

★ ★ ★ Astronomy ★ ★ ★

PARTIAL IMPACT.

The Birth of New Worlds.

Prof. Bickerton's Cosmic Theories.

AN APPRECIATION BY A. C. GIFFORD.

Scientific discoveries may be divided into two main classes, according to the way in which they are received by the world. Some meet with an immediate welcome, others have to wait for years and perhaps sink into oblivion, until at last they are re-discovered and gain a tardy recognition. It is generally neither the truth nor the value of the discovery which determines into which of these

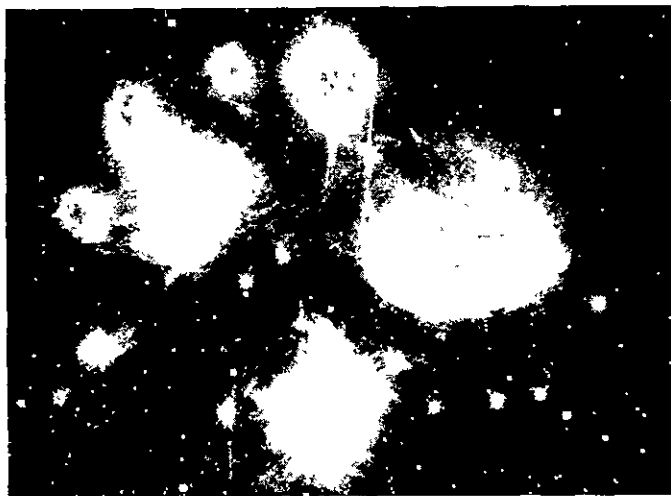
Very different, indeed, is the fate met with by a discovery of the second class. It is made somewhere out of the direct line of progress at the time, or else is so far ahead that the distance hides it from all but the keen sight and clear scientific imagination of some solitary genius. Such a discovery, however beautiful in itself, is doomed to remain unrecognized as long as the world's attention is riveted elsewhere. If it is a new theory it is even harder for it to gain acceptance than if it is a new fact, and rightly so. But we must not forget that the march of knowledge is delayed whenever a truth is rejected.

New theories have a way of upsetting so many preconceived ideas. When a theory is inconsistent with the statements of the text books, and is neither accepted nor even recognised by the leaders of scientific thought, the man in the street quite naturally assumes it to be unsound. But this is by no means necessarily the case. Text

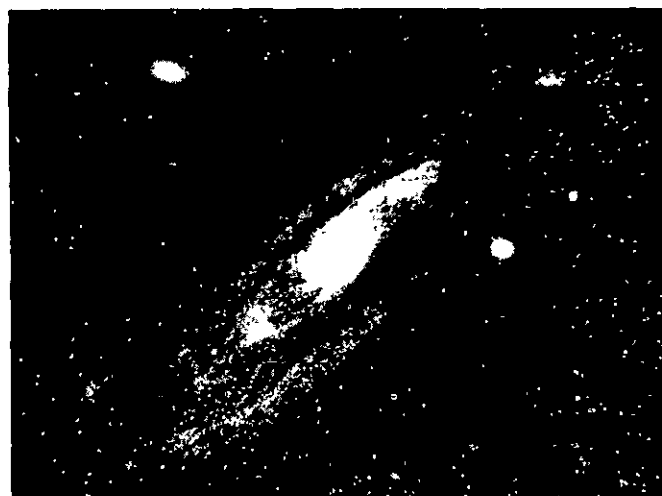
That Avogadro discovered his great law, now one of the corner stones of chemistry, nearly 50 years before the world was ready to receive it is almost equally well known. Less familiar is the fact that when Jules Robert Mayer enunciated the principle of the conservation of energy his paper was contemptuously rejected by all the journals of physics.

Similarly, when Waterston, in 1845, submitted to the Royal Society a memoir embodying the kinetic theory of gases, it was withheld from publication because it contradicted the views then current amongst scientific men, and the discovery had to be remade by Clausius and developed by Clerk Maxwell.

As early as 1867 Niepee proved that salts of uranium impressed photographic plates in the dark, but the researches on radio-active substances did not start in earnest until Becquerel noticed the same thing in 1896.



NEBULOSITY IN PLEIDES (*Bryant*).



THE GREAT NEBULA IN ANDROMEDA. (*Bryant's History of Astronomy*.)

classes it shall fall; it is more often a question of whether or not the world is ready and waiting for it. Fortunately, the majority of discoveries are made by workers who are carried forward on the crest of some advancing wave of human knowledge, and all these belong to the former class. A dozen men are on the watch gazing intently in the same direction, and it is more or less a matter of chance which eye catches the first gleam of light. The fortunate searcher finds his discovery instantaneously welcomed and corroborated by the others, who vie with one another in hastening to give him his due meed of praise. Examples of this class are not far to seek. We might choose them from almost any period in the history of any science, but as the present is a particularly stirring time in the scientific world, we could not wish for a more striking example than is ready to our hands in the splendid series of

books have erred repeatedly in the past, and we can hardly believe our present ones to be infallible. Moreover, a truth discovered by one man must wait for recognition till some one else perceives it, which he cannot do until he directs his attention towards it. Thus it happens that in almost every chapter of the history of human thought we read of truth waiting unhonoured till some reigning error shall have passed away.

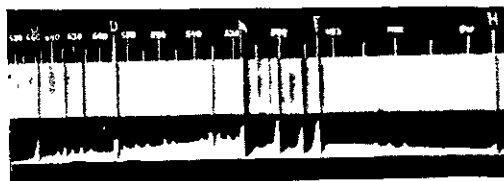
To this second class of discoveries Professor Bickerton's Cosmic Theory belongs. When first enunciated 30 years ago, it was not in the direct line of astronomical progress. Astronomers then were more intent on perfecting methods of observation and completing surveys of the heavens than in making comprehensive generalisations. The new theory was, moreover, opposed to some of the accepted dicta of contemporary scientific thought, especially to the theory of the dissipation of energy. The tidings, therefore, fell on deaf ears. It is easy to understand why this was so in 1878, but it is not so easy to explain why some of its main points are still unrecognized to-day, and why Professor Bickerton's name is not mentioned in the text-books of astronomy.

In 1878 the facts on which the impact theory relied were few, though sufficiently striking. Now they are innumerable. During the last thirty years the advance in observational astronomy has been unprecedented; and every year the observations have verified the deductions which were originally made, the verifications often extending to the minutest details. Thus it happens that though his name is not referred to, Bickerton's ideas are creeping into the books. For thirty years he has waited, not too patiently, for some recognition of his work, but it is highly probable that he will not have to wait very much longer; and all along he must have had at least the satisfaction of knowing that he waited in excellent company. Let us recall two or three names from the great scroll of those whose proffered gift of truth was for a time rejected. All will remember what a storm of opposition greeted Galileo when he proceeded to make deductions from some of his most important discoveries, and how he was persecuted for affirming that the earth moved.

Ever Sir William Crookes, who in 1879 showed the mechanical effect of the Cathode Rays, had to wait twenty years before his theories with regard to them met with decisive confirmation.

Partial Impact.

Now what is this theory of partial impact, the history of which is destined to take its place in the records of science along with these and countless similar instances of the irony of fate? The



SPECTRUM OF NOVA AURIGAE (*Photographed by Campbell*).

triumphs that are still being made by the brilliant band of workers who are establishing on a firmer basis the electron theory, a theory which promises to explain so many of the most puzzling enigmas of science, besides opening up to us two new worlds and presenting to the mind's eye an indication of an infinite geometrical progression of marvellously perfect worlds within worlds. As we watch these pioneers opening up for us a new and magnificent realm of knowledge, it is a pleasure to note how generously each advance made by any one of them is appreciated by all the other workers.



RING-SHAPED NEBULA IN LYRA (*Yerkes Observatory*).

easiest way to get a clear idea of it is to read the articles by Professor Bickerton himself which were published in three recent numbers of PROGRESS. They are written in his usual picturesque style, and breathe a splendid optimism. They give, moreover, very clearly, though of course in a condensed form, some of the main points in his theory, and show conclusively how wide and far-reaching it is and how fertile in suggesting subjects for further research.