

bicarbonate was reduced. In other words, there was "acidosis" without any change in the "acidity."

Dale and Richards produced acidosis without any harm, because there was no increase in the hydrogen-ion concentration. The explanation should be obvious. Lawrence Henderson pointed out that the hydrogen-ion concentration of a bicarbonate solution containing dissolved carbonic acid depends on the relative proportion of the bicarbonate itself to the carbonic acid. The bicarbonate is the alkali which balances, as it were, the presence of the acid. If we diminish the bicarbonate, therefore, we can keep the hydrogen ion constant by removing carbon dioxide. When acid obtains entrance into the blood it drives off carbon dioxide from a part of the bicarbonate, forming the sodium salts of the acid. There is a temporary increase in the hydrogen ion from the excess of carbonic dioxide, but this increase is far less than the acid itself would have produced in the absence of bicarbonate, because carbonic acid is an extremely weak acid and very little dissociated. All the same, the respiratory centre is so sensitive to the slightest increase of hydrogen-ion concentration that the increase in carbon dioxide referred to is sufficient to stimulate it. This excess of carbon dioxide is rapidly removed by the respiratory ventilation of the lungs, and as soon as enough has been removed to make up for the decreased bicarbonate the respiratory centre ceases to be stimulated, because the hydrogen ion has become normal. Such experiments show the actual state of affairs in the living organism, whereas methods of determining merely the bicarbonate reserve in the blood after exposure to the air or to a particular tension of carbon dioxide, give no information as to the hydrogen-ion content in the organism, because they take no account of the respiratory compensation. When we remember that acids are produced by deficient supply of oxygen to the tissues, we see how appropriate the increased ventilation is.

It may be said that if the sensibility of the respiratory centre is depressed, such a compensation may be inadequate. To test this, I repeated the previous experiment under a large dose of morphine, so that the respiration was reduced to five or less a minute. The result was a marked fall in the bicarbonate reserve, but the change in hydrogen-ion concentration, although detectable, was very minute. It was far less than necessary to produce any of the pathological results ascribed to acidosis.

Corresponding experiments may be done with serum *in vitro*. Adding acid in quantity sufficient to neutralize one-half of the bicarbonate causes an increase in hydrogen ion if compared with normal serum after bringing both into equilibrium with my own alveolar air. But if the tension of the carbonic acid in the air with which the more acid serum is brought into equilibrium is reduced to one-half that of alveolar air, then the hydrogen ion is brought to the same point as the normal serum in equilibrium with normal alveolar air. This is within the limits of respiratory capacity. Henderson and Haggard have shown that to maintain the hydrogen ion constant when the bicarbonate falls by one-third, 50 per cent. more ventilation only is required.

The capacity of regulation towards alkali is more limited in the living animal. I performed an experiment similar to the acid one, but injecting bicarbonate instead of acid. Neutral red is yellow in bicarbonate solution, which is therefore alkaline to it. A sample of blood taken forty minutes after the end of the injection, which had been given slowly, still gave a yellow colour with the indicator, showing an abnormal degree of alkalinity. This is perhaps to be accounted for by the fact that to compensate the increase in bicarbonate, less carbon dioxide than normal must be given off by the lungs; this would also mean a decreased supply of oxygen to the blood, a mischievous effect. It shows that the injection of alkaline solutions is to be deprecated, unless care is taken that the normal bicarbonate content of the blood is never exceeded. Too low a hydrogen-ion concentration is as bad as, or worse than, too high a concentration, because it is less easily rectified by respiration, and physiological processes are just as sensitive to one as to the other.

Professor Moore states that Cannon found a decrease of bicarbonate reserve in wounded men in France. This I admit, since I was present at some of the determinations, but it does not prove that this was the cause of the low blood pressure in these cases of shock. Indeed, Cannon

was always alive to the possibility that the low blood pressure was the cause of the production of acid, and further investigation has convinced him that this is the correct explanation. It is remarkable that Wright and Colebrook (*Lancet*, June 1st, 1918), although they recognized deficient blood supply as a cause of "acidaemia," instead of recommending methods of improving the circulation by the injection of appropriate liquids which do not leave the blood vessels, should have recommended merely solutions of sodium bicarbonate. This certainly neutralizes acid after its formation, but has no effect in diminishing its further production, except by the raised blood pressure during the short time that it, like any other saline solution, remains in the blood vessels. A positive objection to it is that, by diminishing the hydrogen-ion concentration of the blood, it depresses the respiratory activity and leads to a lower oxygen supply at a time when more is needed. In no form of experimental shock have I found injection of bicarbonate of benefit, whereas a solution of gum in 0.9 per cent. saline, even when slightly acid, is nearly always curative.

Decrease of bicarbonate in the blood is not, then, of importance in itself, and the only practical value of determination of its degree, whether by Van Slyke's or by Wright's method, is to indicate deficient oxidation in the tissues. It shows the necessity to improve the blood flow, and recent experience seems to indicate that what is needed is only a solution which will permanently increase the volume of the blood; there is a reserve of haemoglobin, unless the loss of blood has been exceptionally great. The important practical problem of when transfusion of blood is required, and when gum alone suffices, is still under discussion.

REFERENCE.

¹ BRITISH MEDICAL JOURNAL, September 7th, 1918, p. 251.

Memoranda:

MEDICAL, SURGICAL, OBSTETRICAL.

CELLULOID SOLUTION FOR TRACTION.

(Abstract.*)

For the past three months experiments have been made with a 5 per cent. solution of celluloid in acetone, which we have found makes an excellent adhesive material; 7 or 8 per cent. may be used where only small areas of skin are available.

The required amount of celluloid scrap and acetone are placed in a dry, clean, wide-mouth bottle, securely stoppered, and shaken at intervals. The solution is ready for use in forty-eight to seventy-two hours, and when properly made is an almost clear homogeneous, syrupy fluid.

The skin should be absolutely dry. A layer of celluloid solution is rapidly applied by a small brush. The quantity should be sufficient to soak through the strip on which traction is to be applied, and a thin coating is applied externally to get out all the wrinkles and air bubbles. Canton flannel is the best material for strips, but a double layer of gauze or muslin that is neither too hard nor too finely woven, may be used. The application of iodine, picric acid and alcohol to areas to which any type of adhesive is to be applied should be avoided as far as possible. If there is delay in putting on the strip, the skin should be recoated, for it dries out in a thin flexible film in a minute or two. The application of a circular gauze bandage increases the effectiveness of adhesion. The solution is combustible, and it is therefore advisable to label bottles properly.

Twenty-five applications of this solution have been carefully observed and it is believed that the scope of traction is increased by its use.

CONCLUSIONS.

The conclusions founded on the cases reported in the full paper are as follows:

1. Six per cent. celluloid in acetone makes an excellent adhesive material.
2. Its rapidly volatilizing quality permits of immediate traction.

*The full paper has been forwarded for publication in *Surgery, Gynecology, and Obstetrics*.

3. It can be used in higher concentrations when only small areas of skin are available.

4. It is insoluble in water—hence not affected by perspiration or climatic changes.

5. Solutions which are likely to increase desquamation should not be used prior to application of adhesive material.

6. The natural process of exfoliation of epidermis limits the effectiveness of one application to about three weeks.

W. F. CUNNINGHAM, Lieutenant M.R.C.U.S.A.,
1st (Presbyterian U.S.A.) General Hospital,
B.E.F., France.

A SIMPLE GRIP FOR ADJUSTING SUSPENSION CORDS.

For adjusting the levels of the shoulder straps in Sayre's suspensions my father used a simple self-retaining grip or hitch. I believe that he designed it sometime about the early eighties, and a large-sized model of boxwood has been placed in the museum of the Royal College of Surgeons of England. Now that so many limb splints are suspended it seemed likely that this grip might be usefully applied for adjusting their heights by the lengths of cord. As used on the Sayre suspension, the grips were machined out of bronze castings, and these would be rather too heavy, and moreover difficult to get made in the present days. I have therefore endeavoured to simplify the pattern so as to make a readily obtainable device of light weight.

The principle consists in passing the cord through a fixed loop formed at its end; the loop is placed in a slot in a solid piece, through which a hole at right angles to the slot is made to accommodate the main cord; thus a running noose is formed, on which a ring or hook is threaded; when the fixed loop is pulled upon it jams the running part against the sides of the slot in the grip block. By means of the ring the tension in the two limbs of the running noose is more or less equalized, so that after pulling up a weight attached to the ring by means of the free end of the cord, on ceasing to pull the weight remains suspended at the point to which it was raised. If the friction exercised by the ring is removed, as by replacing it with a pulley, the mechanical conditions are upset and the grip ceases to act; it is important, therefore, to introduce some friction at this point.



FIG. 1.

FIG. 1.—Showing construction of wire-made grip. The eyes face one another in parallel.



FIG. 2.

FIG. 2.—Diagram of disposition of cord. A A, jamming points, properly one diameter length apart. Arrow X, direction of pull to raise; arrow Y, direction of pull to release.

The first modification was made by riveting two triangular brass plates together with distance rivets, leaving a space of about $\frac{1}{2}$ in. between (for service with $\frac{1}{2}$ in. blind cord, or, rather, the fixed loop of that material), whilst a $\frac{5}{8}$ in. hole through both plates allowed the passage of the free cord. The uppermost of the three rivets serves for attachment to the fixed support. This makes a neat contrivance but demands too much labour in the making. A further simplification results by forming eyes at the ends of a short piece of wire, which is bent at its middle as a staple. One of the free ends of the wire is left rather long and bent across to form a distance piece, and all the points of contact are fixed by a trifle of spelter; even without any solder a considerable weight can be supported without spreading, and possibly pewter solder might be sufficient, but it is rather better to make things absolutely safe with hard solder. For $\frac{1}{8}$ in. diameter woven blind cord, galvanized steel wire of imperial standard wire gauge 12 (about 0.1 in. diameter) is sufficiently thick; the eyes may be formed about $\frac{1}{8}$ in.

internal diameter, which brings the distance piece well above, and so allows plenty of room for threading. The eyes may have about $\frac{5}{8}$ in. distance between them. For larger cord it would be advisable to use a thicker gauge of wire and dimensions to suit.

The figures will perhaps make matters clear; the points marked A A are in reality the contact points with the pair of eyes, against which the running cord is jammed by the tension of the fixed loop.

HERBERT E. DURHAM, Sc.D., M.B., B.C., F.R.C.S.
Hereford.

COLLOSOL MANGANESE IN FURUNCULOSIS AND SEBORRHOEA.

I would like to add my testimony to the value of collosol manganese in furunculosis and in seborrhoeic eczema. I have used the preparation in the form approved by Sir Malcolm Morris—that is, in two solutions, half a cubic centimetre of each being mixed in the syringe and injected intramuscularly. The result is so good as to convince me that this treatment for the above conditions should have a wider use. The following are short notes of two cases:

Case 1.—Wounded on April 14th, 1918, in France; gunshot wound of left thigh. Following wound infection patient developed seborrhoea of scalp, trunk and limbs, specially marked on extensor surfaces of elbows and knees. For three months salicylic acid and ungt. picis were applied without benefit. On July 27th 1 c.cm. injections collosol manganese were commenced and given in all six times during the next month. Patient is now practically free from the disease.

Case 2.—Wounded on August 8th, 1918, in France; gunshot wound of cranium, and extensive burns from mustard gas. Multiple boils developed in both axillae. These had resisted treatment for three weeks during patient's evacuation to England, and were cured in a few days by two injections of collosol manganese.

It would be interesting to know whether extensive general seborrhoea often results from a wound infection as it did in Case 1.

E. W. KIRK, M.B., F.R.C.S.E.,
The Edinburgh War Hospital,
Bangour, West Lothian. Captain R.A.M.C.

Reviews.

MEDICAL OPHTHALMOLOGY.

"It seems to me the best and most hopeful feature of ophthalmology is that it has relations, closer or more remote, with every branch of medicine and surgery; indeed, with almost every branch of science." This saying is taken from a paper by Dr. James Anderson, which appeared in the *Ophthalmic Review* of 1889, and it was adopted by Hughlings Jackson as the conclusion of his presidential address at the annual meeting of the Ophthalmological Society of the United Kingdom in 1890. It now forms the text about which has been shaped the textbook of an American writer, a book written on ophthalmology from the standpoint of general medicine, and one which worthily accomplishes the aim of the author.

Medical Ophthalmology,¹ by Dr. ARNOLD KNAPP, of New York, is one of a series of seven volumes of an International System of Ophthalmic Practice, which already include such well known books as Darier's *Ophthalmic Therapeutics* and Collins and Mayou's *Pathology and Bacteriology of the Eye*. This new work is worthy to rank with the best of these, and there can be no doubt that it will have a wide circulation amongst general physicians and ophthalmic surgeons; both parties will learn something to their advantage in the thoughts of the author.

The book is divided into fifteen sections. The first is an admirably written and illustrated section on the anatomy and physiology of the visual paths, the ocular nerves, the pupils, and cerebro-spinal fluid. There follow sections on diseases of the nervous system, and of internal secretions; on poisons and infectious disease; on diseases of the circulation, of the respiratory tract, and the digestive tract; on anaemia; diseases of the kidneys; on diabetes; on diseases of the female generative organs; of the osseous system,

¹ An International System of Ophthalmic Practice. Edited by Walter J. Pyle of Philadelphia. *Medical Ophthalmology*. By Arnold Knapp, M.D. London: William Heinemann. 1918. Pp. 509.

Committee sees no substantial disadvantages in the proposed departure which I believe would result in our being paid in full and with a promptitude to which we are at present unaccustomed.—I am, etc.,

September 29th.

W. G.

THE ABUSE OF DRAINAGE TUBES.

SIR.—In a letter published in the *BRITISH MEDICAL JOURNAL* of September 21st Dr. Frank Hathaway claims that King Edward VII Hospital, Windsor, was the first hospital to give up the use of drainage tubes. I cannot admit the justice of this claim, as drainage tubes have not been used in the Military Hospital, Lincoln, since 1915.

On June 17th, 1915, I wrote to the D.D.M.S. Northern Command stating that I had almost discarded that barbarity—the drainage tube. In the *R.A.M.C. Journal* of October, 1915, I repeated this statement, and in my article, the "Treatment of septic wounds with equal parts of ichthyol and glycerin," published in *The Practitioner* of January, 1916, I stated: "Many of the wounded come to my hospital with drainage tubes; these I remove at the first dressing and never replace them; they are unnecessary and cause much suffering."—I am, etc.,

C. W. DUGGAN,

Military Hospital, Lincoln, Sept. 23th.

Major R.A.M.C.

Obituary.

JOHN WATSON MULLIGAN, M.D.

Formerly President of the South Wales and Monmouthshire Branch.

We regret to announce the death at Corbet, near Banbridge, co. Down, Ireland, of Dr. Mulligan, formerly of Abersychan, South Wales. He was the son of the late Dr. Thomas Mulligan, M.D., of Meigh, co. Armagh, and was born at Tallyconnaught in 1844. He was educated at Queen's College, Belfast, and graduated M.D. Queen's University in 1864. After practising for a short time first in Achnacloy and then at Abersychan, he went to Australia, but returned to Abersychan in 1872, and he succeeded to the practice of the late Dr. J. W. Davies of Ebbw Vale. Dr. Mulligan was M.O.H. for the area for forty-two years, senior surgeon to the Pontypool Hospital, medical officer of the Pontypool Union, certifying factory surgeon, justice of the peace for Monmouthshire, and an alderman of the first Monmouthshire County Council. He took an active interest in the Volunteer movement and became brigade surgeon and colonel of South Wales Volunteers. He was an enthusiastic Mason and was W.M. of the Kennard Lodge in 1882, Past First Principal of Kennard Chapter, and a Past Provincial Grand Warden. He had been looking forward to being present at the installation ceremony of his son in the Kennard Lodge on September 24th, but death forestalled.

Dr. Mulligan was a man of commanding presence, wide sympathy, and a very exalted standard of professional honour. He was patient and tolerant in all things, and his work in the Pontypool Hospital was marked by care and thoughtful consideration for his patients. He was an excellent operator and a most astute diagnostician. In his relations with his colleagues he exhibited the tenderest charity and fulfilled Newman's definition of a gentleman, that "he never inflicted pain." His work for the British Medical Association was a continuous joy to him. He received every honour that the Branch and Division could give him. He had been president of the South Wales and Monmouthshire Branch, was first Chairman of the Monmouthshire Division, and remained down to his retirement in 1915 a regular attendant at the various committees. His sound judgement and restrained expression were valuable assets; no matter how difficult the situation might seem he provided an acceptable solution. It can be well imagined that such a man would be a valued friend and adviser to a large circle of patients and colleagues, as was indeed the case.

At the time of his retirement in 1915 he received innumerable expressions of regret and good wishes, but none gave him greater pleasure than a small gift of plate to himself and his wife from the Monmouthshire Division as a recognition of his inestimable services and unbounded hospitality. He lived a useful, busy, and well-ordered life. He leaves a widow, a daughter, and three sons, two of whom succeed him in practice.

DR. GEORGE RICHARD CHADWICK died at his residence at King's Lynn on September 20th, aged 66. He received his education at Guy's Hospital and took the diploma of L.S.A. in 1875, that of M.R.C.S.Eng. in 1876, and graduated M.D.Durh. in 1894. He succeeded the late Dr. Woodward in practice and had held the appointments of honorary consulting surgeon to the West Norfolk and Lynn Hospital, medical officer to the post office, surgeon to the borough police, as well as that of Admiralty surgeon and agent. After the departure of some of the younger members of the profession on military service Dr. Chadwick patriotically resumed active hospital work which he had resigned, and also undertook the duties of medical officer to the King's Lynn Union. He was a member of the West Norfolk Division of the British Medical Association.

Universities and Colleges.

UNIVERSITY OF LONDON.

The following scholarships have been awarded:

St. Bartholomew's Hospital and College.—Senior Entrance Scholarship in Science: C. L. Pasricha (£75). Junior Entrance Scholarship in Science: B. M. Tracey (£100). Entrance Scholarship in Arts: J. Maxwell (£100). Jeaffreson Exhibition: N. E. Laurence (£50). *Guy's Hospital Medical School.*—Senior Science Scholarship for University students: J. H. Burn (£75), M. H. MacKeith (£35). Junior Science Scholarships: E. C. Warner (£120), M. B. Goolding (£50). Scholarship in Arts: C. S. Hallpike (£100).

Medical News.

A LECTURE will be delivered on Thursday, November 28th, at 6 p.m., before the Child Study Society, London, by Mr. N. Bishop Harman, F.R.C.S., on the subject of sight-saving schools. Dr. James Kerr will take the chair.

THE Elsie Inglis Unit of the Scottish Women's Hospital is, we are informed, the only field hospital attached to the Jugo-Slav Division in Macedonia. When the latest information was received it was at Dragomantsi, north of Voden, and a new station, served by motor ambulances, had been established nearer the front. The unit has recently been joined by Miss Elinor Rendel, M.B., as junior surgeon.

LIEUT.-COLONEL SIR DAVID SEMPLE, who has held the appointment since 1913, has resigned the post of Director-General of Public Health, Egypt. His second in command, Dr. Cyril Goodman, has likewise retired owing to ill health, and the Government is finding difficulty in selecting successors. Meanwhile a special commission has been appointed under Dr. Andrew Balfour to examine the public health administration in the country, and it is believed that advantage will be taken of this opportunity for amalgamating the International Quarantine Board with the civil public health administration.

A FUND is being raised to do honour to Senator Camillo Golgi, Professor of General Pathology in the University of Pavia, on the occasion of his retirement this year, when he reaches the limit of age. The money is to be used in the foundation of a bursary to be given annually to an orphan of an Italian practitioner who wishes to enter the medical profession, preference being given to one who has lost his father in the present war.

THE annual meeting of the American College of Surgeons will take place in New York under the presidency of Dr. William J. Mayo, on October 21st to 26th, and will be attended by some representatives of British surgery. During the congress visits will be arranged to the hospitals and laboratories of the city and to the clinic for the functional re-education of disabled soldiers and sailors.

V. C. PIAZZA states (*Rif. Med.*, June 15th) that malingersers who desire to produce the appearance of albuminuria either add liquid or dry albumin to the urine or inject it into the bladder. Generally hen's egg albumin is used, but human or horse serum is occasionally employed. The repeated injection of albumin into the bladder sets up an inflammatory condition which manifests itself by the presence of a minimal quantity of pathological albumin and an abundant deposit consisting wholly of well-preserved leucocytes. Sometimes methods tending to set up an albuminuria of renal origin are used, as by the intravesicular injection of big doses of quinine, salted meats or fish, large quantities of sodium chloride or pepper, but more commonly by the ingestion of enormous quantities of egg albumin, liquid or desiccated.

THE British Fire Prevention Committee has prepared a small poster (No. 32) entitled "Fire precautions for householders." It is simply worded and highly practical; copies will be supplied free to any applicant who sends an addressed and stamped envelope to the offices of the committee (3, Waterloo Place, London, S.W.1).

THE American Medical Department has established a central laboratory in France under the direction of Lieut.-Colonel George B. Foster, jun. Among the workers are Major Richard P. Strong, professor of tropical diseases at Harvard, Major William J. Esler, professor of bacteriology at Cornell, and Major W. B. Cameron, professor of physiology at Harvard.

Letters, Notes, and Answers.

AUTHORS desiring reprints of their articles published in the BRITISH MEDICAL JOURNAL are requested to communicate with the Office, 429, Strand, W.C.2, on receipt of proof.

IN order to avoid delay, it is particularly requested that ALL letters on the editorial business of the JOURNAL be addressed to the Editor at the Office of the JOURNAL.

The postal address of the BRITISH MEDICAL ASSOCIATION and BRITISH MEDICAL JOURNAL is 429, Strand, London, W.C.2. The telegraphic addresses are:

1. EDITOR of the BRITISH MEDICAL JOURNAL, *Aitiology, Westrand, London*; telephone, 2631, Gerrard.
 2. FINANCIAL SECRETARY AND BUSINESS MANAGER (Advertisements, etc.), *Articulate, Westrand, London*; telephone, 2630, Gerrard.
 3. MEDICAL SECRETARY, *Medisecra, Westrand, London*; telephone, 2634, Gerrard. The address of the Irish Office of the British Medical Association is 16, South Frederick Street, Dublin.
- The address of the Central Medical War Committee for England and Wales is 429, Strand, London, W.C.2; that of the Reference Committee of the Royal Colleges in London is the Examination Hall, 8, Queen Square, Bloomsbury, W.C.1; and that of the Scottish Medical Service Emergency Committee is Royal College of Physicians, Edinburgh.

QUERIES AND ANSWERS.

CUSTOS inquires for a simple formula for making a 5 per cent. solution of aluminium subacetate which is recommended for use in burns.

G.P. wishes to learn if cuprase or collosol cuprum has been tried in cases of mediastinal growths (not secondary) and with what results.

HEXAMINA inquires whether the continued use of urotropin in 10 grain doses thrice daily can harm the kidneys.

LETTERS, NOTES, ETC.

A PHYSICAL CENSUS AND ITS LESSON.

Erratum.

IN the article which appeared last week with this title there was an obvious misprint in the eighteenth line on p. 349, due to the omission of a decimal point. The sentence should have run: "In other words, in less than 0.4 per cent. of this enormous number of medical examinations there was reason to believe... that the grading by the National Service Medical Board did not correctly represent the degree of physical fitness of the individual."

WOUND TREATMENT.

DR. J. J. BOERMA (Arnhem, Holland) writes to say that he has read with much pleasure the publication issued by the British Medical Association, entitled *British Medicine in War*, and adds: In the chapter on wound treatment I did not see the method of deep disinfection anaesthetization, by injection with novocain and some disinfecting agent around the wound as described in the *Nederlandsch Tydschrift von Geneeskunst* of August 17th, 1918. In infected suppurating wounds you have attained great success with the Carrel-Dakin method, but would it not be logical to try to attain a deeper disinfection by injections in some suitable cases? May be you are employing already some kind of such method and hope you will consider my remark upon your excellent work as a feeble trial to do a little bit for the benefit of the gallant British soldiers.

MANGANESE A POISON.

MR. J. F. WARD (Manager, The Crookes Laboratories, 50, Elgin Crescent, W.11) writes, with reference to the letter of Dr. James Gairdner (September 28th), to point out, in view of the extensive use of colloidal manganese at the present time by intramuscular injection in furunculosis, acne, eczema, gonorrhoea, and generalized systemic infections, that in the colloid state manganese is for all practical purposes non-toxic. Physiological experiments undertaken by Professor R. Tanner Hewlett of King's College in July, 1918, showed that 11 c.cm. of collosol manganese injected intravenously into a rabbit weighing two kilograms produced no ill effect. The dose found by clinical experience to produce the best results

is 0.5 c.cm. to 1.5 c.cm., and reports (as already mentioned by Sir Malcolm Morris and other writers in the medical journals) almost invariably show marked constitutional improvement after the injections.

LIQUID FIRE IN WARFARE.

THE prototype of the liquid fire now used by the Germans was the "Greek fire" which kept sea power in the hands of the Byzantines in their long struggle with the Moslems. This "Palladium of the State," as it is pompously styled by Gibbon, was an incendiary compound the secret of which was imparted to the Constantinopolitans by Callinicus, a native of Heliopolis in Syria or in Egypt. It would seem from the vague and possibly misleading hints of Anna Comnena, daughter of the Emperor Alexius Comnenus I, in her *Alexiad*, and other Byzantine writers, that the principal ingredient was naphtha or liquid bitumen, which is found in abundance in certain areas between the Tigris and the Caspian. The naphtha was mixed with sulphur and turpentine. The fire was used in various ways. The simplest weapon was probably a tube filled with combustible materials, which was flung by the hand like a grenade. From the ramparts of Constantinople it was poured out of large boilers, or shot in arrows and javelins round which flax or tow strongly impregnated with the inflammable oil was twisted. Sometimes it was carried in fire sloops and blown through long copper tubes "fancifully shaped into the mouths of savage monsters that seemed to vomit forth a stream of liquid and consuming fire," which were laid on the prows of galleys. It is probable that naphtha was the "oleum incendiarium" used at the siege of Jerusalem, although there is no direct evidence on the point. Joinville, in his life of St. Louis, says that the fire came flying through the air like a winged, long-tailed dragon about the thickness of a hog's head, with a noise like thunder and the velocity of lightning. There is a formula in a treatise by Marcus Graecus of the ninth century with a title of undisguised frightfulness, *Liber ignium ad comburendos hostes*, which exists only in a Latin translation, edited by F. Höfer in his *Histoire de la Chimie* (1842). The use of Greek fire was continued till the middle of the fourteenth century, when the discovery of gunpowder brought about a revolution in the art of war.

THE BELGIAN DOCTORS' AND PHARMACISTS' RELIEF FUND.

Subscriptions to the Second Appeal.

The following subscriptions, completing the list up to Monday, September 23rd, should have been acknowledged in our previous issue:

	£ s. d.		£ s. d.
Sir A. Pearce Gould	5 0 0	Major W. M. A. Fletcher	1 1 0
Messrs. Bower and Sons	2 2 0	Dr. F. G. Glenow	5 0 0
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Dr. A. W. Cassie	1 1 0	Mr. A. Williams, M.P.S.	1 1 0

Monthly Subscriptions.

The following monthly subscriptions have been received for September:

	£ s. d.		£ s. d.
Sir A. Pearce Gould	5 5 0	Dr. G. Grey Turner	1 1 0
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Major E. R. Fothergill	0 10 0	Dr. H. Caiger	0 10 6
R.A.M.C.	0 10 0	Captain H. L. P. Hulbert	
Dr. J. O. Mussion	0 10 0	R.A.M.C.	1 0 0
Dr. W. Stewart	0 10 0	Dr. H. Whitehouse	0 10 0

Subscriptions to the Fund should be sent to the Treasurer, Dr. H. A. Des Vœux, at 14, Buckingham Gate, London, S.W.1, and should be made payable to the Belgian Doctors' and Pharmacists' Relief Fund, crossed Lloyds Bank, Limited.

THE BELL FUND.

DR. S. A. KINNIE WILSON asks us to acknowledge a donation to the Dr. J. H. Bell Fund of £1 ls. from Dr. S. H. Belfrage. Subscriptions should be sent to Dr. Wilson at 14, Harley Street, London, W.1.

SCALE OF CHARGES FOR ADVERTISEMENTS IN THE BRITISH MEDICAL JOURNAL.

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