the ordinary type, though having some of the imperfections that Dr. Albrecht notes. I can easily understand the cheapening in cost he suggests.

Recently I have received a book on this breed, containing considerable tabular matter, but mostly straight reading, made by this process, double spaced between the lines, type of the normal size of the typewriter, printed on one side of the sheet only, which is really easier on the eyes than the ordinary print, excelling even the admirable type used in SCIENCE in that respect.

I thoroughly agree with Dr. Albrecht in thinking that this method, particularly if improved as he suggests, might help to solve the financial problems that often present themselves to the impecunious research man who wants to let other people know what he has been doing.

And while we are about it, why not follow the suggestion of Dr. Metcalf on the same page, and adopt a character to convey the sound of "th"? I would suggest that the adoption of the crossed "h" which he mentions might lead to the same sort of confusion that some of us have experienced in reading the books of the eighteenth century in which the long "s" was used, and the difficulty in separating it from an "f." Why not take one of the letters from other languages, as the Greek θ?

LUCIUS P. BROWN

SPRING HILL, TENNESSEE

IN reference to the suggestions of Mr. Albrecht in regard to photographic reproductions of typewriting, I, some years ago, prepared a special text in physics for freshmen. I was unable to have it published in the usual way because the price of the book to the student would have to be so great that it seemed unreasonable. I then wrote the whole text on the typewriter, attached cuts in their place on the page and arranged with a firm in Cincinnati to photograph each page and make zinc etchings. This they did for $293.00. These were then sent to the Reformatory at Mansfield, Ohio, where the books were printed and bound for $150.00—500 copies. This made a total of $443.00 and the books could then be sold to the students at $1.25, which not only met all expenses but cleared a small margin for the department.

J. A. CULLER

MIAMI UNIVERSITY

EXPLORATION OF THE ETOWAH MOUNDS

THE department of archeology, Phillips Academy, Andover, Mass., has carried on two seasons' exploration at a large village site and mound group in northern Georgia. About one hundred stone graves were discovered which contained some engraved shells, various ornaments, pottery vessels and some engraved copper plates. The eminent authority on Mexican cultures, Mrs. Zelia Nuttall, examined the collection at Andover and suggested several lines of comparison between certain of the human figures and those observed among Toltec and Mayan remains. It is not claimed that any connection exists, but some of the comparisons are exceedingly striking.

Two complete sarcophagi were shipped to the Andover museum, set up, filled with Georgia earth and the skeletons and objects placed in natural position. Five such graves were shipped to other museums and have attracted considerable attention.

Any museum director or curator who wishes one of these graves and its contents can correspond with me at Cartersville, Georgia.

WARREN K. MOOREHEAD

METAPSYCHICS

IN my "Zoology" (1922), page 536, I have given an explanation of the term Metapsychics, which may perhaps later come into more general use. It may be worth while to record the history of this term, before it is forgotten. I published it in *The Dial* (Chicago) of February 1, 1905, page 86, with a definition. In the *Daily Graphic* (London) of February 9, 1905, page 7, I read that quite independently Professor Richet had proposed the same term at a meeting of the Psychical Society. If there is an earlier publication of the word, I have not found it.

T. D. A. COCKERELL

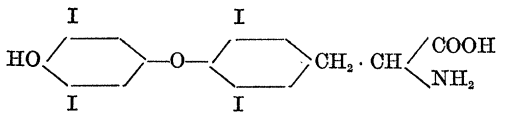
QUOTATIONS

THYROXINE

RECENTLY the Chemical Society resolved to award the Edward Frank Harrison Prize for 1926 to Dr. C. R. Harington, of University College Hospital. The achievement which has earned this tribute from the colleagues of Dr. Harington has been the synthesis in the laboratory of the active principle of the thyroid gland—the substance thyroxine.

It was only in June of the present year that those who follow the literature of chemistry learnt of the progress of his labors, and discovered Dr. Harington on the very threshold of a complete success. Two papers under his name appeared at that time in the *Biochemical Journal*. The first described a greatly improved method for the separation from thyroid tissue of the hormone in a chemically pure state—a method, moreover, which was not found wanting when pursued in an industrial laboratory. The second paper proceeded to the chemical analysis of the pure

substance, and here the classical methods of degradation and synthesis joined in the demonstration that thyroxine was to be represented by the chemical structure:



In one particular only was this formula uncertain. The position of the four iodine atoms could not be definitely affirmed. It had been possible to remove these from the molecule of the natural product. It had been possible by two independent methods to synthesize in the laboratory the iodine-free substance by a series of reactions accurately defining its structure. It had not then been found possible to introduce into the synthetic substance those four atoms of iodine which, in their proper orientation, would create the molecule which is thyroxine.

In a joint communication by Dr. Harington and Professor G. Barger to the December meeting of the Biochemical Society, the final solution of the problem was unfolded. Commencing with hydroquinone and tri-iodo-nitro-benzene — materials which inspired a press report to describe, a little optimistically, the synthesis of thyroxine from "coal tar products and iodine"—a series of classical organic reactions were adapted with masterly tidiness to the issue of a product of the above chemical structure. The substance was chemically indistinguishable from that isolated from thyroid glands. The chemical chapter is complete, the biological story opens. Use was made of the now well established quantitative effect of the hormone on the basal metabolic rate. Two myxoedematous patients were chosen. Their basal rates were respectively 32 and 45 per cent. below normal. Intravenous injection of the synthetic substance was spread over six days to a total dose of 14 mg, and the basal metabolic rates rose, in the first case to 6 per cent. short of normal, and in the second to 3 per cent. above normal. There occurred a coincident fall in body weight and increase in the pulse rate. Such activity was quantitatively as great as that given by natural thyroxine. Physiologically the two substances were indistinguishable. The structure of thyroxine requires the existence of two stereoisomeric forms, and we may suspect that the thyroid gland, by virtue of that elusive asymmetry of vital activities, synthesizes and employs but one of these isomers. That the substance obtained from the gland is the racemic mixture is due to the inevitable racemization which accompanies the process of separation, and it is not improbable that a resolution of thyroxine into its active forms will show that physiological activity is restricted to one only of these. This form should then be twice as active as the materials yet tested. The methods of physiology must now take the field. With thyroxine to hand there is available a means for the quantitative study of the rôle of the hormone and the function of the gland.

The committee which resolved to award the Harrison prize to Dr. Harington comprised the presidents of the Chemical Society, the Institute of Chemistry, the Society of Chemical Industry and the Pharmaceutical Society. Thus have the theoretical and applied interests of a science united to acknowledge the common benefit in a great academic adventure.—*The British Medical Journal.*

SCIENTIFIC BOOKS

Studies of the Variation, Distribution and Evolution of the Genus Partula; the Species inhabiting Tahiti. By HENRY EDWARD CRAMPTON, Ph.D., professor of zoology, Barnard College, Columbia University; curator of invertebrate zoology, American Museum of Natural History. The Carnegie Institution of Washington, 1916. 307 pages quarto. 33 plates.

ONE of the most important contributions to our knowledge of animal evolution, perhaps the most important yet published in the twentieth century, is Dr. Crampton's "Study of *Partula,*" a genus of land snails found in the forests of islands of the South Seas. The central problem of evolution is, as indicated by Darwin, that of the origin of species. There exist on our earth a prodigious number of kinds of animals and plants. These are variously interrelated, and their relations are shown in their structure and development and are connected with their distribution and that of their ancestors in space and time. The features of their relations and the causes of their diverging progression constitute the factors in evolution. The determination of these factors in detail is to science vastly more important than the fate of any or all philosophies of evolution. And the study of these facts is essentially, as Darwin, Wallace, Wagner, Ortmann, Kerr and others have shown, an out-of-door subject, on which not much light can be thrown by closet studies. Studies in greenhouses or breeding-pens have been devoted mainly to problems of heredity, a matter of the greatest importance to biology, but not necessarily illuminating the problem of origin of species.

Even the meaning of species has been confused through indoor studies. A fairly inclusive definition is that *a species is a definable kind of animal or plant which has run the gauntlet of life and which has endured.* The imitation species of the laboratory have arisen through much the same elements, yet they have