until they can be disinfected *in situ*. This, I find, can be perfectly effected by simply anointing the surface of the body, scalp included, twice a day with olive-oil. The oil I use is, generally, slightly impregnated with camphor. As far as the main object is concerned, the addition is perhaps unimportant; but it is agreeable to the patient, and probably has some part in the relief, which almost always follows the inunction, from the troublesome itching which is a well known incident of some stages of the disorder. Current views would, perhaps, indicate carbolic acid as a fitter adjunct; but, having found the camphorated oil to answer perfectly, I have thought it the part of wisdom to make no change. I may add, that the process, so far from being trying, is very soothing to the sick; and, if it exert any influence at all on the evolution of the disorder, this influence appears to be beneficial rather than otherwise. The precise period at which it should be begun varies somewhat, no doubt, in different cases. As early as the fourth day of eruption, a white efflorescence may often be observed on the skin of the neck and arms, which marks the first liberation of the new death-giving brood. This efflorescence should be made the signal for the first employment of the oil. From this time, the oiling is continued until the patient is well enough to take a warm bath, in which the whole person—scalp again included—is well scrubbed, disinfecting soap being abundantly used during the process. These baths are repeated every other day, until four have been taken, when, as far as the skin is concerned, the disinfection may be regarded as complete. If the health be quite recovered—if, in particular, there be no disease of kidney and no discharge from throat or nostril—the patient (equipped, of course, in a new or perfectly untainted suit) may generally be restored without risk to his family. A week or ten days additional quarantine is, however, seldom objected to; and is, on the whole, perhaps more prudent.

Many medical men are in the habit of fumigating the sick room, either constantly or several times a day, with chlorine or sulphurous acid, pending the whole course of the fever. There can be no objection to this measure; but I do not myself attach much importance to it. Experience of the largest and most decisive kind has shown that chlorine—and I believe the observation applies equally to the other chemical agent—in the degree of atmospheric impregnation respirable by man, has no appreciable influence in preventing the spread of infectious disorders.

To complete the preventive code, immediately after the illness is over—whether ending in death or recovery—the dresses worn by the nurses (which, where possible, should be of linen, or some smooth thing) are washed or destroyed, and the bed and room that have been occupied by the sick are thoroughly disinfected. With these measures, when well done, the taint is finally extinguished.

The success of this method, in my own hands, has been very remarkable. For a period of nearly twenty years, during which I have employed it in a very wide field, I have never known the disease spread in a single instance beyond the sick room, and in very few instances within it. Time after time, I have treated this fever in houses crowded, from attic to basement, with children and others, who have, nevertheless, escaped infection.* The two elements in the method are, separation on the one hand, and disinfection on the other. It is almost needless to add, that neither can be secured in the degree here indicated in the houses of the very poor. There are, unhappily, large masses so utterly destitute of every needful thing, that it would be little short of mockery to speak of such measures as those I have just described in connection with them. But the conditions which are denied to the houses of the needy, should always be at hand in the fever hospital; which—small, if you like, but a model of its kind—would, if modern societies knew what belongs to their safety, never be far to seek in any crowded communities. In these matters, beyond all others, the social organisation should be in its perfection, strictly correlative with that of scientific knowledge. If science can point out practicable conditions by which such great evils may be averted, society is, in the highest degree, not only unwise, but blameworthy, if these conditions are not realised. It is high time, at any rate, that some more concerted action should be taken to abate the ravages of this terrible scourge. Every year scarlet fever slays from twenty to twenty-two thousand persons in England alone. There are few families that have not at one time or another felt its deadly power; and it is now and then the cause of tragedies which, although occurring only in single families, are of such

agonising bitterness as to move the heart of the nation. If the measures here suggested were systematically and energetically put in force against this great enemy of man, the annual number of the slain would soon fall from twenty thousand to a low figure.

P.S.—I need scarcely say that the principles laid down in the preceding paper are equally applicable, as I have elsewhere abundantly shown, to all contagious fevers. I have for many years applied with great success the method here recommended for scarlet fever, with the modification in detail required by each particular case, to the prevention of small-pox, measles, typhus, etc. In typhus, the area and activity of infection may be greatly limited by disinfecting all internal discharges, and by oiling and disinfecting the skin in the same manner as in scarlet fever.

ON TORSION OF ARTERIES;

WITH AN ACCOUNT OF SOME EXPERIMENTS ON THE DEAD SUBJECT AND ON ANIMALS.*

By G. M. HUMPHRY, M.D., F.R.S.,

Professor of Anatomy, and Surgeon to Addenbrooke's Hospital, Cambridge.

[Concluded from page 6 of last number.]

July 22nd, 1868. In a *rabbit*, I exposed, divided, and twisted, the two cut ends of one carotid artery, and divided and tied the two ends of the other. The animal was some time under chloroform. It recovered, however, and was brought from the Anatomical School to my house. It remained very quiet. Four hours afterwards, while I was looking at it, it moved a little; then turned rapidly round to the right; soon did the same again and again. Strong convulsions followed, and it threw itself on its back and died. There was no ecchymosis about the twisted artery, the ends of which were quite closed. The proximal end showed a transverse laceration, with slight staining, or ecchymosis, a little above the twisted end, a small portion of healthy artery intervening between the two parts. In the distal end, was a small conical clot just above the twisted extremity.

In a second *rabbit* (July 22nd), I exposed, divided, and twisted, one carotid, and exposed, divided, and tied the right femoral artery, and divided and twisted the left femoral artery. The wounds were all healed on the 26th, with the exception of the small aperture through which the ligatures on the right femoral artery hung.

July 31st. The rabbit was killed. The wound in the neck was quite healed. Beneath the cicatrix in the skin and superficial tissues was a smooth, oblong, almost colourless clot, nearly as large as a French bean. It shelled out of a cavity into which projected another similar but smaller clot. This latter, however, was not loose, but involved with the proximal end of the carotid. I removed the vessel with this clot, and slit it up. Its canal was obliterated immediately above (on the cardiac side of) the clot; and its internal coat was smooth down to the point of obliteration. I judged there had been a leakage from this end of the vessel after the closure of the wound, giving rise to the clots just mentioned, and that the pressure of the effused and confined blood upon the twisted vessel had prevented further hæmorrhage. The distal end was sealed. Just above the sealed end the inner coat, for about an eighth of an inch, was puckered and opaque. This condition terminated abruptly.

In the left thigh the wound was quite healed; there was some adhesion of tissues and induration about the artery where it had been twisted, but no other evidence of the disturbance. In the right thigh the lower ligature remained upon the artery. The upper ligature, involved in a soft whitish mass, laid in a cavity containing dirty fluid close to the obliterated upper end of the vessel. The two vessels in this instance presented a marked contrast in favour of the torsion; and, in the case of the carotid, where some leakage may have taken place, the wound was, nevertheless, quite healed.

July 24th. I exposed the left carotid artery of a *donkey*, tied it in two places near together, divided it between the ligatures, drew out each end by means of the ligatures, and twisted it with needle-pliers. Bleeding took place immediately from the proximal twisted end. I again seized the vessel and twisted it; no further bleeding took place. The wound was united by sutures.

July 31st. I exposed, divided, and twisted the right carotid of the same *donkey*. While I was twisting the fore or distal end, the animal had a convulsion which may have disturbed the coats of the vessel as they were being tied in the forceps. At any rate, bleeding took place from

* One word should be said for the benefit of those who, having yet escaped infection, are living in an infected neighbourhood. For persons so situated, it is well to know that the frequent flooding of their house-drains with disinfectants is a great safeguard. In Bristol, the need of this is superseded by the action of my friend Mr. Davies, who very wisely keeps the sewers of all districts infected with epidemic disease in a state of permanent disinfection. But it is not every town that can boast of such a zealous and enlightened health-officer. In all places where scarlet fever is prevalent, especial care should be also taken to have the drinking water perfectly pure.

* Presented to the Surgical Section at the Annual Meeting of the British Medical Association in Oxford, August 1868.

it immediately after the twisting. I again seized the end and twisted it, after which there was no hæmorrhage.

August 2nd. The donkey was killed. On the *left side* (the sixth day after the twisting) the superficial part of the wound was open, but the deeper part appeared to be quite healed. The ends of the artery were enveloped and connected by tough white fibrous tissue, like adventitious tissue. A firm mottled clot distended each vessel as far as the first small branch; there it terminated abruptly. The clot was loose nearly up to the twisted part; there it was adherent to the sides of the vessel. The proximal end of the vessel was quite closed, and the coats so blended together and with the surrounding tissue that I could not distinguish between them. In the distal end this was also much the case; but here the inner coat could be seen to terminate rather abruptly a little above the sealed end, and the clot could be traced beyond it between it and the outer coat, so as to be covered by the outer coat and to cause a bulging of the outer coat. The blood had, evidently, forced the barrier presented by the approximated or upturned inner coat, and its further passage had been resisted by the twisted outer coat. In the dissection I discovered a track like a mucous track—lined, that it, by a soft membrane; and this extended to and surrounded the rounded extremity of the vessel, that is the bulging part of the outer coat. Scraping a little of the soft substance from the inner surface of this track, I found that it contained corpuscles resembling pus-corpuscles. Thus the closed twisted extremity of the vessel was surrounded by soft corpuscular or purulent substance. I did not ascertain whether this track had any external communication, though it is probable that it had.

Right side, (third day after the twisting). The deeper part of the wound was healed over. The ends of the artery were enveloped in and connected by a mass of soft tissue with entangled clot. Both were securely closed, and contained clots as on the other side extending to the first small vessels. The clots were loose at a distance from the ends, and adherent near the ends. In each instance the outer and inner coats were closely connected and together formed the closing wall of the *cul-de-sac* of the vessel upon which the clot rested. The edges of the inner coat were united. Indeed, the appearance of the parts in this respect was much as if a ligature had been applied.

July 23rd, 1868. I exposed and divided the right femoral artery of a *donkey*, twisted the distal end, and tied the proximal end. I also exposed, divided, and twisted both ends of the right carotid artery.

July 31st. I exposed, divided, and twisted the ends of the left carotid of the same donkey.

The donkey was killed, August 4, twelfth day after the operation on the femoral and the right carotid arteries. There was a collection of thick purulent matter in front of the femoral artery. The ligature lay in this; it was easily separated from the artery, bringing with it a mass of soft, white, sodden substance. The proximal, or tied end of the artery, was pervious to its end, there being no clot in it, and the end was firmly closed in the manner usual in a tied artery,—that is to say, the divided, puckered inner coat was united so as to shut the canal; and the outer coat, continued over it, was soft, sodden, and greyish, where the ligature had just separated. The distal, or twisted end, was securely closed. Its inner coat was united over a short conical clot, which distended it; and its extremity was covered by the outer coat, which terminated in a twisted end. The latter was greyish, and projected into a track which communicated with the abscess cavity before mentioned. Both ends were well secured; but the abscess appeared to be related to the tied rather than to the twisted end. The ends were, in addition, surrounded and connected by tough adventitious tissue.

Right Carotid (twelfth day after twisting).—Both ends were firmly closed. Each contained a clot reaching to the first branch, and adherent in the part of the artery near to the twist. At the proximal end, the inner coat was sealed over the clot, and covered by the outer coat, which was soft and greyish, and in contact with purulent matter contained in a track which was continued into the still open wound. The distal end contained a similar clot enclosed by the inner coat, which had quite healed, and which was covered by the outer coat, also healed. The whole was enclosed by an indurated layer of tissue connecting the two vessels, and blended with the outer coat of each end.

Left Carotid (fifth day).—The proximal end contained no clot, a vessel of considerable size passing from its extremity. Still the vessel was quite sealed. The inner coat was turned up into the vessel, so as to form a distinct projection in it; and the twisted outer coat formed a coil projecting into a cavity containing whitish purulent matter, and continuous with the unhealed wound. The distal end was securely closed. The inner coat was inverted; and the outer coat was twisted upon it, and surrounded by adherent tissue. A clot occupied the vessel for some distance.

It will be perceived that these experiments on animals, as well as

those I have related which were made upon arteries after death, are not quite confirmatory of the favourable opinion that might be formed of torsion from my experience of it in the living human body. They show, in the first place, that there is some uncertainty in the immediate effect of the twisting upon the end of the artery, so far as regards the important point of conferring upon it, in the case of a large artery, the ability to withstand the pressure of fluid in the interior. In the second place, they show that the process does not altogether do away with the liability to suppuration at the end of the vessel; the twisted outer coat having, in some instances, been found to undergo that process much as it does when ligatured, although the disturbance produced was much less in each instance than when a ligature was present; and it did not always take place at all, the end of the vessel having in some healed without any suppurative process. They show that final closure takes place, much as in a tied artery, by the healing of the divided and apposed inner coat, which may remain inverted, or the inversion may have been lost by the pressure of the blood or the shrinking of the coat; and that the ultimate security from hæmorrhage depends upon the healing of this inner coat, though the primary security is afforded by the resistance of the outer coat.

The first stage accomplished, and the flow of blood prevented, we may, I think, expect that torsion will be safer even than ligature, being comparatively free from the dangers incidental to processes by which the ligature is separated from the artery. The result may, and, I think, not improbably will, prove that the ligature is somewhat safer, as well as easier of application in the first instance; but that, in the later stages, as well as in its relation to the healing of the wound, torsion has the advantage.

For several months I have used torsion exclusively, with one or two exceptions, after all operations in hospital and private practice. The operations have included three amputations in the thigh, in each of which I twisted the femoral as well as the other arteries; amputations in the leg and forearm, and of the breast; removal of tumours; excision of the knee, etc.; and it has answered perfectly well. The wounds were closed immediately by suture, and there was no after-hæmorrhage in any of the cases.

I do not mean to say that torsion is quite so easily or quickly done as is the application of the ligature. It requires more care, and, I think, rather more time. In tying an artery, it is not absolutely necessary for the orifice of the vessel to be included in the grip of the forceps; it is sufficient if it is included in, and the mass tied by, the ligature. But, for successful torsion, the artery itself must be held between the blades of the forceps; and it is not always easy to be sure that this is the case. It may not be seized at all; or it may slip on one side as the blades of the forceps are closing. Accordingly, I have often found that the twisting has failed; and I have made, not unfrequently, two or three false attempts, so prolonging, of course, the operation. Still I have always persevered, and have succeeded at last in every instance; and I have never yet known an artery bleed in the human subject after I could be sure that it had been really twisted. Again, the artery should be held in the forceps in, or nearly in, the direction of its axis; the rotation of the forceps in that axis being necessary to secure proper torsion. If it be seized across its length, as not unfrequently happens unless care be taken to avoid this, it is simply turned upon the rotating blades, and torn across, instead of being twisted.

In accordance with the observations made on the dead body, and related above, I have simply seized the end of the artery with the forceps, not drawing it out or holding it with a second pair of forceps applied higher up; and have rotated the forceps till they were free, the piece of the vessel included in them being twisted quite off. This may require ten or a dozen rotations of the forceps; and I am careful to go on twisting till the severance is quite complete, not allowing myself to withdraw the forceps till every thread is divided by the twisting, being fearful lest the pulling upon any undivided portion of the outer coat should tear it, or prevent or disturb that complete twist which my experiments have shown to be so important. Lastly, I examine the twisted end well, to ascertain whether there is any leakage.

One advantage of torsion is, that we need not hesitate to apply it to every vessel which bleeds, or which seems likely to bleed after the wound is closed. We are unwilling to leave thirty or forty ligatures in a wound; but we may twist that number of vessels without any compunction, and thus diminish the oozing which sometimes takes place after the closure of the wound, and, by separating its surfaces, prevents their union. This occupies a little more time, which, under chloroform, is of no great consequence; and it may prevent much subsequent trouble, or even danger.

I have observed that the pain suffered after the operation has been less than when ligatures were used.

To form a correct estimate of the effect of torsion, as compared with

ligature, upon the healing of the wound, will require more extended experience. My own observation is, thus far, certainly in its favour. Some of the wounds, in which several vessels were twisted, have healed quite up at once without a drop of pus, which could not have taken place if ligatures had been used. In the last amputation in the thigh, the patient being a man aged 50, the wound healed by first intention, with the exception of a small track at one part, which soon closed. In two of the amputations in the leg, sloughing occurred from causes quite independent of the torsion; and there was no secondary hæmorrhage. In such cases as excision of the knee, torsion promises to be especially valuable, enabling us to secure, without the presence of a foreign body, any small vessels that may bleed or be likely to bleed. I have used it in two cases of excision of the knee, and in both the wound healed up at once.

I think, therefore, that, in amputations and other operations, all vessels short of the size of the femoral artery, as a general rule, may and should be secured by torsion; that the healing of the wounds will be thereby expedited; and that, in the greater number of operations, the ligature may with advantage be superseded by torsion.

The femoral artery may also be twisted with success. It was so in the three instances that I have tried; but it must be admitted that my experiments throw a doubt over the applicability of torsion to arteries of large size.

ON THE VALUE OF THE PREPARATIONS OF IRON IN THE TREATMENT OF INFLAMMATION AND SOME OTHER FEBRILE CONDITIONS.

By R. W. CRIGHTON, M.D. Edin., Leamington.

THE valuable paper of Dr. C. Bell and Mr. G. H. Bell of Edinburgh on "The Treatment of Erysipelas by the Muriated Tincture of Iron" (*Monthly Journal of Medical Science*, 1851) induced me, shortly after reading it, to employ this agent not only in erysipelas, but in other inflammatory affections, as pleurisy and pneumonia, in which I used it alternately with tartarised antimony (*Monthly Journal of Medical Science*, 1852). The rapid recovery of the patients under this method of treatment was so marked that I have never since omitted the iron in the treatment of the various forms of inflammation—using it as the main agent in certain cases of a peculiarly asthenic type, or giving it in a combined form in smaller doses, while the secretions of the skin and alimentary canal were freely stimulated in plethoric subjects.

The occurrence of an extensive epidemic of diphtheria in 1859 gave me a wide field for testing the effects of iron in this disease; and after treating a few cases, I was led to adopt a combination of the muriated tincture of iron in doses, varying according to age, of four minims, ten or fifteen minims, with one to two drachms of the liquor ammoniac acetatis (*Edinburgh Medical Journal*, 1860) every two or three hours. The resulting compound I have ever found invaluable in the early stage of all inflammatory affections. Free action of the skin is quickly produced, the pulse is lowered, and in many cases, as in tonsillitis, the inflamed organ recovers its natural condition as quickly as the skin does when the muriated tincture is administered uncombined in a case of erysipelas. In the early stage of typhoid fever, I know of no means more likely to mitigate the symptoms and calm the patient than the combination of the muriated tincture of iron and the acetate of ammonia, but in larger doses than seem to be tolerated in most other diseases. A medical friend, to whom I recommended the employment of the combination some years ago, has since assured me that he has observed many cases of typhoid fever apparently cut short by its use, and that he never omits it at the commencement of the treatment in any case.

In scarlatina, the early use of the ferruginated diaphoretic, and afterwards of the iron singly, or in combination with quinine and nitric ether, will, in most epidemics, effect all that can be accomplished by medicines. In the inflammatory form of Bright's disease, occurring from sudden chill, I have seen a speedier convalescence obtained by means of this combination than by any other plan of treatment.

I will only notice one other class of cases where it has, in my hands, proved eminently useful; viz., in puerperal metritis and peritonitis. When given at the very commencement, in conjunction with the application of turpentine stupes to the abdomen, a few hours will often find the patient transferred from a state of extreme suffering and danger into one of comparative ease and safety.

The therapeutic value of the combination of the muriated tincture of iron with the acetate of ammonia in the diseases in which I have employed it is, I believe, due to its power of establishing early and free diaphoresis, of stimulating the capillaries to contraction, and furnishing to the blood the means of renewing its red corpuscles, which undergo

an unusually rapid disintegration in inflammatory and febrile diseases. But, whatever the true explanation of its mode of action may be, the curative effects of the combination I consider to be so great, as to induce me to state that, in many of the diseases in which I have used it rather extensively, I believe there are no other therapeutic means at present in use which are capable of furnishing equally valuable results. I would wish it to be distinctly understood that I by no means ignore the many other indications which have to be followed in the treatment of inflammation, such as the relief of pain by means of opiates, the use of blood-letting in certain cases where there is great danger from over-distension of the venous system and the right side of the heart, and the good effects of the preparations of iodine and mercury in rousing the absorbents to remove exudations and effusions when these have occurred. All that I desire to claim for iron, is that it is entitled to be considered *one of the chief indications* to be pursued in its treatment. Many suggestions in therapeutics, worthy of a better reception, have been at once unceremoniously thrown aside by practical men, as unworthy of their confidence, on account of the enthusiasm of their supporters not having sufficiently limited the useful range of their application. In the present state of therapeutics, the old classic warning seems particularly deserving of attention:

"Est modus in rebus; sunt certi denique fines,
Quos ultra citraque nequit consistere rectum."

OPHTHALMIC CASES.*

By A. SAMELSON, M.D., Manchester.

Absence of Iris.—After an interval of five years (see *BRITISH MEDICAL JOURNAL* of Nov. 7th, 1863), two cases of total absence of the irides presented themselves at the Manchester Royal Eye Hospital within less than three weeks, in last August and September. In the first case (Ann Jones), a girl from Preston, fourteen years old, of short stature and low forehead, articulating somewhat imperfectly, and rather prone to cry, but otherwise quite intelligent and docile, the corneæ are small and somewhat hazy; both lenses present whitish-grey, deep-seated, and irregularly stellated opacities, preventing any details of the fundus from being seen. There is moderate nystagmus. Fingers are counted at nearly ten feet distance. No trace of ciliary processes can be seen. The tension of the eyeballs is manifestly increased (+ T 2). The conjunctival secretion is, by the continual oscillating movements of the eyeball, throwing the mucous membrane into plaits, churned up into a whitish cream resembling a precipitate of lead, and gathering about the outer sclero-corneal junction. Her brother and sister are said to have perfect eyesight. The right lens, as the rather more opaque of the two, was subjected to a cautious division in September, since when the patient has not again been seen.—The second case, which was shown to the Society, is that of Hannah Burns, a healthy plump girl of eight years of age, the eldest of four sisters, and the only one whose eyes are imperfect. There is slight rotatory nystagmus; each lens is the seat of an irregularly serrated, rather deep-seated opacity, *plus* an anterior polar dot in the left lens. The peaks of the ciliary processes are distinctly perceived when the eyes are directed extremely downwards or outwards. Although the whole of the space within the corneo-scleral junction reflects a red light under the ophthalmoscope, there is this peculiarity, that, about a line and a half inwards from the corneal margin, a clearly defined, very thin, white, circular line, separates the central space, within which is the seat of the opacity, from the entirely transparent periphery without. Nothing of the fundus can be seen in detail. The vision is but little less perfect than in the former case. The mother refers the defect of the child's eyes to a fright which she had, when pregnant, from a cat leaping at her.

Synchysis Scintillans.—Mary Lockyer, aged 72, who seven years ago received a severe injury to the left side of her head, and lost her right and at present atrophied eye, in consequence of a stone thrown at her by a boy in the street, noticed something being the matter with the remaining left eye about the beginning of last August. With a + 6 lens, there is S 4, and No. 4 Moorfields is read in daylight. The ophthalmoscope shows the optic disc to be of a manifestly whitish colour, and its arteries extremely attenuated. An abundance of bright, loose, roundish particles, of various sizes, but mostly punctiform, are seen, like a silvery shower, to move about in the vitreous humour, every now and then hiding the optic disc from view. They can, when the pupil has been dilated, be perceived by the naked eye.

Retinitis Pigmentosa.—Archibald Anderson, a cabinet-maker, from Peebleshire, aged 26, of robust health, perfectly equal to his trade, and earning high wages, but hard of hearing, and of somewhat thick and

* Presented to the Manchester Medical Society.