

characteristics. All ceramic plastic materials also contain chemically combined water of crystallization. Although ceramic articles can easily be shaped as a result of the plasticity of their raw materials, the finished materials owe their physical and mechanical properties to the crystals and to the glass matrix formed during firing at high temperatures.

In contradistinction to ceramic plastic raw materials, the plasticity of organic plastics is not caused by water but by the long chains of carbon atoms or arrangements of carbon atoms with other elements of which their molecules consist. These chains are arranged in various forms, such as long bundles or micelles and in tangled masses composed of threads. During manufacture plastic organic materials are transformed by heat (or by heat and pressure) into a non-plastic state, nothing being evaporated. Only the structure of the big molecules is altered and as only very small shrinkage occurs greater accuracy in certain shapes can be obtained from organic-plastic than from ceramic materials. Incidentally, the molecules of ceramic plastics are built up of silicon compounds, whereas those of the organic plastics are built up of carbon compounds—an instance of the many similarities of these two elements. With organic plastics, transformation from the plastic to the non-plastic form which gives the materials their mechanical and electrical characteristics takes place at about 180° C. In the case of ceramics the formation of the crystals and the glass matrix, which imparts these characteristics, takes place between 1,300° and 1,400° C.

The difference between the manufacture of ceramic and other materials, such as metal parts and organic plastic materials, is therefore that the article is not shaped from ready-made material but has first to be prepared from various plastic and non-plastic substances. After the water is removed in a filter press the body is homogenized, and out of this body the article is shaped into the desired form which is then dried and glazed and subjected to very high temperatures for final formation. The methods of manufacturing porcelain and low-loss ceramic articles containing talcum are very similar. The article proceeds to a description of the various processes employed in the commercial production of porcelain insulators.

Stellar Structure

A PAPER on stellar structure appears in the *Observatory* of May, in which Dr. T. G. Cowling gives a brief summary of the work of various physicists on the theory of stellar structure during the past ten years. A large portion of the paper is devoted to recent developments in the physical theory of the generation of stellar energy. The work of Gamow, Weiszäcker and Bethe has shown that the most probable mode of generation of energy is by the transmutation of hydrogen into helium, atoms of carbon and nitrogen acting as catalysts in the reaction. Assuming that the temperature at the centre of a star is about 20,000,000° K., increasing temperature implies increasing rate of generation of energy—approximately as the seventeenth power of the temperature—and the popular idea was that instability of the star would ensue. This view is erroneous because the generation of energy does not affect the internal temperature for a period of the order of a million years, and in this time the star can adjust itself so as to dispose of the extra energy.

It has been argued that reaction between energy generation and temperature would produce radial

oscillations, such as are observed in the Cepheids, but how can their absence in other stars be explained? A possible explanation may be found in the time-lag between increase in temperature and the resulting increase in generation. Another explanation given by Cowling is that a very large dissipation of the energy of an oscillation takes place in the outer layers of a star, but this dissipation is so large that it is difficult to understand why Cepheids continue to oscillate. Eddington believes that the dissipation in their outer layers is very low because of the changes in hydrogen ionization during the oscillation. On the whole, therefore, there are no objections on astrophysical grounds to the view that the energy of a star is nearly all generated in the hottest central part. Other matters considered include the Kelvin-Helmholtz hypothesis that stars radiate because gravitational energy is liberated as they contract, and observational evidence regarding the internal state of eclipsing binaries.

The University of London

THE title of professor emeritus of anatomy in the University has been conferred on Prof. J. E. S. Frazer, who resigned from the University professorship of anatomy at St. Mary's Hospital Medical School in March 1940. The title of reader in geography in the University has been conferred on Dr. S. W. Wooldridge, in respect of the post held by him at King's College.

The degree of D.Sc. has been conferred on Prof. R. V. Christie, University professor at St. Bartholomew's Hospital Medical College; Mr. Frank Dickens, of the Imperial College of Science and Technology; Mr. Charles Potter, of the Imperial College of Science and Technology; Mr. E. E. L. Dixon, an external student; and Mr. C. E. Lucas, an external student.

The University of the Philippines

FEARS were expressed, in the early days of the invasion by the Japanese of the Philippines when the open city of Manila was bombed, that the University and other colleges of the city, some of them of great antiquity, might have been damaged or destroyed. It is therefore welcome news to learn that no damage of any kind has been suffered by the buildings of the University of the Philippines or, apparently, by other educational institutions. The bombing was concentrated on a small area in another part of the city.

Announcements

Archbishop Lord Lang of Lambeth and Sir Charles Sherrington have been elected trustees of the British Museum.

Sir Henry Dale, president of the Royal Society, has been appointed chairman of the Science Committee of the British Council, in succession to the late Sir William Bragg.

Dr. F. W. Hardman and Mr. W. P. D. Stebbing, in two articles in *Archæologia Cantiana* (53 and 54), have outlined the history of Stonar and the Wantsum channel. As the prosperity of the place depended entirely on the state of the channel, this is discussed at some length in the first article. While the matter is primarily of interest to the local antiquary, there are aspects which make it of wider importance.

ERRATUM. NATURE, May 23, p. 584, col. 2, line 3 of second complete paragraph: before words "striking force" insert "the effect of".