AN INVESTIGATION OF THE VIBRATIONS OF PLATES VIBRATED AT THE CENTRE.

By Professor Thomas R. Baker.

Since the publication of the paper under the above heading we have received from Professor Baker two drawings illustrating the same, which we now produce.

The first, Fig. 1, shows Professor Baker's method of producing the sand pictures, useful for class illustration:

Fig. 1.

Most of the plates used were window panes of various shapes and sizes, they were vibrated by rubbing an attached glass rod. The tubes, which were about $\frac{3}{16}$ of an inch in diameter and 20 inches long, were attached at right angles to the face of the plate with sealing wax. The support for the plate was a rubber cap, the common lead pencil eraser, fitted on the end of a post projecting from a disk of lead. A short rubber-capped lead pencil fixed upright in a wooden block answers the purpose just as well.

The plate was balanced on the support, the tube standing upright, and held loosely between the thumb and forefinger of the left hand. Then catching the tube between the moistened thumb and forefinger of the right hand and rubbing downward the vibrations of the plate were produced.

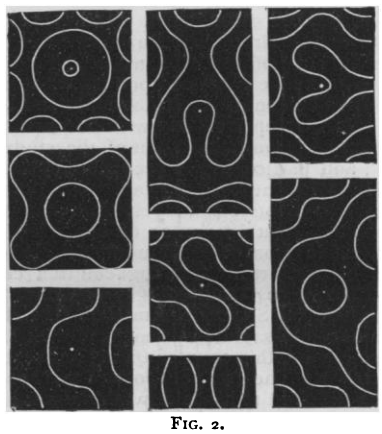

Fig. 2.

Fig. 2 represents copies of various sand pictures thus produced. He states:

"The figures were copied by placing the plate over paper which had been wet with a solution of potassium bichromate and dried in the dark. The plate and paper were exposed to diffused light, or to the vertical rays of the sun. The paper not hid by the sand soon darkened, and when this change had taken place the plate wasre moved and a lead pencil run along the bands of lighter colored paper representing the sand lines. This paper was then placed on white paper, and the figures copied by pressure. About 150 sand-figures were copied and traced."

For a summary of the facts derived from these experiments we refer our readers to Science, Vol. I., No. 13, September 25th, 1880, page 157.

FIELD WORK BY AMATEURS.*

By Helen Harelin Walworth.

It is announced, I believe, that one of the aims of the American Association for the Advancement of Science is to make Natural Science popnlar, to encourage its pursuit among all classes of people. It is because I have such an understanding of its aims that I presume to speak a word in behalf of the class who love science, yet can give to it but a limited portion of their time and thoughts.

Such a class of persons are important factors in the development of every department of knowledge and art. The professor, the artist, the specialist may have higher aims; they certainly do more thorough work, yet they would scarcely be understood, appreciated and encouraged if there did not exist the intermediate class who admire, applaud and exhibit the work they cannot themselves perform.

I therefore deprecate the scorn with which the professional too often contemplates the dabbler in his specialty, as he will perhaps designate the amateur. "A little knowledge is a dangerous thing" only when it is pretentious. A mere elementary knowledge of any natural science is a proposition from which reason starts; it is a foundation on which thought builds, and a height from which imagination takes its flight. It is an education in all other knowledge, because it demands attention, observation and accuracy with well-defined expression.

How can the popular interest in science be stimulated and increased? A majority of educated people shrink with aversion from the memory of tasks performed at school. The bare mention of a natural science recalls pages of unpronounceable words and incomprehensible classifications. Yet, if a practical geologist or botanist will take any three of these individuals into the field with him and beguile them into breaking rocks or gathering flowers scientifically, two out of every three will be delighted with the occupation, and will strive to recall the classical names which inspired them with disgust while they were merely theoretical. It is then only while science is an abstraction that it repels; render it practical and it invariably attracts.

In every city and village of our country we find numerous clubs and societies devoted to special objects of literature and art, and a few to science. These last are rare, they would be numerous and active if slight encouragement were given to them by those who have the ability to guide and direct. Such clubs and associations should begin with a short and well directed course of reading, accompanied, if possible, by a few interesting lectures as a preparation for field work which should not be delayed through timidity or a feeling of ignorance. A few visits to the field by a geological club will serve to arouse enthusiasm, and inspire a desire for research, which months of reading would not accomplish. It cannot be urged that many live in localities where there is nothing to study, for I believe it may be safely stated that uninvestigated scientific facts lie over and under every square mile of the United States. Yet I have heard the members of a geological club, who studied exclusively in the class-room, make such a plea. When visiting their city I said to one of them, "What rocks have you in this vicinity?" The person addressed looked at me with unqualified surprise and answered, "We have none." I exclaimed, "you have a river and hills, and many railroad cuttings, the foundation of things must be visible somewhere." But this individual insisted that there was absolutely nothing to examine within walking or driving distance of that city. There is, of course, a difference in varying localities. In Davenport, Iowa, where there is now a well-established Academy of Science, located in its own fine building, and displaying a great museum, a few years ago there were but half a dozen persons who met in a hired

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