

motor centers, are, perhaps, the most important proof the localizers have brought forward, but they are by no means agreed as to the interpretation of experiments supposed to be identical. For instance, Ferrier destroyed the angular gyrus with resulting hemianopsia and so placed the visual center in this region but others have shown that this blindness was temporary. As already explained, others have shown this blindness was but temporary, and then placed this center in the occipital region where the results of destruction seemed more permanent, but no experiment yet performed seems conclusive, for the reason that complete removal of the cortex without destruction of the underlying fibers in the higher animal is not possible, while in simple brained animals even great destruction is well borne with but few motor or sensory symptoms. Here, however, the localizers claim that automatism comes into play and can not therefore be compared with brains markedly convoluted.

Another objection to experiments of this kind is that when the brain cortex is mutilated the animal's disposition is so entirely changed that no just deductions can be drawn by comparing it with a normal animal, with whom at best we can not intelligently communicate.

The true and only test as to the truth of this theory that has so far been applied is the observation of lesions in the human brain. Numberless cases are on record where cortical lesions have resulted in paralyses and disturbances of the special senses. Cortical destruction of the motor region is often followed by paralysis, in the frontal lobe by mental weakness, in the occipital lobe by visual disturbances and in the temporal by deafness. Left-sided paralyses accompanied by aphasia are frequently found to have their origin in lesions near the base of the third frontal convolution. On the other hand, equally well defined lesions impinging on or completely destroying these centers have not resulted in corresponding deficiencies.

The importance of these researches is undoubtedly great, for they have opened up a new and fertile field for the experimenter and have added vastly to our knowledge of the physiology of the brain. On the other hand, they have been a basis for the justifications of the many operations performed for the removal of localized growths or deposits in or on the brain, and as such their accuracy and diagnostic value are rightly questioned. Surgeons have interpreted these researches in a manner that conservative investigators can not approve.

Our medical journals are filled with accounts of operations which have either justified the diagnoses, or where the results were not so bad as to completely confound and condemn both the operator and the operation. Unfortunately the many unsuccessful or otherwise disastrous operations remain unreported as regards tumors, even were the localizers able to absolutely and definitely point the way to the surgeon, yet post-mortems teach us that at least 75 per cent. of such growths could not be successfully removed; and were all the results of such operations known, characterized, as many of them are by mistaken diagnoses and surgical mishaps, 95 per cent. would more nearly represent the proportion of the operations which are either useless or criminal failures. Granting that 5 per cent. of the operations result in improvement or cure, this small proportion

does not justify the readiness with which such operations are undertaken. But surgeons have gone further than this. Not content to interfere with pathologic cerebral tissues they have opened brains practically normal, removed the recognized centers and noted results. This has frequently occurred in the so-called Jacksonian epilepsy where consciousness is seldom lost and only one limb or group of muscles is involved. Some of our recent text-books have even gone further and advised exploratory incisions as an aid in diagnosis, as if the trephining of the brain was as simple a procedure as is the opening of the peritoneal cavity, or the results which follow healing as insignificant.

While granting the advance made by experiments on animals in elucidating the physiology of the brain, the modern cerebral surgery based on this is not justified, either by reason of the possibility of accurate diagnosis or the probability that the operation *per se* may benefit. The results of operations even those selected for publication are not encouraging, much less do they lead us to regard the operation as one of minor surgery.

YELLOW FEVER: PATHOLOGY AND TREATMENT.

Prepared for the Pan-American Congress and for the International Congress at Rome.

BY F. PEYRE PORCHER, M.D., LL.D.

CHARLESTON, S. C.

I wish in this paper, based on the study of several epidemics of yellow fever in Charleston, to make three points which are of the first importance; also to give some of the results of my experience as regards treatment and pathology, which I do not think have attracted the attention they deserve:

1. That this fever in Charleston has always been accompanied by what is known as "breakbone fever;" this, though extremely mild, is not distinguishable, but being counted in with cases of true yellow fever, prevents all accuracy in the mortality reports,

2. That yellow fever is fully susceptible of successful management in fair cases, seen early,

3. That life is compromised in the first six to ten hours of the disease; so that it is essential that treatment should be begun early.

Co-existence of Yellow and Breakbone Fever.—Invariably two forms of fever existed together, namely, yellow fever, and a milder and more ephemeral, intercurrent species known and designated as "breakbone." Yet this was also not by any means ephemeral, for it often had a duration of several days. Whether they constituted two distinct species, or were only varieties of one and the same malady, has, strange to say, never been decided—no distinct lines of demarkation between the two have ever been satisfactorily established—no physician, however acute, having clearly pointed out any precise diagnostic difference. Though many cried "Eureka," upon more rigid scrutiny the hopes they offered of a solution of the difficulty proved fallacious.

Among the observers there were to be found the lax and the strict constructionists, so that the usual confusion prevailed; *quot homines tot sententiæ*—there were as many opinions as there were persons to utter them. The question was, it must be confessed, surrounded by many difficulties, for while some forms of fever were very mild, and some characterized by black

vomit and suppression of urine were very fatal, others presented every intervening shade of difference between the two; and though the access of what proved to be the simplest cases was sometimes severe and violent, the intensity of the disease was dependent for the most part, I think, upon the amount of climatization enjoyed by the party suffering; and its gravity and its termination, whether favorable or unfavorable, would be modified, it seemed to me by neglect, by delay, or methods of management injurious or beneficial in their effects.

Individually, I am of opinion that, with many who by careful and assiduous attention on the part of the attendants were rescued from falling into a dangerous condition, and who recovered—the result would have been quite the opposite had they been managed otherwise. So that it was the early treatment and the appliances, and the eternal vigilance which sufficed to change the issue, and which did change it; and I hold that such cases, so metamorphosed by the simple, but important difference of management, would have had a very different termination; and would then, even by the most skeptical, have been placed in the category of true yellow fever, which was denied them if they did not get almost or quite into the third stage. The mild cases (breakbone, so-called) may get well with little or no interference. The difficulty was that they could not be surely distinguished at their early inception; and the stranger, in my experience, sometimes had attacks which, when vigorously managed at the beginning, were fully as innocent as those from which natives suffered, and which in these received the designation of breakbone. But in a fever like this which does its work so rapidly, it was at least plausible to believe and to argue that neglect, delay, the avoidance of the proper means and appliances for reducing temperature, etc., would have very much to do with modifying the nature, history, and ending of each case. This need not excite surprise, for did we treat scarlet fever or even measles with agents as active as those we were in the habit of administering in yellow fever, they would inevitably be made quite as fatal.

Pathology.—The peculiar poison when first introduced in the system produces (through nervous paralysis of the capillary arteries, perhaps) intense fever and great excitement of the circulation, with torpor of the glandular and secretory apparatus. It shuts up all the secretions and excretions, and with a high fever which it creates, rapid destructive metamorphosis of the tissues occur, caused by the intense combustion going on; so that spoliative treatment, in the shape of mercurial, saline, or other purgatives, is imperatively demanded at this inceptive stage. These are to be accompanied by revulsives, hot foot baths, and the application of cold to the upper extremities, in order, severally, to empty the intestinal canal and the torpid glandular organs, to diminish temperature, and to contract capillaries. All these means, also, serve incidentally, but powerfully, to lessen the tendency to nausea, and to irritability of the stomach. The latter does not decidedly lead to, or induce black vomit, as is commonly supposed, though the one often accompanies or precedes the other. Both result from the same efficient cause, namely, the altered condition of the blood, induced by the fever. The peculiar vomit is probably owing to what Warren calls "mortified blood," blood thinned by the decomposing action of excessive fever (a

quality peculiar to the yellow fever poison alone) transuding into the stomach and blackened by its acids. I could discover by the microscope,¹ frequently used, no distinct difference between this and other bloody matters vomited, which have been acted upon by the gastric juice, as where blood from a cancer is poured into the stomach and afterwards ejected.

The temperature in this peculiar fever, if unsubdued, leads infallibly and of necessity to subsequent trouble, to destructive tissue changes, to blood poisoning, to black vomit, to albuminuria, to coma, or to convulsions. I have seen thorough and persistent sponging with ice-cold water, when combined with the use of the other agencies advised, reduce the temperature, lessen all the bad symptoms in a surprisingly short time; having the power seemingly to change the entire character of the disease and imparting comparative mildness to its whole subsequent career. I will stand to this truth, for in the perception and practical carrying out of it lies the whole virtue of the plea which I advocate and assert to be successful.

In general terms, then, our first efforts must be directed to the relief of the intestinal and glandular torpor which always exist and which is marked by costiveness; we must diminish the cutaneous and general heat, empty the vessels of the system which are laden with impure blood, and obviate the tendency to renal engorgement indicated by the frequent presence of albumen. This is effected by the revulsives, aided by a mild alkaline diuretic, to be referred to subsequently. Then we must strive cautiously at constriction, and while allowing the recuperative powers full exercise, we are to do nothing to impair the strength remaining, or weaken the energies of the constitution which have become greatly enfeebled. The unacclimated who are seized with the fever are nearly or quite always in a quasi-critical state, ready at any moment to take the descending path and to become dangerously ill; hence they require as careful handling as children do with scarlet fever. While, therefore, nothing is omitted which will tend to diminish the fever their strength must be carefully husbanded, for the slightest neglect, the failure to keep down the temperature by the application of cold water, or too much medication, though these may seem light transgressions, are powerful and weighty in turning the balance.

Mercurial and antiphlogistic purgatives used at the beginning, serve to diminish the heart's action, to lessen the inflammation by spoliation, by the drain of fluids from the body, augmented by the cooling operation of the salines. All of these are measures only to be employed at the beginning, using the agents in sufficient amounts to effect our object, which is to empty the bowel once thoroughly and effectually, without, as I urged, weakening the patient any more than is absolutely required. Purgatives are on no account to be persevered in. The failure to discontinue them after the efficient action of those used on the first day is procured is, I am sure, a grievous error.

Several authorities commit the fatal mistake of repeating the mercury and cathartics and pushing their use much too far. Even Blair, though in my judgment eminently on the right track, and for this reason very successful, permitted his xx of calomel and xviv

¹ Illustrations of Disease with the Microscope. Prize Essay. Charleston, C. S. A., 1861.

of quinin to be repeated under emergencies, and be used again and again as often as four times; I prescribe it invariably, but never more than once, unless it is not retained or does not act.

In a fever like this, of one paroxysm (but with a remission somewhere between the twelfth and thirty-sixth hour, occurring more distinctly when the proper means are used early,) which is exceedingly violent at the beginning, if unchecked, it does all the violence it is capable of in a very brief period.

I have been the first, I believe, to make a most important declaration; that life is virtually compromised in the first fifteen hours of its career. In such a fever, where the danger and the terrible sequelæ are owing entirely to the extreme intensity of the eremacausis, and the injury worked in the system by the high combustion which acts principally upon the blood, a certain treatment flows logically. There is no time to be lost in setting about it, and it is only to be regretted that our measures can not anticipate the invasion of the attack.

I sincerely believe that thousands of lives could have been, and can be saved by a system of management begun at the very commencement of an attack of the disease, before the fever has had time to produce its direful effects, and by methods simple in their operation, perfectly compatible with reason and common sense, and also based upon a view of the pathology and progress of the disease.

That, consequently, where the demand for medical aid is so urgent, when physicians can not see their cases early—such precious time being lost by their enforced absence—an exception must be made to our usual procedure, and the people in such need must be told what to do before the physician arrives. This is required by the fact, which should be recognized by every one, that death results from the insidious and peculiar fever of the first six to ten hours—whenever this is permitted to go on unchecked—through failure to use these means which are perfectly adequate to restrain and keep down the temperature. So that when a man has been ill for twenty-four hours or forty-eight hours with yellow fever, the attendant is not responsible, and treatment which would have been efficient used early is not to be condemned because it fails at the stage where irremediable organic changes have taken place; and the practitioner who boasts that he has fifty or sixty patients on his list does not know that the last installment (those he can not see for ten to fifteen hours) are, in many instances, already irretrievably doomed.

In fair cases and temperate individuals, treated early, there is no need for any violent third stage, for any black vomit, albuminuria, suppression of the urine, etc.

It is a mistake to suppose that yellow fever is necessarily a fatal malady, that epidemics vary greatly in malignancy, and that we must fold our hands supinely. The truth is that physicians in this city and elsewhere report at the end of the season very few deaths. Belot, of Havana, claims that 95 out of 100 fair cases seen early may be cured, and I agree fully with him. I have practiced with success the method to be related in detail (see also *Charleston Medical Journal and Review*, since 1858, and President's address before State Medical Association of South Carolina, 1872). Dr. C. W. Horsey adopted the treatment in the fever of Fernandina, Fla., 1878, others

have employed it successfully, and Surgeon Sternberg refers to it approvingly in his elaborate and able article in Wood's *Hand-Book of the Medical Sciences*. I had long shown by the adoption of Blair's system, materially modified, the application also of cold water was the foundation fact in the treatment. In confirmation of this, Prof. T. O. Summers, of Nashville, says: "Cold water is the remedy in yellow fever." (Paper on treatment of yellow fever in 1879).

Treatment.—The treatment consists: 1, in sponging assiduously the head, hands and arms with ice-cold water at the very commencement of the attack, not losing an hour, and repeating this at intervals whenever the temperature rises, ice-water being quite capable of reducing the temperature. Towels soaked in the ice-water are preferable to sponging; fifteen to twenty minutes generally suffice for each application, its necessity being determined by the existence of pyrexia. Few perform this simple but essential procedure as efficiently as they should do; 2, give immediately Blair's "calomel, grains xx; quinin, grains xxv" (in proportion to ages), and but once. I have never seen the quinin produce a single ill effect, though given when the fever is intense; 3, follow in three or four hours with a saline cathartic (sulphate of magnesia), which is cooling and antiphlogistic; 4, apply mustard plasters to the entire abdomen, and use hot mustard pediluvia from the beginning of the attack, and repeat them frequently. These may be followed by a cantharides plaster upon the abdomen—which certainly does no injury. After the saline has acted, give an effervescent or antacid mixture of this nature (which also had the support of the late Prof. E. Geddings): Potas. acetate, 1 dram ad 2 drams; potas. citrate, 1 dram; morphia, 1 grain; water, 6 ounces. A dessert-spoonful every two or three hours. Used to quiet gastric irritation and to act slightly as a mild antacid and diuretic.

No other treatment or active medication are required, save the continuance of the cold application and pellets of ice given internally if necessary. Doubtless a few drops of tincture of aconite added to the mixture, or given separately, might prove serviceable.

By this method those recover, according to my experience, carefully recorded, who are seen early; who possess their organs in a state of integrity; with the intestinal canal, liver, kidneys, and other emunctories in a fair condition. This surely is not asking too much; and to claim that recovery will almost invariably ensue in such cases, under the plans detailed elsewhere, and on this occasion, is, if I am correct, making what I can not but regard as a true and important advance. This I hope and believe will one day be fully acknowledged. It is spoken seriously and earnestly without lightly coming to the conclusions, and I sincerely trust that the expression of them will not be regarded as presumptuous or premature.

How different is this from a former system of mercurial purgatives repeated every five or six hours, or a constant effort to induce ptialism by giving mercury with opium at any and every stage of the disease—with the omission of other measures insisted on here as of the first importance. Persons seized with such a fever, who are seen for ten or twenty hours, those who already suffer from organic lesions,

whether of the stomach, liver, or kidneys, whose digestive organs (so essential to the nutrition, growth, and repair of the system) are irritated and inflamed by the use of intoxicating drinks, can not be expected to respond to any treatment, however judicious and appropriate.² In such subjects there is great tendency to irritability of stomach; the purgatives are not retained, the inflammatory stage (fever) runs high, and can not be subdued. Congestion of the internal organs, kidneys, etc., with albuminuria, occurs; black vomit sets in; and uremic poisoning, with coma, generally closes the scene—during attacks of violent convulsions. Under such conditions, all agents prove nugatory; every effort is necessarily unavailing; and these cases—falsely and illogically reasoned from—bring reproach upon true and legitimate treatment, which can be shown to be serviceable in those who, from the beginning, are not plainly beyond the reach of art.

In my humble judgment, if not the height of folly, it is at least extremely unfair to decry or, which is worse, to abandon, a course of management which is eminently and strikingly successful in nearly or quite all the cases of the class previously described, because it fails to cure those who have no right to expect a miracle to be worked in their behalf.

Any treatment which is successful is not so by accident, but because it is based upon the requirements and real nature of the disease and throughout does the patient no harm. It is high time for the intelligent members of our profession, particularly if they be at all apathetic, to give up the pleasing idea that the practice of physics is all guesswork, in which one artist does full as well as another; that fate and the disease have the control, and that always when a child or man dies the "physician who heals is Death."

THE CAISSON EXPLOSION OF BATTERY F, SECOND REGIMENT OF THE U. S. LIGHT ARTILLERY.

BY EDMUND ANDREWS, A.M., M.D., LL.D.

FORMER SURGEON OF FIRST REGIMENT OF ILLINOIS LIGHT ARTILLERY;
PROFESSOR OF CLINICAL SURGERY IN MERCY HOSPITAL, ETC.

The writer is at present in charge of a number of soldiers wounded by an accident so rare, that hardly any officer in the United States service has seen an example of it.

The singular character of the wounds produced, and the rarity of the causes producing them, render the cases most instructive for study.

The late riots in Chicago, by obstructing the United States mails, and arresting commerce on interstate railways obliged the general government to send to Chicago about 2,000 regular troops to maintain order.

On the 16th of July, Battery F of the Second Regiment of U. S. Light Artillery was moving at a trot on Grand Boulevard, supported by a company of the Seventh Regular Cavalry, when suddenly the three ammunition chests of the first caisson exploded with terrific violence.

The caisson was drawn by four horses, which were guided by two mounted drivers. Two cannoneers sat on the limber, or forward chest, but fortunately there were no soldiers on the two others. Two sergeants were riding beside the column, and also part of the

cavalry escort. A number of citizens were on the sidewalks, and at the doors and windows of the adjacent houses.

The two cannoneers on the limber were literally blown to pieces and the fragments scattered hundreds of feet. Two of the mounted men were also killed, and fifteen men were wounded. Three citizens received injuries. Nine horses were killed.

The singular character of the wounds will be noted below.

There were 126 cartridges of cannon powder in the chests amounting to over 400 pounds, besides a large number of shrapnel, and other loaded shells.

The subjoined cuts, and some of the facts about the nature of the shells, etc., are from an article furnished to the *Chicago Tribune* by an educated military officer.

There were two kinds of projectiles in the caisson; one, the simple steel shell with a time fuse. These were all picked up afterwards unexploded. The other kind were the complicated shrapnels which have percussion as well as time fuses, and exploded all

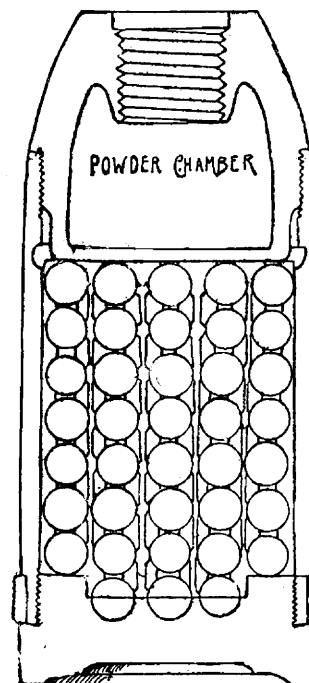


Fig. 1.—Longitudinal section of shrapnel.

about wherever they struck the ground. The shrapnel shell is named from its inventor, Gen. Shrapnel. Fig. 1 shows a longitudinal section of one.

The top of the shell is closed by a metallic plug screwed in and containing a complicated arrangement for firing the powder in the shell, whenever it strikes, or sooner if desired. Below the plug is a chamber filled with a small charge of powder—two and three-fourths ounces—just enough to burst the shell as it flies toward the enemy, while the pieces spread out in the form of a cone and continue on their course, making awful destruction. Below the powder chamber there is a larger cavity containing 162 lead bullets mixed with rings of cast iron. The bullets, added to broken rings and fragments of shell make for each shell over 300 pieces of metal to be shot fiercely into the faces of the enemy.

Experiments made to determine the effect on a target showed that the flying pieces pierced the wood

² "There is no hope for the drunkard."—S. H. Dickson.