The Treatment of Pneumonia.

About a half a century ago, Mr. Samuel McEvatt, now of Paterson, N. J., was cured of pneumonia by a very simple course of treatment, which not only restored him to health, but left him with unimpaired lungs. He has since made use of the same treatment in a number of cases, several of which were unusually severe and had been given up as hopeless. In all of them, however, he met with entire success, and consequently desires to publish the remedy, in the hope that it will be a benefit to others.

Leeches, fomentation, and linseed poultices are the three necessary elements in this course of treatment. If the case is severe, and great difficulty in breathing is experienced, six leeches are used, but ordinarily four will be found sufficient. These are applied on the back, as close as possible to the shoulder blade. The patient should be sitting up and leaning slightly forward, in order to support the leeches. The skin under the shoulder blade is first washed with a little sweetened milk. The leeches are then placed in a glass about two and a half inches wide, which is carefully turned upside down over the spot indicated. It is well to have the glass touch the shoulder blade, and be held a little toward the spine. It may be removed when the leeches have once taken hold. As soon as they drop off, flannel cloths dipped into boiling water are applied to the wounds, and this process of fomentation kept up for half an hour. During this time the water from which the cloths are taken must be maintained at almost a boiling heat. This part of the treatment removes more blood than the leeches. Two or three linseed poultices are then applied to the wounds in quick succession.

The patient will be extremely weak from the loss of blood, and some simple and easily digested nourishment should be administered. The impeded respiration, Mr. McEvatt states, will soon give place to an easy breathing. He has had an opportunity of treating a number of cases, and has met with such constant success that he believes himself justified in saying that if these simple directions are faithfully carried out, the patient will be quite safe. We feel obliged, however, to add a word of caution. Pneumonia is a disease of so serious a nature that wherever possible it would be much wiser to consult a physician, and permit him to decide whether the patient could safely be subjected to this course of treatment. It is one of the recognized modes for strong, healthy persons to give them a single full bleeding; but where the patients are feeble or well advanced in years, the loss of any considerable amount of blood would not be admissible. In case of emergency, when no physician is available, or where he has made a careful examination of the patient, and decides that the system can stand the strain of losing so much blood without injury, we have reason to believe, from the evidence submitted, that the method of treatment here recommended would prove very beneficial, but like all other treatments it must be employed with discretion.

Papaine.

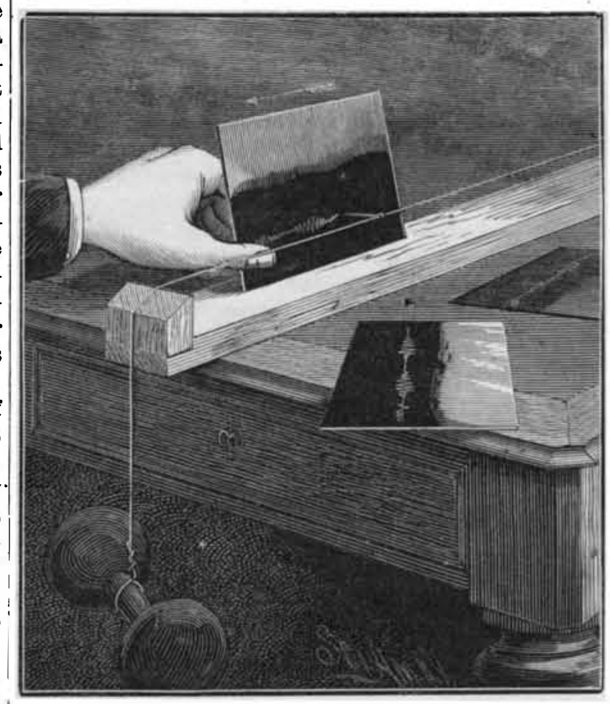
Papaine, obtained both in the form of a white powder and of a dried juice from the fresh milk of the fruit of *Carica Papaya*, is known in this country commercially as *Papaine-Christy*. Under the name of *Papaine-Finkler* also two preparations are known in commerce, and there is one by Merck, of Darmstadt (*J. Soc. Chem. Ind.*, 1885, 571, and 1886, 390). A chemist residing on the Papaw plantations prepares the article from the milk for Mr. Thos. Christy, of London.

Papaine, which, from its chemical nature, is considered to belong to the peptones, is capable, according to Professor Finkler, of Bonn, of dissolving in pure water 1,000 times its weight of fibrin. Experiments show that the papaine preparations are ferments which dissolve albumen; that this solvent action occurs under very different conditions; that it is possible with a very small quantity of the ferment to dissolve a large quantity of albumen. The action is not one of simple solution, but the albumen is changed into peptone. Papaine dissolves albumen best in water, but almost equally well in a slightly alkaline solution, but less readily in dilute HCl. Experiments were made in these three directions with 30 grm. fresh fibrin, 0·03 grm. papaine, and 100 c. c. water, 100 c. c. of 0·1 per cent HCl or 50 c. c. of 0·1 per cent KOH. After 72 hours the fibrin in all cases was completely dissolved. This action goes on between wide ranges of temperature. A higher temperature, 40° to 50°, has an accelerating influence. The author finds from experiment that 1 part of *Papaine-Finkler* dissolves 1,000 parts of fibrin. It has been repeatedly observed that 8 grm. hard boiled albumen were dissolved by 0·01 grm., and even by 0·001 grm. of papaine. Finkler states that it dissolves very rapidly the membranes of diphtheria and croup, and that not a single patient he has treated in the University Hospital or in private practice has died, but that all recovered. In each case the membrane was dissolved by painting it with papaine about five times per diem. He further adds that since papaine can be applied with salicylic acid, which increases its action, there is no other drug known equally powerful for the purpose named. Finkler found that when the membrane was dissolved, the fever disappeared. In the *Berliner Klinische Wochenschrift* (1885) it is stated that Dr. Schoffer, who had tried most of the remedies recommended for diphtheria, obtained the best results with papaine. In the summer of 1884 he treated forty-seven cases of this deadly complaint with a 5 per cent solution of it. The treatment was commenced as soon as possible, and the patches were to be painted every five or ten minutes; in a few hours the membranes are said to be removed, and the fever meanwhile disappears.—*Chem. Zeit. and Christy's New Commercial Plants and Drugs.*

EXPERIMENTS IN SOUND.

T. O'CONOR SLOANE, PH.D.

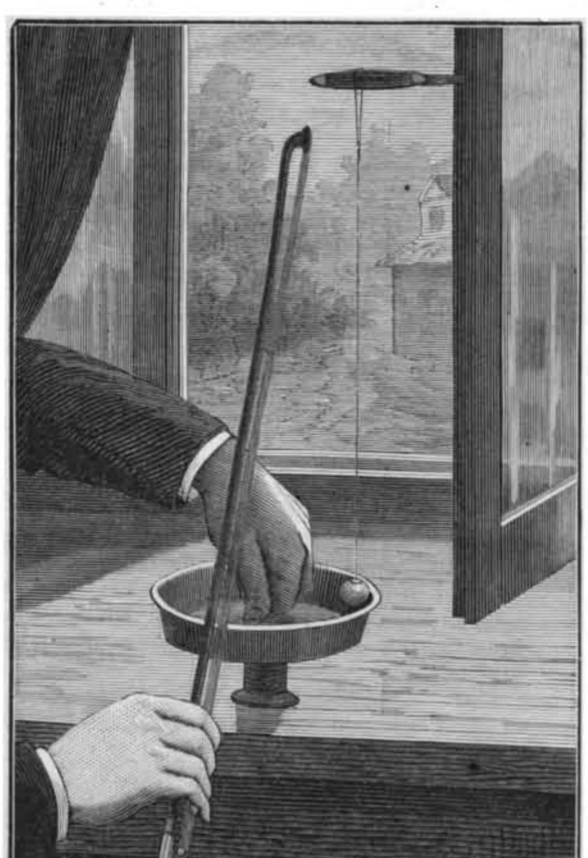
By means described in the last number of this journal, we have seen some of the laws that govern the



GRAPHIC SOUND WAVES.

vibrations of strings experimentally examined. Loops and nodes were produced, and their existence proved by the use of riders. Next, by Melde's experiment, they were made visible to the eye. So far, one thing will have been noticed: that all sounding bodies so far experimented with are in actual physical motion. In the experiments to be now spoken of, this motion is to be still further studied.

It has been found that sound is always produced



VIBRATIONS OF SOUNDING VESSEL.

by a body in actual motion. This motion must be rapidly repeated. It is doubtful if one motion could produce sound, properly so called. If the motion is rapid enough in actual rate to affect the air, and is repeated rapidly enough, and not too much so, then sound is produced. The range of repetition that can be thus defined extends at the utmost from nine vibrations to forty-one thousand per second, or over twelve octaves. But these are extreme limits, and for ordinary ears and ordinary types of sounds they must be curtailed about one octave at the base and one at the highest range. As soon as sixteen thousand vibrations per second is passed, the ear can no longer place the notes musically. The next fact to be observed in this connection is that by delicate enough means the air can always be proved to be in corresponding motion when sound is transmitted. When a body is made to vibrate in a vacuum, no sound is produced. Hence the conclusion is reached that air is the bearer of sound through space.

Very extraordinary results of calculations founded on this principle may be deduced. A sphere of air, one mile in diameter, contains seventy-seven French billions of cubic feet of air, weighing five billions of pounds, or three millions of tons. Yet a slight sound may be heard at a distance of half a mile, and therefore has possessed power enough to throw this vast weight of air into motion. The vocal organs of a bird or even insect may do this. This calculation, or parallel ones, has been used to throw discredit on the air theory of the transmission of sound, but we cannot refuse to believe it under our present limitation of knowledge.

To find the character of vibrations producing sound, the first experiment may be carried out. A pin is secured to the tightly stretched wire of the monochord. To do this, the head and upper end of the pin is bent around the wire, and the pin sustained in a horizontal position until a drop of sealing wax is melted on the pin and wire, and has cooled. Then the support may be withdrawn, and the wire be left free.

Some pieces of glass are next to be provided. They are smoked on one side over a candle or a partly full gas flame. A full flame does not deposit lampblack so freely, and is more apt to crack the glass. The string is set in very strong vibration, and one of the slips of glass is rapidly drawn past the vibrating pin, and barely in contact with it. The wave motion of the cord is delicately developed on the glass as an elegant wave line, diminishing rapidly in altitude of its sines. This forms a very pretty lantern slide. If it were possible to move the glass at the rate of one thousand feet a second (more accurately 1,093), a correct graphic representation of the phases of the air wave would be reproduced. If it were known just how long the glass was in contact with the pin point, the number of vibrations per second would be known. This under the circumstances is impossible, of course. But an accurate ear could place the note given by the string, and the number of its vibrations per second could be ascertained from the text-books, and then, by counting the number of waves marked on the glass, we could determine the period of contact. This last principle is often of great use. A tuning fork can be, and frequently is, used as one of the most delicate and accurate measurers of time, by precisely such a method. The oscillations may run up to 1,100 per second, and, marked on a slip of smoked glass, divide a second to this extent. These three illustrations show what value may attach to this line of work in physics. It may be recurred to in future articles of this series.

The line drawn by the pin point being a true wave line, without angles above or below, shows that the wire is at rest at the beginning and end of its beat, and that from this rest it gradually attains its quickest transverse motion, and loses it in the same way.

Knowing the velocity of sound and the number of waves per second, we may by simple division ascertain their length. It varies from seventy feet to a fraction of an inch.

Other bodies than strings may be made to vibrate, to produce sound, and the vibrations made to produce visible effects. A violoncello bow can be made to draw musical notes from the most unpromising objects. A common stamped metal pan is shown in the cut, held firmly upon the upper end of a spool. From it pure notes can be drawn by a bow manipulated as shown. To prove that it vibrates, a marble is suspended in contact with one of its sides. The thread is attached to a piece of leather cemented to the marble by gum tragacanth. As soon as the true note is struck, the marble starts into motion, being repelled from the side of the pan over and over again as long as the sound continues. The marble must be so placed as to rest in good contact with the metal; the thread should not be in a vertical line, but should be inclined slightly away from the dish.

By using thin wineglasses or goblets containing a little water, very beautiful waves may be produced on sounding them with a violoncello bow or with the wet finger drawn around their upper edge. By using a spool and bow as shown, dinner plates, small tea trays, and other objects may be made to yield notes of great purity.

It is most interesting in thus experimenting to find from how many objects notes can be drawn. By similar manipulation, Chladni's plates may be simply experimented with, which will be more fully explained hereafter.