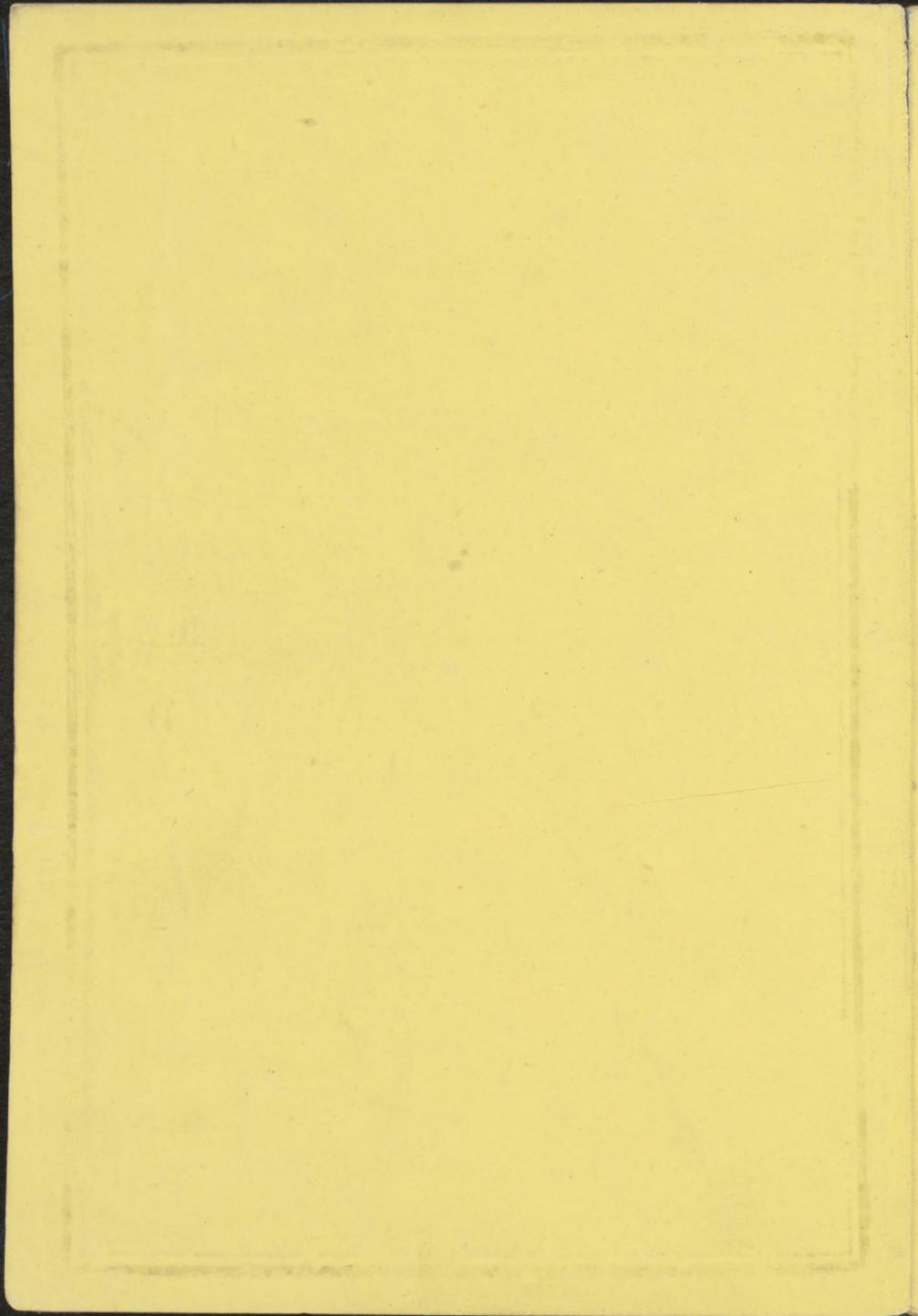
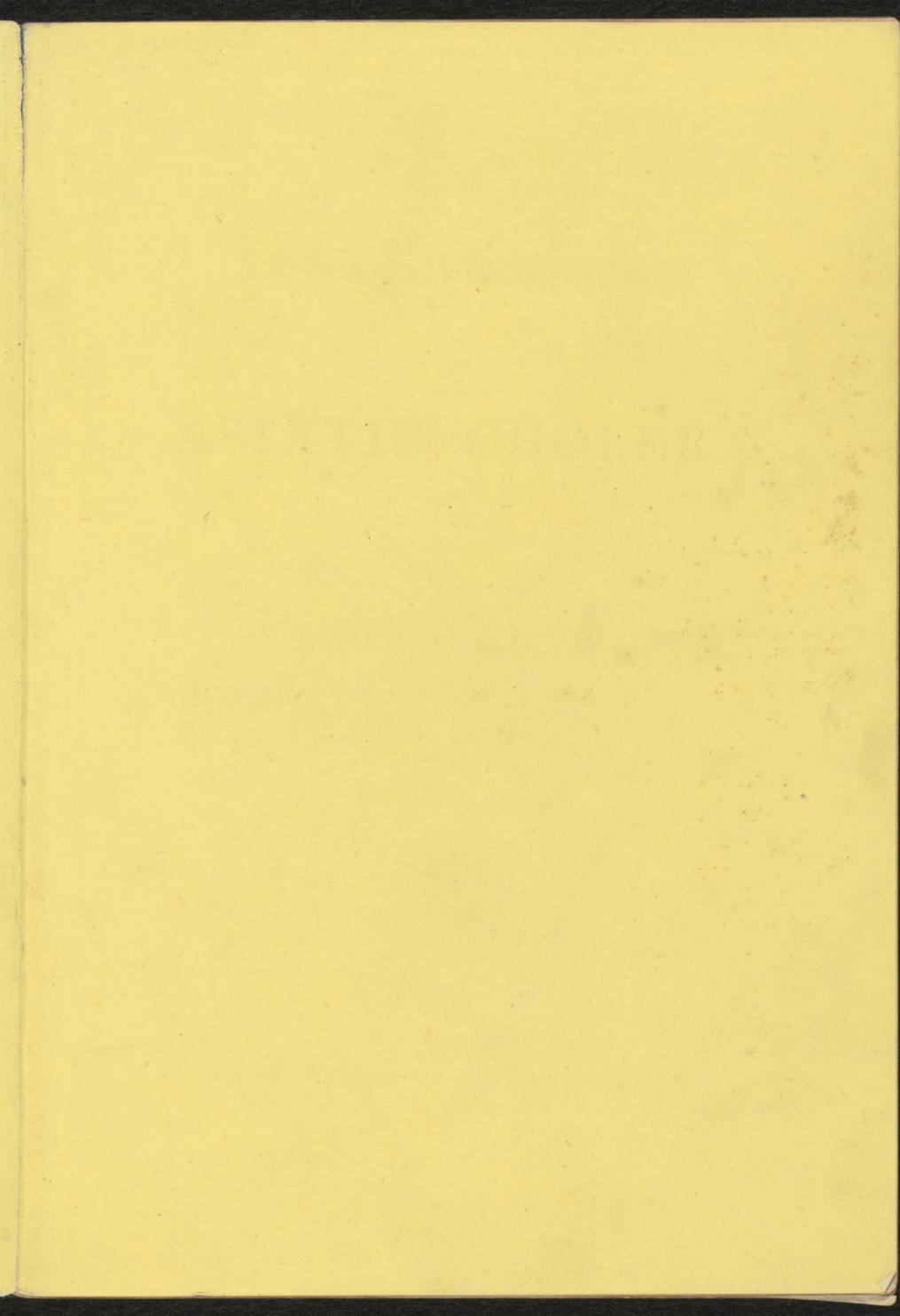


Girdwood
(9.7)

Box 19

ON
SALINE VENOUS INJECTION
IN THE
COLLAPSE OF ASIATIC CHOLERA
BY
GILBERT FINLAY GIRDWOOD
M. D.





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ON
VENOUS SALINE INJECTIONS
IN
ASIATIC CHOLERA

BY

GILBERT FINLAY GIRDWOOD, M.D.

AUTHOR OF

"ESSAYS ON THE THEORY OF MENSTRUATION:" "ON HERMAPHRODITISM:"

"ON DIARRHŒA COETANEOUS WITH, AND CHARACTERISTIC OF,

CONCEPTION:" "ON BELLADONNA AS A LACTIFUGE:"

&c., &c.



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SIR WILLIAM O'SHAUGHNESSY BROOKE

M.D., F.R.S

SURGEON MAJOR, BENGAL ARMY, AND LATE DIRECTOR GENERAL OF
TELEGRAPHS IN INDIA

IN COMMEMORATION OF A DEEPLY CHERISHED FRIENDSHIP
COMMENCED IN THE CHOLERAIC YEAR OF

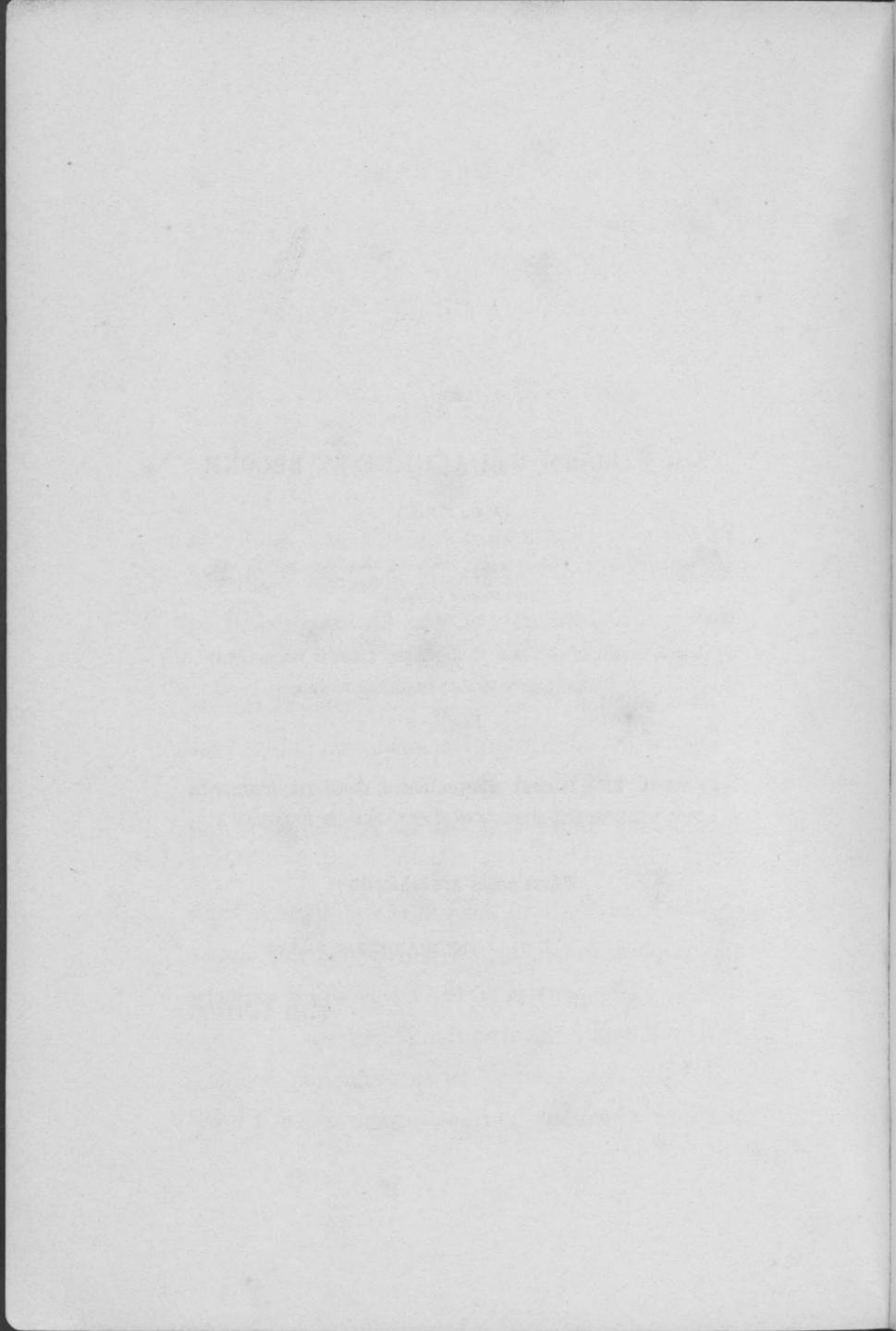
1832,

AND WITH THE WARMEST WISHES FOR A LONG ENJOYMENT OF
THE WIDE-WORLD REPUTATION CREATED BY HIS GENIUS

These pages are dedicated

BY HIS SINCERE FRIEND

THE AUTHOR



PREFACE.

IN the year 1832 a most valuable contribution to Medical Science was presented to, and published under the authority of, the Central Board of Health.

It is entitled "Report on the Chemical Pathology of the Malignant Cholera: containing Analyses of the Blood, Dejections, &c., of Patients labouring under that Disease in Newcastle and London."

The Essay is from the pen of the distinguished philosopher, to whom I have dedicated this monograph. The perusal of the Essay in its entirety will well repay the attention it merits.

I have been content to extract from it those portions which are germane to the object I have

in view in this present communication, namely, to press on the attention of the Profession the benefit derived from Saline Venous Injection in the collapse of Asiatic cholera.

One of the cases in which experiments were instituted was that of Mrs. Barrat, *æt.* 39, a widow, who was taken ill of cholera on the 17th, and died on the evening of the 18th December.

Dewar's was another case of cholera ending fatally.

In the case of bilious diarrhœa it is interesting to mark the difference of the phenomena, when compared with those of the standard of Lecanu, as well as with those of the choleraic cases.

The following Table gives the character of the serum in these cases—two cholera, one bilious diarrhœa—compared with Lecanu.

“ COMPARATIVE ANALYSIS OF SERUM, IN HEALTH, MALIGNANT CHOLERA, AND BILIOUS DIARRHŒA (p. 37). ”

| INGREDIENTS. | Standard of Lecum. | Malignant Cholera. Mrs. Barrat. | Bilious Diarrhea. Hawthorne. | Malignant Cholera. Dewar. |
|--|--------------------|---------------------------------|------------------------------|---------------------------|
| Water..... | 906.00 | 854.00 | 921.75 | 866.80 |
| Albumen..... | 78.00 | 133.00 | 61.85 | 124.00 |
| Urea..... | 0.00 | 0.40 | 0.00 | 0.00 |
| Organic matter soluble in alcohol and water..... | 1.69 | 4.80 | 5.20 | 4.00 |
| Albumen combined with soda..... | 2.10 | | | |
| Fatty matter:— | | | | |
| Crystalline..... | 1.20 | 1.40 | 1.90 | 1.23 |
| Oily..... | 1.00 | 4.00 | 5.00 | 2.17 |
| Chlorides of sodium and potassium..... | 6.00 | 0.00 | 2.30 | .05 |
| Carbonate of soda..... | | | | |
| Phosphate of soda..... | 2.10 | | | |
| Sulphate of soda..... | | | | |
| Carbonate of lime..... | | | | |
| Carbonate of magnesia..... | | 1.60 | 1.10 | 0.70 |
| Phosphate of lime..... | 0.91 | | | |
| Phosphate of magnesia..... | | | | |
| Phosphate of iron..... | 1.00 | 0.80 | 0.90 | 1.05 |
| Loss..... | 1000 | 1000 | 1000 | 1000 |
| Specific gravity of the serum..... | 1.028 | 1.041 | 1.02 | 1.045 |

N. B.—The serum in all these three cases, reddened turmeric paper.

“In Dewar’s case, the dejections (sp. gr. 1·007) that passed before ammonia was given changed the colour of the paper to a deep permanent brown. It was ascertained he had not had any remedy administered previously to his admission into the Hospital.

“In Dewar’s case the blood, separated, had these relations to each other—43 serum, 57 crassamentum. The normal proportions are — 87 serum, 13 crassamentum.*

“The crassamentum was found normal in the proportion of its ingredients:—*so that the addition of a certain quantity of water [mixed with the saline ingredients, G. F. G.], would have restored it to its original density, proportions, &c.*

“Serum, sp. gr. 1·045, devoid of the least action on litmus or turmeric papers.

“Inferences from the comparison of those cases:—in bilious diarrhœa there is no alteration of the specific gravity of the blood, whilst in the choleraic cases there is, to a very marked extent.

* Gregory, Handbook of Organic Chemistry, 1852. P. 455.

“*Analysis of alvine dejections of cholera patient*
James Dewar (p. 65).

“The appearance of these evacuations was most characteristic. They were perfectly colourless, very fluid, and containing numerous white flakes, which subsided when the fluid was allowed to stand. The fluid having been filtered *through fine gauze*, the solid flakes and the liquid part were severally examined.

“*Examination of liquid part*, sp. gr. 1·008 —

- “1. Turmeric paper reddened: reddened litmus paper restored to its blue tint:
- “2. Did not coagulate by boiling, or by the addition of the mineral acid:
- “3. Evaporated to 1-8th at a boiling temperature, still reddened turmeric paper, and turned reddened litmus blue:
- “4. Before evaporation, was precipitated by corrosive sublimate and ferro-cyanide of potassium:
- “5. Alcohol added to the reduced fluid occasioned a precipitate of white flake soluble in water:

- “6. Two hundred and fifty grains of fluid evaporated to dryness left 1·1—45 grains :
- “7. Boiling alcohol took up from the residuum (No. 6) 0·30 grains :
- “8. Alcoholic solution (7) evaporated to dryness, blackened when exposed to heat, and left a crystalline residuum of the muriate and acetate of soda :
- “9. Permuriate of iron occasioned no red colour in the fluid (1) :
- “10. 1,000 grains of the fluid were evaporated to dryness and calcined in a platinum tray : $5\frac{1}{10}$ grains of saline matter were obtained. The saline residuum reddened turmeric paper powerfully : effervesced with acetic acid : sulphuric acid caused the evolution of fumes of acetic acid :
- “11. No precipitate in its aqueous solution by tartaric acid, chlorate of platinum, or perchloric acid :
- “12. The aqueous solution precipitated nitrate of silver white : precipitate insoluble in nitric acid, and soluble in ammonia.

“Conclusions.

“These experiments indicate that the liquid portion of this evacuation consists of water, mucus, albumen in small quantity, and muriate, acetate, and carbonate of soda.

“It contained no caseum, sulpho-cyanide of potassium, or bile.

“Examination of the solid portion.

“Insoluble in alcohol and water: totally destructible by red heat: readily soluble in acetic acid and alcohol, and not precipitated from its alkaline solution by acetic acid: *not reddened when treated by* STRONG SULPHURIC ACID, *and cautiously warmed.* Precipitate copious, of a yellow colour, by ferro-cyanide of potassium from its solution in acetic acid.

“From these experiments I am inclined to conclude that the flaky matter *in this case* was principally composed of fibrine. All practical chemists are aware of the extreme difficulty of distinguishing this substance, in the solid state,

from coagulated albumen. The only mode of distinction I have ever been satisfied with, is the experiment with *sulphuric acid*, which, when properly conducted, affords strong evidence of the nature of the substance under examination.

“We thus find that the dejections in the case of Dewar contained the most remarkable of the principles deficient in his blood.

“*Microscopical examination of the blood from a cholera patient (Dewar)*, p. 38.

“The globular particles were quite distinct. No membranous shreds were perceptible, and the fluid did not differ in any apparent degree from that drawn from an individual in robust health. When freely exposed to the air, it in all cases rapidly assumed a fine scarlet colour, and the same effect was produced with equal celerity by the addition of the usual salts deficient in the abnormal blood.”*

* In choleraic blood, microscopically examined in 1849 by Messrs. Lane and Rodgers, an increased proportion of white globules were remarked.—G. F. G.

The summary of these experiments may therefore be described (p. 41) as denoting—

“Great but variable deficiencies of water in the blood in four malignant cases: total absence of carbonate of soda in two: its occurrence in an almost infinitesimal proportion in one: and remarkable diminution of the other saline ingredients. In the dejections passed by one of the patients we find a preponderance of alkali, and we recover the saline matters deficient in the blood. Lastly, the microscopic structure of the blood, and its capability of æration are shewn to be preserved.”

The learned Author (p. 52) most diffidently states that, “even although the results obtained by chemical analysis were shown to be universal *facts*, still that their remote *causes* yet remain open for investigation. I shall not consequently attempt to draw any practical indications from premises, which, though *perhaps* correct, are nevertheless liable to share the fate of all hypothetical speculations.

“The consideration of the facts established by these inquiries—whatever may be their causes—

recognised in the alteration of the constitution of the blood by them—leads to two important therapeutic conclusions: *First*, To restore the blood to its natural specific gravity, *Second*, To restore its deficiency of saline matters.

“In order to prevent misconception of my meaning I must again emphatically repeat that I do not consider this deficiency of saline matters *essential* to cholera, but that it occurs as an accidental effect in a vast majority of cases; *and that this effect must be obviated before we can accomplish a cure.*”

It will be seen from the observations extracted from this very interesting communication that the value of the Saline Injection, in the collapse in Asiatic cholera, is based—

- 1st. On the deprivation of the blood of its normal saline ingredients:
- 2nd. On the elimination of those saline ingredients in the dejections.

These extracts are most fervently and earnestly pressed on the notice of the Profession. They announce facts—facts of paramount importance

—facts forming the basis of the treatment of malignant cholera by the use of Saline Venous Injections.

The argument so modestly put forward by Sir W. Brooke having been proved by subsequent experience to be true, it behoves that the merit of this important discovery be given him.

PALMAM QUI MERUIT FERAT.

19, HOWLEY PLACE, PADDINGTON, W.,

November, 1866.

I.

CASES
OF
MALIGNANT CHOLERA
TREATED BY VENOUS INJECTION,
By G. F. GIRDWOOD, M.D.

From THE LANCET, August 11th, 1832.

“SIR DAVID BARRY having expressed strongly his wishes that I should communicate to the Central Board of Health the result of my experience in the treatment of cholera by venous saline injections, I have made out a list of the patients thus treated—their residences, their ages, the date when done, and the quantity of saline fluid used. My own sense of duty to Dr. O’Shaughnessy and Dr. Latta would have induced me, of my own accord, to make public my success; and I only waited till further experience enabled me to make my communication more worthy

B

of the authors of this new mode of treatment than it is at present.

“The first five cases in the following list were all of them under my own care.

| Taken ill. | Name. | Age. | Residence. | Saline injection used. |
|------------|-----------------|------|-----------------------|------------------------|
| June 25 | Thomas Jones | 45 | 69, Harrow-road | 4½ pints |
| July 7 | B. Conolly..... | 35 | 27, Princess-street.. | 2½ ditto |
| „ 13 | Pat. Kelly..... | 30 | Workhouse..... | 4½ ditto |
| „ 13 | Mrs. Kemp ... | 63 | 5, South Wharf-road | 3½ ditto |
| „ 24 | Miss B..... | 65 | | 4 ditto |
| June 30 | Mrs. —..... | 32 | 39, Bell-street..... | 5½ ditto |
| July 19 | Mrs. Moore ... | 42 | 8 North Wharf-road | 6 ditto |

“CASE 1.—Jones was a man of very dissolute habits. He was employed on the roads. For a week he laboured under premonitory symptoms. I entertained no very sanguine hope of success, but had recourse to the venous injection as a last resource. His pulse was nearly gone; he was voiceless; the cramps were most violent; the vomiting and purging incessant; the breath and tongue were cold; and the surface of the body was cold and clammy. The operation was performed at eight in the evening; it occupied forty minutes. The violence of the symptoms subsided as by magic; the cramps instantly ceased. There were but two very slight attempts at vomiting after the operation; there was no

longer any purging. The patient described the operation, in his own words, as being 'Very nice.' It was as if 'Something was thrilling all over him.' After four hours of great *heat* and *restlessness*, he dropped asleep for two hours, and during the night had some refreshing slumber. He complained in the morning of nothing but weakness.

"He returned to his usual occupation in *two days* after. Four days after he had been at work he came to me. His legs were slightly œdematous, but the swelling speedily subsided under the administration of sweet spirits of nitre and digitalis.

"CASE 2—Is that of an Irishman, who had partaken freely, the night before I saw him, of bacon and peas and porter for supper. At three in the morning he was attacked violently with the usual symptoms of cholera. I was called to him at eleven a.m. He was then not so far gone in collapse as Jones; but as I considered the benefit so decidedly advantageous in Jones's case, I did not hesitate a moment in making use of the venous injection in this case before the collapse proceeded further. It was used. The instant the operation was finished, *he had a most violent rigor*. His features sank, his limbs shook, and his teeth chattered violently; the surface, mean-

while, became a deeper and a deeper blue. The friends were frightfully alarmed, and I confess I was not without serious apprehension for my patient, and some misgivings in my own mind respecting the propriety of my practice. However, the cramp, sickness, and vomiting were gone. His hands and legs soon became warm, and in two hours he felt hot all over the body. He remained *hot and restless*, with occasionally a little sleep, throughout the day. He complained much of pain in the loins; this pain increased so much that at midnight I was awake to relieve it. The camphor liniment with laudanum was freely applied to the back. In half an hour afterwards he made water—the first he passed from the commencement of the disease—and the pain in the back left him entirely. He remained weak for two days, but required no further medical treatment, excepting a small poultice for three days to the arm, where the vein was slightly inflamed (This is the only occasion on which I have had any annoyance of this kind after this operation).

“CASE 3.—Patrick Kelly was a poor fellow who had been sleeping for some nights in the fields, and had been half starved. He was much in the same state of collapse as Conolly. After the operation *he had a rigor*, though not so strongly marked as in Conolly’s case. I now

recalled to memory that Jones had, after the operation, *felt cold*. This circumstance escaped my notice at the time. Kelly was *hot and restless* for several hours. Nothing worth noticing occurred afterwards. I kept him till Sunday last in the Workhouse. He then left, perfectly well.

“CASE 4.—Mrs. Kemp, a poor woman, who had been long an invalid. She was a cripple, and had been often under my care on account of chronic disease of the liver. She was attacked with the epidemic in a mild form on the 7th, and under the use of the saline internal treatment she had so far recovered, that I was visiting the patient only once a day. It seems that shortly after my visit on the 12th, she fell into a state of stupor. The surface became cold and clammy, and coloured of a dingy yellow. I was not informed of this state of collapse, and when I called next day I found my patient dying. She was pulseless at the wrist. She could be roused for an instant to open her eyes. She would talk sensibly for a moment, and then drop into a state of lethargy. Without the slightest hope of advantage I used the injection. It brought back the pulse at the wrist, and heat to the surface. No other favourable symptom followed. She died fifteen hours after. I may remark that the

collapse came on without any return of the vomiting or purging.

“Continual vomiting and purging, highly characteristic of the disease, existed from the commencement of the attack up to the hour when the operation was performed.

“CASE 5.—Miss B., the last I have had in my own practice. She is 65, of a spare and delicate habit. She came in the morning of the 24th from Brompton, to spend the day with a friend in my neighbourhood, who had just arrived from the country. She felt qualmish on her arrival. As she had occasionally felt so, her feelings did not alarm her, and her friends, whom she had not seen for years and to whom she was tenderly attached, attributed her uneasiness to the excitement of mind she felt on meeting them after so long a separation. Miss B. retired to bed for a few hours; meanwhile the symptoms became more and more declared.

“When I saw her, at four p.m., she was sinking into the state of collapse. Dr. Daun, who was a relative, was sent for to meet me, and as soon as he arrived, as he considered the case hopeless, the operation was performed. This took place at nine in the evening; by this time the collapse was very great. The same relief as in the other cases was experienced. The cessation of vomiting

and purging, the subsidence of the cramps, the restoration of the voice and looks, the return of the pulse, the *rigor* and the heat, and the restlessness following the shivering fit—the symptoms as already detailed in the other cases—occurred in this one.

“It may be remarked, that no secondary fever occurred in the cases already detailed. Miss B. was the only patient who had it after venous injection.

“On the morrow after the operation the tongue was warm and dry; the pulse was not full, as it was immediately after the injection; great debility existed; she was much inclined to sleep. Several bilious stools were passed throughout the day and succeeding night. During the next four days this lady gradually retrograded; the diarrhœa continued, and gradually became of the colour of water, and she wasted in flesh; four or five stools on an average during the 24 hours. No urine was passed all the day after the bleeding. The sleep became more lethargic; the pupil contracted; the sensorium somewhat affected. She could sit up in bed and help herself to food, but would sit for a few minutes in a reverie, with the spoon filled and lifted half way to the lips. She complained of flashes of light in the eyes; there was but little increase of heat over the head.

“On the morning of the 29th, a dozen leeches were applied to the head. The pulse this morning was much fuller than for the last four days. Miss B. was relieved; ice was continued throughout the day to the head; a dozen and a half of leeches were applied in the afternoon; and finding considerable benefit from these two local bleedings, a vein in the arm was opened at midnight, and ten ounces more blood removed. This last bleeding gave the patient decided relief. She had an excellent sleep after, and was much refreshed in the morning. The pupil was now its natural size; the lethargy gone; the mind quite collected. She is now out of danger.

“This last case was one of great interest and much anxiety to me. I considered myself extremely fortunate in having Dr. Daun’s great experience as a guide in the treatment of the secondary fever, as in all the cases of cholera that have come under my care (now upwards of thirty) I had not till now seen a well-marked case of secondary fever.

“And now, with regard to the internal treatment. In all these cases, as well as in all others I have had latterly under my care, I have used the saline treatment. The preparation I have found to rest most readily on the stomach is the

subcarbonate of soda. Of this salt I keep a solution prepared. The recipe is—

“Sodæ subcarb. ℥ ij;
 Liq. opii sedativ. ℥ ss;
 Sp. Myrist, ℥ ss;
 Aq. cinnam. O iij

“Of this mixture a table-spoonful is given every half hour; and between each dose, after the venous injection, a table-spoonful of brandy in a *little* hot water, until reaction be well established.. Miss B. took a pint and a half in this manner; the three others above half a pint. I consider it to be of the utmost moment to give these things regularly, and in these *small quantities*.

“Occasionally the powder for the chalk mixture has been added to the above mixture in small doses. Occasionally the carb. ammoniæ in doses of five grains at a time.

“CASES 6 & 7.—The two last on the list were patients of my friend and neighbour, Mr. Stott. They had both been bled and treated with calomel and opium.

“Mr. Jones, my zealous pupil, saw one case. I saw the other. Both pulseless—both were rapidly sinking. Mrs. — was so roused by the operation as to call for her baby, four months old; she sat up in bed and suckled it. For

several hours she continued well, but gradually sank again into collapse, and died twenty-four hours after the operation. This patient I did not see, as I happened to be from home when Mr. Stott called. I performed the operation in Mr. Stott's presence on Mrs. Moore. The patient rallied amazingly for a few hours, but she too sank again into collapse, and died ten hours after the operation. She too had the *rigor* I mentioned as following the injection in the other cases. It was not followed by the heat so apparently as in the others.

“These two cases, not having occurred in my own practice, I have requested Mr. Stott's permission to publish. I do not consider that the unsuccessful issue of either of them militates in the smallest degree against the operation. I relate them that they may act as a warning to those who wish to give this treatment any chance of success, *not to allow the collapse to go on too far.*

“REMARKS.

“ON comparing these cases together, I wish to draw the attention of the profession to two or three important facts.

“Three of the cases recovered without secondary fever—at least, the reaction that took place for a few hours scarcely deserves that appellation.

“The case in which secondary fever came on was bled with the most decided advantage. The blood had the indications of inflammation to a high degree.

“This patient, it will be observed, was in years. How far this circumstance had to do with the induction of the fever in a *weak constitution* must be proved by future experience.

“In all of them there were indications, after the operation, of the system having received a severe shock—a shock rousing all the vital faculties. In all, more or less, existed *the rigor and the consequent heat*. In those who recovered, this phenomenon was most apparent.

“Two of the unsuccessful had the *greatest* quantity of fluid injected. These two, however, were in a state different from the others; both had *taken opium*—both had been *bled*.

“In three of the successful cases, no purgatives of any kind were administered; they were not required.

“The fluid used was of the nature adopted by Dr. Latta—

“Sodæ muriat. ʒij
 „ subcarb. ʒ ij
 To six pints of water.

“Dr. Latta used the water at the temp. 112° Fah.; I was content with a temp. of 100°.

“The apparatus was made on the spur of the moment. The brass knob of one end of my enema apparatus was cut off, and a silver blow-pipe introduced into the tube air-tight. All that is necessary to secure the instrument from having air in it is to force the fluid several times through it before it is used. Care must be taken not to lift the nozzle of the syringe out of the fluid when once the operation is commenced. As phlebitis has occasionally followed the operation, it is of great importance to handle the vein as delicately as possible. The neatest way of performing the operation is to use the saphena vein, immediately above the inner ankle. The tract of the vein being remarked by the eye, let an assistant push the blood upwards in the vein, whilst the operator's left thumb is on the vein, and below where the operation is to be performed.

“Cut with the point of the lancet a slit less than the fourth of an inch along the course of the vein; one or two scratches more with the point of the lancet will cut through the cellular membrane, and lay the vein bare. The smallest puncture now of the vein to admit the end of the tube is necessary. No blood has flowed, and the end of the apparatus, all ready for action, is readily introduced into the orifice by the right hand of the operator.

“Of the four successful cases I have already mentioned, no inconvenience arose except in Conolly’s case, where a little hardness existed for two or three days, and this I attribute to my own *gaucherie*. I opened the median basilic, and was obliged to cut twice.

“From all I have said, I trust many may feel inclined to give this remedy a fair trial. It is a practice whose immediate advantages are as decided as the extraction of the tooth in tooth-ache, the administration of opium in delirium tremens or the free use of the lancet in peritonitis or pneumonia.

“In the meanwhile, until we know more about it, let it be considered merely as a temporary stimulus, which, used with propriety, at least *does no harm*.

“*August, 1832.*”

In *The Lancet* of August 11th, 1832, is contained the following interesting result of the analysis of the blood of my patient Miss B.:—

“We have received from Dr. O’Shaughnessy an account of his analysis of the blood drawn in one of Dr. Girdwood’s cases (Miss B.), four

days after the operation of injecting four pounds of water, two drachms of carbonate of soda, and three of muriate of soda. In the interval between the injection and the abstraction of the blood, the diarrhœa had continued, and no urine had passed. The results are very interesting. The quantity of water in the blood was 778·76 per 1,000, being exactly the natural or healthy standard; the quantity of colouring matter 124·51; of albumen 78·86, being also natural proportions. The quantity of pure salts was only 4·15, being considerably less than half the normal standard. The serum of the blood, moreover, contained the immense quantity of two grains and one-tenth urea per 1,000 parts.

“During the second irruption of cholera in London, the same gentleman has availed himself of the occasion to repeat his chemical inquiries relative to this disease, on a more extensive scale, and with a view, if possible, to decide the question, whether the alteration of the blood be primary or secondary, and to ascertain what are the conditions of the blood in the several *stages* of the disease. We subjoin the conclusions at which he has arrived.

“1st. In the *premonitory* symptoms, no alteration of the blood exists.

“2nd. In the cases in which the evacuations

are trivial, and *cramps* form the prominent symptoms, the blood is also unaltered.

“3rd. The alteration of the blood, consisting in loss of water and saline matter, only occurs in the collapse cases *preceded* by excessive rice-water evacuations.

“4th. This alteration of the blood gradually disappears, or increases, in the fever stage, according to the aggravation or amelioration of the symptoms.

“5th. The quantity of *urea* in the blood in cholera is most remarkable in the secondary fever, sometimes amounting to three grains in 1,000, and bearing a strict proportion to the duration of the retention of urine. Dr. O’Shaughnessy has, however, reason to believe, that urea, in minute quantities, forms a perpetual constituent of healthy blood. He is, however, pursuing this branch of the inquiry farther.

“6th. The blood of healthy persons resident in infected districts or houses, is not chemically changed in the least degree.

“These results are founded on minute analyses performed on a great number of specimens of blood. Full details will in due time be published in this journal. At present it suffices to say, that these experiments afford ample data for deciding on the perfect inapplicability of the

‘saline treatment’ to the *premonitory* symptoms. They also decisively prove that the alteration of the blood is altogether *secondary*, and they show that saline substances cannot act as prophylactic or preservative agents, as some have asserted.”

The foregoing contains an account of all the cases of saline venous injections in cholera, in which, up to the time when it was written, I had applied the remedy. During this first visit of the epidemic I had four other cases in which it was used, two of which recovered, the other two died.

CASE 8.—Of those two persons who recovered one was a young man in whom the collapse was not far advanced; he speedily became convalescent, without any symptoms of fever or œdema.

CASE 9.—The other patient was a man 68 years of age, residing on Paddington Green. In him the collapse was complete, and indicative of immediate dissolution. At eleven in the morning, the vena cephalica media being opened, upwards of two quarts were injected. At five in the evening, the collapse having returned, a similar quantity was had recourse to, through an orifice in the vena media basilica. The success which followed this second application of the remedy was as evanescent as that of the first, and at

midnight I was again induced to have recourse to the syringe. On this third occasion three quarts were used; thus in all, in about twelve hours, about eight quarts of fluid had been slowly infused to be churned by the heart with the inspissated blood. This last effort was efficient; the symptoms of choleraic collapse disappeared, and were superseded by others, not of simple consecutive fever, but of a very interesting character, and to which allusion will be made when referring to the inconveniences that may follow the operation of saline injection.

CASE 10.—Of the two patients that died one was a young and healthy female of 20, who had the rigor, but yet not a satisfactory one—I use the phrase satisfactory, for by the time I used the remedy in her case, I had lost the alarm I experienced when attending Conolly, and began to look on the appearance of this phenomenon as one that ought rather to encourage than appal.

The improvement was, however, most satisfactory for some hours; and being restless, and with extremities warm, the choleraic voice and cramps and bowel complaint all having ceased, I was induced to encourage the hope of her recovery, a hope, however, which the event ultimately falsified, for in the course of ten hours from the operation she rapidly sank.

CASE 11.—The second fatal of these four latter cases of saline injection was that of a woman about 50, who was in the last stage of collapse. I was requested by a neighbouring surgeon, under whose care she was, as a *dernier* effort to use the injection, but it produced in her no benefit whatever; having introduced slowly more than two quarts of fluid and no benefit supervening, the operation was abandoned, and she rapidly sank.

The symptoms that attended and followed the use of the saline injection in the first seven cases having been minutely detailed, I have only thought it necessary very cursorily to state what occurred in these four latter cases.

II.

31st August, 1849.

THE return of cholera, and the vivid recollection of the benefit of saline injection that existed in my mind, and which the lapse of 17 years had in no manner effaced, induced me to put my apparatus in order to be used on the first necessity.

CASE 12.—On Saturday evening the 17th inst., I was called to a lady with whom I had for years been intimately acquainted. So complete was the collapse, that although the features were most familiar to me, I found it impossible to trace a single lineament in her countenance by which I could recognise her.

In most cases of the severest collapse, there are some traces left by which you may recognise features which are familiar. In this case there were none. Mrs. M—— possessed the *embon-point* which, when in health, is characteristic of her sex at her age (she was about 40), but now the shrivelled hands and shrunken countenance gave her so anile a character, that she might have been taken for 70. She could not recognise me; sense and sensibility were alike dormant.

So prostrated were her powers, so severe the symptoms, that whilst laying bare a vein for the operation, I twice desisted to enquire whether or not she really had not ceased to live.

It was under these discouraging circumstances that, with the consent of Mr. —, of Camberwell, who had attended her since the onset of the disease, and of Mr. Howlett who accompanied me, the venous injection was had recourse to. The fluid was slowly introduced, and as the vessels became filled, the improvement gradually became evident. About an hour was occupied in the operation; by this time the heat of the surface had returned, the faculties were restored, warmth returned to the brow, tone to the voice, strength to the pulse, and power to the muscle. The effect produced was most marvellous; it struck us all with astonishment. The patient raised herself up, she recognised me, she expressed herself satisfied with the relief she experienced and of which she was now so conscious. A chill coming on, the tube was removed from the vein after the injection of about six pints of fluid; a little brandy and water was now administered. We now covered her well up and left her to rest. I found my patient at the end of an hour still promising well; the extremities were warm, and she was disposed to

sleep. She was accordingly left, with strict injunctions for the attendant to call me if any change took place. Another hour sufficed to destroy the hopes indulged of this lady's recovery. One of the family summoned me, saying she again breathed heavily; on my entering her room I found my patient totally insensible, with the breathing most laborious, and she expired in a few minutes after.

What was the immediate cause of death? Probably the blood was in that condition which has been noticed generally to exist in fatal cases of cholera. Large coagula are generally found in the *venæ cavæ*, and within the cavities of the heart. These, impeding the contractions of this organ, occasion dissolution, and judging from the prolonged state of intense collapse in this case—a collapse by the time the operation was performed extending over twelve hours—and from the generally pulseless state of the arteries, most probably such coagula were formed and existed in the present case. Therefore, although the stimulus applied by the syringe occasioned for a short time the circulation to be renewed, yet such an impediment to its continuance as those masses must have occasioned was beyond removal, and formed a bar, fatal to recovery. The blood itself was dead. On the other hand, was

too much fluid administered? This could not well be the cause of dissolution when we compare this case with others in which a much greater quantity of the injection had been used. Again, would this operation have been successful had we, when reaction had begun, as indicated by the chilly feeling, not been content solely with the injection, but had recourse to other coadjuvant and ancillary remedies? Would success then have followed? Perhaps it might, but the disposition to sleep which the patient possessed, and which appeared so natural, lulled for the moment my apprehensions, and thus the favourable instant of time for the *combination* of remedial measures slipped away.

I reflected much on what measures would be best to use in addition to the saline injection.

The rigor not being well marked in this case, at least not so well marked as in those that had done well, I resolved, when next I had recourse to the operation, to combine with it another efficacious means of rousing the functions of organic life and of restoring the capillary circulation. The freedom with which the Russians, after their steam bath, roll themselves in the snow; the enjoyment the Turks derive in their baths, alternately hot and cold; and the advantages in some cases of the use of hydropathic treatment,

occurred to my mind, and I was determined to combine the saline injection on the next opportunity with the cold, wet sheet, and to apply it as soon as the rigor supervened. I soon had that opportunity.

CASE 13.—Early in the morning I was called by Mr. Howlett, on the 22nd instant, to see a lad of 15 or 16, in whom the collapse was complete. He was pulseless, voiceless, with the usual choleraic breath and clammy surface, accompanied with the usual suppression of urine. Mr. Howlett had seen the lad for the first time late at night. The attack had come on in the afternoon. Nothing had occurred out of the patient's usual course of life, but like the attack of Mrs. M—— (Case 12) this had come on without any premonitory symptoms. Collapse speedily followed. A quart of fluid was slowly introduced into the vena cephalica, and by the time this quantity was injected, the anxiously looked-for feeling of chilliness supervened, and the tube was removed. The lividity and other symptoms of choleraic collapse were now overcome. Our arrangements having all been made previously, the blankets warmed, and the cold, wet sheet prepared, the lad was stripped and carefully packed in the wet sheet, the warm blankets were then nicely and closely arranged around him. In addition, he had hot bottles

applied to his feet. He had a regular rigor. He shook very much, and complained of feeling intensely cold. His pulse was, however, good, and his tongue warm, and even dry. A little hot brandy and water with a little ammonia was given him, and he was left for an hour and a half undisturbed. By that time there was no doubt about the success of the treatment.

His face was flushed, and covered, as well as the whole body, with a most profuse perspiration; the pulse 120°, full, but soft; the tongue warm, but somewhat brown; the voice natural—no sickness—no purging—no cramp; in fact, he was saved from the state of collapse, and was passing into that of the usual consecutive fever.

An imprudent indulgence nearly upset all; some tea was craved for, given, and followed by sickness, but which gradually subsided, being allayed by the use of small doses of calomel and opium, half a grain of the latter to one of the former. Nothing but a knob of ice was administered to him for the greater part of the day; this he allowed gradually to dissolve in his mouth, and when dissolved, he was allowed from time to time another. The stomach, thus left quiet and at rest, ceased to be irritable, and in the evening some arrowroot was retained. At 3 in the afternoon, that is, 12 hours from his

first rigor, he had a second one, well marked, but not of long continuance, and when seen in the evening he was restless, but warm, and comfortable in his feelings. A night passed with a good deal of sleep, materially improved him. The next day some urine was passed, and a bilious stool or two. The choleraic secondary fever to a slight degree hung on this lad for several days; there was not much the matter; but he was dull and lethargic. A slight œdema was evident at the week's end; it was confined to the hands and feet, and speedily disappeared. The wound in the arm was irritable for a few days, but required no further treatment than a poultice.

In summing up these cases it will be observed that of the whole number (13) thus treated, six of them were fatal, whilst seven recovered. Then it must be remembered these were not average cases of cholera, all of them were severe and most unpromising, two of them hopeless; and indeed in estimating the worth of the remedy these two ought in fairness not to be reckoned against it.

In Scotland, where the treatment was originally used, the immediate benefits were noticed as being as great as I have related. They are graphically described by Mr. Meikle of the E.I.C. Service,

who, as surgeon to one of the cholera hospitals in Edinburgh, had great experience in the disease.

“ The very remarkable effects of this remedy require to be witnessed to be believed. Shortly after the commencement of the injection, the pulse, which was not perceptible, gradually returns; the eyes, which were sunk and turned upwards, are suddenly brought forward, and the patient looks round as if in health; the natural heat of the body is gradually restored; the tongue and breath, which were in some cases at the temperature of 79° and 80° , rise to 88° and 90° , and soon become natural; the laborious respiration and oppression of weight at the chest are relieved; the sickness, thirst, and inclination to vomit cease, the deafness vanishes, the obscured vision becomes clear, and the whole countenance assumes a natural healthy appearance; the tongue, which the patient sometimes describes as having fallen back into the throat, resumes its proper place, and the *vox choleraica* is heard no more. The whole feelings of the patients become for a time natural: they express themselves as being perfectly easy, and feel as if in a new world; and their spirits are exhilarated, and they converse familiarly upon all matters connected with themselves and their families.

“ Unluckily, this favourable state does not

remain long, and very often within 3 or 4 short hours we find them sunk again into a state of collapse, or bordering upon it, and the same operation is to be gone through, with perhaps less success. I regret to say that latterly I have tried it upon many without the least benefit, except perhaps, a slight temporary change at the commencement of the operation. I have selected for the board a case from my journal, in which 612 ounces of saline fluid were injected, and the patient is, up to the present time, continuing well. This case shows that the practice is not only perfectly safe, but that a great quantity can be thrown into the circulation in a very short time; it also shows how we must persevere in some cases. Had the injection not been repeated a fourth time the poor woman would to all appearance have sunk within an hour, and after four days, it seems that the repetition of the injection alone saved her. During the first fourteen hours after she was brought into the hospital there were 474 ounces of fluid injected. She was in a complete state of collapse for hours before admission. The litter was sent for her a little after 6 o'clock p.m. When the porters had carried her partly down stairs she was seized by the mob and taken back to her miserable habitation; at half-past seven o'clock Dr. MacIntosh, Dr. Racey and myself

visited her, when the mob again interfered, and obliged us to make rather a hasty retreat downstairs, so that another hour and a half elapsed before she was brought to the hospital."

Unfortunately, in his cases, as in mine, some of them rallied only for a time, but this case related by him in which the amazing quantity of 612 ounces was injected, and at the time his report is dated (August 3, 1832), the patient, a female, was still in the consecutive fever, but doing well. This large quantity of fluid was, as in my case (Case 9) on Paddington Green, injected at intervals, in mine extending over twelve hours, in his extending over a period of four days.

The claims of saline injection to our notice are very fairly stated in an editorial article of the same number of the "Lancet" as that in which my communication on the subject was published, and the reasoning and reflections of the editor on the subject are both most excellent. The pros and cons are stated without reserve.

"EDITORIAL REMARKS.

"We invite the attention of our readers to the case of venous injection performed by Dr. Girdwood and recorded in the LANCET of this day. Of seven cases thus treated, five have been

successful* ; affording, thus, triumphant proof of the positively beneficial results of this novel and interesting practice.

“The errors which medical men perpetually commit in their reasoning on the effects of remedies, are amongst the most egregious in the examples of the *non sequitur* species of logic. If in any given disease a dose of calomel, of jalap, of asafetida, be administered, and if thereafter the patient recover from his malady, straightway the professional casuist exclaims that the recovery has been a ‘cure,’ and that his remedy was the *cause* of the happy issue.

“Again, extending his inference a little wider, he argues that what *cured* A. will to a certainty, *cæteris paribus*, exercise an equally sanitive influence over B. At last his generalisation reaches universality itself. How strict and sound reasoning of this description is, the following anecdote suffices to show :—

“About four weeks since the wife of a violoncellist, residing in one of the metropolitan districts, was attacked with cholera. The parish surgeon, a gentleman of known ability, and who had seen and treated nearly two hundred cases,

“* One case, which was under treatment when Dr. G.’s letter was written, having since recovered.”

was called to her assistance. He arrived, saw her desperate condition, and sought the additional advice of the medical inspector of the division. The inspector came, shook his official head, and the aid of a third and most experienced practitioner was invoked. A full consultation was held, and it was unanimously agreed that the case was all but hopeless. The unhappy female was cold, damp, and pulseless, she was blue and voiceless; the evacuations were so profuse as to excite astonishment as to whence they came; in short, it was perfectly evident that if something were not done, she would die within the hour. At least, so thought the three experienced attendants, for they proposed, as a last resource, the venous injection, then recently introduced for the treatment of the disease. The violoncellist at first consented, then wavered, and at last retracted his permission, and the medical men withdrew, deploring his unaccountable obstinacy. Well, strange to say, this woman, thus abandoned by her physicians, not only did not die, but actually made a more rapid recovery than is generally witnessed in the most trivial cases, and from the time of her abandonment till her freedom from danger, she took no medicine whatever.

“Now, it is quite clear that had the operation been performed here, it would have been published

as an example of the *successful treatment* of cholera by venous injection. And thus it is with calomel, and thus with rhubarb, and thus with the muriate of soda. Men systematise and conclude on facts, which, in reality, have nothing to do with the events on which they reason. But the case is widely different, when, in a *group* of half a dozen instances of marked and manifest severity, we find at the same time, a diminished degree of mortality; and when, what is more to the point, we mark the *instant* amelioration of symptoms which follows the employment of the therapeutic agent. If, after a medicine is taken, hours elapse before improvement is perceptible, we are clearly not entitled to infer that the remedy was the cause of the improvement; but, on the other hand, when, in a plurality of cases, the cold become *instantly* warm, when the arteries of the pulseless *instantly* renew their beatings, and when the voice *immediately* returns, no other conclusion is left but that the change was the effect of the measure.

“Having now before us the cases recorded by Drs. Latta and Girdwood, and bearing in mind how far the success of the operation depends upon the manual adroitness of him who carries it into effect, we feel that no amount of negative evidence could be sufficient to warrant the practitioner in

withholding this last resource from his otherwise abandoned cases. The remedy is doubtless in many instances too weak to cope with the virulence of the disease. In many, however, it will succeed, and we are bound to afford our patient every chance that may exist, however slender even the probability of success may be."

Having attempted, in my earliest notice of this remedy, to establish for the saline injection at least this position, that it gives us time to turn round and reflect on what next had better be done for the sufferer, it may now be thought worthy of consideration to note what disadvantages the operation may possess, and whether these disadvantages be inherent or merely concomitant. If the former, of course unavoidable; whilst if the latter, capable, with care and tact and attention, of being obviated. I have lately, as formerly, been often asked, What became of all the fluid injected? Had it no injurious effect on the system? Was there no danger of dropsy? None of serous apoplexy?

It may be noticed that Jones (Case 1), who had no consecutive fever, was the only one who showed any œdema so as to be noticeable, and most probably his very irregular habits had occasioned this predisposition in him by some organic derangement of the kidney. In the other case

no predisposing irregularity existed, but having, unfortunately, not had my attention drawn to the secretion from the kidney, I am unable to say whether or not any derangement existed in that organ. I regret I had not instituted an examination of the urine in this case as well as in that of Jones.

In all those patients who succumbed in spite of the injection, the symptoms of dissolution were those of a nature exactly similar in character to those preceding dissolution in the lethal cases of cholera where injection had not been used. Therefore I do not feel disposed to consider the death of any of these patients as resulting from any oppression of, or effusion on, the brain, from the fluid employed, but simply to the poisonous influence of the disease itself. These are the dangers that I had apprehended as inherent to this operation, but one that is accidental ought to be carefully guarded against; I allude to the phlebitis which has occasionally followed. I have already mentioned the slight inflammation of the puncture that followed in some of the cases that I treated, and already alluded to the care with which the operation should be performed. A fine probe previously introduced into the orifice in the vein guided the end of the instrument, and guarded against the accident of the injection

passing into the cellular tissue instead of into the vein. Of course the water used should be carefully strained. It has been suggested to me that the water should be distilled water; no doubt this also is an advantage where it is at hand. The apparatus should be frequently tried before used, so as to remove any particle of rust or dirt that may by accident exist in the tube or syringe. I may remark also that some elastic tubes are made with wire in them—this wire often rusts—these tubes ought, therefore, to be avoided.

But another accident, a singular one, may also occur; and in the case in which it occurred to me, as it was attended with circumstances that were difficult to account for, and which, whilst they existed with the severity, for a time, with which they did, were most embarrassing. I allude to the case of the old man on Paddington Green (Case 9), in which, on three different occasions, the instrument was used. He was a very tall man, and in both legs the saphenæ were so tortuous and their coats so much thickened, that prudence induced me to avoid them, and from an accidental difficulty of making an orifice for the tube in the left arm, it was to the veins only of the right arm to which we could have recourse.

The frequency with which this arm was meddled with, occasioned some difficulty in intro-

ducing the instrument on the third occasion, and a small quantity of fluid escaped into the cellular tissue. In three days the wounds looked irritable, but no uneasiness was felt along the course of the vein, nor was there any thickening of the neighbouring structures, around the slight, hard, circumscribed swelling formed by the effusion alluded to. But on the fourth day, pain of a most agonising character was felt along the inner side of the fore arm, the hand, and more especially in the ring and little fingers; the pulsations of neither the radial nor ulnar arteries could be felt. Dry gangrene of those fingers in which was experienced the principal pain slightly began, and he who had been snatched from cholera bid fair to die from mortification. These formidable symptoms happily gave way in two days; the pulse became perceptible at both radial and ulnar sides of the wrist; the gangrene was confined to the separation of the cuticle from off the knuckles and tips of the fingers; the nails also gave way.

This man lived for a year and a half, enjoying his usual state of health, which, however, for years had not been good. He had had in former years an inflammation of the chest, and had been ever since a sufferer from time to time from attacks of a similar character to that which at last occasioned his death.

I had an opportunity of examining the state of the arm after death. The blood vessels were all in a normal condition, but there was a slight effusion of lymph which had matted all the tissues together, just at the point where the nerve and artery dip in under the aponeurosis at the bend of the elbow, and this effusion had whilst recent, by its position and pressure, no doubt irritated the nerve, as well as it had, at the same time, suspended the circulation.

Another danger might occur, one from the introduction of air into the vein; such a danger, however, prudence can readily prevent.

Jones died four or five years after, but not under my care.

I know nothing of the subsequent history of the other patients who recovered, excepting of that of Miss B., who is still alive. Years passed away, and a short time ago at her wish I had the pleasure of an interview with her.

I need hardly add, that that interview was one most agreeable to me, for I found a lady now upwards of eighty enjoying the faculties of life, better than other ladies of her age, and this, with the fact that, seventeen years ago, I had so roughly roused the dormant qualities of the vital fluid by sundry pints of salt and water.

III.

October, 1866.

AGAIN we have this malignant malady amongst us, hurrying off its victims, as on its former visits, after the same agonising sufferings, with the same frightful rapidity.

I am not aware that on the present occasion recourse has been had to the saline venous injections to any extent anywhere, except in the London Hospital; there it has been had recourse to in a few cases. But under what circumstances has it been used? "They, the patients, were moribund at the time of injection" (I quote from the Report* lately published), "and it merely failed to save them. It is marvellous how, to a patient already comatose, and apparently drawing his last breath, consciousness and speech were restored, and a belief in his own recovery. Judging from later experience, I think one or two might have had a chance with larger and repeated injections."

This remark, however, applies only to nine of

* Clinical Lectures and Reports, London Hospital, 1866, page 465.

the cases, *i.e.* those at the head of the list of the fifteen in which the remedy was used.

Of the remaining six, there is happily a goodly account to relate. Of these six, one still must be removed from the category of venous injection; for, in that case (No. 12), serum, not saline aqueous fluid, was employed.

We have now five cases left us for contemplation, in which, *pur et simple*, the saline injection was employed; and a most interesting group of cases they are. The first was treated on the 29th of August.

And what were the results of this case, as well as of those of others, subsequently treated
Mark—

That is to say, of these five, *four recovered*. Of the five, let it be specially noted, that four of them had the *rigor well marked*.

One recovered without it being noticed, and one in which it was noticed was a fatal case.

As great importance is attached by the author to this rigor, it is often recurred to in this essay.

Let it be observed with what earnestness this treatment in these cases was prosecuted. One hundred and seventy ounces in one case were injected; two hundred and forty in another. Why! this quantity was but little less than was used in the case mentioned at p. 16 in this monograph. In that case, and with success, the amazing amount of two hundred and eighty ounces were injected.

In the *Report* is a remark that ought to be engraved on the mind of every one watching cases of cholera.

“It is, however,” says the reporter, Mr. Little (*juvenis patre dignus*) “exceedingly arduous to watch the cases.” No doubt, it is very arduous, but how gratifying, to have anxiety and assiduity rewarded by success! I had during the epidemic of 1832 two most diligent and energetic pupils, whose enthusiasm in studying the effects, with me, of saline injections was unwearied, and it is to

their vigilance, ever on the alert, that the recovery of so many patients is to be attributed.

To re-quote the words of the *Report*, "Judging from later experience," remarks the acute observer, "some might have had a chance with larger and repeated injections." Can the correctness of this remark be doubted? As to the nine first on the list, they all died. Why should success have attended the practice at a later date, as on former visits of the cholera? Were those cases which recovered, recovered merely from a fortuitous combination of chances, or was this gratifying event not the result of a combination of vigilance, aptitude and attention?

Was recovery merely good fortune in the hands of Drs. Latta, Tweedie, Craigie, Murphy, Little (*Hospital Report*, p. 134), in the hands of Mr. Archer, and those of the author of the present appeal?

Here, in this present appeal, are the histories of seven cases detailed of recovery out of thirteen injected. But Mr. Archer, of Shadwell, was far more fortunate; he had the satisfaction of having, out of eighteen cases of injection, thirteen recoveries against five deaths. The facts here referred to were recorded *three and thirty years ago*.

Again the question—was all this good luck?

or was it not rather that the operator resorted to the treatment *in time to be of use*, and not, as in those cases reported from the London Hospital, *when it was too late?*

Whoever may adopt this treatment will require to remember the remark I have quoted respecting the arduous watching required. He may, however, rest assured that if not successful, he will at least have inflicted no injury. True, Dr. Little alludes to a case in which the symptoms became aggravated after the use of the injection, but it would be too much after the *post hoc, propter hoc* fashion of reasoning, to assign the injection as the cause of the increased distress of breathing endured in the case he mentions. More likely, had the *post mortem* craved for, been granted, that distinguished physician would have found—what he suspected—some affection of the heart, as fully explanatory of the aggravation of the symptoms.

That no injurious effect could be traced to the treatment, the author has the authority of Mr. Archer to add to his own testimony. Nor did Dr. Little note any. No more did Dr. Latta. These opinions, entertained by those who, like the author, had recourse to venous injection in 1832, are endorsed now in the able Report, from which the antecedent remarks have been quoted.

The rigor alarmed the original operators. All surgeons of any experience have had to remark that a rigor sometimes succeeds the use of the catheter in an obstinate stricture; and every obstetrician knows that it is frequently the forerunner, in the parturient state, of the disengagement of the placenta.

In these pages a great object has been to point out that, so far from viewing the rigor after venous saline injection as an alarming symptom, it ought to be contemplated as one of a most reassuring character, and, in fact, to be the startling index of the turning point towards recovery.

From fear of this rigor, and to prevent it, the temperature of the injection by the original operators was used as high as 112°.

It has been used by the author always at 100°, as previously mentioned (p. 11).

This was from reflection. The temperature in inflammatory attacks, even of a severe character, seldom rises to a point higher than 106°. In febrile diseases it has been observed to rise to the height of 108·5° in children and to 107° in adults.*

True, in a case related by Sir Benjamin Brodie,†

* Hughes Bennett's "Physiology," 1858.

† In his Works (3 vols., 1865), p. 105, vol. iii.

the temperature between the scrotum and the thigh was found as high as 111° Fahr. But this was a special case, depending, no doubt, on the singular and fearful injury to the spinal cord from the laceration described by that distinguished surgeon.

The temperature used by the author, he repeats, was the result of reflection.

Whilst a student, the author, in Ellis's "Inquiries into Changes in the Atmospheric Air, 1807 and 1814," read that which made a vivid impression on his memory—the interesting experiments of Sir Joseph Banks, Sir Charles Blagden and Dr. Solander, who, whilst eggs were cooked and chops dressed around them, still did not have the temperature of the mucous membrane raised beyond the normal standard. The thermometer indicated a temperature of 262° . The experimenters, by merely breathing on its bulb, forced the temperature rapidly down.

The Creator thus, for some wise and vital purpose, securing the internal temperature at its normal standard, leads to the conclusion that the introduction of a fluid into the circulation at a temperature of ¹¹⁰~~101~~^a to 112° Fahr. is not only unnatural, but hostile to those physiological conditions that appear to be essential to life.

On the other hand, what takes place in the

collapse of cholera? The temperature has been known to be reduced to 77° .

Well, what do we do to a patient with a frost-bitten limb? Is he put in a warm bath at a temperature of 112° ? Certainly not. Every care is taken to accommodate the system to the exigencies of the case by measures carefully graduated.

And so with the venous saline injection. Prudence does not dictate the use of fluid so far above the normal temperature as 112° , to be introduced into the circulation of a body with the temperature reduced to 77° .

Before passing from the interesting subject of temperature, let us for a moment pause to contemplate its remarkable altitude in a special case, occasioned by the excitement of the laceration of the spinal cord, with the equally remarkable depression occasioned by an attack of cholera.

In the case related by Sir Benjamin Brodie, there could be no doubt that the exalted temperature was referable to the laceration of the *spinal cord*. Are we to trace the cause of this startling depression of temperature in cholera to some effect also produced on the spinal cord by the poison of that disease? Between the exaltation on one hand, and the depression on the other, there exists a range of no less than 34° of temperature of the body.

SUMMARY.

- I.—Venous saline injection, as a remedy, in the collapse of Asiatic cholera, is warranted on facts proved by Sir William O'Shaughnessy Brooke; these being—
- a. That in the collapse the saline ingredients of the blood have in quantity been greatly reduced:
 - b. That in the dejections there are discovered saline properties of a quantity recuperative of the loss sustained by the vital fluid:
 - c. That to the blood, inspissated by the drain on the system, and black from the want of oxygenation, and of a greater specific gravity than natural, if water containing the saline ingredients of the blood be added, the vital fluid is restored to its normal colour and specific gravity.
- II.—The restoration of the normal condition of the blood, by the injection of water containing the lost saline ingredients, is therefore specially indicated, and *recovery not to be expected until that restoration be accomplished.*
- III.—The safety of this remedy was established in 1832, by the experience of those who, like the author, then had recourse to it;

confirmed in 1849; and in the present epidemic re-established and re-confirmed beyond all doubt or cavil.

IV.—The administration of this remedy admits of no delay. The state of pulselessness at the wrist ought to be anticipated: indeed, as soon as collapse sets in, the remedy may advantageously be adopted.

V.—The fluid is recommended to be of a normal temperature, instead of at 112° , for the reasons antecedently amply assigned.

VI.—Having obtained as a first step, the benefit of the injection, marked by the rigor; let next, as the second step, the wet sheet be applied. The *first* acts towards collapse as acts the spring cable to the ship—as a holdfast, arresting the deadly progress of the malady; the *second* is as the sheet anchor to the vessel, tending to secure thoroughly the safety of the sufferer.

To conclude—

Whatever may be thought of this remedy in collapse, at any rate, it has been proved by ample experience that—which already has been said of it in the concluding paragraph in the Author's original communication of 1832, p. 13, namely, that whilst it may not save life, it at least

CAN DO NO HARM.

ADDENDUM.

THE Author of the foregoing Essay has, from the Report of Sir W. Brooke, culled those extracts only that are illustrative of the change of the blood in Asiatic cholera: the most salient being its inspissation, the absence of the normal salts, and the presence of urea. In one case—that of Dr. Daun's relative, Miss B.—it was present to the extraordinary amount of 2·10 in 1,000. The alkaline and albuminous character of the evacuations are to be added to those changes in the blood.

But, in the interest of science, as well as for the benefit of the pathologist, this is considered a fit occasion to remind the profession here of two, amongst other most interesting facts, observed by Sir William O'Shaughnessy Brooke.

These are—

- 1st. The extraordinary *heating* of the abdominal regions *after death*, and—
- 2nd. The change, *after death*, of the dark and injected mucuous membranes to a vivid scarlet when exposed to the air.

FINIS.



