

A TALK WITH LORD KELVIN.

The Foremost Scientific Thinker of the Day Discusses the Vortex Theory.

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Whenever one hears reference made to such questions as the age of the sun, or the probable length of time that life has been possible on our globe, the name of Lord Kelvin is sure to be mentioned as the authority for the opinion given. But for that matter, there is hardly any other question to which physics has application, which is asked about the same thing may not be said, for Lord Kelvin's interests and mental activities appear to have no barriers short of the very limits of present human knowledge, and the original cast of his thought is such that almost any topic on which he touches is sure to reveal novel and unexpected relations.

It was in reference to one of his speculations, and one that easily takes rank among the foremost scientific imaginings of any age, that he very kindly granted an interview recently. This speculation was & to with the ever-fascinating question of the ultimate nature of matter. When Lord Kelvin (Sir William Thomson as he was then) came forward with his very extraordinary vortex theory it was based upon mathematical calculations of the other great physicist, Von Helmholtz, which took tangible form in Lord Kelvin's mind while he was watching the activities of some curious little whirling rings of smoke in the air, similar to those with which every tobacco smoker in familiar. Helmholtz had shown that such a vortex, which once started in a frictionless medium must, theoretically, go on for ever. The vortex whirls of smoke in the air of course do not go on forever, because their medium is not frictionless; but Lord Kelvin observed that while they last they exhibit a similar stability, and though composed of mere wreaths of smoke, take upon themselves the properties of solid bodies, in virtue of the motion, just as a moving bicycle assumes the property of upright rigidity. And the thought came to him that if a vortex whirl were started in the ether, which physicists assume as penetrating space everywhere, such an



Portrait of Lord Kelvin.

ether vortex (infinitesimal in size, of course) would have the properties of a particle of what we term matter. This thought, expanded became the vortex theory of matter.

THE BEAUTY OF THE VORTEX THEORY.

It is well within bounds to say that this is the most fascinating and beautiful conception of the ultimate nature of matter that has ever been proposed. The thinking world has regarded it, and took it up with acclaim, and made it the foundation of all manner of other beautiful speculations. It had a simplicity that appealed to every philosophical mind; for it enabled the thinker to reduce the entire universe to ether in motion.

One had but to assume a few different kinds of vortices, the simplest of them circular in form, but others perhaps variously convoluted to account for the different chemical and physical properties of the elementary bodies; and in the mind's eye, one had in other that ultimate, unique matter, the foundation substance of the universe.

If then a man may take pride in his achievements, it would seem that the author of this theory might well be excused if he held his child of his brain in a little more tender regard than any other of his mental offspring, and the astonishment of his interviewers may well be imagined when the vortex theory being mentioned to hear him exclaim with all the emphasis that characterizes his delivery:

"The vortex theory is only a dream, it is only a dream."
"But surely we are not to understand that you repudiate the vortex theory?"
"Not that, not that," he said, "I only say that it is uncertain and hoped that it can prove nothing; it is only a dream."

Was ever there a more astounding pronouncement than that? Was ever there finer test of the true greatness of any man? A lesser man than Lord Kelvin, having propounded a theory that found favor with the world, would have dwelt and harped upon that theory all his life, and, if need were, to correspond with it, warping everything into shape to fit its needs. Such is the history of almost every theory, true or false. Yet here was the author of the vortex theory, treating that theory as if it were a chance spark from his brain, which might quite as well be allowed to die away and disappear.

True science differs from every-day knowledge mainly in the precision of its data and its inferences, and it was interesting to see how the most keenly active and most highly developed scientific mind of our time—a mind, too, gifted with imagination as well—is held rigidly in check and made to bow before the proven fact.

HIS IDEAS OF GRAVITATION.

Thus it was, for example, when Lord Kelvin was asked if he leaned toward the acceptance of any particular theory in explanation of gravitation—the universal and familiar of phenomena, yet most inscrutable of mysteries. Before the advent of the vortex theory, the only plausible attempt to explain gravitation was that of the Swiss philosopher, Le Sage, who supposed that myriads of what was called "ultra-mundane corpuscles" are flying through space everywhere, and have the effect of pushing all bodies toward one another. But of late the thought of the vortex atom has suggested that gravitation may be, in fact, what it seems, a pull, due to a sort of suction of the whirling atoms. When asked whether this theory appealed to him as it does to many thinkers of our time, or whether he preferred the rival theory of Le Sage, Lord Kelvin said with even more than wonted emphasis: "No, no; I accept neither theory; I accept no theory of gravitation. Present science has no right to attempt to explain gravitation. We know nothing about it; we simply know nothing about it."

To convey by words the peculiar emphasis and intonation with which this verdict was pronounced would be impossible. It would require hardihood, indeed, in any one who heard it to attempt an explanation of gravitation, until such time as new data shall have come out for it, and the cause of which, in the opinion of Lord Kelvin, we know absolutely nothing is not likely to be illuminated by any other person speaking from the basis of present knowledge. This, of course,

is far from saying that new data may not come to hand tomorrow, or next year, or next century, which will solve the problem. Lord Kelvin, gifted with "heraldic frankness" of imagination, would be the last person to assert the finality of present knowledge. But it is certainly a salutary check upon the egotism of our time to be told that the wisest living physicist, the man who has been called the Newton of our age, knows as little of the cause why a stone tossed into the air falls back to earth, as the boy who tosses the stone.

THE HIGHEST TEMPERATURE.

Another most interesting speculation in which Lord Kelvin is interested has reference to the absorbing question of the limits of temperature. As most people know nowadays, the condition we term heat is held by the physicist to be merely a "mode of motion," a vibration or quiver among the particles of matter. The precise nature of this vibration cannot, of course, be perfectly understood until the precise nature of the atoms of matter themselves is made clear. But Professor Dolbear has pointed out that if the vortex theory be true, then there must be peculiar limitations to the atom's possibilities of vibration. A ring-shaped atom, for example, could only vibrate to the extent of becoming completely collapsed—just as a tuning fork can only vibrate to the extent of bringing its two prongs in contact. Corresponding limitations would be placed upon vortex atoms of any conceivable shape; hence, says Professor Dolbear, if the vortex theory be true, there must be an upper limit of temperature. When the vortex atom has reached its limit of vibration heat cannot become more excessive.

Now, the physicists have long held that there is a lower limit of temperature—a so-called absolute zero—reached when the atom altogether ceases to vibrate, and the question has highly interesting bearings, because it brings into consideration no less a problem than the age of the solar system. Astronomers and physicists are agreed that the sun, the earth and the other bodies of our system are cooling globes, and the calculations of the age of our system are based on the rate of loss of heat, an estimate of which is derived from direct observation of the sun in its present relatively cool state. These estimates have been made most carefully by Lord Kelvin himself, but neither he nor any one else thought of taking into account the possibility that the original nebulous body which was ultimately to become our solar system may have had a limited temperature. Yet this possibility is a most

important one, since, of course, the rate of cooling of any body depends in part upon its degree of temperature.

THINKS THE EARTH IS SOLID.

This entire question is one that appears to have had peculiar interest for Lord Kelvin. It even brought him almost to the point of a controversy at one time with the biologists (and his life has been singularly free from controversies), because he could only allow them 999,999 years for the existence of life on the globe; and with the geologists, because his calculations led him to believe that the earth is solid to the core, and at least as rigid as steel, while they stood out for a fluid interior. Hence it was to be expected that Professor Dolbear's suggestion, based as it is on an speculation of Lord Kelvin's, and tendent, if supported, to vitiate the force of one of his important speculative calculations, should at once interest the author of the vortex theory, and the calculator of the earth's age. And so it did. He either had not

chanced to hear of the suggestion before, or else courteously feigned surprise over it. In either case, it unquestionably interested him intensely; but when it came to the expression of an opinion as to the validity of Professor Dolbear's conclusions, that was quite another matter. "It is interesting," he said, "most interesting; but it is based solely upon the vortex theory, and the vortex theory, as I have said, is quite unproven, and itself can prove nothing—nothing whatever. We must not heap theory upon theory, dream upon dream. We must wait and see. If there be an upper limit of temperature, experiment may some time demonstrate it, but the vortex theory cannot prove it in advance, for the vortex theory is only a dream. It can prove nothing."

THE ABSOLUTE ZERO POINT.

Quite of the same tenor were the great physicist's comments on the probable outcome of the experiments now being made with low temperatures. Every one has heard that Professor Dewar and other investigators have liquefied the gases, and even reduced many of them to a solid condition, producing an almost unimaginable degree of cold. It having been shown that the same body changes from gaseous to liquid and from liquid to solid states, simply in virtue of changed temperature, the question has naturally arisen as to what will happen when a body is reduced to a condition in which the vibration of its atoms altogether ceases. The particles of a gas are so active that they fly asunder, reduce their activity (that is to say, decrease their temperature), and they move freely over one another and assume the liquid condition, make them still more quiescent and a solid results. Will there, then, be another change of state when they are made

absolutely quiescent at the absolute zero point?

But, regarding this point also, Lord Kelvin's scientific caution asserted itself. "The experiments now being made are most interesting and most important," but as to what they would show beyond the range of present experiment he declared himself utterly unable to surmise.

BOTH WILL DIE.

"We must wait and see," he said. "We must wait and see." If every scientific worker would adopt that for his maxim how much less there would be of crude speculation in the world; how much less that we learn would have to be unlearned; how much more rapid would be the real progress of every seeker after truth! Speculation is easy, but the greatest mind attaches no importance to its day dreams unless they are surely built upon a broad foundation of facts.

And so Lord Kelvin's scientific caution serves more almost than anything else visible to him to impress one with the greatness of his mind. The interviewer left the famous physicist feeling an enhanced appreciation of his position, and from the prejudice which he had shown throughout is perhaps the very highest of mental endowments. One feels glad that he answered just as he did about all these half-visionary and half-scientific speculations. But all the same there is pleasure and sometimes profit in the occasional unheating of the imagination, and the scientific world is to be congratulated that once upon a time Sir William Thomson permitted himself to dream the dream of the vortex atom. Nor is it at all certain that future generations will decide that it was "only a dream." Certainly the main body of scientists of our day could by no means be persuaded to hold the vortex theory as lightly as it is held by its author. When progress is to be made, there is always a chance that they may "dream true." Despite Lord Kelvin's modest estimate, therefore, the vortex theory certainly will not be discarded until some better theory shall have come to take its place, and of that there is as yet no sign of promise.

MURDER AND ARSON.

Body Found Cremated With Bullet Lodged In Skull.

Wichita, Kan., Jan. 1.—A special to the Eagle from Kay Center says: The residence of W. S. Carver, one mile east of Kay Center, was burned to the ground early this morning. Carver's remains were found in the cellar partially burned, with a bullet lodged in his skull. The coroner is now holding an inquest. R. S. Sair, of Arkansas City, has been stopped by the police, and the building his house for him, having just completed the building. The supposition is that Carver was murdered.

Death Through Imprudence.

Butte, Jan. 1.—Frank Sweeney, aged 28, was drowned in the big plunge at Gregson's Springs, near here, today. He had

been to the springs with a party of friends, and after dancing for several hours, ate a hearty dinner and immediately went into the water. He sank and was not missed for awhile. His corpse was live in Bellevue, Ia., where the body will be taken.

BOTH WILL DIE.

Double Attempt at Murder and Suicide In Ohio.

Sandusky, O., Jan. 1.—A report was received here of a double attempt at murder and suicide at Mansfield, 12 miles from here. John Williams attacked Mrs. Flint with a knife and cut her so badly that she is not expected to live. Williams then sought to end his own life with a knife, and inflicted injuries from which he is likely to die.

THE CHRISTMAS HERALD

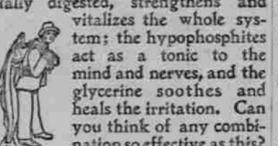
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It's a bold stroke for great business, figuring on a small margin of profit, relying on a tremendous response. Here is an opportunity to buy Thoroughly Reliable Underwear and Stylish Clothing for Man or Boy in the heart of winter, when they are needed most, and at end of the season prices. We have included every garment of the famous "Siegel" brand (except Black Clay Worsteds). Every item we print will bear the closest investigation. Those who come first naturally get the cream of selections.

Item No. 1.

Natural gray in heavy weight underwear, good, warm and strong wearing goods, worth 50c, in any other store in Utah, in the big store you buy the shirts or drawers at 25c.

Item No. 2.

Men's gray and brown mixed, fleece lined underwear, regular price 65c. If you could find the same goods in any other store you would think it a bargain at 75c, in the "Big Store" shirts or drawers at 45c.

Item No. 3.

Fine fleece-lined underwear in mottled brown and natural gray colors, something that is very soft and nice to the skin, sold regular everywhere at \$2.00 a suit; in the "Big Store" you get them on the third day of the new year at 65c per garment.

Item No. 4.

Derby-ribbed wool underwear, pink and gray mixtures and light tan, sell regular at \$2.00 per suit—a New Year's surprise sale, they all go in the "Big Store" at 75c per garment.

Item No. 5.

Lamb's wool underwear, this is our best seller at \$2.50 per suit—it comes in three colors, tan, brown and natural gray, silk finish fronts, pearl buttons, in the "Big Store" you can get them at 95c per garment.

Item No. 6.

Here is one of the biggest bargains in underwear that can be found anywhere. This line of underwear sell regular at \$3.00 per suit; it is in a variety of colors—Derby-ribbed and plain, in the "Big Store" you can have your pick from the lot at \$1.25 per garment.

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Perhaps you've had experience with small stores or large ones, or large stores with small stocks, and think you can't be fitted. In so large a stock as ours almost every man or boy can be fitted with the same size and shape that would be cut for him if made by his tailor. If it doesn't fit we make it. One reason our ready-made clothing never has a ready-made look.

Children's Suits.

Why do you want trash? You don't, it's the price that tempts, and yet experience always teaches it pays to pay a little more, for such care in making and fitting your Boys' Clothing as we give. Twenty-five per cent off on any Boys' suit in the Big Store gives you the best at a cheap price.

Overcoats.

Cloth, work, style, price—each and all we give better than the cheap tailor and yet some of you young men are won by the sound of made-to order. We don't make to order, we make to fit.

Any Man's or Boys' overcoat in the "Big Store" at 25% off.

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About 85 Children's cape overcoats—they come in two colors, black and brown, for ages from 4 to 10 years. The black ones are worth \$3.00, at the Big Store, for New Year's selling they go at \$1.75. The brown ones are worth \$3.75; in this sale they are \$2.15.

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Natural wool sox, the best to be had on earth for the money, pretty strong statement. But we'll prove it, worth 40c a pair; you can have them for 25c while they last.

Black and brown cotton sox, fast colors, worth 10c anywhere, in the Big Store you get them for half, 5c.

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Cotton enough to make them good wearers. No shrinking in these—they come in green, brown, tan, blue, black and garnet; 75c for your choice from the lot; others that are of the best makes, sailor collars, lace fronts, all colors—\$1.25, \$1.50 and up.

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