Remarks by the Editor.—We have no doubt that some good practical results may be obtained by adopting the suggestions of our worthy correspondent. Possibly a polished concave speculum, which would collect and concentrate the heated rays upon the bulb of the thermometer, might be preferable to the cone. [*Tech. Rep.*]

Experiments on the Pressure of the Sea, at considerable Depths. By
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cal College, Philadelphia.

AMONG the various expedients resorted to for the purpose of relieving the tedium and monotony of a sea-voyage, no one is more common during a calm, than to attach to a long line (the log) an empty bottle, well corked, and then to sink it many fathoms in the sea. In all such experiments it is well known, that the bottles, upon being drawn up, are either full, or are partially filled with water. The manner in which the water gets into the bottle, is, in some instances, perfectly obvious, but in others very perplexing, if not wholly inexplicable. Sometimes the cork, however well secured and sealed, is driven into the bottle, and, when drawn up, the vessel is of course, found filled with water; and in such cases, what is a little surprising, the cork is often found occupying its original position in the neck of the vessel, being forced there, no doubt, by the expansion of the dense sea-water, on being drawn near the surface. This seems to be proved by the cork being often in an *inverted* position. In the above experiment, and in some others to be mentioned presently, the bottle appears to be filled instantly; as the person who lowers the bottle, often feels a sudden increase of weight, somewhat similar to the sensation produced, when a fish takes the hook on a dipsey line.

Sometimes the above experiment is varied, by filling a vessel with fresh water, which, on examination, is found to be replaced by salt water; the cork remaining, apparently, undisturbed.

Sometimes, when the previously empty bottle is only half full of water, this, when poured into a tumbler, effervesces like water highly charged with carbonic acid gas. This is readily explained: for when the bottle descends, it is full of air, and when the water enters, it will, of course, absorb the air; especially when the dense water itself expands as it is drawn towards the surface.

Sometimes the experiment is performed by first corking the bottle *tight*, and then tying over the cork a number of layers of lina dipped in a warm mixture of tar and wax; in fact, every device seems to have been tried to prevent the entrance of the water by the cork. In many of these cases, when the bottle is drawn up from a depth of 200 or 300 fathoms, it is found filled, or nearly filled with water, the cork sound, and in its first situation, and the wax and tar unbroken. Two experiments are mentioned, in which ves-

sels with air-tight glass stoppers were used. In one case, the bottle was broken, and in the other, some drops of water were found in it.

How does the water find its way into the bottles? There are two opinions: one is, that it passes through the cork and all its coverings, in consequence of the vast pressure of superincumbent water, in the same manner as blocks of wood are penetrated by mercury, in the pneumatic experiment of the mercurial shower. The other, and less popular opinion, is, that the water is forced through the pores of the glass.

The following experiment, which I made on the 7th of May, 1828, in latitude 48° + longitude $24^{\circ} 34'$, will, perhaps, throw some light on this subject.—Mr. Charles Dixey, the obliging and intelligent master of the packet-ship *Algonquin*, had a boat rowed off from the ship, for me, to the distance of about half a mile, when the sea was almost perfectly calm. A hollow glass globe hermetically sealed, which I had previously prepared in Philadelphia, was then fastened to a line, and sunk, with a heavy mass of lead, to the depth of 230 fathoms, or 1380 feet. On the same line, and 30 fathoms above the glass globe, was fastened a small bottle with an air-tight glass stopper; 50 fathoms above this, a stout glass bottle with a long neck, was tied; a good cork was previously driven into the mouth of this bottle, which was then sealed over with pitch, and a piece of linen dipped in melted pitch, was placed over this; and when cool, another piece of linen treated in the same way, was fastened over the first. Twenty fathoms above this bottle, another was attached to the line, much stouter, and corked and sealed like the first, except that it had but one covering of pitched sail-cloth. Thirty fathoms above this, was a small thin bottle filled with fresh water, closely corked; and 20 fathoms from this last, there was a thin empty bottle corked tight and sealed, a sail-needle being passed through-and-through the cork, so as to project on either side of the neck.

Upon drawing in the line, thus furnished with its vessels, and which appeared to have sunk in a perpendicular direction, the following was the result:

The empty bottle with the sail-needle through the cork, and which came up the first, was about half full of water, and the cork, and sealing, as perfect as when it first entered the sea.

The cork of the second bottle, which had been previously filled with *fresh* water, was loosened, and a little raised, and the water was *brackish*.

The third bottle, which was sealed and covered with a single piece of sail-cloth, came up empty, and in all respects as it descended.

The fourth bottle, with a long neck, and the cork of which was secured with two layers of linen, was crushed to pieces, all except that part of the neck round which the line was tied; the neck of the bottle both above and below the place where the line was fastened, had disappeared, and the intermediate portion remained embraced by the line. This I thought a little remarkable; but, perhaps, it may be explained by supposing that the bottle was first filled by the superincumbent pressure, with dense sea-water, which expanded on being

drawn up near the surface. Had the vessel been broken by external pressure, that part surrounded with the line, ought to have been crushed with the rest.

The fifth bottle, which had been made for the purpose of containing French perfumery, or æther, and which was, therefore, furnished with a long close glass stopper, came up about one-fourth filled with water.

The hollow glass globe, hermetically sealed, which was the last, and had been sunk the deepest of all, was found perfectly empty, not having suffered the smallest change. It is, therefore, concluded, that at the depth of 230 fathoms, the water enters glass vessels through the stoppers and coverings which surround them, and not through the pores of the glass. What the effect of a pressure of 400 fathoms or more will have on the glass globe above-mentioned, Captain Dixey has engaged to ascertain for me on his return to America, if opportunity shall offer. [Phil. Mag.

Account of a new method of projecting Shot, discovered by

MR. SIEVIÈRE.

At a meeting at the Royal Institution in London, held on the 23d of May last, Mr. Brockedon gave some account of a new method of projecting shot, which had been discovered by Mr. Sievière, the sculptor. Mr. Sievière had furnished Mr. Brockedon with a report of his earliest experiments, and to some of a later date, Mr. Brockedon was an eye-witness. The discovery was accidentally made many years since, by Mr. Sievière, who was one evening amusing himself with a pewter syringe, which he had converted into a cannon, having closed the discharging end of the syringe, and made a touch-hole. Into this cannon, he put some pinches of gunpowder, and discharged the piston from it, which fell harmless at a short distance; happening to invert the order of firing, by holding the piston, the syringe was discharged with so much violence, as to pass through the ceiling and floor into the chamber above that in which he sat. He was struck with the prodigious difference of effect produced, and immediately had a shot cast, which, in form, was like a mortar: this he fired from a solid mandrel, or bar swung upon trunnions, and capable of elevation and adjustment. His experiment succeeded so entirely, that he was induced to make a shot with radiant bars, which, though they added little to its weight, added much to its power of destruction to rigging, &c. The weight of this shot, which was of cast-iron, was 15 pounds; this was discharged through a bank of clay 6 feet thick, and fell 20 yards beyond it. When fired again, it hit point blank at a distance of 175 yards, and was buried above 3 feet in the bank; the chamber of this shot, with which a touch-hole communicated, was precisely like that of a mortar, and when it was placed for firing upon the mandrel, the shoulder of the chamber at the bottom of the calibre rested upon the end