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A CHAT WITH A MIND BUILDER

Washington, D. C., Oct. 3, 1897.—I looked through a microscope this afternoon which, I am told, will probably revolutionize our knowledge of the material world. It has been invented during the present month. Its inventor is Professor E. L. Gates, the director of the laboratory of psychology and psychurgy of this city. This new instrument, Professor Gates says, exceeds the power of the best present microscope as much as the present microscope exceeds the power of the human eye. It will magnify an article three million times its diameter, and its inventor tells me that he believes he will be able through it to photograph images which are one hundred million times the diameter of the original object. These figures are so great that it is impossible for the common mind to grasp them. They represent a success beyond the wildest dreams of the microscopists, and they may open a new world of scientific investigation.

The object which was placed in the microscope for me to see was a diatom—one of the smallest living beings that can be seen with a microscope. Diatoms are invisible to the naked eye. Professor Gates tells me that they are so small that the pinhead of the earth in which they live often has as many as two million diatoms in it. About a dozen of these little things were in a microscopical slide as big as a silver five-cent piece. I first looked at them through a microscope which magnified twenty times. Through this they appeared like little bits of dust or straw. Next the slide was placed in what the professor told me was the most powerful microscope known to man. This magnified ten thousand diameters. The magnification was so great that one of the diatoms was all we could see. It was now in the shape of an ellipse with a line running through the center, and with a texture which made me think of that of the finest silk handkerchief. It might have been made of the most minute scales, but it looked more like fine weaving than anything else. Then the new microscope was used, and the magnification was now so great that I could only see one of these little scale. I could see that it was hexagonal in shape, with a filmy center. There were lines around its edges, and Prof. Gates said that, by adding a higher objective, one of these lines would take up the whole space of the microscope, and that if one tried to see the whole image it would be so magnified that for the observation of a single diatom you would need all out of doors for a screen.

As I looked, Prof. Gates said: "You are the third man in the world who has ever seen a diatom magnified to that extent. I have here used one of the smaller objectives. You will notice that I have two microscopes joined together. You can note the numbers of the objectives, and it will

surprise scientists if you tell them that with a fourteen-millimeter Beck objective and a one-sixth Bousch and Lamb objective you saw the hexagonal opening of the diatom known as *Pleurosigma angulatum*. Now, did I use a one-twelfth-inch objective for my first microscope, we could only see the line about the opening, which would be enormously magnified."

"What is the chief element of the invention, Prof. Gates?" I asked.

"It is more of a discovery than an invention," was the reply. "You see, the microscopes, up to the present time, have been limited to ten thousand diameters. We could enlarge the photographs of images produced by such microscopes, but the action of the light on the sensitive plate is such that when lines are very close together the light affects the chemicals on the plate so that they become one. So, in the enlarged photograph you never have any more than is seen in first image produced by the microscope, and you may have less. I conceived the idea of placing a second microscope in the real image produced by the first microscope. This I do here. It remagnifies the image so that I get the results which I have shown you. The mechanism, however, has to be very carefully made, and the light which must come from the original object is so reduced that in getting the first results from my three-million-diameter experiment I remained in my dark room, with the microscope, for two hours, to get my eyes in the proper condition to see the results. You see, in using a ten-thousand-diameter microscope, the image produced by it has only one one-hundredth-millionth part as much light as that which falls on the original object. When you try to get your light from a part of the image, taking one three-hundredth part of it, you get only one thirty-billionth of the light which falls on the original object. This light is so little that it would filter through the best camera made, and it is only by means of my dark room that I will be able to do the photographing of such results. To make the right kind of a microscope for the best work along these lines would cost about \$12,000, but it would add enormously to the scientific knowledge of the world, and would enable us to make as great an advance over our present knowledge as the microscope did over the unaided human eye."

As we looked through the microscope Prof. Gates told me how he had come to make the discovery. His ideas are so striking and unusual that I almost despair of giving them to the public. He has a set of entirely new theories as to the mind, many of which he has gotten through a long series of experiments upon himself and animals, carried on through a series of years. He claims that one can build up and add to his brain; that he can go through a process of training that will make every man, to a certain extent, an inventor, and that his new microscope is one of hundreds of other inventions

which he has produced through a fixed course of mind building. Edison and Tesla are spending thousands of dollars in experiments to discover and apply the properties of matter. Prof. Gates has a laboratory devoted to experimenting upon and discovering the properties of the mind. He has, I am told, an endowment which gives him about \$2,000 a month to be used in such experiments. With this money he has purchased the finest instruments known to man.

He has invented others and he is carrying on some of the queerest experiments ever attempted by a scientific investigator.

I was much interested in the story of how he first came to the conclusion that our brains could be added to and built up. When he was a boy he realized that the mind was the most important thing in the universe. At the age of fourteen he says, he began to experiment upon himself. For two years he kept a record of all that he saw felt or did. He had a book in which he recorded four times each day just what the climatic and other conditions about him were. In another column he put down his physical condition, stating just how he felt, measuring just how much he ate, and, in short, all that he did that would affect his physical state. In the third column he recorded his mental conditions. At the end of two years he went over the record and generalized it. He found that under certain conditions his brain was more active than under others, that he could write better at such times and that his inventive faculties were more active. After this he worked only under such conditions, and found that he could produce twelve times as good results as before. He soon began to see that his work was getting better and better, and later on began a systematic study of brain development. One of his first experiments was as to the building the brain of a dog. Said he: "I wanted to see what effect mental activity has upon the brain and it struck me that if I could take a certain number of puppies and keep them from their birth in absolute darkness, and at the same time take another set which should be trained in seeing and have plenty of light, that upon comparing the brains of the two, I could tell whether the use of the seeing power had changed them. This I did. I took seven shepherd puppies and kept them in a room until they were nine months old. The room was completely dark. I had triple doors, so that the mother could go in and out without allowing the light to enter the room. When the front door was open, and the mother was let in, the doors were closed behind and she was allowed to remain there some minutes. Then, the second door was opened and she was kept there a few minutes, and then allowed to go into the room where her children were. I kept the puppies there for nine months without light, and then killed them by the use of chloroform. I took out