from abstractions and generalities; and, if his views are to be controverted, they must be met with correspondingly practical objections. His treatment of the subject shows a large experience with the every-day life of the women of the present time, and will well repay most thorough and careful perusal.

WRITER'S CRAMP IS AN AFFECTION which, until a very recent date, has been looked upon as in most cases incurable. Fortunately, however, for those who suffer from this disease, means are now known to exist not only for its amelioration, but for its permanent cure. The difficulty is one which is not, as its name implies, confined to writers. It may occur in any individual whose occupation brings into constant play one set of muscles: thus the pianist, the telegrapher, and the ballet-dancer may suffer from these cramps or from an inability to perform the acts peculiar to his occupation. The cramps are merely symptoms of a diseased condition, the exact seat of which is a matter of dispute; some locating it in the brain, others in the spinal cord, while there are those who regard the nerve-centres as in no wise affected, but trace the source of the affection to the nerves themselves. The method of treatment which has been found most successful consists in the application of gymnastics, combined with massage, to the affected muscles. The rubbing, and sometimes a gentle striking of the muscles with a wooden bar, together with regular movements of the fingers or other defective part, are continued for several weeks, during which time not more than one hour daily is devoted to these exercises. During five years, Wolff, who has given special attention to this affection, has treated 277 patients. Of this number, 245 were writers; 32 were pianists, violinists, telegraphers, and painters. 157 were cured, 22 improved, and 98 not cured.

DR. S. W. ABBOTT, of the state board of health of Massachusetts, in the Boston *Medical and surgical journal*, Aug. 12, describes the method employed by Professor Walpert in testing the air of inhabited apartments to ascertain the amount of carbonic acid present. The air-tester of Walpert consists of a simple rubber bulb, of known capacity, connected with a glass tube, which is constricted at its further end. The bulb is filled with the air to be examined, and this air is then forced through a measured quantity of lime-water until the opacity produced by the formation of lime-carbonate is so great as to obscure a black mark upon the bottom of the test-tube containing the lime-water. With very foul air, the bulb having a capacity of twenty-eight cubic centimetres, and the quantity of lime-water being three cubic centimetres, the mark is obscured after filling the bulb ten or fifteen times; while, if the air is as pure as it should be, the lime-water will become turbid only after the bulb has been filled thirty or forty times. Professor Walpert has prepared a table which indicates approximately the amount of carbonic acid present when the bulb has been filled from one to sixty times.

The principle upon which this tester is based is, of course, not new. It is, however, a much more convenient method than that recommended by Angus Smith, in which bottles containing lime-water were employed. All these methods are defective, necessarily so perhaps, for the reason that they all take it for granted that the amount of carbonic acid is a true exponent of the degree of purity of the air. This is, of course, erroneous. An air containing no more carbonic acid than that of the Alps, may, on account of organic impurities, be much more deleterious than one holding a large amount of carbonic acid, but without the organic contamination. There is much reason to hope that biological methods, with plate and other cultures, will help to solve this difficult question of practically ascertaining whether a given atmosphere is or is not contaminated to such a degree as to be prejudicial to health, and in what the danger consists. While the chemists and biologists are at work upon this problem, we shall still be confined to the estimation of carbonic acid present in the air, as an indication of its purity, and are glad to learn that Dr. Abbott has found Walpert's air-tester convenient in form and size, portable, and sufficiently accurate to meet the wants of the sanitarian.

THE CHARLESTON EARTHQUAKE: SOME FURTHER OBSERVATIONS.

FURTHER and more reliable observations and reports seem to confirm the substantial accuracy of the coseismal lines given in the map issued with the last number of *Science* to an even greater extent than could have been reasonably expected. The most disturbing element in compiling that map was the time of the earthquake at Charleston, as given by all the press reports and the signal-service observer at that city, 9.54 P.M. The most

accurate time found by Professor Mendenhall during his visit, however, was 9.51, which agrees very much better with all other accurate observations from adjoining localities. This and other reports might allow of shifting the central ellipse a little farther south ; and this, of course, agrees better with the fact that the greatest destruction was caused at Charleston. Still, all reports agree that the shock was more nearly vertical at points to the north-west of that city, and even at Augusta, nearly due west.

Among all the recorded times, up to date, the following seem most worthy of mention at present : Charleston, 9.51, from very reliable data obtained by Professor Mendenhall ; Washington, D.C., 9.53.30, the mean of observations by Professors Newcomb and McGee ; Baltimore, 9.54, Richard Randolph, civil engineer ; New York, 9.54, Western union telegraph operator ; New Haven, Conn., 9.55.30, signal-service observer ; Toronto, Ontario, 9.55, Professor Charles Carpmael, director of the Meteorological service of Canada ; Mount Sterling, east central Kentucky, 9.53.15, I. J. Evans, watchmaker ; Newport, Ky., 9.54.15, S. P. Newman, attorney ; Portsmouth, southern Ohio, 9.55.57, signal-service observer, corrected by telegram to Columbus ; Dubuque, Io., 9.58, as given in associated press despatches ; Jacksonville, Fla., 9.54, associated press. If we take the centre of disturbance at a point about 50 miles north-west of Charleston, at 9.51 P.M., these figures give velocities about as follows : to Washington, D.C., 144 miles a minute ; to Baltimore, 130 ; to Newport, Ky., 92; to Dubuque, Io., 103 ; to Jacksonville, Fla., 63. These seem to indicate that the origin was along a north and south line rather than at a point. If we take the origin at about the middle of the line joining Charleston and Raleigh, at 9.50 P.M., we get velocities as follows : to Washington, 76 ; to Dubuque, Io., 87 ; to Newport, Ky., 84 ; to Jacksonville, Fla., 71.

The area as stated in the last number of this paper is also about the same according to the latest observations. No reports of any disturbance are yet at hand from any point in southern Florida south of Tampa. It was felt very slightly at Boston, Mass., in northern Vermont, and New York ; in Ontario it was very perceptible at Toronto and a number of points ; and it extended into southern Michigan, eastern Iowa, Missouri, Arkansas, and Louisiana.

It is reported by Captain Boutelle that the water on the bar at Charleston has deepened since the shock from six inches to a foot. The character of the shock is reported from almost all points as decidedly undulatory, rather than vibratory, in character, which perhaps explains the fact that there was generally formed a very fair idea as to the direction of the motion. Published requests for information have been very generously responded to ; and although some letters are amusing, and even absurd, a large proportion of them give valuable and interesting data. The following extract from a letter received from Mr. Richard Randolph, civil engineer, Baltimore, Md., is such an excellent example of clearness of statement combined with accuracy of observation, that its perusal cannot fail to be both interesting and instructive : —

"I was reading in my front room, third story, east side of the street, about the middle of the block ; was sitting with one leg thrown over and resting upon the knee of the other, so that the position of my body was nearly north and south, pointing with the foot about 15° west of north. While in this position, so sensitive to lateral oscillations, I experienced a sensation which I at first ascribed to a violent palpitation of the heart ; but the absence of all uncomfortable feeling, and the great amplitude of the oscillations, quickly drove that idea from my mind. At the same time I was satisfied that such a motion could not be due to what I supposed to be a passing baggage-wagon loaded with trunks, the sound being exactly that of such a wagon, which frequently, during the last month, has passed over the cobble-stone pavement of the street. I did not look to see if there really was a wagon passing, and, although the sound began and ended with my observation of the telluric movement, I still assume it to have been caused by a wagon. After noticing for a few seconds my suspended foot swinging at right angles with the position of my body with the regularity of a pendulum, and feeling a general movement in the same direction, and hearing a sonorous beating of some object in my bedroom adjoining keeping time with these oscillations, I arose and walked across the room to my watch, and, upon inspection, saw that the minute-hand was exactly halfway between 9.53 and 9.54, i.e., 9.53½. My watch has, for the last two months, coincided precisely with the chronometers exposed for public reference in the windows of the principal dealers ; and I had made a comparison only the day before. These chronometers keep the standard time of the Philadelphia meridian.

"While in this standing position, I no longer felt the vibration ; but the sounds in the adjoining room continued at the same rate, but ceased, as did all perceptible vibration, by the time I resumed my seat, when I recorded on the blank leaf of a book I was reading, '6½ minutes of 10 P.M.'

"In order to form an estimate of the duration of the phenomenon, I held my watch before me,

and noticed the time required to repeat from memory the observations I had just made; and this indicated 45 seconds, and 10 seconds from the first sensation to the time of observation. In the same way I counted the number of beats per minute of the sounding body in the adjoining room, which indicated 110. As I have an ear for music and time, I have much confidence in this method of estimating.

"I then went into the other room to examine the object which caused the sounds, and found, that upon oscillating my wardrobe, which was backed against the north-and-south partition wall of the room, the sounds were produced by one of the doors tapping the partition between the two compartments of the wardrobe, giving out a not unmusical sound, and one that could not be evoked from any other object, and could only be produced by an east-and-west oscillation. To reproduce them with the intensity and periods during the earth movement required a movement of $\frac{1}{2}$ an inch at $6\frac{1}{2}$ feet from the floor, for a complete oscillation."

If many observers had the self-possession and skill to make such reports, the results would be valuable indeed. EVERETT HAYDEN.

CHEVREUL'S CENTENNIAL FESTIVAL.

DURING the last two days, Paris has celebrated with unprecedented demonstrations of joy and respectful sympathy the centennial anniversary of the venerable *savant* Chevreul, unprecedented and unrivalled, because he is the only great scientist of our times who has attained the late hour of life he has entered this morning, Aug. 31, and because his life has been one of labor and hard work from the beginning. Chevreul's life is easily and shortly written. Like happy men and happy nations, he has no history, no adventures, no romance of any sort, but a simple, honest, straightforward, and manly life, given entirely to work, — to serious work, seriously conducted.

Michel Eugène Chevreul was born Aug. 31, 1786, in Angers. His father was a well-to-do physician in Angers, professor in the medical faculty, and a talented writer. Old age seems to be hereditary in the family; Chevreul's father having died at ninety-one, and his mother at ninety-three years. Chevreul is yet a very tall man, square in the shoulders, and walks quite erect and straight.

After the revolution the University of Angers was disestablished, a school for chemical and physical studies being put in its place; which school Chevreul attended between the ages of eleven and seventeen. In 1803, Chevreul went to Paris, after having been taught the elements of chemistry by a professor named Héron. Chemistry was taught in Paris at that time by men of great science, Vauquelin and Fourcroy. Thenard was assistant to the former. Chevreul entered Vauquelin's laboratory, and set to work immediately. He was there with Orfila, Payen, Bouchardat, and Frémy, of which only one survives, Frémy, the present director of the Museum of natural history, on whose arm Chevreul leaned to-day when coming to the festival given in his honor. Chevreul's aptitudes were quickly noticed. In 1806 he was appointed director of Vauquelin's laboratory, and professor in the Lycée Charlemagne, and during the same year he published the results of his first experiments. In 1806 seven papers came from his pen, of which three were on coloring-matters (indigo and Brazilian wood). Four years later he was appointed *aide-naturaliste* in the Museum of natural history, then examiner for the Ecole polytechnique; and at thirty he was professor of chemistry in the Gobelins, the world-known manufactory of tapestry, and director of the department of tinctorial baths. In 1826, after the death of Proust, Chevreul was appointed member of the Academy of sciences, to which he has belonged ever since. Not one of his colleagues of that time is yet living. In 1830 he became professor in the museum, and some time after director, holding the former position till the present day, though not so actively the last two years, and the latter till 1883. He is a member of a great number of foreign scientific societies, and since 1875 has attained the highest dignity in the order of the *Légion d'honneur*. He never misses a meeting of the Academy of sciences, and it is not long since one could meet him in the Rue des ecoles, walking to the institute, hat in hand, and hands behind the back. He seems to have an aversion to hats, and dispenses with them a great deal.

During the war of 1870 he remained in Paris the whole time of the investment, and lived in the museum, notwithstanding eighty German bombs scattered to pieces the magnificent hothouses of the Jardin des plantes, and one fell quite close to his own laboratory. It was in a letter written during January, 1871, to Abbé Lamazon, in answer to a note of the latter, that Chevreul used for the first time the expression he prefers when speaking of himself, — 'the dean of French students.'

Chevreul married early, but his wife died more than twenty years ago. His conjugal life was a very quiet and happy one. Chevreul has only one son, who lives in Dijon, and is a retired magistrate. He himself lives alone in Paris, devoted to his books and laboratory, both of which