*,' I allude to that period (about two or three years of age) when the whole of the bones cease to be cartilage, except the extremities, which remain so to provide for the future growth of the bones, till the animal arrives at maturity.

gone farther, they have proved, that this disease may be, and has been cured, after a considerable degree of malformation of bones must have taken place. It is probable, that many more may be cured, when patients are much farther advanced in life; it therefore now becomes necessary to examine, by what alteration in the state of the bones such cures can be effected, as well as by what means those effects are to be produced. The powers of the agents will be considered in another place; the object at present is, to ascertain, as nearly as possible, by what actions of the system the form of the bones can be altered; at what period those bones cease to be susceptible of alteration; and what obstacles may, in any case, render the disease absolutely incurable.

To do this, it will be necessary to trace the origin and progress of the formation of bones, from a very early period, to the time in which they may no longer be susceptible of alteration, in point of form. This I shall do, in the words of the Author I have already quoted.

‘ All * the bones in the body, both in
 ‘ the human foetus, and in other animals,
 ‘ are merely cartilage before the time of
 ‘ birth. The whole foetus is gelatinous;
 ‘ the bones are a pure, almost a transparent
 ‘ and tremulous jelly; they are flexible, so
 ‘ that a long bone can be bended into a
 ‘ complete ring; and no opacity, nor spot
 ‘ of ossification, is seen.

‘ This cartilage never is hardened into
 ‘ bone; but, from the first, is an organised
 ‘ mass. It has its vessels which are at first
 ‘ transparent, but which soon dilate; and
 ‘ whenever the red colour of the blood be-
 ‘ gins to appear in them, ossification very
 ‘ quickly follows, the arteries being so far
 ‘ enlarged, as to carry the coarser particles
 ‘ of the blood. The first mark of ossifica-
 ‘ tion is an artery, which is seen running
 ‘ into the centre of the jelly, in which the
 ‘ bone is to be formed. Other arteries soon
 ‘ appear, overtake the first, mix with it, and
 ‘ form a net work of vessels: then a centre
 ‘ of ossification begins, stretching its rays
 ‘ according to the length of the bone, and
 ‘ then

* Anatomy of the Bones, &c. by JOHN BELL.

' then the cartilage begins to grow opaque,
 ' yellow, and brittle ; it will no longer bend,
 ' and the small nucleus of ossification is felt
 ' in the centre of the bone, and when touch-
 ' ed by a sharp point, is easily known by its
 ' gritty feel. Other points of ossification
 ' are successively formed. Always the ossi-
 ' fication is foretold by the spreading of the
 ' artery, and the arrival of red blood. Every
 ' point of ossification has its little arteries,
 ' and each ossifying nucleus has so little de-
 ' pendence on the cartilage in which it is
 ' formed, that it is held to it by those arte-
 ' ries only ; and when the ossifying cartilage
 ' is cut into thin slices, and steeped in
 ' water till its arteries rot, the nucleus of
 ' ossification drops spontaneously from the
 ' cartilage, leaving the cartilage like a ring,
 ' with a smooth and regular hole where the
 ' bone lay.

' The colour of each part of a bone is
 ' proportioned exactly to the degree in
 ' which its ossification is advanced. When
 ' ossification begins in the centre of a bone,
 ' redness also appears, indicating the pre-
 ' fence

‘ fence of those vessels by which the bony
 ‘ matter is to be poured out. When the
 ‘ bony matter begins to accumulate, the
 ‘ red colour of those arteries is obscured,
 ‘ the centre of the bone becomes yellow or
 ‘ white, and the colour removes towards
 ‘ the ends of the bone.

‘ In the centre of the first colouring of
 ‘ the bone is a cloudy, diffused, and general
 ‘ red, because the vessels are profuse. Be-
 ‘ yond that, at the edges of the first circle,
 ‘ the vessels are more scattered and sparse,
 ‘ distinct trunks are easily seen, forming a
 ‘ circle of radiated arteries, which point to-
 ‘ wards the heads of the bone. Beyond that
 ‘ again, the cartilage is transparent and
 ‘ pure, as yet untouched with blood; the
 ‘ arteries have not yet reached it, and its
 ‘ ossification is not begun. Thus, a long
 ‘ bone, while forming, seems to be divided
 ‘ into seven various coloured zones. The
 ‘ central point of most perfect ossification
 ‘ is yellow and opaque; on either side of
 ‘ that there is a zone of red; on either side
 ‘ of that, again, the vessels being more
 ‘ sparse,

‘ sparfe, form a vascular zone; and the
 ‘ zone at either end, is transparent or white.
 ‘ The ossification follows the vessels, and
 ‘ buries and hides those vessels by which it
 ‘ is formed: the yellow and opaque part
 ‘ expands and spreads along the bone;
 ‘ the vessels advance towards the heads of
 ‘ the bones; the whole body of the bone
 ‘ becomes opaque; and there is left only a
 ‘ a small vascular circle at either end. The
 ‘ heads are separated from the body of the
 ‘ bone by a thin cartilage; and the vessels of
 ‘ the centre, extending still towards the ex-
 ‘ tremities of the bone, perforate that car-
 ‘ tilage, pass into the head of the bone, and
 ‘ then its ossification also begins, and a
 ‘ small nucleus of ossification is formed in
 ‘ its centre. Thus the heads and the body
 ‘ are, at the first, distinct bones, formed
 ‘ apart, joined by a cartilage, and not
 ‘ united till the age of fifteen or twenty
 ‘ years.

‘ This process, so difficult and slow, is
 ‘ assisted by every provision of nature. The
 ‘ progress of the whole is slow, that so
 ‘ long

‘ long as the body increases in stature, the
 ‘ bones also may grow : but it is assisted
 ‘ in the individual parts, where some are
 ‘ slow, some rapid in their growth,
 ‘ some delayed, as the heads of joints, that
 ‘ their bones may be allowed to extend,
 ‘ and others hastened, as the pelvis, that it
 ‘ may acquire perfect size in early life.
 ‘ Ossification is assisted by the softness of
 ‘ the cartilaginous bed in which the bone
 ‘ is formed ; by those large and permeable
 ‘ vessels which carry easily the grosser parts
 ‘ of the blood ; by a quick and powerful
 ‘ absorption, which all along is modelling
 ‘ the bone ; and, most of all, by being
 ‘ formed in detached points, multiplied
 ‘ and crowded together, wherever much
 ‘ bone is required.

‘ There is one central ring first ossified
 ‘ in a long bone, as of the leg or arm ;
 ‘ the heads or ends of the bone are, at first,
 ‘ mere cartilage, but they also soon begin
 ‘ to ossify ; the body stretches in a ra-
 ‘ diated form towards either head ; the
 ‘ the heads ossifying each in its centre also
 3 ‘ stretches

' stretches towards the bone: the heads
 ' meet the body, and join to it; a thin car-
 ' tilage only is interposed, which grows
 ' gradually thinner, till the twentieth year,
 ' and then disappears, the body, heads,
 ' and processes, becoming one bone. In
 ' flat bones, as in the scull, ossification goes
 ' from one or more central points, and the
 ' radiated fibres meet the radii of other
 ' ossifying points, or meet the edges of the
 ' next bone. *The thick round bones, which*
 ' *form the wrist and foot, have each one ossifica-*
 ' *tion in their centre, which is bounded by car-*
 ' *tilage all round.* The processes are of-
 ' ten distinct ossifications, joined to the
 ' bones, like their heads, and slowly con-
 ' solidated with them into firm bones.'

As the preceding long quotation from
 Mr. J. BELL's valuable work, includes
 every fact respecting the formation of bones,
 that is necessarily connected with the sub-
 ject of the present enquiry, I trust I shall
 be excused for having inserted it, rather
 than attempt to relate the same facts in any
 other words.

K

As

As opportunities of examining subjects that have laboured under this deformity, do not occur so frequently as to enable us to demonstrate the facts I have endeavoured to establish, respecting the state of the parts concerned in this disease, I was obliged to assume it as a fact, that the bones were not, when considered separately, deformed, before the patients had attained the age of two or three years; but the uniformity of my success in curing it in children of that age, which was formed on that idea of the disease, and cannot be explained consistently with any other, may now be said to amount to positive proof, that no malformation of bones does take place before that period. My present attempt to ascertain, under what circumstances the disease is or is not curable, in patients after that time of life, must, in like manner, assume the form of conjectures, founded on observing what has passed, or is passing under my eye, in patients of greater age, and deductions from what we know of the animal economy in persons of that age; and if fu-

ture facts should prove equally successful, the doctrine will then be permanently established by practice, to the greatest extent to which it can be carried.

As the situation of a child now under my care will tend to elucidate this part of the subject, I shall briefly describe the state I found him in.

He was more than four years old when I first saw him ; he was born with two feet, exactly resembling Case IV. Page 15. As his parents were informed nothing could be done, nothing had been attempted to relieve him. He began to walk at the usual time, and had walked ever since, wearing only common half-boots, with the notion of enabling him to walk rather better than he would do without assistance.

This case, according to notions generally received, was to be considered as absolutely incurable, and perhaps incapable of alleviation. The bones were completely

K 2

ossified :

ossified* : at his age, and from the circumstance of his having walked at least two years upon them, there must have been considerable malformation of bones, and, therefore, according to all established opinions, the disease was irremediable. As observations I had made in other cases induced me to believe this patient might be much relieved, perhaps perfectly cured; as the consideration of this case includes every circumstance that can render the cure of any other case, after the age of two years, doubtful, or otherwise, I shall particularly explain the state of his feet, and the reflections that occurred to me on examining them.

His toes pointed inwards, directly towards each other: when he stood, the os cuboides of each foot was on the ground, the feet seemed perfectly rigid, and there was no perceptible difference between them; but
their

* It will be more correct to say, they were no longer in the cartilaginous state, but as completely ossified, as the bones of children usually are at that age.

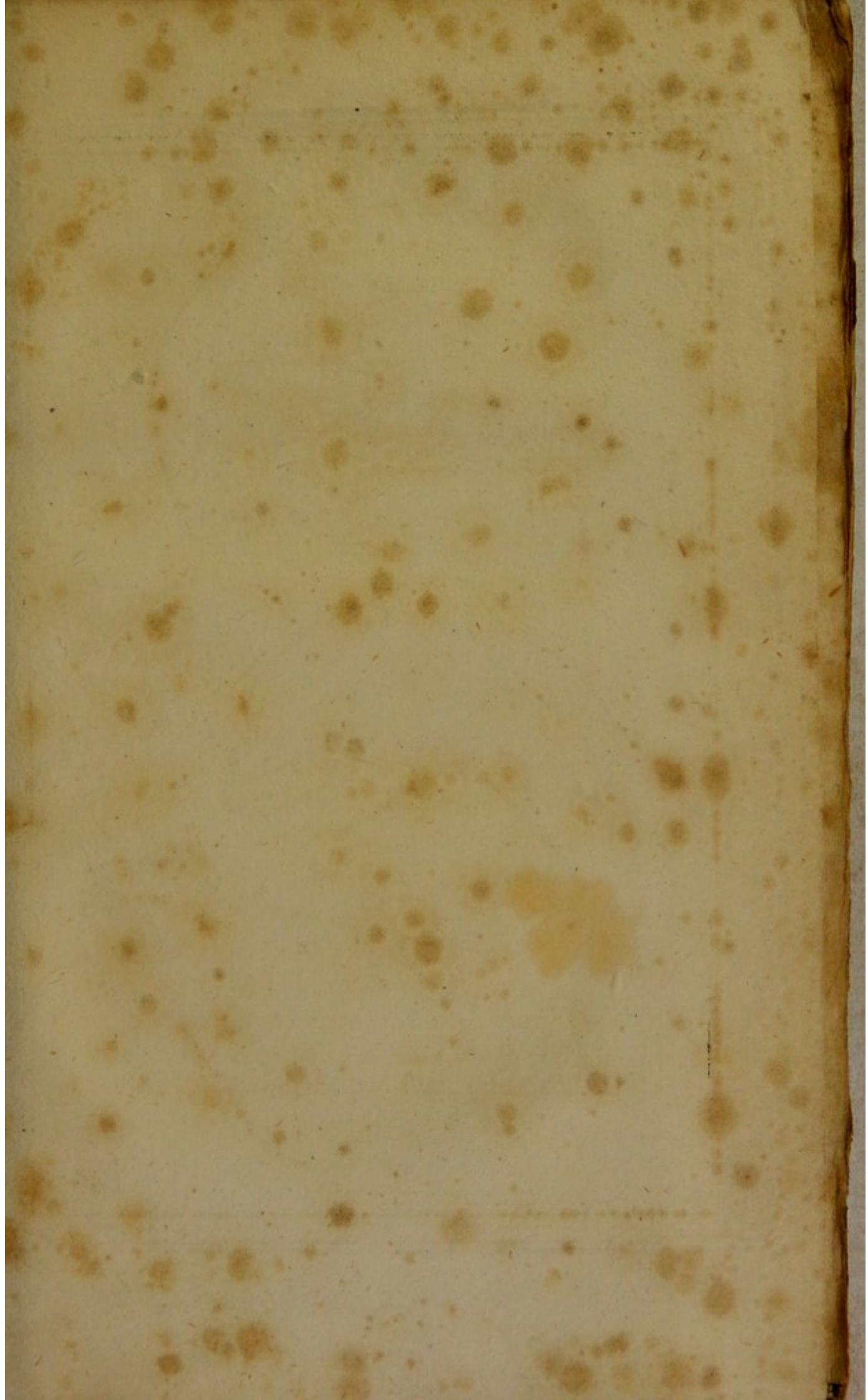
their condition will be better understood, by referring to the annexed figures, which I drew from the life.

Pl. X. contains three views of one of the feet, *viz.* the outside, the inside, and the top of the foot. The dotted lines indicate the position of the bones, as nearly as I could ascertain their situation through the integuments: the black lines in the top view, indicate the position of the tibia and fibula.

The position of the foot was such, that the circular head of the astragalus, which ought to lie under the tibia, projected considerably forwards and outwards; therefore the os calcis, which should have rested on the ground when he stood, was moved close to the tibia on the inside of the leg, and gave the appearance of a very short heel. The os cuboides was so much distorted from its natural situation, as to bring its upper surface on the ground, when he stood. That part of the astragalus which should be joined to the os naviculare, seemed to project
much;

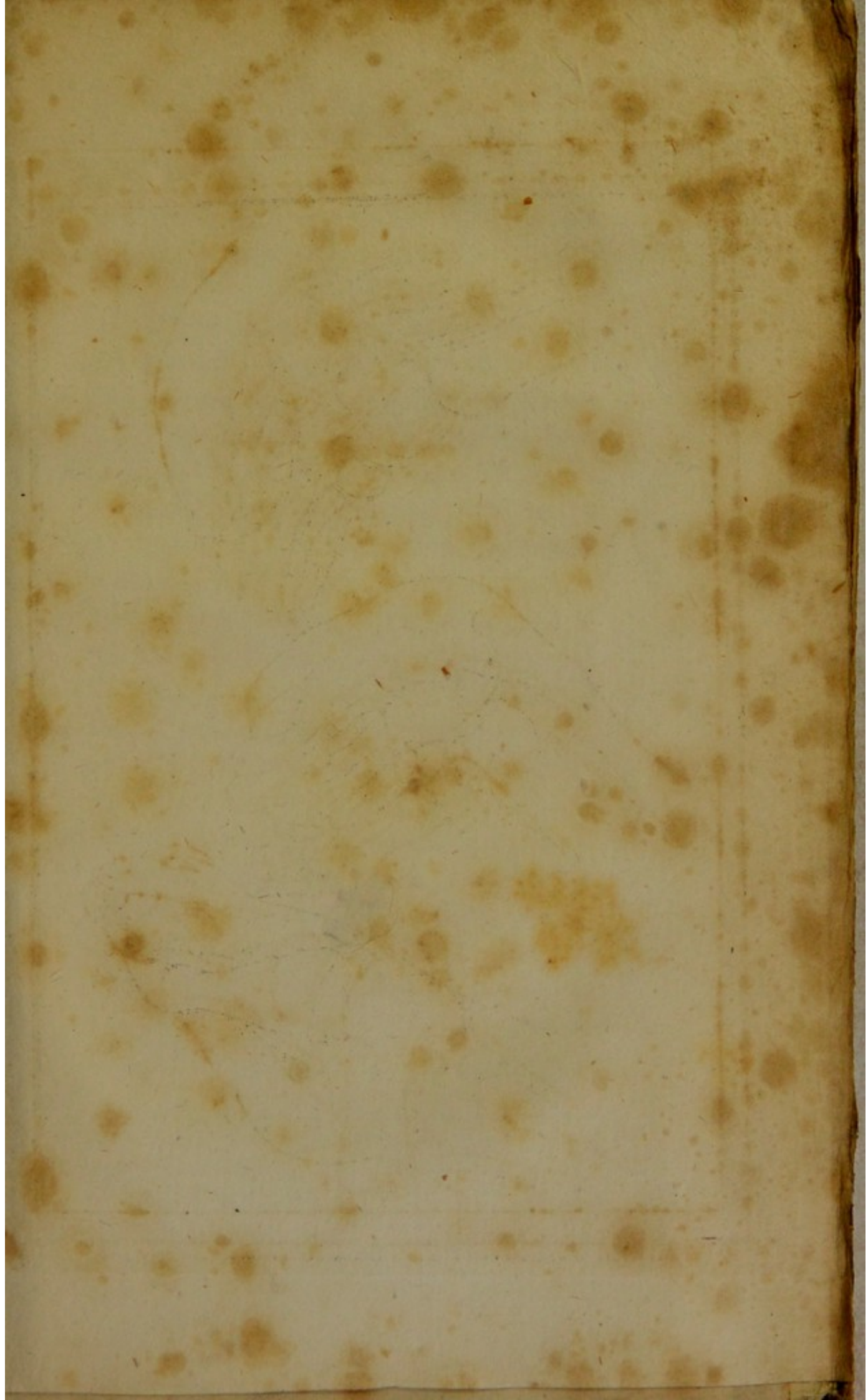
much; the os naviculare turning downwards, and inwards from it, at a very acute angle. The cuneiform bones made a similar angle, with respect to the naviculare. The first phalanx of the metatarsus, formed a similar angle, with respect to the cuneiform bones and cuboides; but all the other bones of the metatarsus were in their natural positions, with respect to the first phalanx.

The general aspect of the case, when the child stood on his feet, was this; the astragalus so much out of its place, that its circular head presented itself before the fibula, much of the os calcis laying under the scaphoid cavity of the tibia; the os cuboides so placed, as to bear the weight of the body when he stood; and the toes pointing directly towards each other, instead of standing strait forwards. Considering the foot superficially, it was much broader and thicker than it should be, with almost no heel. That it would finally and irrecoverably have acquired that form, there
can

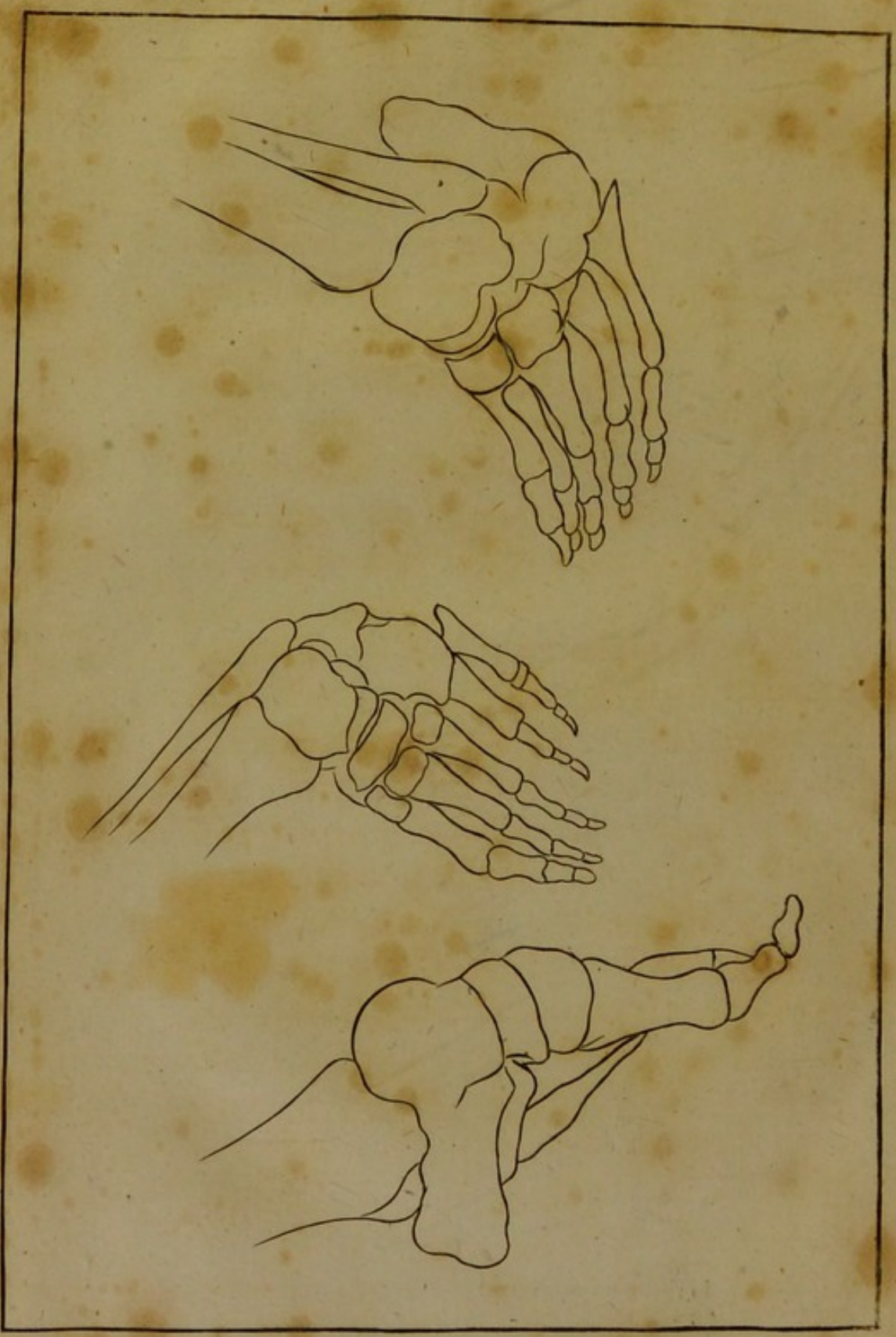




Pl. 10.



Pl. II.



can be no doubt ; but I trust a short time will shew, that it has not done so.

I then placed the dry bones of an adult foot, as nearly as possible, in the same situation. I drew three * views of these bones, (*Pl. XI.*) to correspond with the preceding. By comparing these (*Pl. X. and XI.*) together, a more accurate idea of this child's feet, (allowing for what malformation had actually taken place) may be obtained, than can be conveyed by any other means.

Upon examining the bones in this situation, it must appear, that those parts of them which form the under, and inside of the foot, are close together; but those parts of the same bones which are on the upper, and outside of the foot, have considerable spaces between them. This circumstance deserves particular attention, as it will serve to explain my ideas of the disease in its
earliest

* I do not pretend, by these sketches, to represent correctly, the form of bones, but merely to indicate their relative position in the diseased foot.

earliest stages, before any malformation of bones has taken place.

If the foot of an adult could, by luxation, or other means, be placed in a similar position, the bones of that foot would be in the same situation, with respect to each other, as those I have drawn. If the foot of the foetus in utero is, by compression, or whatever other means it is occasioned, placed in a similar position, the bones, or rather the cartilages which are afterwards to become bones, are in the same relative situation. It is from this state of the parts only, that the uniform success with which I have reduced these feet to their natural state, in a short time, can be accounted for; for the time, in some cases so little as twenty days, does not allow us to believe any alteration in the form of individual bones can have taken place. But if it shall be supposed, that in this stage of the complaint, there is any malformation of bone, then the advantage of undertaking the cure as early as possible, must be admitted, upon the commonly received notion, that the
softness

softness of the bones renders that stage of the complaint peculiarly favorable for compressing them into their natural form.

When a child, born with such feet, has remained twelve, or perhaps eighteen months, without any attempt being made to reduce them, a material alteration has taken place in the condition of the bones. A considerable part of the round bones, and perhaps the head of the tibia, are ossified; and as in the growth of the patient, the increase of cartilage precedes the formation of bone in those parts, the cartilaginous part (if I may be allowed the expression) of the bones concerned in the disease, begins to assume an unnatural form; because they will grow, for want of the natural compression, till the spaces between the superior parts of the bones of the tarsus is filled up, by the proportionable growth of each bone, till they meet. In this stage, the progress of the cure is more tedious, because one part of it consists in preventing the farther growth of those superabundant parts, and even diminishing that mal-

L

formation

formation which has already taken place, by compressing the foot into a proper situation : still, allowing for the additional trouble occasioned by the advanced age of the patient, the cure has always been complete.

But in the last stage, when all the bones are completely ossified, that is, when the whole substance of them is really become bone, though softer than the bones of an adult, and covered with cartilage in every direction, to provide a bed for its future increase, when the patient has walked, and thus perhaps increased the original deformity and distortion, we are no longer justified in saying all such cases may be cured. The doctrine I hope to maintain is, that many of them may still be cured, provided no insurmountable obstacle is opposed by the accidents of any given case : and as both the doctrine and the nature of the accidents that may arrive will be illustrated by the case I have already mentioned, I shall proceed with my examination of it.

The

The most striking peculiarity of this case, and the circumstance of most importance in this, and all similar cases, is, the position of the astragalus; its circular head projecting forwards, almost removed from under the tibia, and the end of that bone occupying much of the space between the head of the astragalus and the os calcis.

The scaphoid cavity of the tibia was certainly intended to receive the head of the astragalus; and all the motion of the body over the foot, depends more upon the natural form and juxtaposition of those parts being preserved or restored, than upon any other circumstance. In the formation of the foetus there is, no doubt, a natural arrangement of parts, tending to facilitate its growth and progress towards its final form, if I may be permitted to use the expression: there is a disposition to grow progressively into that form; but the final accomplishment of that purpose depends upon the natural action of all the parts being preserved or restored, and afterwards kept up, during the whole progressive growth of the animal, till it arrives at maturity.

turity. In the parts we are now considering, the continual friction of the scaphoid cavity over and upon the head of the astragalus, from the time the child first moves its foot, till it arrives at maturity, certainly preserves and maintains their natural form; and by this means, their capacity for their natural action. By the derangement of those parts in this disease, the natural action is immediately impeded, and, for the time, in many cases, destroyed. If the derangement continues, the parts, for want of mutual friction, begin to assume a new and unnatural form. The scaphoid cavity may be so far obliterated, as not to receive the head of the astragalus, if *that* could be reduced into its situation; or the head of the astragalus might assume such a form, as would for ever prevent it from being replaced in the scaphoid cavity, if *that* were capable of receiving it. In either case, the deformity must be irremediable; for, however perfectly the other parts of the foot might be restored to their natural form, the defect remaining in this grand centre, over which the body is moved, must ever prevent
them

them from moving in the natural way ; on the contrary, however imperfect the rest of the foot may remain, if the natural, relative position of the tibia and astragalus can be restored, the patient may be enabled to walk with tolerable ease and activity. After the age of two or three years, the possibility of effecting this must vary, according to circumstances. In the present instance, I thought it practicable ; and therefore have ventured to say, he will at least be so far cured, as to have his feet rendered serviceable.

In examining the other bones of the foot, in this case, I found the os naviculare bending inwards, and forming an acute angle, in this direction, with respect to the astragalus ; and that part of the astragalus which should join to the naviculare, when in the natural state, in this case seemed to form an unnatural projection on the top of the foot. I say *seemed* to form, because, though in this case there was, from the age of the patient, some enlargement of the bone, in younger children,

children, this enlargement of the upper part of the foot is a deception, occasioned by the improper position of these bones of the tarsus ; but, in patients farther advanced in life, it becomes a malformation of those bones, that is sometimes absolutely incurable.

The cuneiform bones, and the os cuboides, are under the same circumstances as the astragalus ; that is to say, they have, at first, from their position, only the appearance of being enlarged on the top of the foot ; but, in time, that enlargement becomes real, permanent, and at last, perhaps, irremediable.

If those sketches of the dry bones, which I have made to represent the upper and outside of the foot, be examined, it will be seen that there are spaces between the surfaces of the bones, when viewed in those situations ; but if the underside is examined, they will be found close together. In early infancy, the bones of feet distorted in this manner, are in this situation,
so

so far as relates to form and position. Each individual bone, or, to speak with more propriety, each cartilage that is afterwards to become bone, has its perfect and natural form; but by whatever cause the disease is produced, they are placed in positions similar to those represented in my sketches: whence it happens, that when those obstacles which arise from the condition of the muscles and ligaments are overcome, the bones are immediately placed in their natural position: but when that period arrives, which I have described by saying the ossification is complete, each bone of the tarsus has acquired an unnatural form, because, the spaces that were between the upper parts, are filled up by superabundant ossification of the superior parts of each bone. At this period of the disease, it has been universally believed to be impossible to cure it; but as many facts, within my own experience, have induced me to form a different opinion, I shall be excused for taking this opportunity of investigating the subject a little farther.

While

While the old, erroneous opinions, that bone was an almost unorganised concrete, was formed by layers from the periosteum, &c. &c. prevailed, it is by no means surprising that another erroneous opinion should be engrafted upon them, *viz.* that bone once formed, could never have its form altered. This, in some particular instances, may be true; because the means of producing alterations in the form of some bones are not known, or because they cannot be applied; but not from any physical impossibility that can be deduced from the nature of bones. If this can be made evident, if it can be shewn, that in the disease at present under consideration, the means of producing alterations in the unnatural form of the bones of the foot can be applied, all ideas of the impossibility of curing many cases of this disease that have been thought incurable, must vanish.

Mr. JOHN BELL has demonstrated, that
 ‘ Ossification is a process of a truly animal
 ‘ nature. No coagulation will harden car-
 ‘ tilage into bone; no change of consist-
 ‘ ence

‘ence will form the blood into it ; no condensation of the periosteum can assimilate it to the nature of a bone. Bone is not the inorganic concrete, which it was once supposed, but is a regularly organised part, whose form subsists from the first, which is perfected by its secreting arteries, balanced, as in every secretion, by the absorbents of the part.’ *Page 19.*
 Again. ‘Thus every bone has, like the soft parts, its arteries, veins, and absorbent vessels. *Page 17.*

‘Yet, by these experiments with madder, one most important fact is proved to us ; that the arteries and absorbents, acting in concert, alternately deposite and reabsorb the earthy particles, as fast as can be conceived, of the soft parts, or even of the most moveable and fluctuating humours of the body. The absorption of the hardest bones is proved by daily observation, &c.’ *Page 16.*

He has proved too, that the progress of ossification of the round bones of the
 M foot,

foot, which I am at present considering, is from the centre of each bone diverging outwards, in the following order, reckoning from the outside towards the centre, first, a transparent, tremulous jelly; then cartilage, in which blood vessels are afterwards seen, and by which the earthy particles are finally deposited, to give the bones strength. Thus it appears, they are always hardest, and most perfectly formed in the centre, and least so in the external parts, where they touch, or ought to touch each other.

There is, no doubt, a natural arrangement of parts, tending to facilitate the growth and progress of the bones towards their final form. There is, likewise, a disposition to grow in any direction, that may be requisite, to supply any defect in the form that may be occasioned by accident: thus, when the bones of the foot have been separated in the manner I have described, and are kept asunder till the child has arrived at the age of three or four

3

years,

years, the spaces between them are filled up by the unnatural growth of each bone.

As it will hardly be asserted, that we cannot, by bandage adapted with moderate skill, and applied with competent attention, confine a deformed foot in any requisite situation; and by instruments properly adapted to supply its defects, so far as to enable the patient to walk with a degree of activity, proportioned to the circumstances of the case; I shall proceed to consider the effects of pressure, when applied, with a view to reduce the deformity of a foot, in which a considerable degree of malformation of bones of the tarsus has taken place.

If so much pressure is applied as to bring the separated parts of those bones into contact, and is invariably supported, it will stop the growth of that gelatinous substance, which is first formed in those parts where the bones come in contact with each other; in those parts which do not come into contact, it will continue to

grow till they meet ; the progress of ossification will be continued, in the natural way, till the patient arrives at maturity ; and with no more malformation than existed at the time the pressure was first applied.

If more pressure is applied, and uniformly kept up, the cartilages will be compressed in those parts in which they come in contact ; and if only the natural action of the foot is permitted, will assume a permanent form, as nearly approaching to the natural one, as the pre-existing deformity will admit. This compression of the cartilages will, by condensing their substance, prevent the arteries from shooting so freely into it, in an improper direction, as they would have done but for this impediment, and thus stop the progress of ossification in an improper direction, while that process will go on in the natural way, in every other part, till the patient has arrived at maturity, and every part is completely formed.

If

If the same pressure is uniformly continued, or a greater degree of pressure be constantly applied, the action of the arteries, which deposite the earthy particles nearest the surface of the bones, will likewise be impeded, while the action of the absorbents, which, in the course of circulation, are employed in taking up earthy particles, will be continued in full vigour, if it is not increased; and by perseverance in this process it is certainly possible, that an unequal action, *i. e.* a diminished action of the secreting vessels, and an increased action of the absorbing vessels, may be kept up, and so modified, as to alter the form of these bones, long after they are ossified; and, of course, so much of the deformity of such feet as depends on malformation of the bones, may be radically cured, long after that period of life at which they have generally been thought incurable.

Having said thus much on the bones of the tarsus, their junction with each other, and with the bones of the leg, and the derangement of those junctions, which
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take place in the disease in question, it only remains to consider the metatarsal bones in the same points of view, to complete this part of the subject.

As the bones of the metatarsus are, in some respects, similar to the cylindrical bones of the leg and arm, the general progress of their formation is the same, *i. e.* the centre is first ossified, and ossification proceeds gradually from thence to each end. There is no reason to suppose the bodies of the metatarsal bones are deformed in this disease, though the heads which unite them to the tarsus, and to each other, certainly are distorted, in some cases. When they are so, it is from the same causes, and in a similar manner to the distortion of the tarsal bones. They are liable to the same alterations, both in their diseased state, and their progress towards a cure: and as these circumstances have been fully explained, in speaking of the bones of the tarsus, it will be needless to repeat what has been said of them here.

I have

I have thus endeavoured to prove, that before the age of two years the individual bones of a club-foot are not distorted in any manner; that as far as the bones are concerned in the disease, it is only by improper combination; that after the age of two years, individual bones become deformed, according to circumstances which vary in different cases; but which do not, in all, render the disease incurable. I shall now proceed to examine the condition of the ligaments, in various stages of the disease, in order to discover what alterations must be produced in them, in order to effect a cure.

OF THE LIGAMENTS AND MUSCLES.

As those who are acquainted with the number and variety of the ligaments which connect the bones of the foot with each other, and with the leg, will agree that it is needless to enter into a minute description of them all, on this occasion; and as those who are not acquainted with them would
not

not comprehend that description, I shall confine myself to such general observations on their nature and properties, as will explain the changes they must undergo, in the progress of a club-foot, from the diseased to the perfectly natural state; prefixing, however, such descriptions of them as are requisite, in the words of the author I have already quoted.

‘ The * periosteum which has run
 ‘ along one bone, leaves it at the head, and
 ‘ forming a bag for the joint, goes onwards
 ‘ to the next bone. Thus the periosteum
 ‘ of all the bones is one continued mem-
 ‘ brane, passing from point to point; each
 ‘ bone is tied to the next by its own peri-
 ‘ osteum, and this membrane betwixt the
 ‘ end of one bone, and the beginning of
 ‘ the next, is so thickened into a strong
 ‘ and hard bag, as to form the capsule of
 ‘ the joint; and the periosteum is assisted
 ‘ in performing this office, by the tendons,
 ‘ fascia,

* Anatomy of the Bones, &c. by J. BELL, page 409.

‘ fascia, burſæ, and all that confuſion of
 ‘ cellular ſubſtance which ſurrounds the
 ‘ joint. The *capsule* of the *joint* is then a
 ‘ firm and thick bag, which, like a liga-
 ‘ ment, binds the bones together, keeps
 ‘ their heads and proceſſes in their right
 ‘ places, contains the glairy liquor, with
 ‘ which the heads of moving bones are be-
 ‘ dewed, and prevents the adjacent parts
 ‘ falling inwards, or being caught betwixt
 ‘ the bones, in the bendings of the joints.
 ‘ The capsule of every joint proceeds from
 ‘ the periosteum, and is ſtrengthened by
 ‘ the tendons ; it is formed like theſe parts,
 ‘ out of the cellular membrane ; and when
 ‘ a bone is broken, or its periosteum de-
 ‘ ſtroyed by any accident or diſeaſe, when
 ‘ a tendon ſnaps acroſs, when a joint is
 ‘ luxated, and the capsule torn, the injury
 ‘ is ſoon repaired by a thickening of the
 ‘ cellular ſubſtance round the breach ; and
 ‘ wherever a bone, being luxated, is left
 ‘ unreduced, a new ſocket, new periosteum,
 ‘ new ligaments, and new burſæ, are
 ‘ formed out of the common cellular ſub-
 ‘ ſtance ; and though the tendons may
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‘ have been torn away from the head of
 ‘ the bone, they are fixed again, taking a
 ‘ new hold upon the bone.

‘ A joint* is composed of the heads of
 ‘ the bones swelling out into a broader
 ‘ articulating surface, and of a thin plate
 ‘ of cartilage, which covers and defends
 ‘ the head of each bone ; sometimes of
 ‘ small and moveable cartilages, which roll
 ‘ upon the bones, and follow all the mo-
 ‘ tions of the joint, and, like friction
 ‘ wheels in machines of human invention,
 ‘ abate the bad effects of motion. There
 ‘ are mucous glands, or rather mucous
 ‘ bags, which convey a lubricating fluid :
 ‘ and there is a burfal ligament, which
 ‘ forms the purfe of the joint, bends the
 ‘ bones together, contains the fynovia, and
 ‘ prevents the furrounding parts from be-
 ‘ ing caught in the joint. There are leffer
 ‘ ligaments on the outside of this, going
 ‘ along the fides of the joint, and paffing
 ‘ from

* Anatomy of the Bones, &c. by J. BELL, page 414.

‘ from point to point ; there are great
 ‘ tendons moving over the joint, and burfæ
 ‘ or mucous bags, which accompany thefe
 ‘ tendons, and prevent the violence which
 ‘ their continual rubbing might do to the
 ‘ bones.’

Speaking of the ancle joint, he fays,
 ‘ The ancle joint* owes lefs of its ftrength
 ‘ to ligaments, than to the particular forms
 ‘ of its bones ; for while the ftiong lateral
 ‘ ligaments of the knee guard it, fo that it
 ‘ cannot be diflocated till they are torn, the
 ‘ lower heads of the tibia and fibula fo
 ‘ guard the foot, that it cannot be luxated
 ‘ fide ways, without fuch violence as breaks
 ‘ thofe bones. Firft, the fibula is fo con-
 ‘ nected with the tibia, at the lower end,
 ‘ that they form together one cavity for
 ‘ receiving the aftragalus, with two pro-
 ‘ jecting points, the fibula forming the
 ‘ outer ancle, and the tibia forming the
 ‘ procefs of the inner ancle. The joining
 N 2 ‘ of

* Anatomy of the Bones, &c. by J. BELL, page 452.

of the fibula to the tibia here, is like that
 of its upper end, too close to admit of
 the smallest motion, and it is thoroughly
 secured by particular ligaments, one of
 which passing from the fibula to the tibia,
 on the fore part, is named the *ligamentum*
superior anticum, consisting, in general, of
 one or two distinct flat bands. Another
 more continued and broader ligamentous
 membrane, goes from the fibula to the
 tibia, across the back part, and is named
ligamentum posticum superius; the *ligamen-*
tum posticum inferius being but a slip of
 the same. Next comes the capsule of the
 joint, which joins the astragalus to the
 lower heads of the tibia and fibula. It is
 thinner, both before and behind, than
 we should expect, from the strength of
 a joint, which bears all the weight, and
 the most violent motions of the body;
 but, in fact, the capsule every where
 serves other purposes than giving strength
 to the joint, and never is strong, except
 by additional ligaments from without. So
 it is with the ankle joint, the capsule of
 which is exceedingly thin before; but it
 is

' is strengthened at the back part, and
 ' especially at the sides, by supplementary
 ' ligaments. First, a strong ligament comes
 ' down from the acute point of the inner
 ' ankle, expands in a radicated form upon
 ' the general capsule, adheres to it and
 ' strengthens it, and is fixed all along the
 ' sides of the astragalus. This ligament,
 ' coming from one point, and expanding
 ' to be inserted into a long line, has a trian-
 ' gular form, whence it is named *ligamen-*
 ' *tum deltoides*; and while the general liga-
 ' ment secures the joint towards that side,
 ' the oblique fibres of its fore edge prevent
 ' the foot being too much extended, as in
 ' leaping, and its oblique fibres on the
 ' back edge prevent its being too much
 ' bended, as in climbing; but the liga-
 ' ments of the outer ankle, tying it to the
 ' outer side of the astragalus, are indeed
 ' distinct, one going forwards, one going
 ' backwards, and one running directly
 ' downwards: one goes from the point or
 ' knob of the fibula, obliquely downwards
 ' and forwards, to be inserted in the side
 ' of the astragalus: it is square and flat,

‘ of considerable breadth and strength; and
 ‘ is called *ligamentum fibulæ anterius*: ano-
 ‘ ther ligament goes perpendicularly down-
 ‘ wards, from the acute point of the out-
 ‘ ward ankle, to spread upon the side of the
 ‘ astragalus, and of the capsule, and is fi-
 ‘ nally inserted into the heel bone; this is
 ‘ named the *ligamentum fibulæ perpendiculare*:
 ‘ a third ligament goes out still from the
 ‘ same point, to go backwards over the
 ‘ back part of the capsule, adheres to the
 ‘ back of the capsule, and strengthens it,
 ‘ and is named *ligamentum inter fibulam et as-
 ‘ tragalum posterius*.’

Again, describing the joints of the foot,
 he says, ‘ The *os astragalus, os calcis, os
 ‘ naviculare, and all the bones of the tar-
 ‘ sus, are united to each other by large
 ‘ heads, and distinct and peculiar joints;
 ‘ besides which, the bones are cross tied to
 ‘ one another by ligaments, so numerous
 ‘ and complicated, that they cannot, nor
 ‘ need

* Anatomy of the Bones, &c. by J. BELL, page 455.

' need not be explained. They pass across
 ' from bone to bone, in an infinite variety
 ' of directions, some longitudinal, some
 ' transverse, and some oblique. There is
 ' a curious complication, which we may
 ' call a web of ligaments, covering either
 ' side of the foot with shining and star-like
 ' bundles. Each bone has its capsular li-
 ' gaments, for joining it to the next; each
 ' joint of each bone has its articulating
 ' cartilages, always fresh and lubricated;
 ' each joint has, besides, its capsular flat
 ' stripes of oblique, longitudinal, and trans-
 ' verse ligaments, joining it to the nearest
 ' bones; and the greater bones have larger
 ' and more important ligaments, as from
 ' the astragalus to the os calcis, from the
 ' os calcis to the os naviculare, and from
 ' that to the scaphoid bone, &c. &c.

' The metatarsal bones have their cap-
 ' sular ligaments, joining them to the tarsal
 ' bones, and they have ligaments strength-
 ' ening their capsules, and tying them
 ' more strongly to the tarsal bones; and,
 ' as in the metacarpal bones, the several
 ranks

‘ ranks are tied one to another by cross
 ‘ ligaments, which pass from the root of
 ‘ one bone to the root of the next. We
 ‘ have ligaments of the same description
 ‘ and use, holding the metatarsal bones
 ‘ together, both on the upper and on the
 ‘ lower surface of the foot; and all the li-
 ‘ gaments of the foot are of great strength
 ‘ and thickness. The lower ends of the
 ‘ metatarsal bones have also transverse li-
 ‘ gaments, by which they are tied to each
 ‘ other. The toes have hinge-joints, formed
 ‘ by capsules, and secured by lateral liga-
 ‘ ments, as those of the fingers are; and,
 ‘ except in the strength and number of
 ‘ ligaments, the joinings of the carpus,
 ‘ metacarpus, and fingers, exactly resemble
 ‘ the joinings of the tarsus, metatarsus,
 ‘ and toes.

‘ But these ligaments, though helping
 ‘ to join the individual bones, could not
 ‘ have much effect in supporting the whole
 ‘ arch of the foot. It is further secured
 ‘ by a great ligament, which extends in one
 ‘ triangular and flat plate, from the point
 ‘ of

‘ of the heel to the roots of each toe.
 ‘ This is named the *aponeurosis plantaris pe-*
 ‘ *dis*, which is not merely an aponeurosis
 ‘ for covering, defending, and supporting
 ‘ the muscles of the foot ; that might have
 ‘ been done on easier terms, with a fascia,
 ‘ very slight compared with this ; but the
 ‘ chief use of the plantar aponeurosis is in
 ‘ supporting the arch of the foot. It passes
 ‘ from point to point, like the bow-string
 ‘ betwixt the two horns of a bow, and
 ‘ after leaping, or hard walking, it is in
 ‘ the sole of the foot we feel the hard
 ‘ straining and pain ; so that, like the pal-
 ‘ mar aponeurosis, it supports the arch,
 ‘ gives origin to the short muscles of the
 ‘ toes, braces them in their action, and
 ‘ makes bridges, under which the long ten-
 ‘ dons are allowed to pass ; it comes off
 ‘ from the heel in one point ; it grows
 ‘ broader, in the same proportion as the
 ‘ sole of the foot grows broad. It is di-
 ‘ vided into three narrow heads, which
 ‘ make forks, and are inserted into the
 ‘ roots of the second, third, and fourth
 ‘ toes ; and the great toe and the little toe
 O ‘ have

‘ have two smaller or lateral aponeurosis,
 ‘ which cover their own particular mus-
 ‘ cles, and are implanted into the roots of
 ‘ the great toe and little toe.’

From these demonstrations of the ligaments of the joints of the ankle, the tarsus, and the metatarsus, which I have extracted from Mr. BELL's valuable work, and from what has been said of the condition of the bones in various stages of club-foot, the condition of the ligaments, in different stages of this disease, may be well understood. Upon referring to the situation of the bones of the foot, as I have already sketched them, it will be seen, that the bones are, on the upper and outside of the foot, at some distance from each other; and if nothing is done to alter that position, will continue so, till the period of life at which the improper growth of each bone has filled up the interstices between them. On the under, and inside of the foot, the bones are always as close together as in the natural state. Now as the capsular ligaments are formed by a continuation of the
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periosteum, passing from one bone to the next, as the bones of the foot are originally gradually placed, so as to grow into this form, the capsular ligaments must derive a peculiarity of form from the accidental position of the limb. As the bones of the tarsus have no perceptible motion on each other, the capsules which connect them, unite them closely together, and keep them firmly so, when in their natural state; and in this disease, the capsules on the under side of the foot, are in the same condition, *i. e.* they unite the bones of the foot firmly and closely together; but on the upper side of the foot, as they pass from one bone to the next, their extraordinary length must be exactly equal to the unnatural distance between those bones. If, therefore, we consider this part of a foot, so diseased, and suppose it divested of every obstacle, from the state of the muscles, that would prevent us from placing it in the natural state, it would only be requisite to press the upper parts of the tarsal bones together; and as there is not, nor can be much, if any contraction in the capsule on the un-

der-side of the foot, there would be no obstacle in preventing them from being immediately placed in their natural position. But as the ankle joint is intended to move freely backwards and forward, its capsule must be in the natural state, so formed, as to admit of this motion. In the diseased state, however, the case is very different; there has never been the natural motion in the parts: the capsule is, therefore, like the capsules of the tarsal bones, a mere continuation of the periostium, uniting them as firmly together, as their position will allow. Now if the other obstacles which prevent the reduction of the ankle joint to its natural position were removed, we could not, as in the tarsal bones, immediately place the bones concerned in the ankle joint in their natural situation; because there is a permanent contraction of the capsular ligament on the back of the joint, and the reduction of the bones of the ankle joint, into their natural situation, can never be effected, so long as that contraction continues. Here then, a new operation becomes necessary, *i. e.* by mechanical

nical means, to produce such an alteration in the state of this capsule, as shall allow of the natural quantity of motion. The metatarsal bones have more motion than the bones of the tarsus, and less than the ankle joint, and therefore in the point of view I am now considering them, hold a middle situation between the two: but as the foot is always contracted, so as to draw the toes more or less downwards, and inwards, in this disease, there must always be a permanent contraction of the plantar aponeurosis, exactly proportioned to the degree in the deformity. The other ligaments, which, as they partake of the same general nature, and contribute with the capsular ligaments to preserve the bones in their positions, are to be considered all together in the same point of view, with respect to their contraction, or other deviations from the natural state.

It is this contraction of the ligaments, which constitute the essential part of the disease, before the age of two or three years, when the bones begin to be affected,
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and afterwards become the most important part of the deformity; for though there is, likewise, muscular contraction, yet as the muscular fibre is more easily acted upon than the ligament, from its peculiar nature, can be, this must always claim the greatest part of our attention, since it is certain, that whatever means are successfully used to produce the requisite alterations in the ligaments, must necessarily produce, in less than the same time, the requisite alterations in the state of the muscles; but the reverse of this position can never, in the nature of things, be true.

The ligaments are powerfully elastic, but endued with very little active sensibility, by which qualities they are peculiarly adapted to their functions of binding the bones firmly together, when they should be so bound; of limiting their motion, when bounds ought to be set to it; and of resisting the effects of strains of every description, from all the violent actions to which the parts may safely be rendered liable. But if forced beyond this, a material alteration

alteration takes place in all their sensible properties. If a limb is strained by any action, too violent for the parts to bear, and the ligaments are not lacerated, they are forcibly extended in length, inflammation comes on, sensibility is excited to a degree, of which very few other parts are susceptible, and, too frequently, the most dreadful consequences ensue. If these are averted, and the sensibility and inflammation removed, the parts are, for want of sensibility, and from other properties, peculiarly slow in recovering their natural tone and full power of performing their natural functions. In a young growing animal they *may* perfectly recover it, but in an adult, or old one, almost never; as is too well known to those who have opportunities of observing the consequences of sprains, often apparently slight, and too sorely experienced by those to whom such accidents happen.

Now as the essential operation to be performed, in curing a club-foot, is to produce such an extension of some of the ligaments, as, if it happened by accident, would
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constitute a considerable sprain, it certainly is the duty of the operator, so to conduct this operation, that none of the consequences which would have taken place from an accidental sprain, shall ensue. If he does not do this, he will certainly leave his patient in a worse condition than he found him; for a child had, no doubt, better be lame from deformed feet only, than from the same deformity combined with debility, arising from luxation, or sprains from injudicious treatment. This circumstance has always been so strongly impressed on my mind, that after the maturest consideration, and reiterated experience, I feel myself justified in laying it down, as a rule most proper to be followed, to employ something more time than may be absolutely necessary to effect the reduction; rather than risk the consequences of a more precipitate proceeding. I have, indeed, when called to a patient in the country, or at a distance from home, when the time of my attendance was necessarily limited, proceeded in the necessary operations with all possible dispatch; but always with a degree of anxiety

xiety I would not willingly encounter, and a risk to the patient, which nothing but necessity can justify us in hazarding. I have, indeed, never seen any accident happen, in my own practice, from precipitate treatment; but shall be excused for relating the following case, to shew the consequences of rashness and ignorance united.

A Gentleman had a son born with two club-feet. He had been told I had discovered a method of curing this disease, and had a patent for the invention; and for this reason, he intended to put the child under my care. But he accidentally met with a youth, whose ignorance can only be equalled by his dishonesty, who assumed my name and character, declared himself the inventor and patentee, and undertook to cure the child. He might have examined my specification in the office, as it was not then published; he might have suborned some of my servants to give him some information of the instruments I use; for he certainly did make such imitations of them, as would have subjected him to a

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prosecution, had I chosen to put the laws in force against him. For a very short time he exulted in his success, for the child was said to get better; but, in a few days, there was a general inflammation of both legs, and he was obliged to desist. Unfortunately for the patient, this inflammation subsided in a few days; I say *unfortunately*, since it induced the parents to subject the child again to this treatment, when fresh inflammation was produced, to a more dangerous extent, and more permanent in its effects; for notwithstanding a considerable time has elapsed since this empiric was discarded, the child remains in the same condition; the feet deformed, as at first, and apparently weak and useless, from the severe treatment they experienced.

There can be no doubt, but that by assuming my name and character, and calling himself the inventor of the method of curing the disease, his intention was to defraud me of the reputation, and what little profit could be obtained from the case. The cautions that were given him to desist, per-

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haps, only stimulated him to perseverance, and induced him to exert himself to support his imposture, and shew how much he could do ; but as he is in the most perfect ignorance of every part concerned in the disease, it is not surprizing, such an undertaking should terminate in his disgrace ; though it is difficult to conceive what apology he can make to a Gentleman, for having so treated his child. The event of this case may serve as a necessary caution to the unwary, to ascertain, correctly, who they confide in, upon an occasion of such importance.

After so much extension of the contracted ligaments has been produced, as will enable us to place the foot in its natural form, a further alteration in the condition of those ligaments must take place, before the cure is complete. The ligaments that have been extended remain weak, and, in that respect, similar to those that have been violently strained, and the inflammation of which has recently subsided. By bringing the upper parts of the tarsal, and metatarsal bones into contact, the ligaments

which connect them are too long and loose for their situation and office; whence the whole foot, instead of being firmly bound together by the ligaments, as in the natural foot, is loose, and may be thrown into many improper positions, by various actions or accidents, and, by this means, occasion a relapse into the former deformity, or give rise to a new one. To prevent this, it will always be necessary to keep the foot bound, by proper instruments and bandages, in its natural position, till the parts have so far recovered their natural powers, as to render this alteration improbable; the patient may then be safely suffered to go without any.

The time requisite to effect this, will vary in patients of the same age, but differently circumstanced with respect to the disease; and it will vary materially, in proportion to the age of the patient. In general, I have found, that in children taken at, or within two months of the birth, a cure will be, in every sense, complete, by the time they begin to walk. If not began till two years old, it will be at least as long before

before a child can go without support : and thus the time requisite to effect a cure will increase, progressively, with the age of the patient, till they have completely done growing, at which period it is possible that some patients may be so far cured, as to have their feet reduced into the natural form ; but it is unlikely, that they should, even then, ever be able to walk without artificial support.

The cause of this difference of time requisite to effect a cure, in patients of different ages, is the peculiar nature of the ligaments, which are less susceptible of alteration than any of the other soft parts of the body. The muscles are, from their texture, easily affected by various diseases : they are strengthened and enlarged by action, they are wasted and debilitated by disease ; but the ligaments, though susceptible of the same alterations, are not so in the same degree. Now as a healthy child grows more in a given time, immediately after the birth, than it does in the same space of time at any future period of its life,

life, and as the progressive alteration in the texture of its parts is slower, in proportion as it advances in life; as the ligaments are, in every stage, less susceptible of alteration than the other parts, and as a great alteration must be produced in the condition of the ligaments, to cure this disease, we see at once the importance of undertaking the cure as early in life as possible, and by this means, diminishing the trouble necessary to obtain, and the risk of being disappointed of success.

The bones form the basis of the body, give it solidity, and form the foundation on which those parts are fixed, which enable it to move; the ligaments connect the bones together, firmly, where firmness is required, and admitting of certain degrees of motion, where motion is necessary; but the muscles are the powers by which motion is performed: and such is the connection between these three parts of the animal, that any derangement in the one, necessarily interrupts the functions of both the others. Having endeavoured to explain
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so much of the nature of bones and ligaments, as is connected with the disease in question, it only remains to examine the muscles of distorted feet, in the same point of view, to enable us to form correct opinions on the probability of curing them, in the various stages of the disease.

It has been usual to divide the muscles of the foot into flexors and extensors, arranging under the first head the gastrocnemii, the peroneii, the tibialis posticus, and plantaris; and to call the tibialis anticus the only extensor muscle of the foot. If this arrangement was correct, it would necessarily follow, that the foot is capable of only one kind of motion, *viz.* flexion and extension, directly forwards; but as we know that it is capable of other motions, when in its natural state, *viz.* a degree of rotation, turning the toe inwards or outwards, and another motion, bending the whole foot upwards and inwards, it is evident, that the opinions that might be deduced from the above arrangement, would be erroneous; and as it is important, in
consider,

considering this disease, that we should understand the situation and action of every muscle of the foot, I trust I shall be excused for dissenting from the common manner of classing them.

Of the muscles called flexors of the foot, three, *viz.* the gastrocnemius, soleus, et plantaris, certainly do bend the foot, and, undoubtedly, have no other motion: they are, perhaps, the strongest muscles in the body, as they lift the whole weight of the body, every step we take, and with a degree of force, proportioned to the action intended in running, jumping, &c. It is the apparent contraction of these muscles, that, for want of a counteracting force, forms a most prominent feature of the disease, as it continually draws the heel upwards, and gives the appearance of preternatural smallness to the os calcis. But this contraction is not the original disease; for, notwithstanding, as the patient advances towards maturity, the calf of the leg, which is formed of these muscles, wastes entirely away, for want of action,
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and the whole disease is then, perhaps, incurable. It is certain, that this mischief is solely occasioned by the bones of the foot, which have got into an unnatural position, and thus impede the action of the muscles. So long as the state of the bones does not render a cure hopeless, no insurmountable obstacles are opposed to it, by this apparent contraction of the muscles of the leg.

Although the *tibialis posticus*, and *peroneus longus et brevis*, certainly do, in some circumstances, unite their action with that of the *gastrocnemius*, *soleus*, et *plantaris*, to bend the foot, they have other, and distinct functions, in which the latter have no concern, and which deserve particular attention; as the derangement of their natural actions, and the restoration of their natural powers, constitute most essential parts of the disease and the cure.

If we try to bend the foot, as much as possible, into the position of the common club-foot, we find it can be easily inclined very much that way. This is effected by

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the contractile action of the tibialii muscles; the peroneii are relaxed and quiescent. If we reverse this action, it is effected by contraction of the peroneii muscles, and *consequent* relaxation of the tibialii; and both these motions are to be performed without bringing the gastrocnemii and plantaris into action. It is evident, that in these actions, the tibialii, and peroneii muscles are, alternately, flexors and extensors; and it is, therefore, manifestly incorrect, if not improper, to call the peroneii and tibialis posticus muscles, simply flexors of the foot.

Again, when we point the toe directly downwards, all the muscles, called flexors of the foot, concur in this action, except the peroneus longus, which is chiefly employed in counteracting the tendency of the foot to turn inwards; this it certainly would do, if not so counteracted: and when the foot is raised directly upwards by the anticus, the peroneus longus combines with it in that action, as we find, in this situation, we can turn the toe inwards or out-
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wards,

wards, according as we direct either of those muscles to act. As these actions of the muscles of the foot must be evident to every one who will examine into them, it is difficult to conceive how the tibialis anticus can be called the only extensor of the foot, and the six others denominated flexors; particularly the peroneus longus, whose action is so continually combined with that of the anticus, in raising the foot, that, in no instance, can the foot be extended in the natural way, if the action of the former is impeded in any manner.

The action of each muscle has been examined separately; but it is easy to conceive, that no one of them can act entirely by itself. When the foot moves, in any manner, all the muscles are variously put in motion; nay, there are few actions can be performed, without the united power of the leg, foot, and toes: whence it must follow, that any derangement, in any of those muscles, must give rise to a defective and irregular action in the whole limb, and, on many occasions produce additional

Q 2 distortion.

distortion. Thus the muscles of the thigh, leg, foot, and toes, are always combined in those actions that contribute to locomotion, though, from the nature of their connection, notwithstanding the thigh may in adult patients be wasted, because distortion of the foot renders the patient less capable of action, yet it is subject to no other derangement. But as the muscles of the toes are much concerned in every action of the foot, every derangement of the parts of the foot must affect those muscles; and, in a healthy state, their action is of consequence to the motion of the foot itself; they are, therefore, as much objects of attention, in every stage of the diseased, as those of the foot itself.

There is manifest disproportion in the power of the muscles of the foot itself, considered simply on the idea of flexion and extension; because the flexors must lift the weight of the body, at every step we take, while the extensors are only to lift the foot, and prepare it for a second step. There is a similar disproportion in the
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power and action of the muscles of the toes, because there is, likewise, a great difference in their intended functions; for, while the flexors only bend the toes downwards, the extensor longus digitorum pedis, the peroneus tertius, the extensor digitorum brevis, and extensor pollicis proprius, not only extend the toes, but contribute much towards raising the foot, in conjunction with the anticus and peroneus longus. In this light, I believe it has not been usual to consider them; and it may, therefore, not be improper to explain this part of their functions.

The origin of these muscles is on the tibia and fibula: their insertion, in and about the toes, and their contractile power, is divided equally through their whole length; whence it is evident, that when these muscles counteract the flexors of the toes, by contracting themselves, they must necessarily assist in raising the foot, if it is lifted at the same time; acting upon the foot, with respect to the ankle joint, like a cord applied to the extremity

tremity of the long arm of a lever, and thus raising the weight, in the most advantageous manner. This may be ascertained by any person endeavouring to raise the foot, at the same time the toes are kept down, by contraction of their flexor muscles; and it will be found, that the foot cannot be raised, till the flexor muscles of the toes relax, and the extensors combine with the action of the anticus and peroneus longus, to produce the desired effect.

Such is, nearly, the action of the muscles of the feet and toes, when in their natural state. We are now to examine, in what manner they deviate from this mode of action, when a foot is distorted in that way that has obtained the name of club-foot; and I shall therefore proceed to examine the worst stage of that disease.

The first, and most prominent feature of this disease, when we consider the state of the muscles, is the apparent contraction, and absolute rigidity of the gastrocnemii, plantaris, and tibialis posterior muscles,

muscles, and the apparent incapacity for motion in the peronei and muscles of the toes. I call these circumstances apparent, because the contraction is not an absolute disease: the position the bones have got into, prevents these muscles from acting, and therefore their power of action seems to be lost; what small degree of motion remains in the foot, is performed by the anticus, which, in consequence of the improper position the foot has taken, draws it more inwards and upwards. All these circumstances, I have seen in the foot of a new-born child: and if others are not so bad at first, as they grow up, if no attempts are made to cure them, these circumstances come on gradually, till the parts of the foot become incapable of any kind of motion, and the bulk of the leg diminishes, by the wasting of the muscles, till it is very little more than the bones covered with the integuments.

During the time that the condition the of bones does not render the disease incurable, no insurmountable obstacle is opposed to
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the cure, by this apparently desperate situation of the muscles ; for as no disease exists in the muscles themselves, as in paralytic affections, if the bones can be, and are reduced into their natural form, and relative position, the impediment to action of the muscles is removed, and with proper attention, the action of these muscles, as well as their natural form and relative proportion, in growing children at least, may be restored, and thus the cure be rendered complete.

To illustrate these important facts, I took an opportunity to examine an adult patient, who had been born with one club-foot, and to relieve which no attempts had ever been made. I measured the perfect leg, as accurately as a line could be traced on the surface of the skin, in the course of soleus muscle, from its origin at the upper part of the tibia, to the insertion of the tendo achilles on the os calcis, and found, when the heel was raised as much as possible, the whole length was fourteen inches and a half ; and when the heel was depressed

pressed as much as possible, as in the act of climbing, the whole length was sixteen inches and a half. I measured the anticus muscle of the same leg, and found its most extended length seventeen, its most contracted length fifteen inches. The peroneus longus, in its most contracted state, when the foot was turned outwards and upwards, as much as possible, measured nineteen inches and a half, and in its most extended state, when the foot was turned inwards, and drawn up, as much as possible, in the position of the club-foot, by the action of the tibialii muscles, it measured twenty-three inches. These measurements were as accurately taken as possible; but are, perhaps, not perfectly so. They are, however, sufficiently accurate for the present enquiry; and the result of them shews, that in mere flexion of the foot backwards and forwards, the anticus and gastrocnemei muscles contract and expand to the same extent; but the alteration of the peroneus longus, in its two extremes of contraction and extension, is nearly twice as much as that of either the gastrocnemius or anticus.

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It is difficult, from the peculiar functions of the peroneus longus, to name any muscle as its particular antagonist. In the view I am now considering it, it seems to be counteracted by the tibialis anticus and posticus; and it is certain, that neither of them contracts or extends, more than a fourth part of the length that the peroneus longus does in this action; and this variation from the general principles of muscular motion*, which are, that antagonist muscles move through equal spaces, in counteracting each other, gives it a peculiar character, that will afterwards require particular attention.

The distorted foot, in this patient, was turned inwards and outwards so much, that he stood with the os cuboides on the ground. The length of the soleus, from its origin to the insertion of the tendo achilles on the os calcis, was thirteen inches and a half, and it was perfectly rigid. The length
measured

* I should have said, that part of muscular motion which contributes to loco-motion in the human subject, as the principle is by no means universal.

measured in the course of the anticus was fourteen inches ; but the length of the peroneus longus, as nearly as it could be traced on the foot so deformed, was twenty-five inches and a half.

This is, perhaps, as correct a statement of the difference between the length and size of the muscles of a distorted foot, and a foot naturally of the same size, as can be obtained without dissections, the opportunities for making of which very seldom occur. It proves, that in a disease which had taken place before the birth, and continued without any attempt to remove or diminish it for twenty-five years, which was the age of the patient when I saw him, the actual contraction of the gastrocnemii muscles was but one inch more, in fourteen inches and a half, than the corresponding muscles in the opposite leg continually contracted themselves, in performing their natural functions. As we know that muscular contractions, under some circumstances, to a much greater extent, are overcome, we are authorised to conclude, that if the state of the bones, in this case, had not ren-

dered a cure absolutely impossible, this contraction of the muscles at the back of the leg might perhaps have been overcome.

If it is possible, that this contraction, in an adult, might have been overcome, after it had existed and been increasing during the whole of his life; if we consider, that contraction equally rigid to appearance, but less in degree, in proportion to the difference of the patient's size, takes place in all these cases, and has been supposed to be the principal obstacle to a cure, may we not conclude, that whenever the bones can be reduced to their natural state, this condition of the muscles of the foot will never, for a moment, retard the cure?

A circumstance, more important in itself, and more important because it seems to have been overlooked, is the alteration that has taken place in the exterior muscles of the foot and toes, and more particularly in the peroneus longus, if I am not to call that an extensor of the foot. It is upon the total removal of this circumstance, that the perfection of a cure in this disease always

ways depends ; it is a point upon which so much depends, and upon which so little stress has been laid, even by those who have been most interested in the welfare of those patients I have under my care, that I trust it will not be thought irrelevant if I attempt to discuss it here.

Considering the muscles only, two operations are necessary to effect a cure ; one, by reducing the foot into its natural form, to remove the contraction that has taken place. In this state, the foot appears well formed, but is useless, as to all purposes of loco-motion ; it will remain in this position so long as it is held or bound, but upon removing the hand or bandage, immediately falls back into its former position. The second operation is, therefore, necessary to keep it in the natural position, till the perfect use of all the parts is obtained, and then a relapse is no more to be feared.

In the comparison I have made between the distorted and the natural foot of a patient, it has been seen, that the peroneus longus on the distorted foot, was two inches and a half

half longer than the same muscle on the natural foot, when extended to the greatest degree that it could be. In the views I have given of the bones of a distorted foot, it has been seen, that from the position of those bones, there are spaces between them at their upper surfaces, which at last become ossified. In this case it is obvious, that all the muscles and integuments must be longer than they are in a foot of the same patient, when in the natural state.

By the operation of reducing the foot into its natural form, those spaces are obliterated, by the reunion of the divided bones; of course the muscles and integuments which cover them, are now longer than they ought to be, therefore they are incapable of performing their natural functions, till this superabundant length is remedied. To know how this can be done, we must make some enquiries into the nature of muscular action.

Muscular motion, so far as it is connected with loco-motion, seems to depend upon this principle, that the flexor and extensor

tenfor muscles of a member are equal in power, and the parts are enabled to perform their functions, continually, by the regular transfer of volition, from flexors to extensors alternately; but the power of executing these functions, depends upon the correct and natural proportion of the parts to each other. Thus we have seen in the leg of which I have given the measurements, that the flexor and extensor muscles, in performing their natural motions, each alternately contracted and extended in the same degree: but in the diseased leg, there was no motion; there was a positive contraction of the gastrocnemii muscles of one inch: and there was an elongation of the peroneus longus, which made it two inches and a half longer than the same muscle in the perfect foot. This case was incurable, from the age of the patient and the form of the bones; but if we suppose a case that is curable, though under the same circumstances, as to form and position of the parts, the first operation would be to reduce the bones into their natural state, by which the capacity for motion would be restored to the foot. The next would be,

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to produce extension of those muscles that had been contracted, which would be effected in a short time, and thus one of its actions be restored to the foot; but the patient would still remain lame, and in a great measure helpless, unless due care is taken to preserve the foot in a proper position, till the exterior muscles have likewise recovered their action.

I suppose the size of the muscle of this foot corresponds with the measurement I have already given; we therefore see, the peroneus longus is two inches and a half longer than the same muscle in the naturally-formed foot of the same patient, it is evident, that by reducing the foot to its natural form, in the short time it has been effected by my operations, this muscle must be left two inches and a half too long for its antagonists; or, in other words, by reduction of the foot to its natural form, the peroneus longus, and all the soft parts on the upper part of the foot, would form in wrinkles, and remain so, till by the growth of the patient, and confinement of the foot in a proper situation, the superabundant parts

parts are wasted away, and the whole limb will then regain and keep its natural form and action.

Having thus endeavoured to ascertain the circumstances which constitute the difference between the bones, ligaments and muscles, in the diseased and natural state, considering them separately, it now remains to consider them as united into one whole. As each fibre is united to its fellow by cellular substance, till they constitute a muscle, so the muscles, ligaments, and bones, are united together, by different modifications of the same substance, to constitute a perfect limb. The tendons and ligaments themselves are but modifications of the same substance, differing from each other. The cellular substance that unites them is in the simplest form; but would not answer the purposes requisite for the perfect state of the limb, without farther assistance; as it is evident, from the form and action of the parts, that their tendency to form straight lines from their origin to their insertion, would alter the form of the leg, and impede

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its action, unless assisted by a peculiar provision for that purpose.

This provision is the general fascia which firmly embraces the whole limb, to give strength to every muscle, and the crucial ligaments which are found at the acute angle made at the joining of the foot to the leg. These parts I shall describe in the words of the author *, from whose work I have already made many quotations.

‘ It is often useful, that an individual
 ‘ muscle should be inclosed in a tendinous
 ‘ sheath, to give it strength and firmness,
 ‘ and preserve it in its shape. All mus-
 ‘ cles, or almost all muscles, form for them-
 ‘ selves individual sheaths, such as are seen
 ‘ inclosing the supra spinatus and infra
 ‘ spinatus of the scapula, the biceps hu-
 ‘ meri, and most of the muscles of the leg
 ‘ and thigh ; but it is especially necessary,
 ‘ that the whole muscles of the limb should
 ‘ be enclosed in some stronger membrane
 ‘ than

* J. BELL on the Bones, &c. p. 406, &c.

' than the common skin, both to give form
 ' to the limb, and strength to its muscles,
 ' and to keep the individual muscles in
 ' their proper places, which otherwise
 ' might be luxated and displaced. And so
 ' the trunk of the body, the arm, the thigh,
 ' the leg, are bound each with a strong,
 ' smooth, and glistening sheath, formed
 ' out of the cellular substance, condensed
 ' and thickened by continual pressure. And
 ' this also is thicker and stronger, accord-
 ' ing to the need that there may be for
 ' such a help. It is hardly to be distin-
 ' guished in the child, grows thicker and
 ' stronger as we advance in years and in
 ' strength; and, in the arms of workmen,
 ' it grows particularly thick and strong,
 ' increasing in the back, shoulder, or limbs,
 ' according to the particular kind of la-
 ' bour. These are the membranes which,
 ' by inclosing the muscles like sheaths,
 ' are called the vagina, or fascia of the
 ' arm, the leg, the thigh,' &c.

Again, ' These tendons * must be bound

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' firmly

‘ firmly down ; for if they were to rise
 ‘ from the bones, during the actions of the
 ‘ muscles to which they belong, the effect
 ‘ of contraction would be lost, and they
 ‘ would disorder the joint, starting out in a
 ‘ straight line from bone to bone, like a bow
 ‘ string over the arch of a bow. The
 ‘ same inanimate substance still performs
 ‘ this office also ; for the tendons of one
 ‘ muscle often split, to form a sheath or
 ‘ ring for the next ; or their tendons, after
 ‘ taking hold of the bone, spread their
 ‘ expansion out over all the bones, so as to
 ‘ form an entire sheath for the finger and
 ‘ toe ; or there is a wide groove in the
 ‘ bone, which receives the tendons, and it
 ‘ is lined with a cartilage, and with a lu-
 ‘ bricated membrane. The membrane
 ‘ comes off from the slips of the groove,
 ‘ or from corners or edges of the bone,
 ‘ passes over the tendons, so as to form a
 ‘ bridge, or often it forms a longer sheath,
 ‘ as in the fingers, or where the peroneii
 ‘ muscles pass behind the ancle, and thus
 ‘ the vagina or sheaths of the tendons are
 ‘ connected with the tendons, periosteum,
 ‘ and

‘ and other modifications of the common
 ‘ cellular membrane.’

Again, ‘ These exterior tendons * are
 ‘ bound down by cross-bands, resembling
 ‘ the annular ligaments of the wrist.
 ‘ The general fascia of the thigh is con-
 ‘ tinued over the knee and down the leg;
 ‘ it is much strengthened at the knee,
 ‘ where it adheres to each point of bone;
 ‘ it descends very thick and strong over the
 ‘ leg, binding and strengthening the tibia-
 ‘ lis anticus, and exterior muscles. The
 ‘ sheath grows thinner towards the ankle;
 ‘ but where it passes over the joint, it is so
 ‘ remarkably strengthened, by its adhe-
 ‘ sions to the outer and inner ancles, that it
 ‘ seems to form two distinct cross bands,
 ‘ which going from the point of the outer
 ‘ ankle, across the exterior tendons, to the
 ‘ point of the inner ankle, forms a strong
 ‘ crucial ligament, resembling the annular
 ‘ ligament of the wrist; so that this which
 ‘ is called the *crucial ligament* of the ankle or
 ‘ foot,

‘ foot, is plainly but a strengthening of
 ‘ the common sheath.’

By this accurate description it appears, that the fascia is increased to its full strength, if not actually created, by the action of the muscles; and that the crucial ligaments are formed by thickening of the fascia, at the angle made between the foot and the leg. The importance of the fascia, and more particularly of the crucial ligaments, in keeping the muscles in their proper position, so as to obtain the full effect of their contraction, when in action, is well understood. It remains to observe, that as the fascia and ligaments are scarcely discernible in infants, and increase in every sense, in proportion to the increase of action in the foot, if a child born with a club-foot is suffered to grow up with it, the fascia must always be thin, because the action of the muscles decreases, they waste, and therefore that, as well as the whole leg, becomes debilitated; and as the crucial ligaments are formed by compression of the fascia, by continual action of the foot in walking, there will be no crucial ligament,

or at least it will scarcely be discernible in a club-foot; and that, if we reduce a club-foot to the natural form, it will still remain weak, for a time, in proportion to the age of the patient, till the crucial ligaments have acquired strength to support the muscles in their natural action; therefore it is of as much consequence on this account, as of any circumstance respecting the bones or muscles, that the cure should be undertaken as early in life as possible.

I may now recapitulate that three distinct operations are requisite to cure this deformity; first, to reduce the bones to their natural position, and natural form, if the patient's age has occasioned any malformation to take place; secondly, to produce extension of any muscle that has actually been contracted, or seems to be so from the position and consequent inactivity of the foot; and, thirdly, to keep the foot bound in its natural position, till those muscles which have, from the circumstances of the disease been weak and inactive, perfectly recover their tone and power, when, and when only, the cure will be compleat.

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I may likewise be permitted to conclude, from what has been said, that every case of this disease may be perfectly cured, before the patient is three years old ; that after that age, some may soon become incurable ; but that others may remain in a condition to be cured, till the age of ten, eleven, or twelve years old, and even to much later periods of life.

Having said so much on that species of club-foot which takes place before the birth, it may not be thought useless, to make some remarks on those which happen afterwards, and are by no means unfrequent. Two cases I have related, and have known of many others. In doing this, we must suppose the feet to have been in a perfect state ; and, in some cases, from debility, to have lost a part of their powers, which has given rise to deformity that becomes incurable ; in others from palsy, to have lost the whole of their powers, and for want of due assistance, only recovered a part of them, and thus terminated in incurable distortion.

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The ankle joint has been called one of the strongest in the human body. It may be so, but it is so no longer than while all its parts are in their perfect state; for while other joints may suffer considerable injury from luxation, &c. without producing lasting mischief, a very slight derangement of any of the numerous bones, ligaments, and muscles of the foot, which are connected with this joint, may, and frequently does give rise to incurable lameness, and has often occasioned the loss of a limb to the incautious sufferer. To have a correct view of the manner in which this happens, and to be upon our guard against the numerous mischiefs that may arise from neglecting seemingly trifling accidents, in children especially, it is necessary again to examine, particularly, the whole of that joint, and parts connected with it; and by that examination we shall, perhaps, be enabled to form some rational conjectures, on the manner in which the common club-foot takes place before the birth.

It has been commonly supposed, that
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the ancle joint owes more to its strength to the form of the bones, than to the strength of the ligaments; and it has been asserted so frequently, without contradiction, that the ancle joint cannot be luxated, without fracturing the head of the tibia or fibula, that it is now almost considered as a demonstrated fact. Yet, perhaps, few things so generally believed, are so totally destitute of foundation; some found it on the peculiar structure of the bones of the leg; others derive it from some passages in Mr. POTT's Treatise on Fractures. As the only passage in Mr. POTT's book which relates to this subject seems to bear a very different interpretation, I shall quote it at length below*; I shall proceed to examine the state of

* ' Whoever will take a view of the leg of a skeleton,
 ' will see, that although the fibula be a very small and
 ' slender bone, and very inconsiderable in strength, when
 ' compared with the tibia, yet the support of the lower
 ' joint of that limb (the ancle) depends so much upon
 ' this slender bone, that without it the body could not be
 ' upheld, nor loco-motion performed, without hazard of
 ' dislocation every moment. The lower extremity of
 ' this

of the leg bones, so far as they are concerned in the ancle joint; and, I believe, shew, that this doctrine is unfounded.

If,

‘ this bone, which descends considerably below that end
 ‘ of the tibia, is, by strong and inelastic ligaments, firmly
 ‘ connected with the last named bone, and with the astragalus, or that bone of the tarsus which is principally
 ‘ concerned in forming the joint of the ancle. This
 ‘ lower extremity of the fibula has, in its posterior part,
 ‘ a superficial sulcus, for the lodgment and passage of the
 ‘ tendons of the peronei muscles, which are here tied
 ‘ down by strong ligamentous capsulæ, and have their action
 ‘ so determined from this point or angle, that the
 ‘ smallest degree of variation from it, in consequence of
 ‘ external force, must necessarily have considerable effect
 ‘ on the motions they are designed to execute, and consequently distort the foot. Let it also be considered, that
 ‘ upon the due and natural state of the joint of the ancle,
 ‘ that is, upon the exact and proper disposition of the
 ‘ tibia and fibula, both with regard to each other, and to
 ‘ the astragalus, depend the just disposition, and proper
 ‘ action of several other muscles of the foot and toes; such
 ‘ as the gastrocnemii, the tibialis anticus and posticus,
 ‘ the flexor pollicis longus, and the flexor digitorum pedis
 ‘ longus, as must appear demonstrably, to any man who
 ‘ will first dissect, and then attentively consider these
 ‘ parts.

If, indeed, we are to define luxation to be partial dislocation of a joint by violence only, this opinion may be correct; for it
 seldom,

‘ If the tibia and fibula be both broken, they are generally displaced in such a manner, that the inferior extremity, or that connected with the foot, is drawn under that part of the fractured bone which is connected with the knee; making, by this means, a deformed, unequal tumefaction in the fractured part, and rendering the broken limb shorter than it ought to be, or than its fellow: and this is generally the case, let the fracture be in what part of the leg it may.

‘ If the tibia only be broken, and no act of violence, indiscretion, or inadvertence be committed, either on the part of the patient, or of those who conduct him, the limb most commonly preserves its figure and length. The same thing generally happens if the fibula only be broken, in all that part of it which is superior to letter A in the annexed figure (*viz.* about three inches from the bottom) or in any part of it, between its upper extremity, and within two or three inches of its lower end.

‘ I have already said, and it will obviously appear to every one who examines it, that the support of the
 ‘ body,

feldom, if ever, happens, that such violence is done to the joint, without fracture of the fibula, or that process of the tibia which

‘ body, and the due and proper use and execution of the
 ‘ office of the joint of the ankle, depend almost entirely
 ‘ on the perpendicular bearing of the tibia upon the astragalus, and on its firm connection with the fibula. If
 ‘ either of these be perverted or prevented, so that the
 ‘ former bone is forced from its just and perpendicular
 ‘ position on the astragalus; or if it be separated by violence, from its connection with the latter, the joint of
 ‘ the ankle will suffer a partial dislocation, internally;
 ‘ which partial dislocation cannot happen without not
 ‘ only a considerable extension, or perhaps laceration of
 ‘ those strong tendinous ligaments, which connect the
 ‘ lower end of the tibia with the astragalus and os calcis,
 ‘ and which constitute, in great measure, the ligamentous
 ‘ strength of the joint of the ankle.

‘ This is the case, when, by leaping or jumping, the
 ‘ fibula breaks in the weak part already mentioned, that
 ‘ is, within two or three inches of its lower extremity.
 ‘ When this happens, the inferior fractured end of the
 ‘ fibula falls inward, toward the tibia, that extremity of
 ‘ the bone which forms the outer ankle is turned somewhat outward and upward, and the tibia having lost its
 ‘ proper support, and not being of itself capable of steadily
 ‘ preserving its true and perpendicular bearing, is forced
 ‘ off

which forms the inner angle. But if we are to understand by the term luxation, such derangement of the parts of the ankle joint,

‘ off from the astragalus inwards, by which means the
 ‘ weak bursa, or common ligament of the joint, is vio-
 ‘ lently stretched, if not torn, and the strong ones, which
 ‘ fasten the tibia to the astragalus and os calcis, are always
 ‘ lacerated; thus producing, at the same time, a perfect
 ‘ fracture and a partial dislocation, to which is sometimes
 ‘ added a wound in the integuments, made by the bone
 ‘ at the inner angle. By this means, and indeed as a ne-
 ‘ cessary consequence, all the tendons which pass behind
 ‘ or under, or are attached to the extremities of the tibia,
 ‘ the fibula, or os calcis, have their natural direction and
 ‘ disposition so altered, that instead of performing their
 ‘ appointed actions, they all contribute to the distortion
 ‘ of the foot, and that by turning it outward and up-
 ‘ ward.

‘ When this accident is accompanied, as it sometimes
 ‘ is, with a wound in the integuments of the inner angle,
 ‘ and that made by the protrusion of the bone, it not un-
 ‘ frequently ends in a fatal gangrene, unless prevented
 ‘ by timely amputation; though I have several times seen
 ‘ it do very well without. But in its most simple state,
 ‘ unaccompanied with any wound, it is extremely trouble-
 ‘ some to put to rights, still more so to keep it in order,
 ‘ and unless managed with address and skill, is very fre-
 ‘ quently

joint, whatever may be the occasion of it, the above-mentioned opinion is by no means true ; for we frequently see distortions of the

‘ quently productive both of lameness and deformity ever
‘ after.

‘ After what has been said, a farther explanation
‘ why this is so, is unnecessary; whoever will take a cursory
‘ view of the disposition of the parts, will see, that it must
‘ be so. By the fracture of the fibula, the dilatation of
‘ the bursal ligament of the joint, and the rupture of those
‘ which should tie the end of the tibia firmly to the
‘ astragalus, and os calcis, the perpendicular bearing of
‘ the tibia on the astragalus is lost, and the foot becomes
‘ distorted. By this distortion, the direction and action
‘ of all the muscles already recited are so altered, that it
‘ becomes (in the usual way of treating this case) a
‘ difficult matter to reduce this joint, and the support of
‘ the fibula being gone, a more difficult one to keep it in
‘ its place, after reduction. If it be attempted with
‘ compress and strict bandage, the consequence is often
‘ very troublesome, as well as painful ulceration of the
‘ inner angle, which very ulceration becomes itself a
‘ reason, why such kind of pressure can be no longer
‘ continued ; and if the bone be not kept in its place,
‘ the lameness and deformity are such, as to be very fa-
‘ tiguig to the patient, and to oblige him to wear a
‘ shoe

the foot to a great extent, and in which there certainly never was any fracture. Such distortions are the subjects of the present enquiry.

Upon examining the bones of an adult foot it appears, that the end of the fibula which forms the outer angle, is more than half an inch nearer the ground, than that process

‘ shoe with an iron, or a laced buskin, or something of that sort, for a great while, or perhaps for life.’

Pott on Fractures, &c. p. 406.

This is the only passage in Mr. POTT's book, which can be supposed to justify the notion, that the ankle joint cannot be luxated, without fracture of the fibula, or internal process of the tibia; and yet it does not support such a doctrine. He says, that where there is fracture of the lower part of the fibula, there must be dislocation of the astragalus, with rupture of some ligaments, and distension of others; but he does not reverse the position, by saying, that where there is dislocation of the astragalus, there must be fracture of the fibula or tibia. What is more to the purpose, and justifies me in quoting his opinion at length is, the clearness with which he demonstrates, that any derangement of the muscles, tendons, or ligaments of the foot, will produce lameness, often incurable, if not timely prevented.

process of the tibia which forms the inner ancle; and that part of the astragalus which lies next the fibula, is perfectly flat. From this peculiar formation of these bones, it seems unlikely, that the ancle joint should be dislocated, or suddenly luxated, so as to turn the foot outwards, without, at the same time, fracturing the fibula above, but near the joint. It is, perhaps, from the same formation of the bones, that the distortion of the feet, which sometimes takes place before the birth, and is included under the denomination of *varii originates*. The case is not very common; but in those I have seen, the feet were turned outwards and upwards, so that what should be the superior part of the foot was laid against the outside of the leg, and the bones of the leg perfectly doubled upwards, to bring the foot into that situation.

If this disease is occasioned by peculiar position of the foetus in utero, it would seem to take place in this way. The foot may, by some accident, be turned out-

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wards, and by continual struggles to regain its natural situation, the strength of the foot is brought to act upon the weakest part of the bones of the leg, which bend gradually, and at last are folded into the position they are found in at the birth; the foot being flattened more or less, in proportion to the degree of compression it has suffered, and the length of time it has been confined. In the cases I saw*, the arch of the foot was nearly obliterated, and the whole foot nearly as flat as a common hand.

On the inside, the astragalus is secured in its natural situation, by that process of the tibia which forms the inner ancle. This, as I have already observed, does not descend

* I have seen three of these cases. One was sent me by Mr. HOOPER, from the Mary-le-bone Infirmary: this child died a few days after I first saw it, and before I could make any attempt to relieve it. The other two were brought to me during one of my visits to Ireland, and when I was on the point of leaving that country, so that I could make no attempt to relieve them; but am persuaded, if they could have been placed under my care, they might have been cured.

descend so near the ground as the fibula, by more than half an inch in an adult foot, and therefore the astragalus is much less securely fixed in its place on this side, than on the other. If, therefore, dislocation, or violent luxation of the ankle joint, so as to turn the foot inwards, does take place, it may frequently happen, that this process of the tibia may be fractured: but, as the foot is capable of moving sideways, as well as suffering the leg to move directly forwards over it, and the process of the tibia does not impede its motion to the inside, so completely as the fibula does to the outside, it may frequently be violently luxated if not actually dislocated in this direction, without fracture of the tibia.

It is from this facility of the foot to turn inwards, and to some peculiarity in the form of the bones of the leg, that the origin of the common club-foot is to be attributed. It is well known, that the leg bones of young children, for some time after the birth, are not strait; they are curved outwardly, from the position in

which the foetus is naturally laid, and that curve disappears as the child grows up. But in every case of club-foot that has come under my observation, the bones of the leg have been remarkably straight; so much so, as to excite the attention of nurses, &c. who are in the habit of seeing children, and certainly would not have made the observation, if the fact did not exist. Whether this peculiar straightness of the leg bones does, or does not account for the origin of this disease, may be understood from the following considerations:

If we reflect on the position of the foetus in utero, we shall see that the outside of the leg and foot, while in that position, describes a segment of a circle, or at least of an ellipsis; and from the form of the impregnated uterus, this elliptical tendency of the legs and feet, as well as of the whole foetus, is inevitable. Now, in the ordinary course of things, if a straight line was drawn from the knee of the foetus, the whole leg and foot would be found to deviate from that line to a certain degree,
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and form a regular section of a curve ; but if, from whatever cause, the bone of that leg is perfectly straight in its whole length, all the curve, which is necessary to allow the foetus to lie in its situation, instead of being equally divided through the whole length of the leg and foot, is confined to the foot only, which, in consequence, forms an acute angle with respect to the leg. It is more acute, in proportion to the degree of compression it has sustained, and the length of time it has been confined in that situation : and as the foot is composed of numerous small bones, which in the foetus, are loosely connected together, in consequence of this accident, it easily assumes those forms we see in such variety in incipient club-foot.

Thus we see the connection between the bones which form the ankle joint is remarkably strong ; strong enough to bear a continuation of the most violent exertion, so long as all the parts are in perfection ; but when any derangement in the muscular action takes place, the importance of each part to the well being of the whole

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is so great, that a very slight sprain, or even accidents more trifling, may give rise to lameness, and incurable deformity.

I have already explained, why the flexor muscles of the foot are so much stronger than their antagonists, the extensors: and it results from this fact, that where general debility of the limb takes place, from any cause, its effects will be first and most sensibly felt in the weakest part. For this reason, if a child, after it has walked, becomes debilitated by illness, by over exercise, or by any accident, so much of that weakness as falls upon the foot and leg, will most affect the outside of them: the peronei muscles will be less able to support the foot properly; they will soon give way, and, by repetition of this failure, be continually strained, till at last they will lose all power of action. The bones, from the circumstances of their connection with each other, will favor and increase this defect, till themselves feel the effect of it; their relative position is altered, and by negligence and time, they will at last acquire all the deformity

deformity that takes place in (if I may so call it) the natural club-foot.

This will most frequently happen from weakness, from violent sprains, or from other violent accidents; because where such accidents happen, their effects naturally fall on the weakest parts. But there are cases the reverse of all this; cases, where the muscles inside the leg, which are much the strongest, become too weak to support the body under its own pressure; where the bones, which are so well secured as to be commonly thought incapable of dislocation on the outside the joint, without being fractured, fall gradually into a condition similar to what would be produced by luxation. This may, on some occasions, be the effect of mere debility; but it is more frequently the produce of negligence, or of gross absurdity in the management of children; a conjecture which derives much strength from the fact, that these defects are most frequent in females of the middling and higher classes

classes of life. A young lady learns to dance; it is proper that she should do so, as few actions are more graceful than that of turning out the toes, &c. as she walks: but she is perhaps obstinate or negligent, and will not do so; she is, therefore, made to stand in the stocks, with her feet turned out as much as possible. The anatomist must see, that the effect of this practice is by twisting the foot outwards, to force the astragalus against the end of the fibula, by the resistance of which the ligaments which connect the bones of the foot and ankle joint are weakened; the muscles are, in consequence, strained; and at last permanent debility, and often deformity, is produced. If this does not happen, or if she is made to sit in the stocks, another defect, at least as bad, may be produced. By turning the feet outwards in this manner, the knees are inevitably bent inwards; and very considerable distortion may, in this way, be produced. If the habit of turning out the feet must be acquired, it will be best done by the practice
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of dancing or marching, under the inspection of proper teachers. What is so learnt, will add strength to the limbs, as well as grace to their motions; but whatever is done by such machinery, which is too generally and improperly used, will generally produce debility, and too often deformity.

When a leg becomes paralytic, all its powers are lost; it becomes flaccid, and may be turned in any direction that does not exceed the extent of its natural motions; but when the paralytic affection is removed, it recovers its powers by degrees; and as the flexor muscles of the foot are much stronger than the extensors, they have acquired a considerable degree of power, before the power of the latter is sensibly restored; and as a patient in this situation begins, or at least attempts to walk, as soon as possible, and long before the natural power of all the muscles is restored, the obvious effect is, that a halting, imperfect kind of motion takes place, in consequence of the defective action of the muscles of the foot; and, through

the rest of his life, he drags a debilitated, and almost useless limb after him; or obstinate contraction of the flexor muscles, and consequent deformity of the foot takes place, which, in many of these cases at least, might be prevented, by a very moderate degree of attention, as the methods by which the above-mentioned diseases may be obviated, are deducible from the same general principles, by the application of which I have been uniformly successful in curing the common club-foot. I trust I shall be excused for having inserted these brief remarks here, though they do by no means include all that can be said on the subject. The conclusions I wish to draw from them are, that in young children, very trifling accidents may, if neglected, produce incurable deformity; and that moderate attention to such accidents, which are too frequently called only a little weakness, that will go off of itself, will prevent any such consequences from arising: and that when paralytic patients are recovering from the effects of that disease, if the necessary attention is paid to keep their legs and feet in
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their natural positions, at the same time that the original disease is attended to, many would perfectly recover the use of their limbs, who, for want of mechanical assistance in due time, remain cripples for life.

C A S E XVI.

Miss —, aged five years, had but indifferent health, and been neglected by her nurse. The knees were both bending inwards, in the common way. This gradually increased, till the bones of the leg, about three inches below the knee, began likewise to bend: when her knees were close together, the inside of the feet were eight inches apart. The instruments I have already described were perfectly adapted, and left to the management of the nurse in the country, who totally neglected them. When this was discovered, she was taken home, and better taken care of; but the instruments were never applied in the night,

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notwithstanding I repeatedly pressed the importance of incessant application, in a case so bad as this. The consequence has been, that at the end of two years she is *almost* well, and continues to wear the instruments in the way she has already done; but I have no doubt, on comparing this with other cases that have fallen under my observation, that if the whole plan proposed had been properly followed, she would have been quite well in half the time that has been already employed in the cure.

C A S E XVII.

MASTER —, aged two years and a half, had the right knee much bent, like the preceding case; but the bones of the leg were not affected. By the recommendation of Doctor CLARKE, he was put under my care. The instruments I usually apply were adapted to both legs, as there was reason to fear the left would bend, if the right leg only had been supported; and as it was not thought necessary to keep
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them continually in use, they were only worn in the day time. In six months, the knees were both perfectly straight; but it was determined to use the instruments some time longer, to prevent a relapse. There can be no doubt, that if the instruments had been continually used, this patient would have been well in much less time; but as the distortion was not originally of the worst kind, and the patient's friends were desirous that he should avoid the inconvenience of wearing the instruments at night, even at the expence of being long under cure, the additional time can hardly be regretted, since he was so soon and so completely cured.

C A S E XVIII.

MASTER —, had always been a very delicate child, and at the age of two years, his knees were so much bent inwards, that when they were close together; his feet were five inches apart, and he was scarcely able to walk at all. By the application of the
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instruments, properly adapted, and under the care of a nurse in the country, where I had few opportunities of seeing him, he got perfectly well in about fourteen months.

C A S E X I X.

Miss —, aged two years and a half, was remarkably small and delicate, in every respect. Her knees began to bend from the time she first walked, and this debility encreased so much, that when I first saw her she could scarcely walk at all, and when she stood, her feet were six inches apart, while her knees were close together. By steady perseverance in every part of the plan recommended, her knees were perfectly straight at the end of six months. She had become very active, and more healthy; but as there was reason to fear she might relapse, if the instruments were too soon taken away, she was directed to continue to use them some time longer.

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C A S E XX.

Miss —, aged three years, and healthy in every respect, had the left knee very much bent inwards, but without distortion of the bones. There was much reason to believe this deformity was occasioned by the indolence of a careless nurse-maid, who constantly carried the child swinging over her left arm. By experience in other cases, I was justified in advising the application of instruments to both legs, in this; but it was not submitted to, and that which was applied to the distorted leg, was so carelessly treated, and scarcely attended to at all, that no benefit was derived from it, till the increasing distortion proved the necessity of perseverance.

Still the instrument was only applied to one leg, and that only in the day time. At the end of fourteen months, the leg, originally distorted, had become almost straight, and that which at first was quite straight, is now a little bent, so that now
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she has both knees in some degree bent ; but the parents are so well satisfied with her situation, that the instrument is laid aside.

There can be no doubt, that if the plan I advised had been regularly followed, this child would have been perfectly cured ; but as the parents have chosen to act, they have, perhaps, only laid a foundation for future deformity.

C A S E XXI.

Miss —, aged five years, and remarkably small of her age, had always very bad health, and from some cause that was not explained to me, had lost both the power and inclination to walk, for some time. When she began to recover, her endeavours to walk caused her knees to bend, for which reason she was then not permitted to stand on her legs, till proper assistance was giving. After the instruments were properly adapted, she was advised to try

try sea bathing, for the benefit of her general health. In less than two months, I was requested to make some necessary alterations in the instruments, and informed, she was then able to take much exercise, was become active, more healthy, and no doubt was entertained, by those who had seen the alteration already produced, that she would perfectly recover.

C A S E XXII.

MASTER —, six years of age, had both knees much bent inwards. His parents had been advised to get what are commonly called leg-irons for him. These were so improperly constructed, that the tops of them rested against the femor, about two inches above the knee joint. By the sedulous use of these ingenious instruments, for about twelve months, the thigh bones became bent, at those parts that were pressed upon by the tops of the irons, and had something the appearance of bones that had been broke and badly set, and the knees were more bent than
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when the irons were first applied. By the application of my instruments for six months, the distortion of the knees was removed; but the incurvation of the bones still remains, though it is probable that, by perseverance in the same plan, even that deformity will be cured.

C A S E XXIII.

Miss —, aged two years and a half, remarkably small of her age, apparently healthy, and very active, had both the knees much bent inwards. As there was no other circumstance to account for this distortion, and she was able to go alone at the age of ten months, it was probably occasioned by putting her so very early on her feet. The necessary instruments were applied, and sedulously used, by which means she was enabled to walk with tolerable ease. She was ordered to the sea-side, where she bathed constantly, and in something more than six months, by perseverance in the plan recommended, her legs became perfectly straight.

C A S E XXIV.

Miss —, aged twenty-two years, had had both the knees very much bent inwards from her infancy; so much, as very sensibly to impede her walking. In consequence of my advice, she determined to try what alteration could be produced by those instruments, which I had found so effectual in younger patients. They were properly adapted to her case, and sedulously applied for several months. The curvature at the knees has been much diminished; she finds she can walk so much more, and with so much more ease with, than she could possibly do without them, and to use her own expression, she finds them such a comfortable support to her, that she has determined to persevere in using them, for sake of the temporary support she receives, and not without hopes of obtaining a perfect cure.

C A S E XXV.

Miss —, aged nineteen, had, in her infancy, had some distortion of the legs, of which I could obtain no authentic and certain account. The best I could get was, that her family lived a considerable distance from London, and when the distortion in her legs was perceived, were advised to procure leg-irons for her, which they did. A difference of opinion arose, with respect to the application of them ; one person insisting that they should be placed on the outside, another that they should be on the inside the legs. In this dilemma, it was determined to try them on one side, and if that did no good, to move them to the other side the legs. This plan was actually executed ; but, unfortunately, the legs got worse, on whichever side the irons were applied, therefore they were entirely laid aside.

At the time I saw her, the toes were pointing inwards, considering their situation
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relative to the feet. The knees were bending considerably outwards; but all the bones, both of the legs and thighs, were perfectly strait. She was healthy, tall, and inclined to be corpulent, and in consequence of this peculiar position of the legs, &c. was incapable of walking more than half a mile at once, without being quite fatigued; complained of extreme pains on the outside of her knees and ancles, and was therefore prevented from taking much exercise, otherwise than in a carriage. From the circumstances of her case, it is evident that she must either become more helpless, by declining all attempts to walk, or by walking, increase the distortion of the knees and ancles, and thus ultimately increase her debility. Under these circumstances, any assistance that could alleviate any of the inconveniencies this patient laboured under, became an object of consequence to her. The plan I proposed, was either to attempt a cure, by endeavouring to restore the limbs to their natural position and action, or merely to support them in their present situation, so

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as to enable her to take proper exercise, with as little inconvenience as possible. The instruments applied were calculated to produce both these effects, if they were attainable; and I have the satisfaction to say, she has been materially served by them. She has now worn them more than a year, and is now able to walk four miles at a time, without being much fatigued. In short (I use her own words) she is so much more active and comfortable to herself with, than she should be without them, that she is determined never to lay them aside, unless it should happen that they perfectly restore her legs to their natural state; and thus render the farther use of them unnecessary.

By the ordinary modes of treatment, nothing could have been done in the two preceding cases, except, perhaps, applying heavy, unwieldy leg-irons, which would encumber, at least as much as they would assist the wearer: but by the instruments I have applied, a positive increase of the power of walking has been produced, to a very great degree; and

and though in one sense, it may be said to be only temporary, it is still a temporary good, that may be continued to any length of time, at the will of the patient. But as there is no physical impossibility to prevent the form and strength of the limbs, in both cases, from being perfectly restored, it is surely an improvement of consequence, in the treatment of such diseases, that can produce so much temporary benefit, and afford well founded hopes of permanent relief, to persons who could obtain no benefit whatever from any other method of cure.

C A S E XXVI.

Miss —, aged two years, was recommended by Mr. CRUIKSHANK to me, for assistance. She had long been under his care for complaints, which it is needless to particularise; but, in addition to them, she was incapable of supporting or directing her head in any particular position; it always fell backwards, and lay almost motionless on her shoulders. As there was reason to suppose this defect would increase,
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and produce other deformities, it was determined to support her head by my spinal machine, which was done for two years before the defect disappeared.

During my attendance on this case, I remarked a peculiar defect in her manner of walking. She seemed as if the tendo achilles in each leg was suddenly contracted, so as sometimes to force her to walk on her toes, while, at others, she could walk flat on her feet. I recommended some precautions, which if duly followed, might have prevented the ill consequences of this defect; but I believe they were not complied with.

Several months afterwards, I was called to assist this child. The tendo achilles of one leg was much, and rigidly contracted; the toes were drawn inwards, and she walked on the outside of her foot, which had assumed much of the form and appearance of the common club-foot. I adapted proper instruments, by means of which, in a few months, this foot perfectly recovered

covered its form, position, and use. Some time afterwards, the other foot was affected in the same way, and was perfectly recovered by the same treatment.

Without pretending to ascertain the predisposing cause of this patient's distortions, I may be permitted to observe, that if the precautions I recommended (and which perhaps were thought unnecessary) had been followed, the feet would not have been distorted, as they afterwards were; and if they had been farther neglected, they would have terminated in two club-feet, as completely as that of Case XIV, page 48.

C A S E XXVIII.

Miss —, aged four years, had very indifferent health, with much enlargement of the bones of the wrists, ancles, &c. besides other symptoms of rachitis, and the knees so much bent inwards, that she could not walk with ease.

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Mr. TAYLOR, Surgeon, of Southampton Buildings, recommended her to me. I adapted the necessary instruments, gave proper instructions for the care of them, and she was immediately taken into the country, for the benefit of her health. At the end of three months, I enquired after her, and was told, that in the country they could not get shoes made properly to wear with the instruments, and therefore they had not been used. The knees were worse than when I saw them at first. Shoes were now procured, and the instruments applied. They then began to mend, and did so for some time; but in consequence of some very improper advice, were laid aside before she was well, though even still she is much better than when I first saw her.

REMARKS

 REMARKS

*On the preceding Cases of Distortion in the
Knees, &c.*

I HAVE not thought it necessary to engrave any of the drawings I made from the patients whose cases I have related, as the distortion of the knees, which is the principal circumstance in them all, is exactly represented in the second plate, belonging to the annexed Specification; and as the method of cure is fully detailed in the same paper, few remarks can here be made in addition to it. This distortion is occasioned by weakness in the ligaments and tendons, which connect the bones of the leg and thigh at the knee joint. In consequence of this debility, the legs become unable to bear, without sinking under the weight of the body; of course, when the bones of the leg do not bend, the knees come in contact with each other, and the

legs diverge ; or the knees diverge, and the feet approach to each other. All these distortions may be considered, either as simple relaxation of the ligaments and tendons, on one side the joint, as in very young children, when they are recent, or as relaxation on one side, and contraction on the other side the joint, as in those who have had the complaint long, and grown perhaps to maturity with it. In whichever point of view it may be considered, I have shewn it may be easily remedied ; and am, perhaps, justified in believing it is, in no case, incurable.

Those who are prone to wonder, and those who are determined to be sceptical, may be equally surprized when told, a distortion of the knees, to such an extent as to place the feet at the distance of seven or eight inches from each other, may be perfectly cured in a few months ; but that surprize may be diminished, by an accurate examination of the facts, which may be thus demonstrated.

Suppose

Suppose a perpendicular column, eighteen inches high (which is nearly the height of the leg and thigh of a child about three years old) and two inches in diameter, divided in half, horizontally. While these parts lie directly upon each other, the whole would be perpendicular; but if, by any accident, they should be separated from each other on one side, and on the other remain in contact, and if, by any means the upper half retained its upright situation, the lower would diverge from its perpendicular situation, in proportion to its length, and the distance to which the separated parts are removed from each other; and if there were two such divided columns, diverging from each other in opposite directions, the distance between the lower ends would be doubled, and a considerable separation between them produced, by a very trifling alteration in the relative situation of those parts, which actually occasion the whole deviation from the natural form. This is, nearly, the situation of the legs of a child, distorted by the knees bending inwards; and it is,

hence, easily seen, that a very trifling relaxation of the ligaments of the knee-joint, and the tendons connected with them, may produce very considerable deformity of this kind.

In such distortions, when recent, two operations are requisite to effect a cure, *viz.* to replace the bones in their natural relative position; and to retain them there, till the ligaments and tendons connected with the knee-joint, have recovered their natural power of supporting the weight of the body properly on the legs.

In recent cases, where the distortion has been brought on suddenly, or at least, quickly, by debility, the reduction will be easily effected; for the same debilitated state of the parts, which have occasioned them to give way, will not oppose any obstacle to any rational attempts to return the legs to their natural form, and then time, with the assistance of cold baths, &c. will enable them to recover, perfectly, their natural functions. But when, from length
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of time the disease has existed, age of the patient, or any other circumstance, the parts have become rigid or contracted, it will require considerable caution to reduce them to their natural position ; but still it is possible to do so.

As the degree of relaxation requisite to produce this distortion is not great, so the degree of rigidity or contraction necessary to retain it in its worst form, is not greater than the relaxation which occasioned it. From this view of the subject, and from what we know of the effects of mechanical action upon tendinous contractions, it is not too much to conclude, there are few, if any cases, even in adults, that are absolutely incurable : and from a knowledge that the mode of treatment I have invented may be adopted to every possible case, it would, perhaps, not be unwarrantable to conclude, that every case, which in its nature is not incurable, may be cured by it. But I shall, at present, confine myself to that class of patients, about which there can be little difference of opinion. I have related

related the result of many of these cases; the particulars of the process will be found in the Specification of my Patent; but as I have thought it right to differ, in some points of practice, from opinions generally received, it is incumbent on me here to account for the practice I have adopted.

When the common leg-irons were used in such cases, they were fixed upon shoes, and it was, therefore, necessary to remove them when the patient went to bed. From this circumstance it has been deduced, that *they ought*, and, therefore, whatever may be used as a substitute for them, ought likewise to be taken off, when the patient goes to bed. It is by such reasoning, if it may be so called, that error is perpetuated, and rational improvement impeded; for there can be no difficulty in making it appear, that this practice, whatever system of treating these disorders it may be applied to, will render more than double the time requisite to perform a cure, than would be necessary, if the plan of constant application, which I recommend, be adopted.

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For reasons which I have given in a former publication, I think the common leg-irons are totally useless, if they are applied with a view to perform a cure. They may have some little utility, if applied to afford a trifling support, and thus prevent the farther progress of the distortion subsequent to the application; but I contend, that this support is as necessary while the patient is laid in his bed, as while he is walking about, though this application of it is to be justified upon different grounds from the former.

It is understood, that these applications are made to support the weight of the body, and prevent the weakened knee-joints from bending still more under the pressure; and from these premises a conclusion is drawn, that as the weight of the body is not thrown upon the legs while the patient is supine, this support, during that period, is unnecessary. The truth of this argument may be allowed in its full extent; for there are other facts to be considered,

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which have a strong claim to our attention.

Whenever there is distortion in the legs, or elsewhere, the patient will always sleep in a position that favors, and therefore has a strong tendency to increase the deformity. If the instruments, of whatever description they may be that are used, during the day, to counteract the distortion, are capable of producing that effect, if their action is merely limited to restrain the progress of the deformity, it must be performed by compression on the knees, the moment, therefore, these are removed, and the patient lain in bed, the knees will fall, more or less, into their deformed position, and by this means, great part of the benefit that had been derived from them in the day, will be counteracted by the relaxed position of the parts during the night; but if any rational attempt is made, during the night, to continue the restraint that they are kept under in the day, the cure will be effected in less than half the time it will
require

require to perform it, if the same means are employed during the day only.

If this argument is allowed to be well founded, when applied to the common leg-irons, it is much more so, when applied to the instruments I have invented for curing these distortions. By them, a constant uniform action may be kept up, so long as is necessary to effect the cure. If a cure is to be effected by this action, there can be no doubt, that the more constantly the action is kept up, the sooner its ultimate effect will be produced. This is so evident, that farther arguments will be deemed unnecessary to prove, that the instruments described in the annexed Specification, for curing distortions in the knees of children, or others, ought to be constantly and regularly applied, during the night, as well as the day, till the cure is completed.

Two objections, however, have been made, with some plausibility, to this practice; first, the great uneasiness it must occasion to the patient; and, secondly, that

some cases are too slight to require this treatment.

To the first it may be answered, that whatever we are not accustomed to is unpleasant, till habit has reconciled us to it; therefore a child may be restless and uneasy, for the first night or two after it is put into this situation, but will not, afterwards, feel the least inconvenience or uneasiness from sleeping in these instruments. To the second it must be replied, that I have considered the whole subject in one general point of view, and stated, *generally*, what appears to me the best mode of treatment. It must be determined, in practice, by the circumstances of particular cases, what exceptions shall be made to the general rule.

If I were required to lay down a rule on this subject, it should be nearly in the following way.—In very young children, when the distortion at the knee is small, when the patient's health is so indifferent as to be injured by want of rest, even for two or three nights, the instruments should
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only be used in the day time; since it will be better to protract the cure for some time, than to take the chance of such evils by accelerating it. Even in cases where there is no reason to dread such effects, if the over tenderness of parents should render them unwilling to subject their children to such treatment, no very cogent reasons can be given for insisting upon it, as it is a question of prudence, which they alone have a right to decide; and if they chuse that a longer time should be employed in effecting a cure, rather than adopt the most expeditious mode, we may, without impropriety, pursue that plan. But in very bad cases, where there is much contraction, or at least rigidity to overcome, where the distortion is of long standing, and the patient, perhaps, farther advanced in life, the most rigid, but indispensably necessary plan must be pursued, by keeping up the necessary action continually, by constantly using the necessary instruments, both day and night. I have seen many cases cured, by adopting this practice, that never would have been benefitted in any other way; and

I can-

I cannot hesitate to say, that in all such, the question, whether the instruments shall be kept in continual use, during the time of performing the cure, or not, is the same as, whether the patient shall be cured by, or derive no advantage from the use of them.

C A S E XXVIII.

IN the month of April, I was desired by Mr. KNIGHT to attend the son of a person of high rank. Dr. UNDERWOOD and Mr. KNIGHT were present. The child was two years and an half old, was remarkably strong and healthy, but had the bones of the legs bending outwards, and the toes considerably turned in, in consequence of the curve. *Fig. 1* and *Fig. 2*, annexed to the Specification, though not drawn from this case, will convey a very correct idea of it.

To remedy these defects, I proposed to apply the instruments described in the Specification,

cification, with an addition that would enable me to place the feet in any situation that might be requisite, and vary that situation at pleasure. This proposal was approved of both by Dr. U. and Mr. K., and therefore was carried into execution.

As the distortion was not of the very worst description, it was not thought advisable to keep the instruments continually in use, they were therefore taken off at night, and applied in the morning. As this mode of treatment did not require continual attendance, and as, from the rank of the patient, we were certain that every direction given would be implicitly obeyed, it was only requisite for me to see him occasionally, to make such alterations as were necessary in the progress of the cure.

This case went on as well as could be wished. The instruments did not, in the least, incumber or prevent the patient from taking his usual exercise, and the legs straightened so quickly, that in the beginning of September, when Dr. UNDERWOOD
and

and Mr. KNIGHT were desired to examine the child, they were of opinion, that he was perfectly cured, and therefore directed all the instruments to be laid aside.

As incurvation of bones of the legs has justly been held to be incurable by any means before known, and as this was the first case in which I had occasion to try this mode of treatment, which I have invented, it was peculiarly gratifying to me, that it should be tried so fairly, under the observation of Dr. UNDERWOOD and Mr. KNIGHT, as their opinions on the subject will be received as sufficient proofs of its efficacy.

C A S E XXIX.

Soon after I was called to the above case, I was consulted by Mr. DELCOUR of Rathbone Place, whose daughter was in a similar situation. The curve of the legs was exactly like it; but the child by no means so healthy. The promising appearance

ance of success in the former induced me to try the same means to effect a cure in this case, and with equal reason to expect a favorable event. For four months that she wore them, the legs improved so fast, that it was soon intended to lay the instruments aside, as useless, when a sudden alteration in the state of her health made it necessary to discontinue them, before the cure was complete. This ill state of health continues; but it is proposed, as soon as possible, to resume the application of the instruments; and there is no doubt, from what has already been done, that the success will be complete. .

As the cure of this case is, at present, imperfect, and as I wish to establish every fact relative to this hitherto incurable deformity, on the firmest basis, I have requested Mr. DELCOUR to give me his opinion, which will be found to confirm the facts I have already stated.

‘ Mr. DELCOUR presents compliments to
‘ Mr. SHELDRAKE, has received the con-
‘ tinuation of his observations, and finds
B b ‘ that

‘ that part of them which are relative to
 ‘ his daughter’s case, is exactly consistent
 ‘ with the strictest truth.’

‘ Rathbone Place,

‘ Sept. 4, 1797.

C A S E XXX.

In May, 1797, I was consulted by a Lady, whose daughter was in a situation similar to the two preceding. She was two years and a half old, very delicate health, and had the bones of both legs bending directly outwards. The same instruments were applied as in the former case ; but as an objection was made to the continued use of them, they were only applied in the day time. By this imperfect mode of application, I was rather surprized to find they were visibly better in three weeks, and at the end of four months were perfectly recovered.

C A S E XXXI.

During my stay in Dublin in 1796, a Lady applied to me with her daughter, in
 the

the same situation as the last described case. The same kind of instruments were adapted, and proper instructions given for the use of them. The child was frequently brought for me to examine her legs; and during the short period of my stay, the amendment was so quick and so visible to every one, that no doubt could be entertained of her speedy and perfect recovery. I have since been informed, that in less than six months she was perfectly cured.

R E M A R K S

On Incurvation of Bones of the Leg.

ALTHOUGH it is certain, that the form of bones, in young children, may be altered by accident or disease, and it may be justly concluded from this fact, that it is possible, by counter alterations, to remove the effects of such diseases, yet it is perfectly notorious, that no rational method

of curing these distortions has been practised. Under these circumstances, it is with much satisfaction I am enabled to announce a method that, with due perseverance, promises to be successful, in every case where success is possible. The preceding cases prove, that it has been successful when fairly tried, and the demonstrations in the annexed specification will explain the principles, by the application of which the cure of these distortions have been effected; so that it is only necessary, in this place, to add such remarks on the causes of this disease, as could not, with propriety, be included in the specification.

It is a fact, generally known to anatomists, that the central part of the cylindrical bones is first ossified, and, in young children, is of a more solid texture than the other parts of the same bones: and it has been observed, and may be fairly accounted for, from the preceding fact, that when incurvation on the bones of the leg takes place, the central part of them is least affected.

affected. They generally bend towards the lower part; and it happens, not unfrequently, that when such distortions are long neglected, they proceed so far as to let the bones of the leg, when moved sideways, touch the ground. I have, in one case of the direct curve, seen the lower part of the leg so bent, as to lie in contact with the upper part of the foot. When a disease of this nature is suffered to go to such extent, it is perhaps not reasonable, for many reasons, to expect a perfect cure: if any thing can be done to alleviate the most distressing effects, a point of consequence to the patient is gained; and if they are too far gone, even for this degree of mitigation, notices of such cases may serve as reasons to caution the negligent, and prevent them, by carelessness, from suffering their children to sink into similar situations.

The little attention that has been given to these diseases, by professional men, has left the treatment of them too much in the hands of the weak and the ignorant of various descriptions; and the way in which
such

such people must talk on a subject they cannot understand, has given rise to vague and unsatisfactory opinions, concerning the facts of the disease and the circumstances that have produced them. Thus we have been told, the weight of the body occasions the legs to bend under it; and those who have strength of imagination enough to think they are sure of this, are willing to believe, the weight of the body is the only circumstance deserving notice, either in preventing or in curing distortions of the legs. With them, peculiarity of formation, irregular muscular action, or ill habits of various kinds, are of no importance, though there is abundant reason to believe, that these principally contribute to the formation of this disease, or, at least, have a strong tendency to deprive the weight of the body, and setting children too soon on their legs, of the reputation they have acquired for being the sole cause of all this class of distortions in the legs of young children.

In speaking of the predisposing causes of
club-

club-feet, I have endeavoured to explain, that from the position of the foetus in utero, the legs of children, from the thigh downwards, assume a particular curve, which in the ordinary course, disappears as the child grows up. I have, at this time, a child under my care, that was born with one club-foot. The bones of that leg seem as strait as they could be laid by a rule; the bones of the other are curved in the natural way. Here is a different conformation of the two legs of this child; and it must be allowed, that whichever we may chuse to call the natural form, the other is a peculiar original formation, tending to deformity. The extreme straightness of the leg, I imagine, for reasons already given, occasioned the distortion of the foot; and if it deviated a little farther from its natural form, the leg itself might have been distorted: on the other hand, if the opposite leg had been a little more curved, than the legs of children *commonly* are at the birth, that peculiarity might have laid the foundation of a deformity, like that at present under consideration.

If

If the force with which the muscles of the leg and foot are capable of acting, be considered, we shall be able to deduce the origin, or at least the increase of some distortions of the legs, from peculiar actions of those muscles; for example, that in which the bones of the leg bend directly forwards. In all cases of this kind that I have seen, the tendo achilles has been much more rigid than in the well-formed leg; the calf of the leg very thin; and the gastrocnemii muscles almost incapable of acting. I might, perhaps, be justified in attributing the origin of this distortion to the action of these muscles operating upon the bones, under peculiar circumstances; but I shall, at least, be permitted to observe, that after the distortion has taken place, the contraction of the gastrocnemii muscles, and tendo achilles, must, from their position and action, perpetually tend to increase the curve of the bones of the leg; and this being once admitted, certainly confirms the former conjecture, that the action of these muscles operating upon the weakest parts of the soft bones, may, either
of

of itself, or in conjunction with other causes, produce many of these deformities.

I have said thus much, in hopes of making it appear, that other causes, besides pressure from weight of the body, may produce these distortions. It is, however, by no means my intention to say, that the gravitating power of the body is of no importance in the formation of these diseases; on the contrary, I am persuaded, that as a secondary cause, it is concerned in them all; for if we consider the legs as columns intended to bear the weight of the body, and that, by whatever accident their form is so altered, as to diminish their natural strength, the pressure from the weight begins to act in depressing them, and continues, with accelerated force, till, by artificial means, the farther progress is prevented.

If the principles I have laid down for the treatment of these distortions be investigated, it will be found that I begin by supporting the legs in their present condition:

dition : the acting power is then placed on the most solid part of the leg bones, which form the basis from which it acts; the bandages are then fastened upon the weaker extremities, which brings the springs into action, and the re-action of which is, by this means, constantly exerted in correcting the curve; by this means every possible advantage is obtained in the application, and every possible benefit may be expected in the event.

In this, more than in any other class of distortions, there is occasion for unremitting perseverance. It is not the question, whether a debilitated joint shall be enabled to bear the weight of the body; but whether a bone that is bent out of, shall be restored to its natural shape. In canvassing the former subject, it may be disputed, whether any support is necessary, except when the patient is upon his legs; but, in the latter, it cannot be denied, that the curve having once taken place, must remain, in whatever situation the patient may be placed, till the proper means are applied

applied to eradicate it: and that it will be eradicated early, in proportion to the constancy with which the means are applied, is a self-evident proposition.

SPECIFICATION

OF A PATENT, &c.

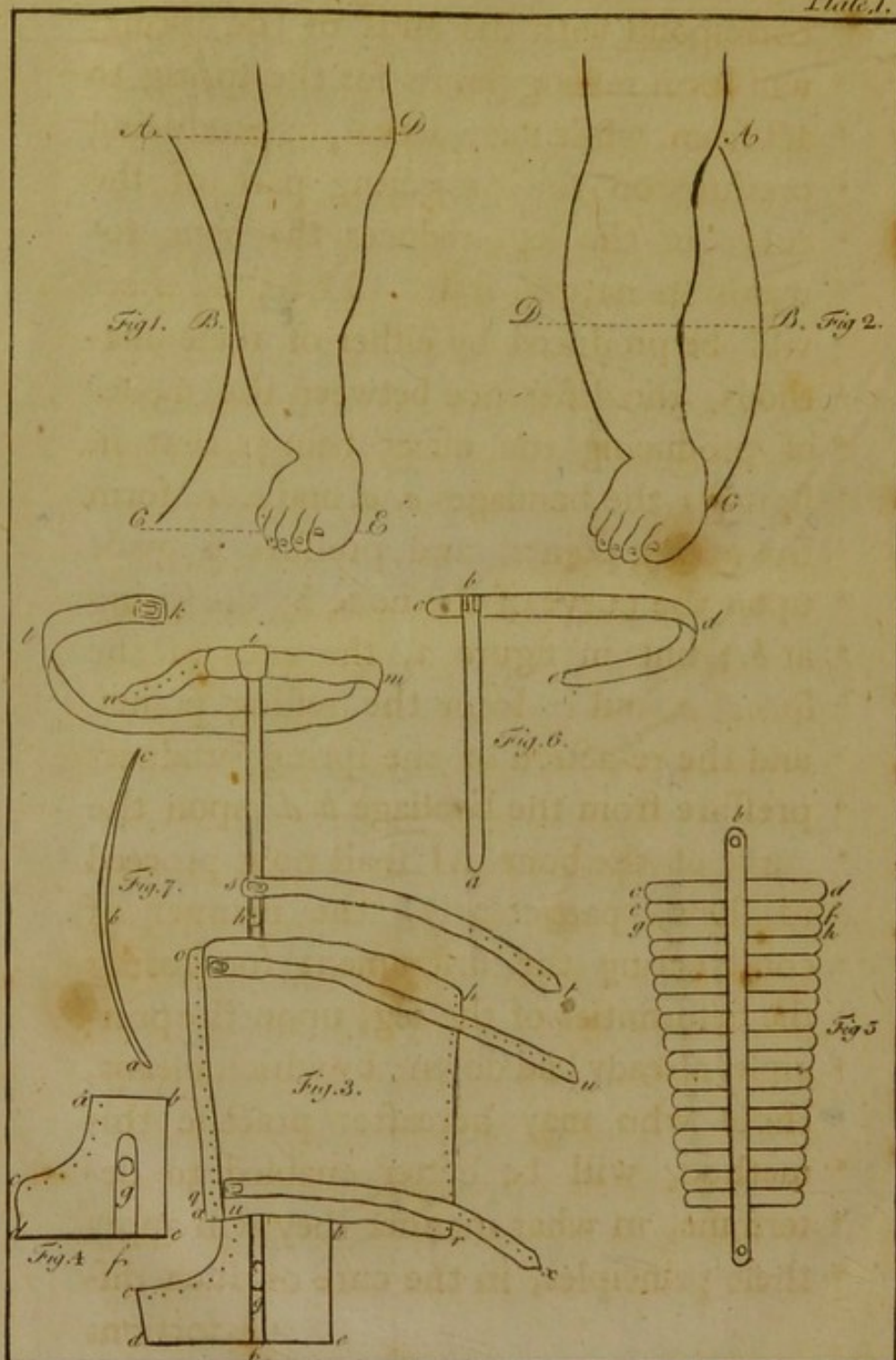
‘ TO ALL TO WHOM THESE PRESENTS
 ‘ SHALL COME, I, TIMOTHY SHELDRAKE, the
 ‘ younger, of No. 50, in the Strand, in the
 ‘ county of Middlesex, Truss-maker, do send
 ‘ greeting: Whereas his most Excellent Ma-
 ‘ jesty, King George the Third, by his letters
 ‘ patent, under the great seal of Great
 ‘ Britain, bearing date at Westminster

‘ did give
 ‘ and grant unto me, the said TIMOTHY
 ‘ SHELDRAKE, my executors, administra-
 ‘ tors, and assigns, his special licence, sole
 ‘ privilege, and authority, that I, the said

' TIMOTHY SHELDRAKE, my executors, ad-
 ' ministrators, and assigns, during the term
 ' of years therein exprest, should and
 ' lawfully might make, use, exercise, and
 ' vend, within England, Wales, and the
 ' town of Berwick upon Tweed, my new
 ' invented method of curing all the de-
 ' formities of children, or others, which
 ' arise from, or are connected with dis-
 ' tortion in the form or combination of
 ' bones that exist in the deformed part;
 ' in which letters patent there is contained
 ' a proviso, obliging me, the said TIMOTHY
 ' SHELDRAKE, under my hand and seal, to
 ' cause a particular description of the na-
 ' ture of my said invention, and in what
 ' manner the same is to be performed, to
 ' be inrolled in His Majesty's High Court
 ' of Chancery, within one calendar month
 ' next and immediately after the date of
 ' the said recited letters patent, as in and
 ' by the same (relation being thereunto
 ' had) may more fully and at large appear.
 ' Now KNOW YE, That in compliance with
 ' the said proviso, I, the said TIMOTHY
 ' SHELDRAKE, do declare, that my said in-
 ' vention

' vention is defined and described as fol-
 ' lows; that is to say, My new invented
 ' method of curing all deformities, or dis-
 ' tortions in the legs, feet, arms, or other
 ' parts of children, or others, (provided
 ' they are not in their nature incurable)
 ' whether such deformities or distortions
 ' arise from, or are connected with the
 ' improper form of one or more bone or
 ' bones, or by the improper combination
 ' of two or more bones, or by the impro-
 ' per form, and improper combination of
 ' any number of bones that exist in the
 ' deformed or distorted part, is effected by
 ' the continual, repeated, and varied ap-
 ' plication of a spring or springs, to be
 ' constructed, adapted, and applied with
 ' bandages, and by instruments, in such
 ' manner, that the spring or springs which
 ' constitute the efficient part of such ap-
 ' plications shall be constantly acting, to
 ' correct the disease, and shall have their
 ' powers varied, modified, and increased,
 ' as circumstances shall require, so as to
 ' diminish the deformities or distortions, by
 ' degrees, until they are finally eradicated.

‘ This is the general nature of my inven-
 ‘ tion, a more particular description of it,
 ‘ and the manner in which it is to be per-
 ‘ formed, I will now state, in various in-
 ‘ stances, as particularly and distinctly as
 ‘ the nature thereof will admit. In the
 ‘ first place, I shall illustrate the method
 ‘ of treating those distortions or deformi-
 ‘ ties, which arise from the improper form
 ‘ of bones, by explaining the treatment of
 ‘ curvature in bones of the leg, which is
 ‘ one of the most frequent diseases of that
 ‘ description; whether the bones bend in-
 ‘ wards, outwards, or forwards, is of no
 ‘ consequence, as the principle on which
 ‘ the remedy is to be applied is the same in
 ‘ all.— Figures 1 and 2, hereunto annexed,
 ‘ represent a child’s leg bending outwards;
 ‘ the lines marked with the letters *a. b. c.*
 ‘ in both figures, represent the curved
 ‘ spring, intended to correct this deformity.
 ‘ It is evident, that if this spring is, by
 ‘ bandage or otherwise, at *a. d.* and *c. e.* in
 ‘ figure 1, or *b. d.* in figure 2, brought
 ‘ into contact with the leg, the inside of
 ‘ the knee as at *d.* in figure 1, and *a.* in
 ‘ figure



' figure 2, and bottom of the leg which
 ' correspond with the ends of the spring,
 ' will form resting points for the spring to
 ' act from, while its re-action, by producing
 ' pressure on the projecting part of the
 ' curve of the leg, reduces the bone to-
 ' wards its natural state. The same effect
 ' will be produced by either of these me-
 ' thods, the difference between the modes
 ' of producing the effect being, that in
 ' figure 1 the bandages *a. d.* and *c. e.* form
 ' the resting points, and pressure is made
 ' upon the curve of the bone by the spring
 ' at *b.*; but in figure 2, the ends of the
 ' spring *a.* and *c.* form the resting points,
 ' and the re-action of the spring produces
 ' pressure from the bandage *b. d.* upon the
 ' curve of the bone. I shall now proceed
 ' to shew, particularly, the manner of
 ' constructing the instrument for curing
 ' the deformities of the leg, upon the prin-
 ' ciples already laid down; by which means,
 ' those who may hereafter practise this
 ' method, will be better enabled to de-
 ' termine, in what manner they will apply
 ' these principles, in the cure of such dif-
 ' tortions

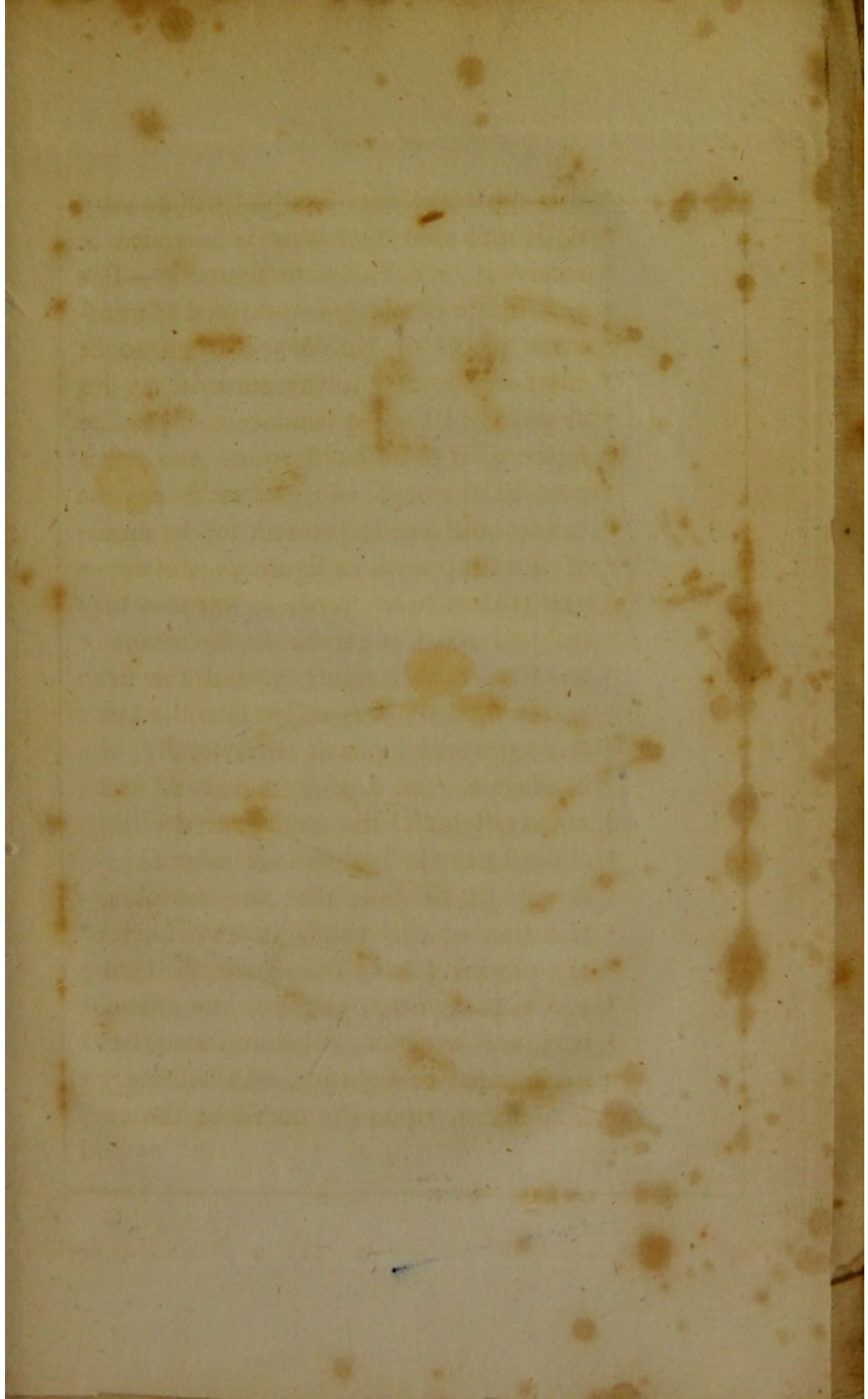
' tortions or deformities as may be entrusted
 ' to their care. The instrument I use to
 ' cure curvature in bones of the leg, is
 ' constructed as in figures 3, 4, 5, 6, and
 ' 7, hereunto annexed, and is described in
 ' manner following, that is to say; the
 ' foot piece *a. b. c. d. e.* in figure 3 and 4,
 ' is made of calf skin, or any other mo-
 ' derately stiff leather, in form of a com-
 ' mon half-boot, and to lace in front, with
 ' the sole of iron, or any other strong
 ' metal; and to cure a bone curved like
 ' figure 1, I fix on the outside of this sole,
 ' a piece of iron, steel, or other convenient
 ' metal, *f. g.* in figures 3 and 4, to go in
 ' a perpendicular direction, as high as the
 ' ancle joint at *g.* in figures 3 and 4; with
 ' this I connect, by means of a joint, an-
 ' other piece of iron, steel, or other con-
 ' venient metal, *a. b.* in figure 5, to go as
 ' high as the knee; upon this I rivet (but
 ' it may be otherwise fixed) transversely, as
 ' many pieces of tin, or other metal *c. d.*
 ' *e. f. &c.* in figure 5, each about half an
 ' inch wide, as will reach from the ancle
 ' to the knee, and so long, as to be equal
 ' to

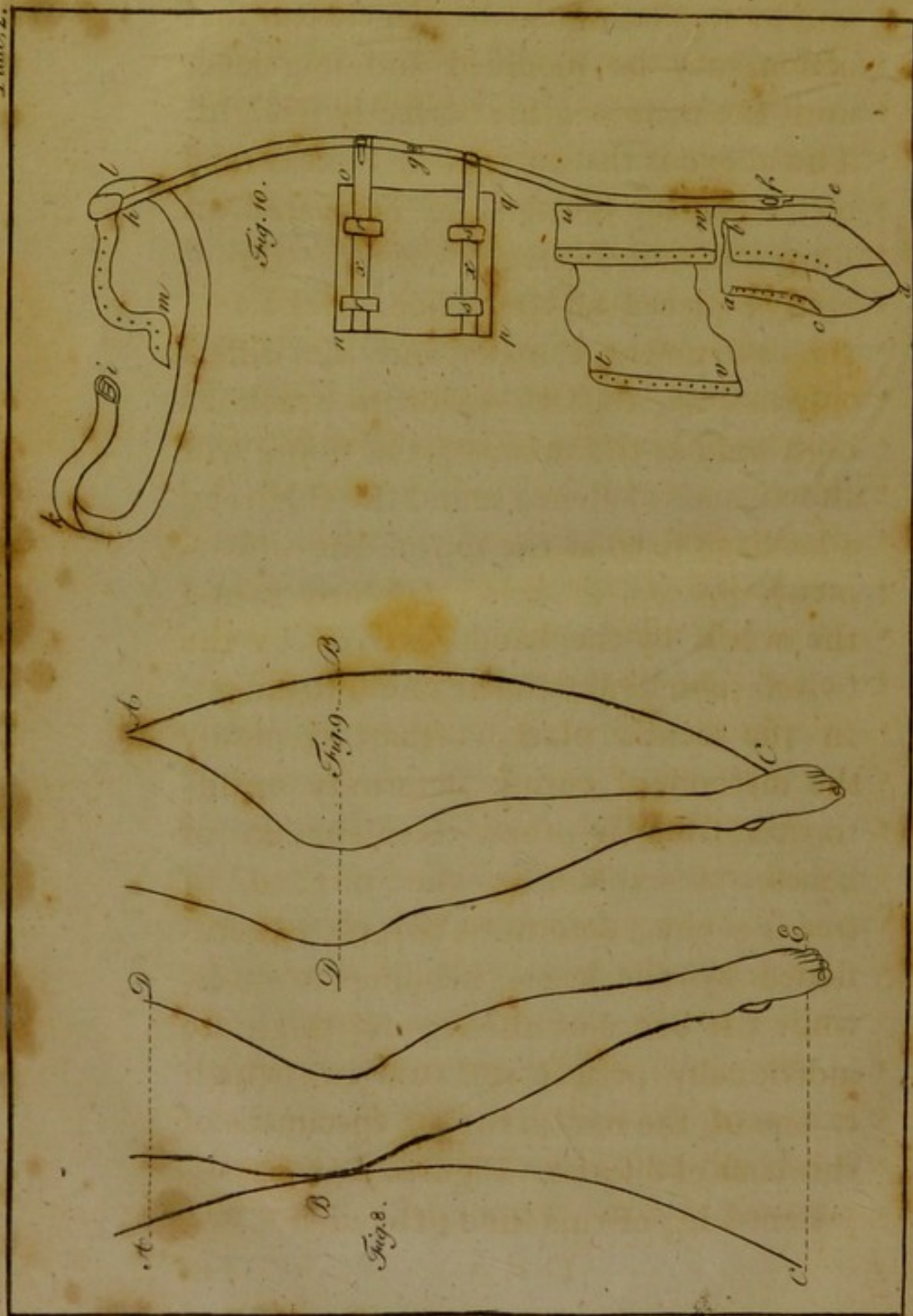
' to about half the circumference of the
 ' leg, the whole way. I continue another
 ' piece of iron, steel, or other convenient
 ' metal, *a. b.* in figure 6, and *b. i.* in figure
 ' 3, to the hip joint; this is connected
 ' with the leg, by a joint at the knee *b.*
 ' in figure 3, and *b.* in figure 5, to allow
 ' the knee to move in its natural directions,
 ' and is fixed by a swivel joint to allow the
 ' hip to move in its natural direction, to
 ' a bandage *c. d. e.* in figure 6, and *k. l. m.*
 ' *n.* in figure 3, that goes round the waist,
 ' and on the outside of that iron, steel, or
 ' other convenient metal, *a. b.* in figure 5,
 ' which bears the transverse pieces of tin,
 ' I fix a spring *a. b. c.* in figure 7, whose
 ' curve is similar to the line marked *a. b. c.*
 ' in figures 1 or 2; this I call the skeleton
 ' of the instrument.—The foot-piece is
 ' lined with any soft materials, to prevent
 ' it from galling the foot; the side of the
 ' leg is guarded in the same manner, and
 ' covered with strong leather, or any other
 ' convenient material, to go all round the
 ' leg; the rest of the bandage may be co-
 ' vered in the usual manner. To apply

D d

' this

‘ this apparatus, the foot must first be laced
 ‘ tight into that part that is intended to
 ‘ receive it, *a. b. c. d. e.* in figure 3.—The
 ‘ part figure 5, which is composed of trans-
 ‘ verse pieces of tin, &c. is then to be
 ‘ moulded, as near to the form of the leg
 ‘ as possible; the leg bandage *o. p. q. r.* in
 ‘ figure 3, is to be laced round the lower
 ‘ part of the leg, as tight as it can be
 ‘ borne, and fixed to remain so, by means
 ‘ of the strap *w. x.* in figure 3; the upper
 ‘ part is then to be laced, as tight as may
 ‘ be, and fixed to remain so, by means of
 ‘ the strap *r. u.* in figure 3, and the strap
 ‘ *s. t.* in figure 3, fastened round the knee,
 ‘ to keep it in its place; and, finally, the
 ‘ bandage *k. l. m. i. n.* in figure 3, to be
 ‘ made fast round the waist. If the prin-
 ‘ ciples I have laid down are attended to,
 ‘ it will be evident, that the skilful ap-
 ‘ plication of this bandage, according to
 ‘ the process I have described, the spring
 ‘ *a. b. c.* in figure 7, which is the efficient
 ‘ part, and which is, as before stated, fixed
 ‘ or fastened to figure 5, will be brought
 ‘ into action upon the curve of the leg,
 ‘ and





‘ and by regulating the bandages, &c. that
 ‘ action may be modified and increased,
 ‘ until the bone is made perfectly straight.
 ‘ The above is the instrument I make and
 ‘ use, when the spring is to be placed on
 ‘ the outside of the leg; when the spring
 ‘ is to be placed on the inside of the leg,
 ‘ the instrument I make and use differs
 ‘ only in this, that it is made to reach as
 ‘ high only as the inside of the thigh will
 ‘ allow, and is fastened round the thigh, by
 ‘ a bandage fixed at the top of the instru-
 ‘ ment, instead of being fastened round
 ‘ the waist, by the bandage fixed by the
 ‘ swivel joint to the top of the instrument.
 ‘ In the second place, I shall exemplify
 ‘ the method of curing deformity or dis-
 ‘ tortion from improper combination of
 ‘ bones, by explaining the method of
 ‘ treating that deformity, which is occa-
 ‘ sioned by the knees bending inwards,
 ‘ while the bones of the leg and thigh are
 ‘ individually perfect and straight; which
 ‘ is one of the most frequent specimens of
 ‘ this class of diseases. Figures 8 and 9, re-
 ‘ present a leg of this kind; the lines *a. b. c.*

' in each figure, represent the curved spring
 ' intended to cure this deformity. In defor-
 ' mities or distortions from curvature of
 ' bones, the bones alone are objects for at-
 ' tention, every thing that covers them be-
 ' ing merely passive; but in deformities, or
 ' distortions from improper combination of
 ' bones, the muscles, tendons, and liga-
 ' ments connected with them, become e-
 ' qually objects of attention, being some-
 ' times merely deranged, in consequence of
 ' the improper combination of bones, but
 ' at other times some disease or derange-
 ' ment in the muscles, tendons, or liga-
 ' ments, have been the original cause of
 ' the deformity. In the deformity repre-
 ' sented in figures 8 and 9, where the de-
 ' rangement of the connecting ligament of
 ' the joint, the loss of power in the muscles
 ' of the leg, and consequent diminished ca-
 ' pacity for loco-motion in the patient,
 ' are merely consequences of the derange-
 ' ment in the relative position of the
 ' bones, the means proposed to remove
 ' that original disease will likewise obviate
 ' all the consequences; but in that class
 ' of

‘ of deformities which originate in some de-
 ‘ fect of the muscles, tendons, or ligaments
 ‘ in the parts affected, our attention must
 ‘ be principally directed to supply or re-
 ‘ medy this defect which is the producing
 ‘ cause, or the consequences can never be
 ‘ removed, or even palliated with much
 ‘ effect; that it is proposed to do effectual-
 ‘ ly by my invention. I exemplify the
 ‘ method of constructing instruments for
 ‘ curing diseases of the latter class, occa-
 ‘ sioned by improper combination of bones,
 ‘ according to the method I have invented,
 ‘ by describing the manner of making in-
 ‘ struments to cure that deformity which
 ‘ is occasioned by the knees bending in-
 ‘ wards, as drawn in figures 8 and 9. I
 ‘ make the foot piece *a. b. c. d. e.* in figure
 ‘ 10 of this instrument, exactly the same as
 ‘ described in the preceding case in figures
 ‘ 3 and 4; to this I connect, by means of
 ‘ a joint, a spring *f. g. h.* in figure 10, to
 ‘ go from the ankle joint at *f.* to the hip at
 ‘ *h.* if I place the instrument outside the
 ‘ leg, as in figure 9, which I think is the
 ‘ preferable mode; or from the ankle to
 ‘ the

‘ the top of the thigh, if on the inside, as
 ‘ in figure 8. The spring *f. g. h.* is made
 ‘ of two pieces, united by a joint parallel to
 ‘ the knee, as at *g.* in figure 10, to allow
 ‘ the knee to move in its natural direction.
 ‘ If these instruments are for both legs,
 ‘ they are connected by a bandage round
 ‘ the waist, as I have already described, as
 ‘ *i. k. l. m.* in figure 10. Between the
 ‘ spring and the leg, I place a splint of metal,
 ‘ or other convenient substance, as in figure
 ‘ 3, fastened to the inside of the spring, to
 ‘ cover as much as may be necessary of that
 ‘ side the leg, to guard it from pressure
 ‘ from the spring, and to form one of the
 ‘ resting points; the other is formed by
 ‘ the bandage *i. k. l. m.* in figure 10, to
 ‘ which the spring is fixed on the hip. If
 ‘ the instrument is to be placed on the in-
 ‘ side the leg, it is made as high only as
 ‘ the inside of the thigh will allow, and is
 ‘ fastened round the thigh, by a bandage
 ‘ fixed to the top of it. These parts con-
 ‘ stitute the skeleton of the instrument.
 ‘ To apply it, I fix the foot-piece *a. b. c. d. e.*
 ‘ in figure 10, on the foot, in the manner
 ‘ I have

‘ I have described in the preceding case ; I
 ‘ then lace a bandage, *n. o. p. q.* in figure
 ‘ 10, round the knee, upon which are
 ‘ fixed four loops, *r. r. s. s.* in figure 10,
 ‘ viz. two above, and two below the knee
 ‘ joint ; I likewise fix a bandage to the
 ‘ splint, *t. u. v. w.* in figure 10, which is
 ‘ then laced on the leg. I have, besides,
 ‘ two strong straps to the spring *x. y.* in
 ‘ figure 10, one above, and the other below
 ‘ the knee joint ; I then pass these straps
 ‘ through the loops *r. r. s. s.* on the knee
 ‘ bandage in figure 10, and fasten them to
 ‘ the spring of *f. g.* and *g. h.* above and be-
 ‘ low the knee joint at *g*, which, by these
 ‘ means, are bound to the limb, and the
 ‘ re-action of the spring *f. g.* and *g. h.*
 ‘ draws the limb into its proper place.—
 ‘ Upon applying this, with what I have
 ‘ said on the general principle, as applied
 ‘ to figures 8 and 9, the action of this in-
 ‘ strument will be easily comprehended.
 ‘ In the next place, I shall instance two
 ‘ diseases, which may be referred to as
 ‘ striking examples of this last species of
 ‘ deformities, or distortions from improper
 ‘ com-

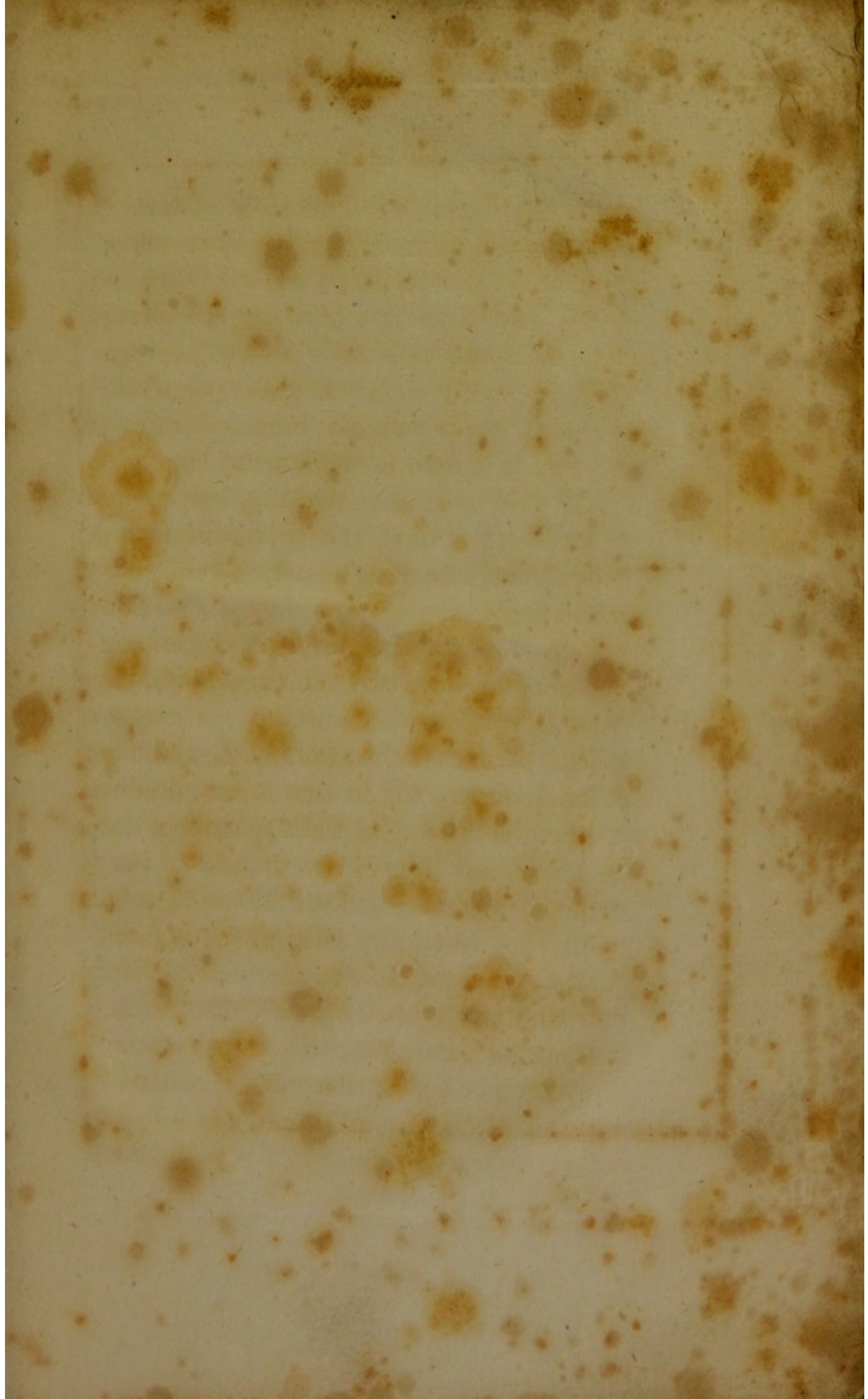
‘ combination of bones, *viz.* when a wry
 ‘ neck is produced, either by contraction
 ‘ of the sterno mastoideus muscle on one
 ‘ side, or the loss of power in the same
 ‘ muscle on the other side the head, or in
 ‘ those distortions of the legs, occasioned
 ‘ by contraction of the gastrocnemii mu-
 ‘ scles, and tendo achilles; when that con-
 ‘ traction is the original cause of the dis-
 ‘ ease, or by loss of power in the antagonist
 ‘ muscles; when the contraction of the
 ‘ gastrocnemii muscles and tendo achilles is
 ‘ only one of the consequences of that
 ‘ want of power, however produced. In
 ‘ all these cases, the curative intention is the
 ‘ same, and by my invention, is effected by
 ‘ adopting a spring or springs, to supply
 ‘ the deficiency of action in those muscles.
 ‘ Thirdly,—I shall exemplify the method of
 ‘ curing those defects, which arise from
 ‘ defects of muscular action, whatever may
 ‘ be the cause of that defect, by my me-
 ‘ thod of curing that distortion of the leg
 ‘ and foot, which is occasioned by con-
 ‘ traction of the gastrocnemii muscles and
 ‘ tendo achilles, or by want of power in
 ‘ those

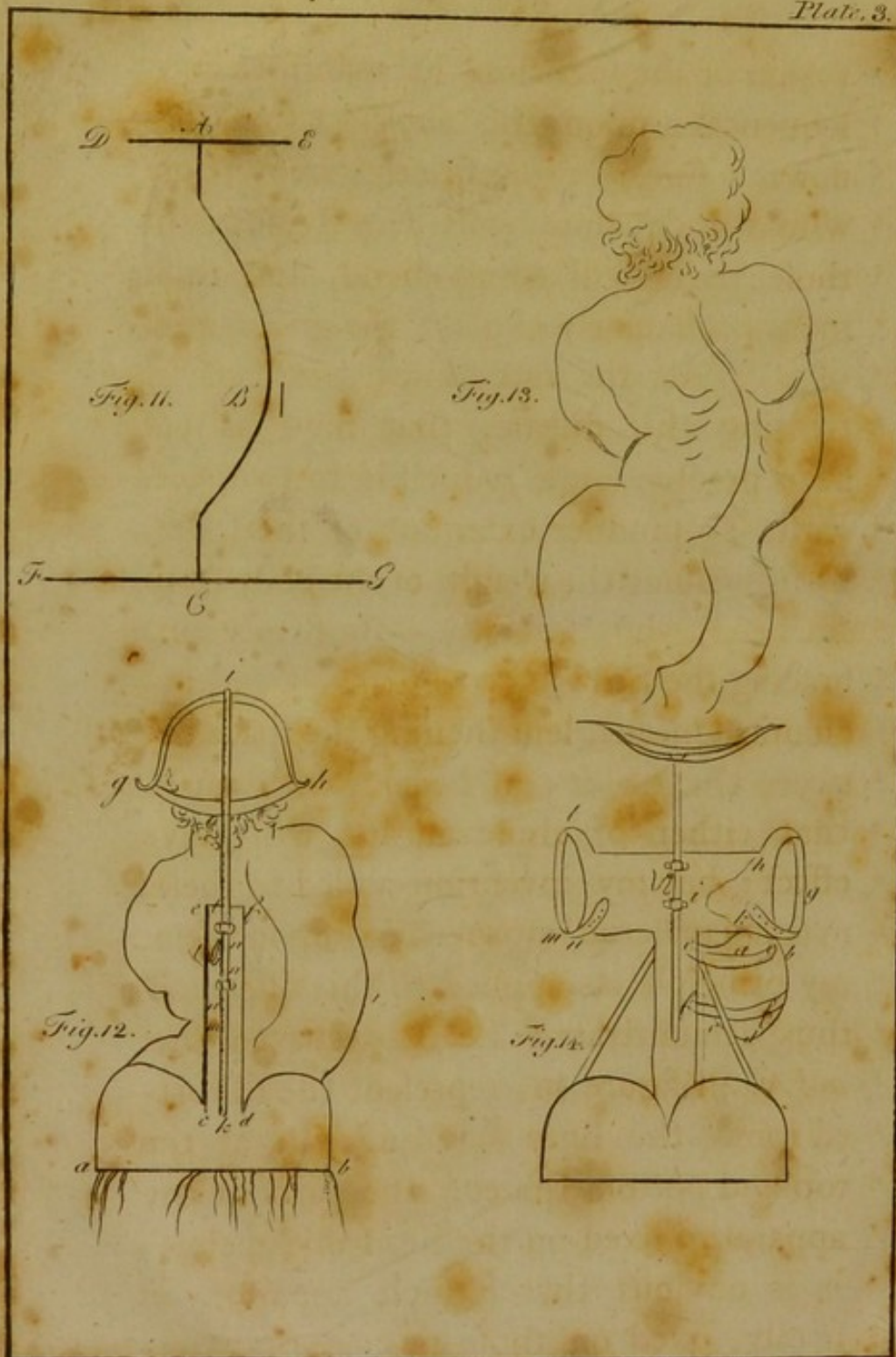
‘ those muscles, whose office is to counter-
 ‘ act the above-mentioned.—In this kind
 ‘ of disease, the heel is drawn up, and the
 ‘ toe pointed straight forwards, with more
 ‘ or less rigidity, according to circum-
 ‘ stances ; the curative intentions are, to
 ‘ place the limb in its natural position, and
 ‘ restore (if possible) the natural action of
 ‘ the muscles. I examine the diseased part,
 ‘ to discover what muscle is deficient in
 ‘ contractile power, and consider in what
 ‘ direction that muscle would draw the
 ‘ parts, if in its natural state : I then pro-
 ‘ vide, and apply a spring, whose power is
 ‘ equal to the natural power of the defec-
 ‘ tive muscle, and whose curve is such, that
 ‘ when bound on the limb, its re-action
 ‘ will draw it, as much as possible, towards
 ‘ its natural state. If the disease is occa-
 ‘ sioned by defects in the action of more
 ‘ than one muscle, I provide a separate
 ‘ spring, to imitate and supply the action
 ‘ of each of the defective muscles, and
 ‘ apply them separately, and alternately,
 ‘ varying their powers and action, until
 ‘ the whole disease is eradicated : I apply

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‘ these

‘ these springs in the following manner ; I
 ‘ provide a splint of tin, or other conve-
 ‘ nient substance, to cover one half the
 ‘ leg, and serve as a basis for the springs
 ‘ to act from ; this splint is lined with lea-
 ‘ ther, wool, or other convenient sub-
 ‘ stance, to prevent it from galling the
 ‘ part ; it is then bound on the leg, with
 ‘ any kind of bandage that may be conveni-
 ‘ ent ; I then bind the spring in such a
 ‘ direction, that its re-action will draw
 ‘ the limb, as much as possible, towards its
 ‘ natural state, and leave it in this con-
 ‘ dition for one, two, or three days, ac-
 ‘ cording as the circumstances of the case
 ‘ will permit ; I then unbind it, and alter
 ‘ its direction, &c. so that it may produce
 ‘ a farther effect ; or if it is a complex case,
 ‘ and various springs are necessary, I ap-
 ‘ ply a different one, for the same or a like
 ‘ space of time, and thus proceed gradu-
 ‘ ally, until the cure is complete. There
 ‘ is another species of deformity, arising
 ‘ from, or connected with improper com-
 ‘ bination of bones, that may be materially
 ‘ benefited by this invention, *viz.*—Incur-
 ‘ vation





Sheldrakes Patent.

' vation of the spine and its manifold con-
 ' sequences: upon this subject I shall lay
 ' down a simple proposition, which those
 ' who are acquainted with the structure of
 ' those parts will comprehend, and then
 ' more particularly explain the application
 ' of it. All the mechanical methods of
 ' treating this disease, that have as yet
 ' been practised, are reducible to two, *viz.*
 ' First, To produce extension of the spine,
 ' by suspending the weight of the body from
 ' the head; and, secondly,—By firmly em-
 ' bracing the head and pelvis, and, by me-
 ' chanical means, lengthening the space be-
 ' tween them. It may be said, with truth,
 ' that either of those means will have
 ' effect; but my invention added to these,
 ' makes a material improvement upon them:
 ' my principle, as applied to this disease, I
 ' thus demonstrate: Let the curved line
 ' *a. b. c.* in figure 11, represent the distort-
 ' ed spine, the lines *d. e.* and *f. g.* at the
 ' top and bottom thereof, the parts of any
 ' apparatus fixed on the head and pelvis;
 ' it is obvious that if such apparatus is
 ' firmly fixed on those parts, and after-
 ' wards sufficiently lengthened, the curved
 ' spine,

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' spine, that is extended between them,
 ' must in the end become straight; but my
 ' improvement is to add springs, properly
 ' adapted, to press, at the same time, on
 ' the projecting part of the curve, by
 ' which means the extension is acceler-
 ' ated and facilitated, so that the curve
 ' will be straightened in much less time,
 ' and with less force, and less inconve-
 ' nience to the patient, than by any other
 ' method. I shall now proceed to the
 ' application of my invention to cure dis-
 ' tortions of the spine, which are the
 ' most complex and most varied of diseases
 ' arising from improper combinations of
 ' bones, and which I thus demonstrate.
 ' Figure 12 represents the instrument for
 ' curing that disease, invented and made
 ' public by me, sixteen years ago, and
 ' which is no part of my present invention,
 ' or included in this patent—*a. b. c. d. e. f.*
 ' is the part intended to fix on the pelvis,
 ' *g. b. i.* is the part to fix on the head, and
 ' *i. k.* the back, which connects the two;
 ' on this is the spring catch *l.*, which falls
 ' into notches, *n. n.* in the upright bar *c. d.*
 ' *e. f.* as it is raised, and thus produces
 ' extension.

‘ extension. The figure 13, represents the
 ‘ back view of a patient with distorted spine,
 ‘ and, in consequence, projection of the
 ‘ ribs, and enlargement of the scapula on
 ‘ one side, with a proportionate diminution
 ‘ of those parts on the other side; and, fi-
 ‘ gure 14, represents the spinal machine
 ‘ (which forming no part of my present
 ‘ invention, it is unnecessary for me to
 ‘ describe) with additions upon the prin-
 ‘ ciples of this invention, consisting of a
 ‘ pad, *a. b. c. d.* properly guarded, and con-
 ‘ nected with springs *e. e.* and *f. f.*, fixed
 ‘ to the back of the machine at *e.* and *f.*,
 ‘ and intended to press on the projecting
 ‘ ribs; another pad, *b. i. k.* connected by
 ‘ springs, with the inside of the back of
 ‘ the machine, and intended to press on
 ‘ the projecting scapula; one elastic spring
 ‘ strap, connected with it, is intended to
 ‘ depress the elevated shoulder, *b. g. k.* and
 ‘ a similar one, *l. m. n.* to raise that which
 ‘ is below its proper situation. Whoever
 ‘ considers the general principles of this
 ‘ my invention, in this, its application to
 ‘ the class of diseases at present under
 ‘ con-

' consideration, will see, that these addi-
 ' tions, upon the principle I have already
 ' described, are a part of my present inven-
 ' tion, and included in this patent, and
 ' are a material improvement to my former
 ' method of treating this disease. To such
 ' persons as may in future practise this
 ' method of curing these distortions, &c.
 ' the following rules which I adhere to,
 ' will be useful in addition to what is be-
 ' fore stated, in aiding their own judgment
 ' and experience, in the application of this
 ' my method, *viz.* First, In curvature of
 ' bones, a small force should be at first ap-
 ' plied, and afterwards gradually increased
 ' to the utmost extent that can be applied
 ' without injury to the soft parts which lie
 ' under the instruments; and, secondly,
 ' In improper combination of bones, or
 ' defect of muscular action, the force to be
 ' used should be something more than the
 ' parts affected would exert if in their na-
 ' tural state. IN WITNESS, &c.'

23d February, 1797.

THE END.

LATELY WAS PUBLISHED,

Price 3s. sewed.

OBSERVATIONS ON the CAUSES OF DISTORTIONS in the LEGS of CHILDREN, and the Consequences of the pernicious Means, generally used, with the Intention of curing them ; with CASES to prove the Efficacy of a Method of Cure invented and practised only by

T. SHELDRAKE,

Truss-maker to the Westminster Hospital and Mary-le-Bone Infirmary.

Of this Work the ENGLISH REVIEW gives the following Account :

‘ This work consumes many pages, in animadverting on the defects of other operators, and mechanical contrivers of instruments, for what is called the Club-foot, &c. There are plates that exhibit an explanation of what the writer advances : cases follow, with the respectable names of JOHN HUNTER, the ingenious Mr. LYNN, Dr. TURNBULL, and Mr. KNIGHT, whose professional respectability is well known.

‘ 1st. The Author supposes the Club-foot to be owing to compression of the foetus in utero.

‘ 2dly. The cure should be attempted as early as possible after the birth, before ossification be completed ; after which he thinks the cure uncertain.

‘ 3dly. ‘ This, the author declares, is effected by the use of elastic bandages, which he invented, and with much labour hath improved.

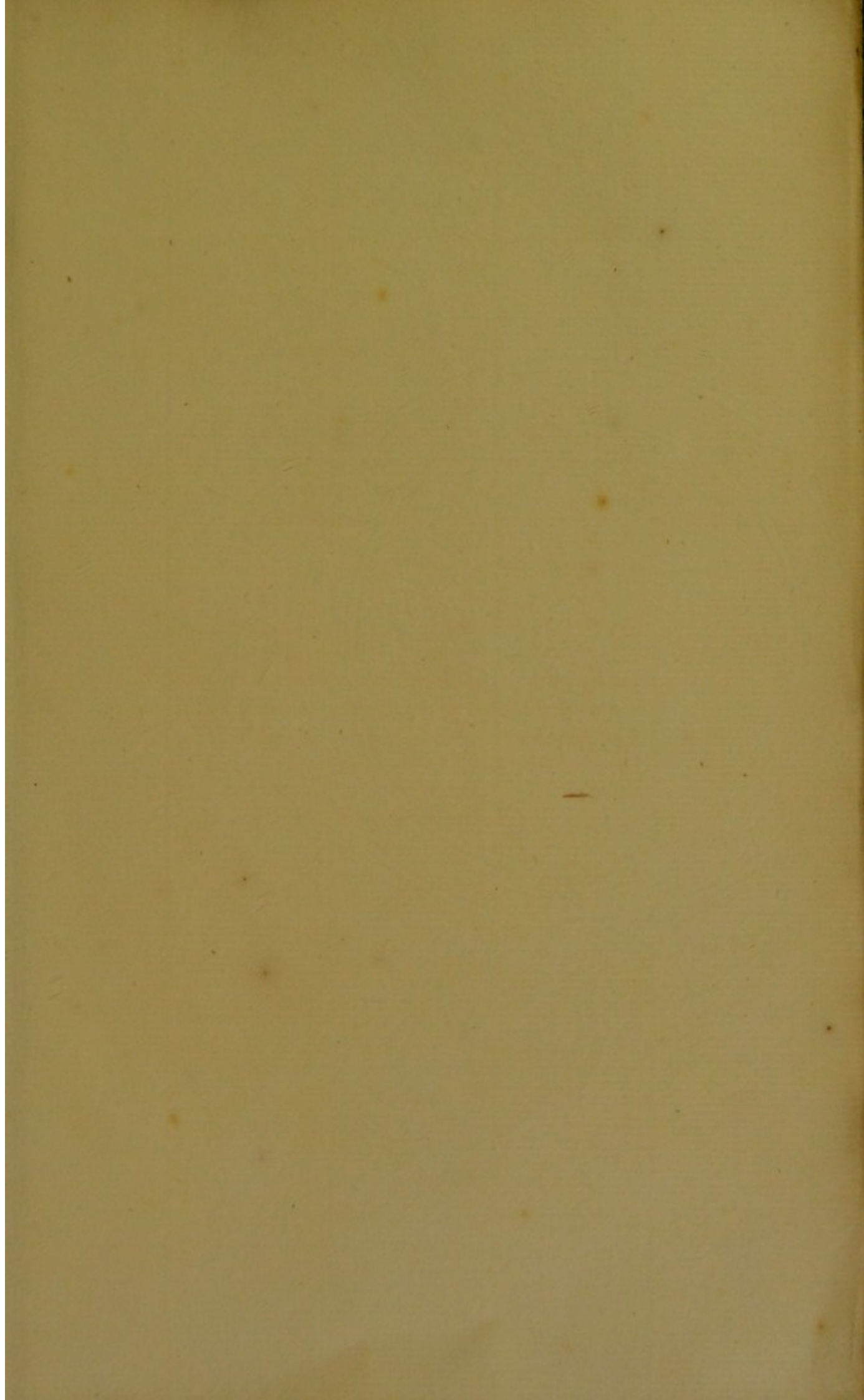
‘ The

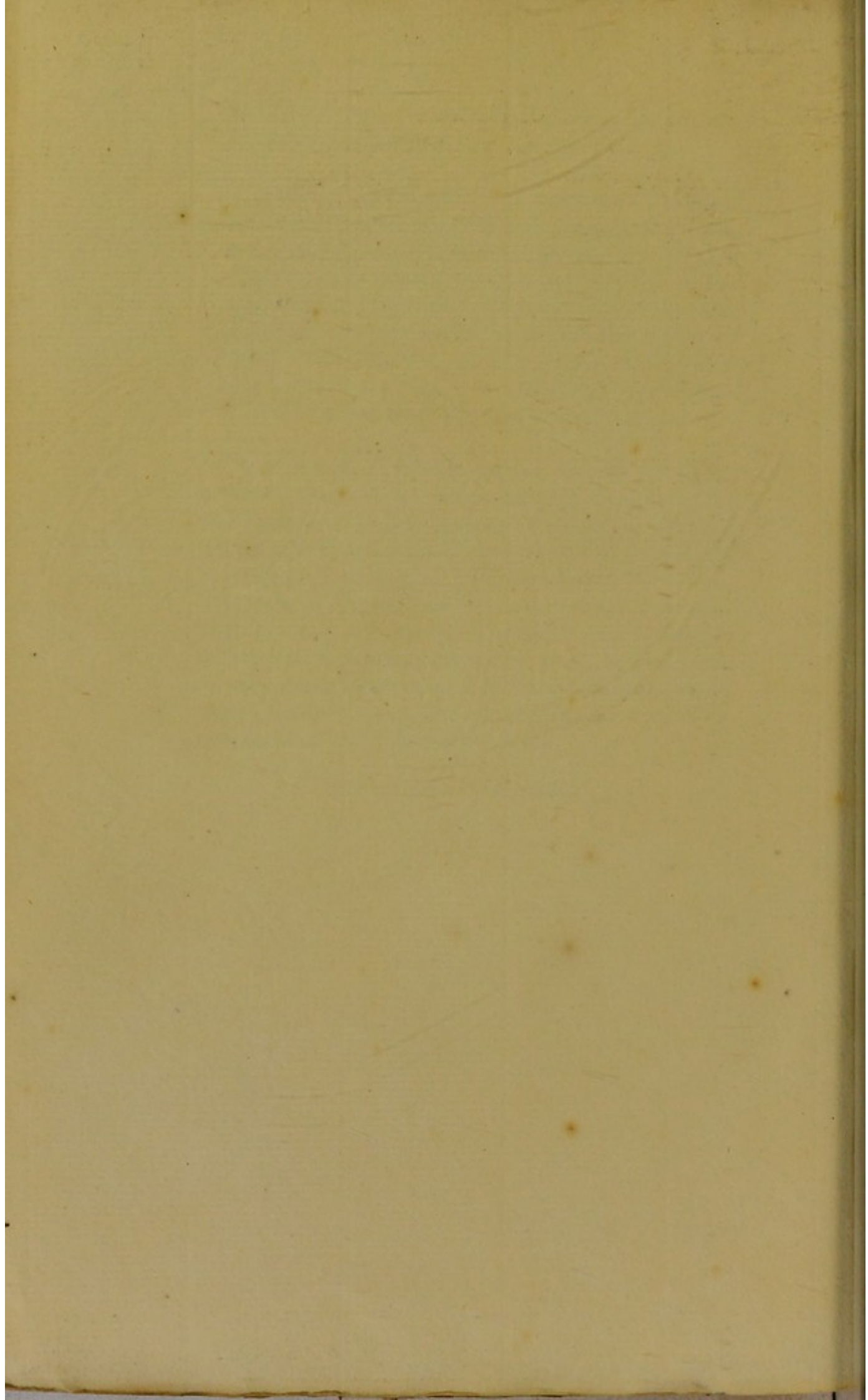
‘ The incurvation of the bones of the leg is considered,
‘ with an explanatory plate.

‘ In considering this work, it is necessary to remember,
‘ that figulus figulum odit; one trusts-maker another: but,
‘ on examination, it must be confessed, that Mr. SHELDRAKE’s
‘ observations are *reasonable*, and that the intentions of the
‘ elastic bandages are *plausible*. The incurvation of the bones
‘ of the leg certainly require mechanical contrivances to
‘ remove their deformities; and if, on experience, the inven-
‘ tions of Mr. SHELDRAKE be found superior to those hither-
‘ to used, he will merit the approbation of all mankind.’

As we are all, in different degrees, the children of im-
perfection and error, it is not unreasonable to conclude, that
this Reviewer misunderstood a part of my design, because I
did not sufficiently explain it. I certainly had no intention
to *animadvert on the defects of others*; my design was to shew,
exactly, what had been done by others, that I might make
good my title to what afterwards might be done by myself:
having done so, I have, in the present work, confined myself
to the explanation of my own system and its effects, which
I hope, will prove what claim or pretence I may have to the
premium held out by the Reviewer, *viz.*

‘ *The approbation of all mankind.*’





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