

from protozoan cell to highest vertebrate in the course of geologic ages, he let 40 weeks (reduced to hours) represent geologic time—say 20 or 40 million years. For the third term in the proportion he took the number of hours it was necessary to observe the embryonic development in order to detect an appreciable change, and obtained for an answer as the fourth term a number in years which was much longer, even when the shortest lengths of geologic time were taken, than our historic period.

So that it was clear there was plenty of geologic time for evolution to proceed at a pace so slow that it could not be detected within the historic period and still accomplish its perfect work.

When it comes to attempts to estimate geologic time in years it seems to me that most persons must agree that they are not very satisfactory. This is particularly so with those of the physicists who have assumed as a basis for their calculations an origin for our planet, no longer looked upon with much favor in the light of the facts which support the planetesimal hypothesis. These calculations have also been largely invalidated by discoveries relating to the radio-activity of matter.

Of all geologic time estimates, those based upon rate of denudation, and its correlative—the rate of deposition of stratified rocks, seem least unsatisfactory. When these methods are applied to precambrian time it is admitted they amount to little more than wild guesses.

And yet we know that evolution was well on its way before the beginning of Cambrian time.

Walcott has brought to light in the Canadian Rockies abundant evidence of a rich and by no means lowly organized marine fauna at the very beginning of Cambrian time.

He and others estimate that at least 90 per cent. of the total evolution to the present had taken place before the Cambrian period.

Le Conte, even before he had had the benefit of these discoveries, was impressed with the high type of the Cambrian faunas.

His memorable words in this connection are:

When the curtain goes up on geological history

at the beginning of the Cambrian Period we find practically all the subkingdoms of the animal kingdom present and ready to answer to the roll call.

In the light of these facts what vistas of practically unrecorded geologic time filled with evolutionary process are opened up to us!

Bold indeed is he who from a rate of development predicated upon that observed during the brief span of the historic period would assert that geologic time is too short for a gradual evolutionary process.

ARTHUR M. MILLER

STATE UNIVERSITY,  
LEXINGTON, KY.

#### POTASSIUM CYANIDE AS AN INSECTICIDE

READING the article of Professor Fernando Sanford in the October 9 issue, I would add that I have found potassium cyanide very effectual in killing ants in lawns, and it does its work without killing the grass. A half ounce in 6 to 8 quarts of water applied with a sprinkling pot is enough for a nest 18 or 20 inches across.

W. G. BLISH

#### SCIENTIFIC BOOKS

*Dialogues concerning Two New Sciences.* By GALILEO GALILEI. Translated from the Italian and Latin into English by HENRY CREW and ALFONSO DE SALVIO, of Northwestern University, with an introduction by ANTONIO FAVARO, of the University of Padua. New York, The Macmillan Company. 1914. Pp. xxi + 300. Price \$2.00 net.

In these dialogues Galileo presents the results of his investigations in mechanics and physics. His representative, Salviati, speaking either for himself or as the reader and expositor of the manuscript of a certain unnamed academician—of course Galileo once again—is the principal speaker, and the source of most of the valuable original ideas. Sagredo, the more learned of the other two interlocutors, occasionally contributes something of importance. Simplicio, as an interested layman, raises the objections which would occur to such a man, and gives occasion for the introduction of alternative ex-