

Observations on adhesion, with two cases, demonstrative of the powers of nature to reunite parts which have been, by accident, totally separated from the animal kingdom / by William Balfour.

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1

OBSERVATIONS
ON
ADHESION,
WITH
TWO CASES,

DEMONSTRATIVE OF
THE POWERS OF NATURE TO REUNITE PARTS WHICH HAVE
BEEN, BY ACCIDENT, TOTALLY SEPARATED FROM
THE ANIMAL SYSTEM.



By WILLIAM BALFOUR, M. D.

Tantum, quantum quisque potest, nitatur.

Cic.

EDINBURGH:

Printed by Abernethy & Walker,
AND SOLD BY WILLIAM BLACKWOOD, EDINBURGH; AND
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1814.

ON

OR

ADDITION

AND

TWO CASES

OF

THE EFFECT OF NATURE TO RESTORE THE NERVOUS SYSTEM

IN CASES OF PARALYSIS, AND OTHER AFFECTIONS

OF THE NERVOUS SYSTEM

BY WILLIAM BARRIST, M.D.

OF THE FACULTY OF PHYSIC, IN THE UNIVERSITY OF CAMBRIDGE

IN A DISCOURSE, READ AT THE ANNUAL MEETING OF THE SOCIETY OF PHYSICIANS, IN THE YEAR 1781

LONDON:

Printed by J. DODD, in Pall-mall

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IN THE YEAR 1781

These CASES and OBSERVATIONS were first published in NO. 40. of the Edinburgh Medical and Surgical Journal, a Work deservedly in extensive circulation, and therefore a proper Repository of Facts that ought to be made universally known to the Faculty. But as that Publication is in the hands of Medical Practitioners only, and as the Facts here recorded must be interesting, not only to the Physician and Surgeon, but to all mankind, they are given in this form, that the knowledge of them may be diffused as widely as possible.

OBSERVATIONS
ON
ADHESION,
&c.

THE practice of engrafting trees first suggested to medical practitioners the idea of repairing mutilated parts. This practice was successfully prosecuted by a few, when the state of society afforded opportunities; but has uniformly been treated with a certain degree of ridicule by far the greater number of the profession. This distrust in the powers

of Nature, in the face, too, of evidence which it would be difficult to controvert, is not more unphilosophical in itself, than its influence on practice must be detrimental. What a man believes impossible, he never will attempt. But if a branch of one tree unites with the stump of another, so as not only to live, but to bear fruit, it can be no great stretch of imagination to suppose, that a part totally separated from the animal system, may, under proper management, reunite and live, and perform all its proper functions.

A number of years ago, an accident happened, in the management of which I proceeded upon the principle, of the possibility of parts entirely separated uniting again, with all the success I

could desire. This idea was suggested by the necessity of doing something without delay, and the recollection of the Taliacotian mode of forming artificial noses. At that time, however, I knew of no case in which even an attempt had been made to replace parts, as near being totally separated from the system as were those in this instance. This case I did not publish at the time it occurred, for reasons hereafter to be mentioned. Indeed it had almost gone out of mind, till a fresh accident occurred, the cure of which by reunion, ranks, under all the circumstances of the case, among the most wonderful instances of the powers of Nature, and for ever sets at rest the question, "Whether parts, which have been completely separated from the rest of the animal

system, and in which circulation has ceased altogether, can be again reunited *?" There is a circumstance, too, which stamps a value and importance on the two following cases, above all, or most others of the kind,—that is, their authenticity, or the proof that can be led, that the facts recorded really happened precisely as recorded ; a proof, which, from the number and respectability of the witnesses, must convince the most sceptical.

The recollection of what took place in the first case, left little doubt in my mind of an equally favourable result in the second ; for I never attributed the least degree of the success attending the

* Dr Thomson's Lectures on Inflammation, p. 230.

former, to the small slip of skin that remained undivided. It appeared to me highly improbable, that a connection so very slender could keep up circulation betwixt the system and the separated parts, with a vigour sufficient to keep the latter alive.

From the moment, therefore, I found reunion to have taken place, I began to suspect, that the precautions employed by Taliacotius, and his contemporaries, to keep up circulation in parts destined to supply the place of others, were unnecessary, and inadequate to the purpose. Can it be supposed, for instance, that an extensive surface cut out of the arm for forming an artificial nose, could be fed by a small attachment, with a vigour at all proportioned to the celerity

with which adhesion by the first intention takes place? It is impossible. Suppose a piece of skin, of such extent, were raised from any part of the body, and allowed to remain, without being connected with any other raw surface, how long, I ask, would that part of its margin, most distant from the attachment left to keep up circulation in the part, live? I am convinced very little, if any blood, would issue from it, except what might be in the vessels at the time of their being divided.

If, therefore, the connection left to keep up the circulation of the excised parts, in Taliacotius's operations, was insufficient for that purpose, these parts must be considered as having been in the same situation as if entirely separat-

ed from the system, and their adhesion to the parts to which they were applied as having depended, not on the circulation supposed to have been kept up in them, but on the principle of vitality remaining in them, and on the circulation having been restored to them, by the new surface to which they were attached.

With regard to circulation being kept up, in parts cut out of the forehead, as now practised in India *, it is out of the

* A thin plate of wax is fitted to the stump of the nose, so as to make a nose of a good appearance. It is then flattened, and laid over the forehead. A line is drawn round the wax, and the operator then dissects off as much skin as it covered, leaving undivided a small slip between the eyes. This slip preserves the circulation till an union has taken place between the new and old parts. The cicatrix of the stump of the nose is next pared of; and, immediately behind this raw part, an incision is made through the skin, which passes

question. The twist given to the small attachment, left at the root of the nose, must almost entirely preclude any thing of the kind.

I am convinced, therefore, that had Taliacotius at once separated from the system, the flaps of skin with which he repaired mutilated parts, his operations would have been equally successful, infinitely less troublesome to himself, and distressing to his patients. With this conviction, arising solely from the suc-

around both *alæ*, and goes along the upper lip. The skin is now brought down from the forehead, and, being twisted half round, its edge is inserted into this incision, so that a nose is formed with a double hold above, and with its *alæ* and *septum* below, fixed in the incision. The connecting slips of skin are divided about the twenty-fifth day, when a little more dissection is necessary to improve the appearance of the new nose.—Gentleman's Magazine for October 1794.

cess attending the first of the following cases, I was resolved to attempt the reunion of any divided parts that might come in my way, unless such parts were of a magnitude that the apposition of the wounded surfaces would not restrain hæmorrhagy.

There are instances on record, with not one of which was I acquainted when the accident happened to my son, of the *points* of fingers, ears, noses, being nearly or entirely separated from the system, that were made to re-adhere. But Pedie's case, so far as I know, is without a parallel ; and I have the authority of a number of the first characters in the profession in this place to say, that it is the most extraordinary that has come to their know-

ledge. This is my apology, if any is necessary, for giving it to the public. For "it must not be imagined, that the recital of such uncommon cases is without its use; for, while they extend our knowledge of the powers inherent in living bodies, they inform us of the advantage often to be derived from allowing these powers proper opportunities of exerting themselves. Of reunion, by adhesion, we are, in no case, to despair, so long as the least degree of circulation remains in both, or even in one of the parts divided *." To this I would add, that many things are left undone, from mere supineness, or a belief that they are impracticable, because they were never known to have been done

* Dr Thomson's Lectures on Inflammation, p. 243.

before. Of what advantage then may it be, to be generally known, that such things as are detailed in the two following cases, are not only practicable, *but have been done?*

Individuals in every line of life, but especially those who work with edged instruments, or who are employed about machinery, would often have it in their power to prevent unsightly mutilations in themselves or others, and be enabled to earn their bread as before. Surgical skill is not necessary in all instances of such accidents. The chief thing wanted is, a conviction that attempts at reunion of divided parts *may* be successful; for whoever has this belief will not fail, when such accidents occur, to give opportunity to the powers of Nature to

exert themselves. There is, indeed, no saying what may be done in this way. It would be unphilosophical to set bounds to the powers of Nature. And because noses, ears, and the *points* of toes and fingers, are the only parts which, when separated, are known to have reunited, is Nature to be blamed for that? The reason is, the reunion of other parts has never been attempted. I would not, however, from these observations, be understood as imagining, that parts of very considerable magnitude, when totally separated from the system, can ever be expected to reunite. The impossibility of this is, I think, evident *a priori*.

But the knowledge of such facts as occurred in the following cases, must,

by increasing his confidence in the powers of nature, induce every rational practitioner to trust more to them, in many circumstances, than he otherwise would do. Therefore, though it would be madness to expect the reunion of a leg or an arm that had been entirely separated, yet I can very easily conceive a leg or an arm to be wounded in such a way, by accident, or in battle, as, according to received principles, to render amputation necessary, but which in the hands of a surgeon, quite aware what Nature can do, might be preserved. I can very easily conceive that, to a practitioner who knows that Nature, by her own innate powers, unaided by a single auxiliary artery, can effect the reunion of a finger that has been entirely separated from the system for nearly half

an hour, cases may occur, in which he will pause before he takes off a limb, which, but for such knowledge, he would amputate without hesitation. In this view, Pedie's case, in particular, will, I trust, be an acceptable present to Surgeons in the Army and Navy, where casualties occur so often, and of course there are such opportunities for observation, and warrantable experiment, and may be the cause of preserving limbs which otherwise would be lost, to many a gallant man. At all events, it is evident, that the practice of attempting the reunion of separated parts, may be carried farther than has ever yet been done; and it must be a comfortable reflection to an unfortunate sufferer, in the hour of accident, to know, that a whole finger, or even all

the fingers of a hand, though entirely cut off, may be restored *.

* A gentleman, to whom I told Pedie's case lately, expressed his regret that he had not known it sooner; for, said he, "our blacksmith, a very clever fellow, a short time ago, struck off three of his fingers, from about the middle. He ran immediately, with the pieces hanging by small slips of skin, to the surgeon of the village, who out with his scissars, divided the slips of skin, threw the fingers away, and contented himself with dressing the stumps." Now, this gentleman did what almost every other surgeon would have done; but had he known Pedie's case, the blacksmith, a thousand to one, would have had his fingers to-day.

CASE I.

About eleven years ago, Mr Gordon, surgeon, now, I believe, in India, after having conversed with me for some time one day, in my shop, upon going out shut the door smartly after him, without perceiving any body near it. Unfortunately, one of my sons, a boy of about four years and a half, diverting himself on the outside, had one of his hands in the groove of the hinge-side of the door. I was shocked with a wild scream that I heard upon the door being shut ; and still more so, when Mr Gordon came in, carrying the boy in his hands, stretched, from agony, as upon a rack. The points of three of his fingers

were completely separated, with the exception of a slight attachment of skin, which barely suspended the parts. The points hung at right angles when the fingers were extended. The point of the index was cut off at the middle of the nail, the fore-finger a little above the nail, and the ring-finger at the root of the nail. The wounded surfaces were necessarily much bruised, but the fingers were nevertheless cut so perpendicularly, that, unless I had seen it, I could not have believed a door could have done it. With the assistance of Mr Gordon, the innocent cause of the accident, I instantly replaced the parts, with but little hopes, I confess, owing to the degree of contusion of the wounded surfaces, of reunion taking place. But I was so shocked at the idea of the boy's

hand being mutilated for life, that I hesitated not a moment to put the powers of Nature to the test. On the sixth day after the accident I removed the bandages, when I found adhesion had taken place, to the unspeakable joy of Mr Gordon, the boy, and myself. The skin and nails came off all the three fingers, but were afterwards renewed; and the cure was so complete, that a narrow inspection was necessary to discover any difference between the fingers of the one hand and those of the other. There was, indeed, no difference to be perceived, but a slight scar on the left side of the ring-finger, at the root of the nail. This case I certainly would have published at the time it occurred, but on Mr Gordon's account, who, though not the smallest blame was attributable to him,

suffered more anxiety and distress of mind than I did myself, and never liked to hear the subject mentioned. I trust he will now excuse me for mentioning him by name, having no other motive for so doing, than the establishment, beyond the possibility of contradiction, of the truth and accuracy of the above statement. Mr John Moffat, accountant of Excise, Mr Alexander Milne, surgeon, now on board the Norge, 74, and my servants, were likewise witnesses of the fact. The boy died of the scarlet-fever, a year and a half after the accident ; and but for the following case occurring, which to most, I am sensible, will appear much more interesting and decisive, that of my son would never have been recorded,

CASE II.

On the 10th day of June last, two men came into my shop, about eleven o'clock forenoon, one of whom, GEORGE PEDIE, a house-carpenter, had a handkerchief wrapped round his left hand, from which blood was dropping slowly. Upon uncovering the hand, I found one half of the index wanting. I asked him what had become of the amputated part. He told me he had never looked after it, but believed it would be found where the accident happened. I immediately dispatched Thomas Robertson, the man that accompanied the patient, to search for and bring the piece. During his absence I examined the wound, and found that it began near the upper end of the

second phalanx, on the thumb side, and terminated about half an inch lower on the opposite side. The amputated piece, as measured by the patient himself, was an inch and a half long, on the thumb side, and an inch on the other. The wound was inflicted in the cleanest manner, by one stroke of a hatchet, and terminated in an acute point.

In about five minutes, as nearly as I can guess, Thomas Robertson returned with the piece of finger, which was white and cold; and I remarked to Dr Reid, who was present, that it looked and felt like a bit of candle. Without the loss of a moment, I poured a stream of cold water on both wounded surfaces, to wash away the blood from the one, and any dirt that might be adhering, from the

other. I then applied, with as much accuracy as possible, the wounded surfaces to each other, expressing a confident expectation that reunion would take place.

I endeavoured to inspire the patient with the same hopes, by detailing to him the success I had in my son's case, which, for the reasons already mentioned, was to me quite decisive of the question, whether or not parts entirely separated from the system would reunite? All this was heard by the patient with a very apparent distrust. But I could do no more than tell him, that, if reunion did not take place, no harm could ensue from the attempt, and that, if it did, a great deformity would be prevented. I informed him, that unless pain or foetor,

or both, should occur, I would not remove the bandages for a week at least; directed him to keep his fore arm slung, and not to think of any kind of work. At last he entered so far into my views as to promise punctual obedience. He called on me next day, when he felt no particular uneasiness, but remarked, that the wound had not altogether given over bleeding. Assuring him there was nothing in that, I desired him to call on me every day; but did not see him again till the 4th of July! Concluding, from his absenting himself without assigning any reason, that he was one of those too frequently to be met with in the lower ranks, who go from one medical man to another, just as their fancy strikes them, or as they happen to be advised by some of their foolish and ig-

norant neighbours, and whose ingratitude to any practitioner is in exact proportion to the good he does them, I suspected he had fallen into bad hands, and that I never would hear more of him. On the 2d of July, however, a gentleman called on me, and asked if I recollected a man who had got a finger struck off, about three weeks before, to have come through my hands?

I told him I recollected perfectly well; that I was filled with indignation at the fellow's unreasonable and ungrateful conduct; and that I was just about setting on foot a search after him, not having informed myself either of his name or place where he was employed, at the time he applied to me. The gentleman said he would save me the trou-

ble, for he could give me an account of the man.

The accident happened on the 10th of June, and on the 12th, the patient, under the influence of the ridicule of his acquaintances, for giving the least credit to my assurances that reunion would take place, applied to another practitioner. This gentleman, I am informed, on being told the object I had in view in replacing the piece of finger, represented the impropriety of any other person intermeddling with it. But, prepossessed with the belief that he carried about a piece of dead matter only, tied to the stump of his finger, the man insisted on having the bandages removed, which was done accordingly. Thus were nearly rendered abortive, my at-

tempts at the reunion of the parts, and the profession deprived of a fact, which, as demonstrating the wonderful powers of Nature to repair injuries, is inferior in importance, to none in the annals of the Healing Art. But, fortunately, Nature had been too busy for even this early interference to defeat her purpose. ADHESION HAD TAKEN PLACE.

In consequence of the information I got from the gentleman who called on me on the 2d of July, I found out the patient on the 4th, when reunion of the parts was complete. The finger, in fact, is the handsomest the man has, and has recovered both heat and sensation. In the progress of the cure, the skin was changed, and, soon after the accident, the nail fell off; but I have not the

smallest doubt that it will likewise be renewed.

From the information obtained, not only from the patient himself, but from those present when the accident happened, I am satisfied, that upwards of twenty minutes must have elapsed before the parts were replaced. For the patient did not apply to me *immediately* upon receiving the injury. He waited on the spot till a great number of his fellow workmen, separated in different apartments of a large building, came to see and condole with him on the occasion. The word *immediately*, in his affidavit, must therefore be understood as so qualified.

I have thought it proper to subjoin the affidavits of George Pedie, Thomas

Robertson, and Dr Reid, to the principal facts and circumstances of Pedie's case, that no doubt might remain of their truth and accuracy. For "it must be confessed, that instances of reunion among parts which had been entirely separated, are very rare in the human body; so rare, indeed, that most practitioners still treat with disbelief and ridicule the few instances which have been put upon record*." These affidavits are still more necessary to convince people who are not of the medical profession, but to whom the knowledge and belief of such facts may be useful. Numbers of such having heard an imperfect account of Pedie's case, have called upon me to ascertain the truth;

* Dr Thomson's Lectures on Inflammation, p. 239.

but I have never yet met with one who expected me to confirm the facts, of the *entire* separation and *complete re-union* of the parts.

I GEORGE PEDIE, house-carpenter, declare, That, on the 10th day of June last, when at work in the Advocate's Library, I accidentally struck off the finger next the thumb of my left hand, at one stroke, with a hatchet: That, accompanied by Thomas Robertson, foreman of the work, I immediately went to Dr Balfour, who, as soon as he saw what had happened, asked where the bit of finger was that had been struck off? That I said I did not know, but believed it would be found where the accident happened: That Dr Balfour requested Thomas Robertson to go and bring it as quickly as

possible : That Thomas Robertson went and returned with it in about five minutes : That Dr Balfour immediately washed both it and my bleeding finger with cold water, and replaced the piece that had been struck off, and bound it up : That Dr Balfour said he expected it would adhere, because he had been successful in a similar case eleven years ago, having replaced three of one of his son's fingers that had been cut off by accident, and which completely united : That I had no reason to go to any other than Dr Balfour, but that I did not believe the part of my finger that had been cut off would reunite, and that I was laughed at by all my acquaintances for ever expecting that it would : That when the dressings were first removed, which was on the 12th of June, reunion

of the parts was found to have taken place. And I declare, that the merit of the cure belongs exclusively to Dr Balfour. All which I declare to be truth.

(Signed) GEORGE PEDIE.

DUNCAN COWAN, J. P.

Edinburgh, 18th July 1814.

Edinburgh, 19th July 1814. Compared Thomas Robertson, mentioned in the preceding declaration, who being examined, declares conform to the preceding witness *in omnibus*. And this is truth.

(Signed) THOMAS ROBERTSON.

DUNCAN COWAN, J. P.

I PETER REID, physician in Edinburgh, declare, that I was witness to the facts

and conversation stated in the above declaration by George Pedie ; that I have this day examined his finger, and find that complete reunion has taken place.

(Signed) PETER REID, M. D.
DUNCAN COWAN, J. P.

Sworn before me at Edinburgh,

July 26. 1814.

From the above details, many questions naturally arise, any one of which I am far from pretending satisfactorily to answer. It is impossible, however, to dismiss such a subject without hazarding some observations,

What, then, is the process which Nature follows in re-establishing a connection betwixt the animal system, and a

part that has been entirely separated from it? It is agreed upon, as the result of observation, however inexplicable the facts may be, that when two recently divided surfaces, both of which are still connected with the system, are applied to each other, with a view to immediate adhesion, or reunion by the first intention, a layer of gluten is first interposed between them. It is reasonable to suppose, that both surfaces contribute equally to the formation of this layer, which, soon after, is seen to be penetrated with blood-vessels. These vessels, however, are not unconnected, in any stage of their existence, with the surfaces. They do not begin in the substance of the layer and advance to the surfaces. They begin at the surfaces and advance towards each other ;

or, more properly speaking, they are the blood-vessels which had been divided, now elongated, through the medium of the organizable fibrin, for the purpose of reuniting the parts. Not so with parts that have been entirely separated from the system, and in which circulation has ceased altogether. The fibrin, in this case, must be effused from one surface only, that connected with the system. The vessels of this only can be elongated; and those of the separated part must be nearly passive in the process of re-establishing circulation. The separated part must be considered in a state of suspended animation, still possessing excitability. When new blood comes in contact with the open mouths of its vessels, it is probable that it is absorbed by capillary at-

traction. This new blood, being the proper and natural stimulus to its own vessels, must excite the dormant vessels to action ; and upon this action must depend the connection that is formed between them and the vessels projected from the living surface. Circulation between the surfaces being thus established, must be gradually extended through the whole part that had been separated, by the *vis a tergo*, and the action of its own vessels.

Analogous to this is what happens to persons who are recovered from drowning. Though in them all the functions are suspended, the body is not dead. The principle of vitality still remains. It is, indeed, difficult absolutely to say when this principle is extinguished ; at

least, nothing short of the formation of new combinations can warrant the conclusion. Thus, though the body may have been a considerable time immersed in water, and is to all appearance dead, if the circulation of the blood can be restored, by the gradual application of heat, friction, and artificial respiration, it becomes reanimated, and is restored to the exercise of all its functions.

THE END.