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Much Smaller Than Atoms.

Professor Elmer Gates has been making some researches recently which throw light upon the nature of the ether which is supposed to fill all interstellar space. Hitherto science has been disposed to claim that this mysterious element, if such it may be termed, was homogeneous and continuous everywhere; i.e., not consisting of distinct particles. But Professor Gates has proved to his own satisfaction that the ether is actually composed of such particles. That they must be infinitely small goes without saying; but the Professor asserts that they are as much smaller than a chemical atom as such an atom is smaller than the sun. If that be so, it is no wonder that nobody has succeeded as yet in finding out about the nature and properties of ether.

However, Professor Gates thinks that he has made a beginning in research in this direction. The first step has been accomplished by devising a means of creating an absolute vacuum—something never accomplished hitherto. Though the air in a receiver may be reduced by an exhaust-pump to the utmost tenuity, even to the one-millionth of an atmosphere, some of it still remains. A Crookes tube contains a little air. Up to now the total vacuum has been a mere conception, never accomplished in fact. But Professor Gates's vacuum is absolute. He produces a glass receptacle which contains not a particle of air. It has absolutely nothing in it save the long-sought ether.

This remarkable result is accomplished in a very simple way. To begin with, the Professor takes a tube of potash glass. The tube and its contents are then subjected to slow heating, until the soft glass is sufficiently melted to enable it to be pulled out bodily part way from the tube of hard glass containing it. The space thus left is an absolute vacuum, containing no particle of air or any other gas. It holds nothing but ether pure and simple.

Here, then, is a quantity of absolutely pure ether. The question is, will it exhibit under certain conditions any phenomena calculated to throw light upon its nature? One thing which Professor Gates has accomplished by means of it is the taking of photographs in the dark; but he declines to say much about that, inasmuch as he has made only a beginning at it. An extremely interesting experiment is performed by suspending in the vacuum a little metal ball on the end of a platinum wire. The ball and wire are fixed in place incidentally to the process of creating the vacuum. A glass lens is used to focus the sun's rays at a point near the ball. At the point of focus—according to the theory, as

Professor Gates explained it—the particles of ether move about most rapidly, and are farthest apart, owing to the sun's energy. Thus the ball swings toward that point of less density. This it does every time, showing that it is acted upon by some sort of matter. The Professor regards it as proof positive that the ether is a material substance, and composed of particles which are thickly crowded together, though inconceivably minute. This is the substance which fills all space—whose wave-motions make light and transmit electrical energy from the sun to the earth.

Professor Gates has succeeded in making photographs with the dark rays of the sun; i.e., the rays of the solar spectrum above violet and below red. This is not new, but he is carrying [on] experiments in that line beyond any point hitherto reached. His new-built laboratory in the suburbs of Washington has dark rooms for developing purposes, which are black beyond the blackness of the Egyptian plague. They are windowless, and are entered by tortuous passages, so that no ray of light may reach and penetrate the gloom. The walls are painted black and are made of wood, with layers of tar paper, lead, zinc, gallium, and orange paper, all of which have the power of absorbing light. The walls of the passages are constructed in the same way, and the path is further barred against light by a series of black curtains.

This laboratory is a very remarkable establishment. It is crowded with instruments and apparatus for psycho-physical research. Professor Gates has several boxes which are filled with illusions of various kinds. Most of these are illusions of the eye, but there are others which deceive the touch, the taste, and other senses. According to Professor Gates, human beings have eight senses—the sense of cold, the sense of heat, the sense that a muscle is moving, touch, taste, smell, hearing, and seeing. And, by the way, he has a collection of fifteen hundred different smells, good and bad in a series of bottles containing perfumes and various chemicals. They are intended for the education of the sense of smell.

Ordinary people are constantly deceived by false appearances in this world. In the College of Mind Art, which Professor Gates is establishing, he proposes to train the minds of students to that illusions will cease to deceive them. The illusions primarily considered are those of the senses. The Professor has more than three hundred illusions of the sight. A simple example of this kind is a teetotum, consisting of a black paper disk and a pin of wood. When this little top is spun on a printed page, the paper disk looks transparent, and as if made of glass, so that one can read the print through it—the fact being that the paper disk has a couple of slits in it. A familiar illusion of touch is Aristotle's pea, which feels

like two peas when rubbed beneath the first two fingers of the hand crossed.—*Exchange*.