DYNAMITE THROWN FROM CANNON BY POWDER.

On the 22d of April a trial was made in the vicinity of New York of firing dynamite from a 12 pound Rodman gun with a charge of powder. The system employed by the inventor, Mr. F. H. Snyder, to whom we are indebted for the following particulars, consists in the insertion of a buffer combination between the powder and the dynamite, so that the buffer will take up the shock without exploding the dynamite.

The trials were made in the presence of a number of spectators, and following, as they do, so closely upon the trials of the pneumatic dynamite gun, have excited great interest, particularly on account of the simple manner in which the problem has been met.

By referring to the accompanying illustrations, it will be seen that no extra appliances whatever are required as regards the gun. The dynamite can be loaded in ordinary guns, such as exist at the present day, and is fired in the usual manner with powder. The great advantages of such a system are obvious, since it conforms in every respect with the practice of firing solid shot, and is equally applicable to naval and land operations. In our illustration Fig. 1 represents an ordinary gun with the naval projectile in position. The latter consists essentially of the dynamite compartment, B, and the wooden shank, A, provided with wings, C, to guide it when it strikes the water.

In addition to this, and constituting the principal features of the invention, are the means provided for reducing the shock when the gun is fired. These consist, in the first place, of the sabot shown in Fig. 2. This is built up in three sections of wood or *papier mache*, W and S, between which are located leather washers with overlapping sides, L. In front of the third section, W, is placed a convex disk of copper, F, which bears against the former at its outer edge, the copper in turn butting against a plug, X. The whole is bolted together, all the disks, however, fitting loosely on the bolt. This arrangement acts both as a gas check and as a buffer, the washers, L L, performing the first office, and the copper disk the latter. This will be understood by stating that the copper disc is of smaller diameter than the bore of the gun; thus, when the latter is fired the shock is taken up by the disk, which becomes flattened out, thereby overcoming the inertia of the projectile gently.

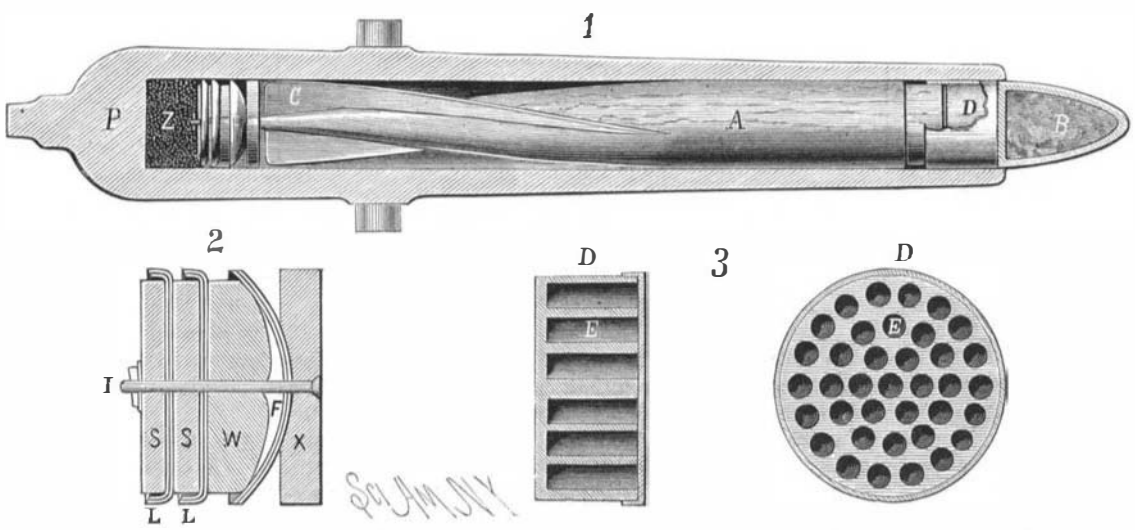
There is, however, still another provision made to reduce the shock of a sudden discharge, which consists in placing a cushion between the end of the shank, A, and the dynamite chamber, B. The latter is formed into a hollow cylinder at its rear end, passing over the shank, A, like a sleeve. Into this hollow cylinder there is placed the buffer, D, shown enlarged in Fig. 3. This is made of India rubber, and has a series of holes, E, running longitudinally nearly through, a cap fitting over the end to close the holes. When the projectile is in position the end of the shank lies against the bottom of the India rubber buffer, and the cap of the latter in its turn against the dynamite compartment, the shank, A, being recessed a short distance behind the sleeve so as to allow free motion. When the gun is fired the shock is partly taken up, not only by the rubber, but also by the air which is confined in the holes, E, and which cannot escape, the device making a very efficient cushion, which experiment has shown to be all that is necessary.

For land purposes the projectile is considerably shorter than the one shown in the illustration; it is cut off close behind the dynamite compartment, and lies well down in the gun. Thus, for an 8 inch gun the naval projectile has a length of about 9 feet, while the land projectile is about 3 feet. In the experiments lately made, projectiles were fired from a Rodman 12 pounder, 4·62 inch bore, in which quick burning "FF sporting powder" was used, and which threw a charge of 5 pounds of dynamite three-quarters of a mile; the dynamite buried itself several feet in soft mud without exploding. Subsequently, when firing a naval projectile, the latter ricocheted a long distance before sinking, thus proving itself capable of striking a ship at the water line with certainty

Another important point observed is the fact that the recoil of the gun is greatly diminished by the interposition of the cushions, which property will commend itself particularly in naval guns.

As yet no official tests have been made of the system, but the United States Government has invited thei nventor to make a trial of it, which will take place at Sandy Hook as soon as arrangements can be made.

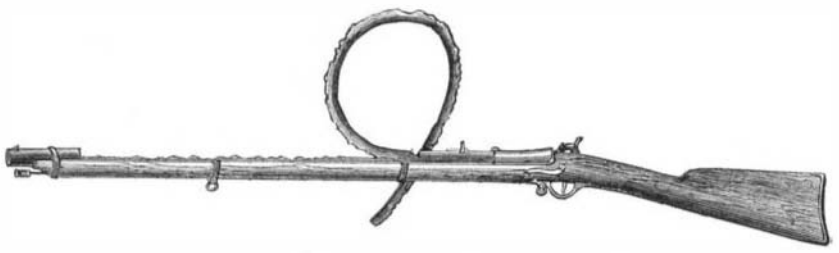
The simplicity of the system must commend itself, requiring no change in the cannon, and entailing but a small cost in the other appliances used. As a weapon of destruction in warfare, dynamite is as yet an almost unknown force, but if a charge can in this way be thrown five miles many old ideas will have to be discarded.



DYNAMITE CARTRIDGE THROWN FROM CANNON BY POWDER.

THE BURSTING OF GUN BARRELS.

We give below some extracts from a letter of Mr. Munn Davis, of Nebraska, who writes us upon the subject of the bursting of gun barrels, and criticises some articles which have been published upon this subject in some of the sporting papers and in *Harper's Weekly* by Mr. W. McK. Heath,



THE BURSTING OF GUN BARRELS.

of Philadelphia. Mr. Heath has been making some experiments, and he has spent many words in describing them. But the point which is of most interest, and which would render his experiments of any value, he seems carefully to have avoided, namely, the cause of the bursting of gun barrels. He passes over the subject with a single sweep of the pen, and says that it is the jamming of the projectile against some obstruction in the muzzle of the barrel. This may be all very true, but it scarcely explains anything, and least of all the real action which takes place

Fig. 1.

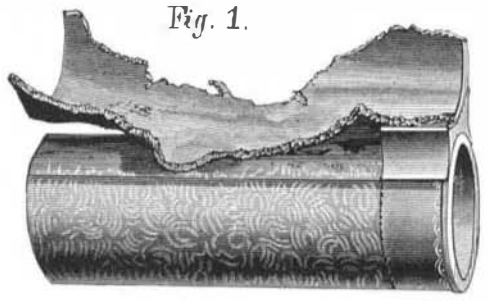
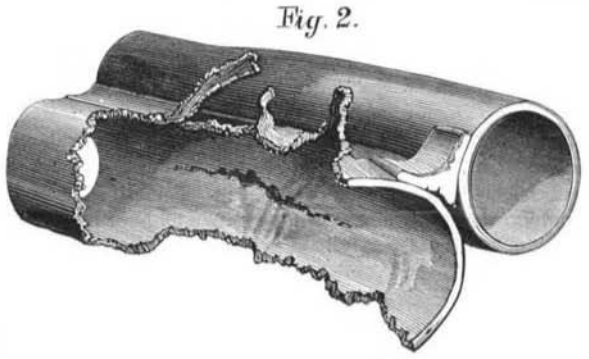


Fig. 2.



THE BURSTING OF GUN BARRELS.

in the barrel before and during the explosion. Mr. Heath's experiments have consisted in discharging guns which had been obstructed at the muzzle by all sorts of different substances, such as mud, sand, water, snow, stuck bullets, etc., and of whatever value the experiments may prove to be, they show one fact very conclusively—that it makes little odds whether a barrel be obstructed with a bullet or simply with wet sand; in either case the result may be equally destructive.

If Mr. Heath's theory is true that the bursting is due to simple jamming of the projectile against the obstruction, we do not see how he explains what has become of the air which filled the space between the projectile and the obstruction before the discharge, nor how he accounts for that total wreck of firearms which we so often hear of. Mr. Davis, in his communication, has elucidated this point, we think, in an experience which he relates, and in which case the bursting must have been due, not to the jamming of the bullet against the obstruction, for this does not seem to have occurred, but to the almost instantaneous compression of the air in the barrel between the cartridge and obstruction. He says:

"During the summer of 1871 I saw in Topeka, Kansas, among a lot of government arms that were being overhauled and cleaned, a "needle gun" which had been burst by a "stuck" ball about four inches from the muzzle. The upper part of the barrel had been blown up and back, the rupture commencing at the rear end of the "stuck" ball; the end of the broken section had struck the barrel itself at a point immediately in front of the back sight, and with such force as to dent it about one-sixteenth of an inch in depth, and had then glanced off to the right side and continued its course downward some three or four inches below the lower line of the stock. The "stuck" ball was still in the gun, and showed *no signs* of having been struck by the projectile, except that in one place it was slightly battered over the jagged edge of the ruptured barrel. If it was not the compressed *air* which caused this break, what force was it which could split the barrel from the rear end of the "obstruction" to the point of indenture, just in front of the back sight, a distance of about fifteen inches? The accompanying sketch shows the appearance of the gun at the time." Fig. 1.

"I also send a fragment, 2½ inches long, taken from the muzzle of a Piper breech-loading shotgun, the right barrel of which burst from a mud obstruction at the muzzle. The barrels are Damascus steel, and have a patent appliance at breech and muzzle, by which they are said to be "re-enforced." It is evident in this case that the shot struck the "obstruction," and then "wedged" to such an extent as to cause the rupture, as you will readily perceive the black line of lead still sticking to the barrel."

"In most breech-loading shotguns the diameter of the shell chamber is perceptibly larger than that of the remainder of the barrel, and it is customary to use a No. 8 wad in loading a 10 gauge brass shell. This gives what is commonly called a "force" wad, *i. e.*, a wad which will fit tightly the entire length of the barrel; and, to a common thinker, it seems as though the wad over the shot would be sufficient to remove the "obstruction," provided it was not jammed into the barrels so tight as to prevent the escape of air. Some think the break is caused by the shot jamming against the "obstruction," and indeed this seems to be the case with the Piper gun."

"A few days since I took occasion to test the matter, with the following results: Procuring an old muzzle-loading shotgun (No. 14 gauge), I loaded each barrel with four drachms of Hazard gunpowder (FG) and two No. 12 Ely Bros.' pink edged wads. In the right barrel two of the same kind and size wads were placed about two inches below the muzzle, and in the left barrel I put one wad down about the same distance from the muzzle, and on top of it some *mud*, crowding it against one side of the barrel so as to leave clear about half the space. The gun was then discharged, and the "obstructions" in both barrels were blown clear without injury to either barrel. The piece was loaded again in the same manner as before, and mud put in the muzzle of each barrel, but a small aperture was made through the "obstruction" in the left barrel. The result of the discharge this time, however, was the bursting of the right barrel, where the obstruction was solid, while the left barrel, in which the obstruction had a small aperture, remained intact. The effect upon the right barrel may be seen in the illustration, Fig. 2. *There was no shot in either barrel.*"

"On different occasions I have fired a rifle when the ball was so tightly lodged about ten or twelve inches from the muzzle that it was impossible to move it with the rammer, and I did on one occasion fire a *ramrod* from a shotgun when the wad had "turned," and thus wedged it in the barrel so that it could not be moved, but have never had a gun burst in my hands yet."

A 30 inch barrel probably has over 24 inches of air space between the charge and the obstruction.

The sudden compression of this air not only wedges the obstruction tighter, which prevents the escape of the air, but will generate an immense pressure, by compression, liberation of latent heat of compression, and the escape of the products of combustion by windage, of from three to four thousand pounds per square inch, before the charge could reach the obstruction.

This great pressure is made up from say 60 or more volumes of air instantly compressed into one volume, which will give about 450 pounds. The heat liberated by this amount of compression is theoretically over 5,000° Fah., which will add a thousand pounds more to the pressure. This is upon the supposition that there is no windage or leakage of the products of combustion of the charge past the bullet or wad, which however is not to be admitted.

The windage during the first few inches of the movement

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of ball and wad, when the pressure is at its greatest behind them, must be very considerable, and in some cases is no doubt enough to add one or two thousand pounds to the pressure above enumerated. This pressure is greater than the thin and possibly defective muzzles of some shotguns or muskets will bear. Any opening in the obstruction that will give vent to the compressing air without having to overcome the momentum of a solid body will very much modify the liability of rupture at the muzzle.

Deep Water Fishes.

Remarkable additions have been made to our knowledge of the animals inhabiting the profound abysses of the sea within the last few years, and almost the last few months, by means of the system of dredging persistently and regularly carried on from government vessels.

One of the results has been to reveal the fact that a remarkable group of fishes—*Malacosteus*—have their home only in those hidden depths. We cannot call them a "group" in respect to ichthyological classification, for they are of very diverse types; it is only that certain very strange features are found common to them all, and these features are doubtless associated with the abysmal region which is their home.

The most striking of their peculiarities of form is the disproportionately enormous development of the jaws and jaw apparatus. The skull, the true head of the fish, is quite remarkably small, while the parts representing the maxillary structures of other fishes are elongated to such a degree that so far as they are concerned one could easily swallow an object much larger than his own body, several times as large, in fact. A glance at the figures shows this much better than many words of description. What object is served by this peculiar form is not evident, and yet it apparently pertains in some way to the depth at which they live.

The feeble development of bone cells, from which has come the use of the name *Malacosteus* (soft bones), was suspected by some to be accidental; but now it is found that it pervades the group to a certain extent, though more completely shown in *Malacosteus* than in any of the others, and associated also with a softness and looseness of the other tissues. The suggestion has been made that this lack of firmness and solidity may be due to the great pressure borne by the fishes at such enormous depths; that this tends to sustain the tissues and hold them in place, thus giving the animal power to act firmly and strongly: but such a supposition can scarcely be maintained.

In fact, this matter of pressure upon living tissues being caused by great depth, or any depth whatever, has been sadly misunderstood. The theory is totally untenable, and it is singular that it is so constantly brought forward and urged. That pressure must necessarily come upon any cavity, either filled with air or not, is certain, the pressure being proportionate to the depth. This has been shown most strikingly in connection with the attempts of the Fish Commission to lower electric lights to a great depth. The lights have been extinguished invariably, because it has been found impossible to prevent the entrance of water into the glass vessels, even when the points of insertion of the wires have been secured with every care available; it seemed as though the water had been forced through the pores of the glass itself by the pressure. Is it to be supposed that any living tissue could retain its vitality under such a strain? And still again, any motion whatever by the animal would be an absolute impossibility. If he was placed in a vise, no power of the screw could "set" him so hard and fast as the pressure of say 2,000 fathoms.

The simple fact is, that every portion of the body of the fish, every single microscopic cell, is permeated by fluid, in perfect correlation with the surrounding water; and as the internal and external reactions are equal, there are no differences of tension, and of course no pressure is manifested or felt.

We cannot believe, therefore, that the conjecture as to this cause having anything to do with the looseness of structure has any foundation in truth. A much more rational idea appears to be this: That the gloomy depths of the sea water are totally and constantly at rest; all is quiet, and motion is performed with so much freedom and ease, that firmness of tissue, either osseous or muscular, is not required.

And with this quiescence of the water in their home is associated another characteristic which pervades the deep sea group to a certain extent, which is the great slenderness and delicacy in form of the fins and other appendages, and in some instances even of the posterior portion of the body itself, as strikingly shown in *Macrurus globiceps*. The fins themselves are often only indicated in position by exceedingly delicate fibers or rays without connecting membrane.

Another strange, and as yet scarcely intelligible, feature shown by many of these fishes, but not by all, is the presence on the head or along the sides of curious rounded masses, "showing mother-of-pearl colored bodies embedded in the skin." These have been conjectured to have some relation to the eyes, or to sight, but there is apparently small ground for such a belief. There is no reason to think that they have any connection with the nerves of vision, nor have they the structure which could render such a connection of avail. Dr. Gunther suggests that they may be "accessory eyes," or may be producers of light from phosphorescence. Even a suggestion from him is worthy of respect, but what these organs could achieve in the intense darkness of the sea bottom must be infinitesimal in effect. In none of the other types is this strange feature more fully developed than in *Malacosteus*. Almost all of these fishes show evidence, from the nature of their jaws and teeth, of being strongly voracious in their habits and rapid in movement, and it is not impossible that phosphorescence, if pertaining to these "mother-of-pearl" bodies, might serve as a lure for their prey. Perhaps this is as probable a conjecture as any other.

IMPROVED PERMUTATION LOCK.

The accompanying engraving illustrates permutation locks intended for trunks, valises, satchels, wardrobes, bureaus, drawers, desks, etc., and for which letters patent were recently issued to Mr. W. M. Brooke, of Brooklyn, N. Y. The arrangement of the lettered disks is such that

IMPROVED PERMUTATION LOCK.

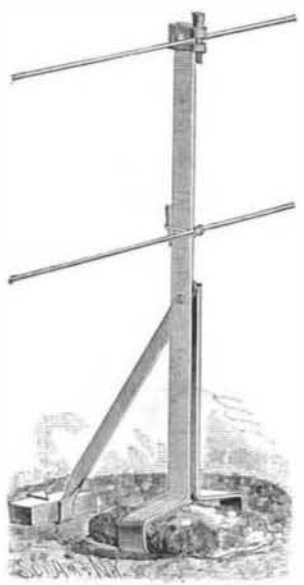
different combinations can be conveniently formed. The superior excellence of these locks lies in the fact of their being burglar-proof and keyless, and also because of their simplicity of construction, durability, strength, and ease of management.

Messrs. Sias, Swasey & Co., of 78 Broad St., Room 14, New York, are the sole managers, and propose to manufacture pad locks and to dispose of British and Canadian rights to manufacture, and also privileges for manufacturing in the United States, except for pad locks.

This is a substantially meritorious and ingenious invention, worthy the investigation of those interested in this branch of manufacturing industry.

AN IMPROVED FENCE POST.

The annexed illustration shows an invention recently patented by Messrs. G. Moll and F. Hottes, of Mascoutah, Ill. The post is made of bar or band iron bent to form a flattened loop at the lower end, and then extended upward to about the middle. The loop is formed to receive a block of stone or a brick. The upper end of a brace is pivoted to the post as shown; the lower end is bent to form a loop for receiving a brick or block. Loosely held to the upper end of the post by a rivet is a U-shaped clip which may be swung to opposite sides of the post, and which is cut away at the head so as to form two loops projecting from the edge of the post. The wire is held in place by a pin passed through the loops. The second wire is held by a U-shaped wire having hooks



MOLL & HOTTES' IMPROVED FENCE POST.

at the ends of the shanks, and held to the post by a wedge-shaped pin driven between the cross piece and the post. The post is sunk in the ground as far as may be necessary, the earth bearing upon the blocks in the loops holding it firmly in place. By pivoting the brace and clip, they may be swung to opposite sides without digging up the post. Our engraving shows the post ready to be set in the ground.

Poisonous Sleep Producers.

The death of a medical man—Dr. John Middleton, late Surgeon-major in the 2d Life Guards, but at the time of his decease a practitioner at Stockton—will again draw attention to the mischievous and, as we believe, wholly indefensible practice of giving and taking such depressing narcotics as chloral and bromide of potassium as a remedy for sleeplessness. Sleeplessness is always wakefulness in one or more of its multitudinous forms, and the recourse to narcotic poisons for its relief is utterly unscientific and deplorable from a therapeutical point of view. It is as clumsy in theory—in so far as it can be said to have a theory—as knocking a man down because he needs rest. What is it that prevents the natural and physiological rest of the body at rhythmical periods? The brain is as truly a part of the body as the stomach, and it is as much a fault of the organs of the mind to prevent sleep by mental worry or wakefulness as it is a fault of the stomach to render sleep impossible by bad digestion. No intelligent practitioner dreams of narcotizing the nerves of the gastric organ to promote sleep. Why, in the name of common sense, should any medical man for an instant think it legitimate to narcotize the brain because *it* exhibits some disturbing irregularity in its functions?

Sleep is not a special prerogative of the brain. Every organ sleeps, and general sleep is the aggregate of many sleeps. It is time to protest against this clumsy procedure. If we do so warmly, it is because we feel that the mistake is of common making. It is so much easier to write a prescription or make up a bottle of medicine or a box of pills with one of the rank poisons that mimic sleep, and as they do so deprave cerebral and nerve tissue, than it would be to search out the real and active cause of wakefulness. When will the progress of professional enlightenment reach that point at which all those cloaks for ignorance that depend for their significance on the negative *in* are ostracized from our nomenclature? Dr. Clifford Allbutt has just pleaded forcibly and eloquently for the discarding of that wondrously silly word "indigestion." Will no spirited scientist help to exorcise the haunting folly that clings to the term "insomnia"? All terms with *in*, negative, imply ignorance on the part of those who frame and use them, and, which is worse, are content with the state of knowledge arrived at, or are too indolent to extend and improve it. Who shall sound the depths or measure the range of the stupendous unknown over which the audacity of a specialty and the apathy of a profession conspire to cast the veil of "insanity"? There are more than a score and a half of *known* causes or forms of sleeplessness, each one requiring direct and specific treatment, and yet, as by common consent, the profession sanctions the abuse of such drugs as chloral and bromide as "poisoned sleep" producers. No medical man is justified in undertaking the treatment of his own maladies. It is impossible that he should so far step out of himself as to be able to form a reasonable judgment of his case *objectively;* and no practitioner has the justification of science for the recourse to narcotics as remedies for sleeplessness except when an exceptional pain is the accidental disturber of a sleep function, or a habit of wakefulness may be broken by an occasional dose of the stupefier.—*Lancet.*

An Improved Photo Developer.

At a recent meeting of the Society of Amateur Photographers of New York, Mr. H. J. Newton communicated a formula for an improved developer for gelatine plates which he had found by experiment to be particularly valuable in the development of instantaneously exposed plates, and also to produce negatives of a superior color and quick printing quality. He makes two stock solutions in the following proportions:

Stock No. 1.

Water	1 ounce.
Dried carbonate of soda in which the water has been driven out	48 grains.
Pure carbonate of potash	48 grains.

Stock No. 2.

Water	1 ounce.
Sulphite of soda	48 grains.

To develop a 5 x 8 plate with a drop shutter exposure he pours in the graduate ¾ of an ounce of 6 drachms each of No. 1 and No. 2, and then adds 1½ ounces of water and 6 grains of dry pyrogallic acid. It may be mixed half an hour before use if desired. The sulphite of soda keeps the solution clear.

If the exposure has not been too long, the developer will rapidly bring out the image; the development should be carried on until the whites of the shadows have turned a steel gray color.

If the plate has been overexposed, the developer should be diluted with water and restrained with two or three grains of bromide of sodium to each ounce of developer, which may be in the form of a 10 per cent solution.

If the plate has been known to have been greatly overexposed, development should be commenced with 1 drachm each of No. 1 and 2 to 2¾ ounces of water and 3 grains of dry pyro, adding a little of each at a time should the picture develop too slow.

Pilocarpine for Deafness.

For all recent cases of deafness due to labyrinthine disturbances, whatever the primary cause may have been, Politzer tries the subcutaneous injection of a two per cent solution of the muriate of pilocarpine. He injects four drops at first, and gradually increases the dose to ten drops daily. He gets fairly good results in about one-half of the cases. I have seen three cases of persons totally deaf, who, after being treated in this way, could hear and understand loud speech spoken at the distance of a few inches from the ear; and Politzer has had one case of perfect recovery of the hearing after it had been absent for three years, and several other very satisfactory results following the use of this drug. He is about to publish the results of his experiments with the history of some of the cases. It is not known how pilocarpine acts in these cases, but the benefit derived from its use is certainly great in some of them. *Berlin Med. and Surg. Journal.*

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