Sphygmoscope.

The accompanying figures illustrate a new instrument for indicating the movements of the heart and blood vessels, invented by Dr. Scott Alison, London.

The sphygmoscope consists of a small chamber containing alcohol, or other liquid, provided with a thin india rubber wall, where it is to be applied to the chest. At the opposite extremity the chamber communicates with a glass tube, which rises to some height above its level—the chamber. Liquid is supplied to the instrument until it stands in the tube a little above the level of the chamber. The pressure of the column of liquid in the tube acts upon the elastic or yielding wall of india rubber, and causes it to protrude. This protruding part, or chest-piece, is very readily affected by external impulse; it yields to the slightest touch, and, being pushed inwards, causes a displacement of the liquid in the non-elastic chamber, and forces a portion of liquid up the tube. The protruding wall of india rubber is driven inwards when it is brought in contact with that portion of the chest which is struck by the apex of the heart, and a rise in the tube takes place. When the heart retires, the india rubber wall, affected by the pressure of the column of liquid in the tube, is pressed back, follows the chest, and permits the liquid to descend. The degree to which the india rubber wall is forced in by the tube, and the amount of protrusion of the india rubber wall which takes place when the heart retires is denoted by a corresponding fall in the tube. The tube is supplied with a graduated scale, to denote the rise and fall with exactitude. The glass tube is provided at the top with a brass screw and collar, to prevent the egress of the liquid when the instrument is not in use, or a bulb with an orifice may be supplied. When employed, the glass tube is left open to permit of the passage of the air to and fro.

Fig. 1 represents an instrument without a a stand; fig. 2 is another form of it without a stand; and fig. 3 is the most perfect form, but is not quite so convenient.

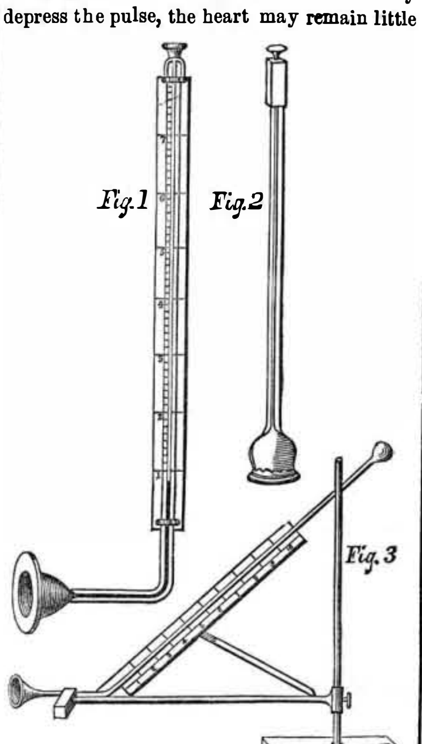
The glass tube is a foot or more long, and the round bore is about the one-eighth part of an inch. If the bore be much larger, the movement will be inconsiderable; if much less, capillary attraction will interfere and prevent free motion.

When the instrument (fig. 3.) is to be employed, mounted upon its stand, it is placed upon a firm table with the chamber projecting beyond it. The person whose heart is to be examined is seated upon a firm chair, with his chest erect and free from motion. The protruding india rubber wall of the chamber, or chest-piece, is delicately made to receive the blow of the apex of the heart. The liquid in the tube is now observed to be in motion. With persons in ordinary health, the liquid rises and falls about an inch. This rise and fall, after taking place three or four times, is followed by a much longer rise and fall to the extent of three or four inches, due to the advancement and retirement of the wall of the chest during the acts of respiration. The shorter rise and fall are again repeated, and are again followed by the longer rise and fall caused by the motions of the chest. During the longer rise and fall due to respiration, the beat and retreat of the heart are still to be recognized by brief interruptions in the rise and fall of the liquid. Thin persons are very favorable for examination; on the other hand, the corpulent, less readily affect the instrument.—Placed upon the heart it indicates strokes of that organ which are so feeble as to have no corresponding pulse at the wrist.

No pause whatever in the movement of the liquid has been at any time observed when the sphygmoscope has been carefully placed so as to receive the full beat, and fall back with freedom. This would go to show that the heart, however slow, is in constant motion, and, contrary to the belief of many physiologists, enjoys no pause. There is no pause in the descent of the liquid, which takes place when the heart retires from the thoracic walls, in the middle of which movement it has been said a very short pause is to be observed in living animals having the heart exposed.

When the heart is excited, the liquid in the sphygmoscope rises and falls more than usual; but the rise and fall of the excited enlarged heart is much the same as the rise and fall of the excited normal organ. For the most part, the enlarged heart gives movements to the instrument when placed upon the ribs and sternum, whilst the normally sized heart affects it more exclusively when it is placed upon the fifth intercostal space.

The sphygmoscope indicates with exactitude both the absolute and the comparative influences upon the heart, of food, cordials, stimulants, and tonic medicines. It does the same in respect to depressing causes, such as hunger, cold, and sedatives. With the aid of this instrument the fact is demonstrated that the action of the heart may be great when the pulse is small, that the heart may strike the instrument with force when the pulse scarcely affects the liquid of the hand sphygmoscope. It affords proof that the pulse is one thing, and the heart's action another, and teaches that the pulse is only an approximate sign of the state of the heart. It is found also, that while cold at the surface and extremities may depress the pulse, the heart may remain little



enfeebled, or even become excited, and that warmth and friction applied to the extremities may cause an excited pulse without there being any accompanying increased force of the heart.

The sphygmoscope (fig. 2,) having a level elastic wall instead of a protruding one, and having a glass tube with an almost capillary bore, forms a remarkably delicate indicator of the pulse. It is so delicate in its impressions that it is appreciably affected by the regurgitant wave in the jugular veins, and by the wave in arteries much smaller than the radial. From its nicety in manifesting the beat of the blood-wave, it is very valuable.

By means of this hand instrument applied to the arteries a comparison is readily made between the time of the beat of the heart and the rise of the arteries under the influence of the blood-wave. This instrument is much more delicate than the finger in such an inquiry. The impressions made upon the fingers of two hands fail to be conveyed with sufficient nicety to the mind to tell with certainty the relative time of the beat of the heart and arteries. Except in cases of extreme slowness, the sensations obtained from the two hands impressed at nearly the same time, do not admit of a distinct difference in respect to time being made out. It has been to this very defect the erroneous idea, that the beat of the heart and the beat of the pulse are synchronous, or nearly so, owes its origin and continuance.

The hand sphygmoscope placed upon the the radial artery, shows a rise of the liquid while there is a fall in the sphygmoscope placed over the heart. As the liquid in the one instrument starts from below, the liquid in the other starts from above, and as the liquid in the one reaches the top of its ascent, the liquid in the other reaches the bottom of of its descent, to renew their opposing course. The movements in the two instruments at the same instant are always opposed, and the whole time occupied in the movement of one instrument in one direction appears to be occupied by the movement of the other in the opposite direction. The movements *alternate* with as much apparent exactitude as the arms of a well-adjusted balance. When the lapse of time between the beat of the heart and the pulse at the wrist was first observed, suspicion of disease of the aorta was entertained, but the subsequent examination of many persons proved that this alternation was natural. In some twenty persons subjected to examination, the complete alternation has been made out without the shadow of a doubt. These persons were of all ages above childhood, and had the pulse of different degrees of rapidity, from 60 to 100.

Hand sphygmoscopes placed upon the carotid, the barachial, the radial, the femoral, and the dorsal artery of the foot, rise at the same instant, and fall at the same point of time.

These facts prove the existence of two great laws not previously enunciated—first, that the heart's beat alternates with the pulse at the wrist; secondly, that the pulse of arteries beyond the chest takes place in all parts at the same instant, and without any appreciable interval.

The sphygmoscope forms a good pneumoscope. It delicately measures the rise and fall of the chest in respiration. It likewise declares the relative duration of inspiration and expiration, and may thus prove useful in the detection of incipient phithsis, and other pulmonary diseases. When the liquid has attained its highest elevation at the end of inspiration, it immediately begins to fall; but when it has reached the lowest point at the end of expiration it remains there some instants. The ascent is slower than the descent. After the fall of an ordinary expiration a forced expiration gives a second fall.

The sphygmoscope (fig. 1,) may be employed without a stand, and is then more portable; but from the want of a fixed basis, and from the motion of the ribs on which it must rest, its manifestations are less extensive and satisfactory. When employed without a stand, as it must rest upon the ribs, the elastic wall of the chamber should be plain, and not protruding.

The Mental Faculties and Phrenology.

Our actual experience of the human mind is only as we find it in combination with corporeal organs. Sir Benjamin Brodie places its seat in the brain, which he states is composed of a congeries of organs, each having its peculiar function, and yet, he believes, that what has been taught as the science of phrenology has no foundation in fact. He says:—

"Now, there are two simple anatomical facts which the founders of this system have overlooked, or with which they were probably unacquainted, and which of themselves afford a sufficient contradiction of it. First, They refer the mere animal propensities chiefly to the posterior lobes and the intellectual faculties to the anterior lobes of the cerebrum; but the fact is, that the posterior lobes exist only in the human brain, and in that of some of the tribe of monkeys, and are absolutely wanting in quadrupeds. Of this there is no more doubt than there is of any other of the best established facts in anatomy; so that, if phrenology be here, the most marked distinction between man on the one hand, and a cat or a horse, or a sheep, on the other, it ought to be, that the former has the animal propensities developed to their fullest extent, and that these are deficient in the latter. Second, Birds have various propensities and faculties in common with us, and in the writings of phrenologists many of their illustrations are derived from this class of vertebral animals; but the structure of the bird's brain is essentially different, not only from that of the human brain, but from that of the brain of the mammalia generally."

And yet, if it is admitted that the brain is a congeries of organs, it seems to us that there is a foundation for the science of phrenology. As a science, however, it must be very uncertain, because it is principally based on the formation of the casket which contains the organs, not the organs themselves.

Cremona Violins.

We are indebted to Mr. W. Hudswell, of this city, for posting us up somewhat on the above subject. Dr. Lee, who was lecturer in St. Thomas' Hospital, London, and an accomplished amateur performer on the violin entertained a great passion for the instruments themselves, and made hundreds of experiments to find out the cause of the superiority of tone in the Cremona. He had a fine Cremona taken to pieces, and a number of new instruments made in every part exactly like it, and yet none of them equalled it in tone. He thus found out that it was not a particular form which gave these instruments a superiority over all others. He then experimented with various kinds of wood, and also treated the same sort of wood in various ways, in order to discover if this was the cause. For example, he steeped some in alcohol, others in oil, then dried them, and had them made of the genuine Cremona shape. All these efforts however, were vain; the old Cremona sung sweetly over them all. At last it struck him that there might be something in the varnish connected with the subject, and he discovered that *amber* varnish was the coating of old Cremo. To work at varnishes he then went, (for he was a determined experimenter and a good chemist, and at last he made a grand hit. By making amber varnish in the same way that copal varnish is made, namely, by heating the amber, then pouring hot oil upon it, he obtained a varnish which, when applied to his violins, improved their tones in a wonderful manner. This varnish takes a long time to become perfectly dry. The violins to which it is applied have to be hung up in the open air for months before they lose their tacky character, but when perfectly dry it is the grand solvent of the Cremona's superiority. Severia, the famous violinist, and pupil of Paganini was presented with one of Dr. Lee's violins, and he declared it was equal to a Cremona; of twenty violins in his possession it was excelled only by one, while it was superior to all the others.

Gum and Starch.

Chemistry is the most wonderful of all sciences, abounding as it does in such curious transformations. There is the substance *starch* so generally used, and so universally known. It is not soluble in water, but by a very simple process, it can be converted into a gum, known by the name of "dextrine." The process for accomplishing this result may be varied, but the following is among the most simple and recent:—

It consists in moistening one tun of dry starch with water containing four and one-half pounds of strong nitric acid. The starch, thus uniformly wetted, is made up into small bricks or loaves, and dried in a stove. It is then rubbed down into a coarse powder, and exposed in a room to a stream of air, heated to about 160 degrees Fahr. Being now triturated, sifted, and heated in an oven to about 228 degrees, it forms a perfect dextrine of a fair color, and soluble in water.

Dextrine is now extensively employed in giving body and adhesive qualities to colors employed in printed paper, calicos and woolen fabrics. It is also used for dressing colored muslins, also as a paste or size for painters, and for many purposes as a substitute for gum-arabic and fine glue, it being so much cheaper than these substances. By moisture and heat alone in an oven, starch may also be converted into dextrine

Western Grain.

The *Chicago Magazine* (a new and very useful monthly) states that 20,086,616 bushels of grain were exported from that city last year. It also says: "It has been estimated that the average amount of grain transported each season between Chicago and Buffalo is 150,000 bushels by a good propeller, and 80,000 by a brig." At this rate, the above amount of grain requires a marine equal to 50 propellers and 150 brigs to transport it to the Eastern markets, supposing each to make but one trip during the season.

We would call the attention of our readers to the advertisement of the "American Fire Alarm Telegraph" in another column.