example. With regard to certain commodities, and perhaps more especially certain cereals, there are those who contend that a higher quality is retained in bulk than when done up in small packets. On the other hand, when kept for a long time contamination is more to be feared in bulk than in packets. Again, in regard to certain articles which are put up in tins, the quicker this is done the better. Coffee is an outstanding example; the quicker it is put in sealed tins after roasting the greater the likelihood of its retaining its flavor.

Whether it be best to pack a certain article in packets or tins depends upon the article. Some articles will keep as long as necessary in the ordinary packet, while others keep better in tins. The introduction of mechanical appliances has, of course, reduced manufacturers' expenses. Even in regard to food packed by machinery there is naturally considerable expense to be borne. Per packet or tin it may work out at a very small figure. The masses, however, are aware of the fractional difference in the article sold in packets and that in bulk—it may only amount to ½d. per two or three lbs. on cereals—and for that reason they adhere to the old fashion of buying at a store which carries a big supply in bulk.

Still, everything considered, the development of the trade in food in packets and tins has given general satisfaction to the consumer. Indeed the contention is frequently made that but for that development the masses at least would to-day still be without many articles of food which they have come to regard as necessary.—*London Times.*

ELECTRICAL SCIENCE.

ROMANCE OF THE ATOMS—TRANSMUTATION OF THE ELEMENTS.

Speaking at Oxford, Sir J. J. Thomson, Cavendish professor of experimental physics at Cambridge, pointed out that the atomic theory, the theory that matter, in spite of its apparent continuity, is in reality made up of a great number of very small particles, is as old as the science of physics itself; but for two thousand years it made no progress because it had no real connection with physical phenomena. No facts were known by which it could be tested, and it was too vague to suggest for itself effects that could be put to the test for experiment. It was sterile because it was divorced from experience, and it affords a striking proof that a theory can grow only by the coöperation of thought and facts. Facts play such a large part in stimulating imagination and suggesting new ideas that every mechanical improvement in apparatus, every new method that makes it easier to investigate physical phenomena, not merely affects the technique of the science, but may originate ideas that will ultimately revolutionize our philosophy of the universe.

In giving an account of the present state of the atomic theory, the lecturer pointed out that we now know that such things as atoms exist, and that the atoms of an element are all of one kind. We know that all atoms contain electrons—minute particles charged with negative electricity—and that there is only one kind of electron; and this knowledge constitutes the first step towards a knowledge of the structure of the atom and towards the goal towards which since the time of Prout many chemists have been striving—the proof that the atoms of the chemical elements are all built up of simpler or "primordial atoms." The number of electrons in an atom is also known. From measurements of the scattering of Röentgen rays it follows that the number is not very far from half the atomic weight, so that in the carbon atom there would be six electrons, in the oxygen eight, and so on, while in the lightest atom, hydrogen, there is probably only one.

TRANSMUTATION.

The constant difference between the number of electrons in the atom of one element and that in the atom of the element next in the series is strong evidence in favor of the view that the atoms of the consecutive elements differ from each other by the addition of a primordial atom, which is apparently the atom of helium. The atomic weights of the elements show that in their formation a measureable change of mass has taken place, and the changes of energy involved must be enormous compared with those liberated in any chemical changes with which we are acquainted. For instance, the atomic weight of chlorine being 35-5, which is not a whole number, it follows that in the formation of 355 grammes of chlorine there must have been a change of mass of at least half a gramme, and this involves the absorption or liberation of an amount of energy about equal to that required to keep the Mauretania going at full speed a week. The amount of energy required to break up an atom has a very important bearing on the problem of transmuting the elements by physical means, but the lecturer said that his efforts to split up atoms, though he had succeeded in detaching electrons, had not yielded any evidence he could regard as conclusive that by such means the atom of one element could be changed into an atom of a different kind.

WORK FOR FUTURE SCIENTISTS.

As regards the structure of the atom there is strong evidence that the electrons in it are divided into groups and that some of its properties—those associated with its innermost group—are connected in a very simple way with the total number of electrons in the atom; and that there are other properties, notably the chemical ones, which change in a rhythmical way with the atomic weight and which depend on the electrons near the surface of the atom. Lastly, there are regions in the atom, probably the most interesting of all, about which we know little or nothing, the investigation of which will provide work for many generations of physicists, who will assuredly have no reason to be "mournful that no new wonder may betide."