He could have saved himself and his audience at least two minutes had he referred simply to "the organism."

5. Most speakers try to squeeze too much into one slide. The print is usually too small. Large freehand printing is at least readable, if not as neat as ordinary typewriting, which can't be read anyhow. Give your audience time to read your important data. One frequently hears a speaker allude to a slide when it comes on the screen, "This slide isn't too important." So flip! . . . we go on to the next. If it isn't too important, why include it? Almost every institution, whether it be educational, governmental, or industrial, has someone who is more or less expert on visual aids. It will pay to consult him before having slides prepared. Your slides, if they are readable and clear, will help tell your story more easily.

If speakers would keep these points in mind, our meetings would certainly be a greater success. Remember that some of your listeners may have come especially to hear your paper. How often one hears the remark, "The title sounded so good, but what a waste of time!"

PAUL F. KLENS

Falls Church, Virginia

University of Michigan Geological Field Work in Mexico

A PROGRAM of studies of sections across the Mexican geosyncline at right angles to the marginal land masses has been designed to determine lateral variations in structure, lithology, and faunal relationships of successive geologic formations. Although purely scientific, these regional studies have economic implications. Their bearing on ore deposition is threefold: (1) to provide the regional setting for detailed studies of structure in the mines and mining districts along the eastern edge of the Sierra Madre Occidental; (2) to place the age of the prelava sedimentary rocks on a sound regional and paleontologic basis; (3) to locate intrusive bodies with respect to mineralization. Petroleum exploration may be guided by the interpretation of geologic history resulting from the series of stratigraphic sections measured in mountain ranges of the Plateau Central. The sequence of faunas and faunal zones recognized in each formation provides useful markers, which should be found in wells penetrating the subsurface. Structural features mapped in the mountain ranges can be projected into the basins, where geologic conditions may be obscure.

Field work in northern Mexico in the area of the early Mesozoic "Coahuila Peninsula" was resumed during July and August 1952 by a party from the Museum of Paleontology of the University of Michigan. Lewis B. Kellum, in charge of the program, was accompanied by two graduate students, Bob F. Perkins, of Dallas, Tex., and Cecil C. Kersting, of Muskegon, Mich. The primary purpose of the investigation was to study the fauna of the Lower Cretaceous Aurora limestone and the geologic relationships of the Aurora limestone to the Cuchillo evaporites.

The area mapped is along the Durango-Coahuila state line in the central part of the Sierra de Tlahualilo, about 250 miles south of the international border at the Big Bend of the Rio Grande. The general structure of the Sierra de Tlahualilo in Cretaceous strata is a broad, northward-trending anticline. On this major structure is superimposed a variety of well-defined local deformations. A small area of volcanic rocks encroaches on the western side of the range.

Three stratigraphic sections were measured. Small patches of fossiliferous platy limestones and yellow marls of the Indidura formation were found beneath the volcanics resting on the Aurora limestone. Fossils were collected at four horizons in the Aurora, the lowest of which occurs in a silicified zone that may mark the top of the Cuchillo formation. The limestones below this zone weather darker gray, are interbedded with gypsum, and grade downward into the highly gypsiferous beds of the Cuchillo formation. Rudistids occur at the top of the Aurora limestone but are not the dominant element in the molluscan fauna. A faunal zone about 600 ft below the top is characterized by a large assemblage of pelecypods, gastropods, brachiopods, and echinoids, of which *Gryphaea marcoui* Hill is the most abundant form. This zone, present throughout the area mapped, proved to be a most reliable datum plane in a thick limestone section. A few feet above this zone nautiloid cephalopods were found at several localities. The faunas from the Aurora will be studied in the Museum of Paleontology during the coming year.

LEWIS B. KELLUM

Museum of Paleontology, University of Michigan

A New Medium for Modeling Microscopic Structures in Three Dimensions

A FREQUENTLY annoying problem in research is the difficulty encountered in reconstructing a microscopical structure in a three-dimensional model large enough to allow effective study and yet not requiring too much time in preparation. This difficulty was experienced by the author while studying the embryonic development of the oriental fruit moth *Grapholitha molesta* Busck, the egg of which measures 0.7×0.4 mm. The embryo is coiled within the egg in such a fashion that the usual methods of orienting the block for sectioning yielded cross, longitudinal, and oblique sections of the same embryo, and an understanding of its orientation within the egg was important.

After blotting paper, cardboard, balsa, and wax sheets proved unsatisfactory, self-hardening sculptor's clay was found to be excellent for modeling, in that it reduced construction time, made greater detail possible, and resulted in a nearly indestructible product.

Modeling consists of three distinct steps: preparation of the clay, cutting the clay section, and building the model. A ball of clay of appropriate size is placed between two sheets of waxed paper. This sandwich is laid on a sheet of glass, rolling guides are put into place, and the ball is rolled into a slab of proper

thickness with a rolling pin. The thickness of the rolling guides depends upon the desired magnification; for example, if the specimen were sectioned at 8 μ and the desired magnification through a camera lucida system were 200×, the thickness of the clay slab representing each section would be $8 \times 200 = 1600$ μ, or 1.6 mm. Since clay slabs greater than 2 mm in thickness are more easily handled, it is better to double the thickness of the calculated slab and use alternate sections on the slide. When the clay slab has been rolled out, the top piece of waxed paper is stripped off, and the slab, still on the glass, is transferred to the camera lucida field.

The outline of the section image projected onto the clay through the camera lucida system is then traced with a scalpel or stout dissecting needle, with sufficient pressure to cut out the clay section from the slab. The clay section is then inverted on the glass plate, the second piece of waxed paper stripped off, and the clay that was not a part of the section removed. The clay section is carefully lifted from the glass and placed on the model. The next clay section is cut and placed on top of the first after the two interfaces have been wet with water. The remaining sections follow in like manner. After a number of sections have been pieced together, details are sculptured into the soft clay.

In the case of a round specimen in which the first section is too small to support the increasingly heavier sections placed upon it, construction must start somewhere in the middle, preferably with the largest single section, and be continued outward to the smallest. Care must be taken to build the second half in reverse so that the two halves can be joined. Compression of the lower sections by the weight of new sections can be prevented by allowing the lower sections partially to dry so that the harder clay will support additional weight. A partly completed model can be kept pliable for subsequent work if wrapped in damp toweling.

CHARLES W. RUTSCHKEY
Department of Zoology and Entomology
The Pennsylvania State College

Color in Trilobites

IN SCIENCE (**117**, 17 [1953]) appears M. W. Garretson's interesting note on "Color in Trilobites of Trenton Age." The author states "no mention of color in any trilobites has been found in the literature." Possibly this should read "Ordovician" rather than "any trilobites." In 1922 there appeared the following: "A Trilobite Retaining Color-Markings" (Raymond, P. E. *Am. J. Sci.*, **4**, 461). In this article Raymond described with a figure a pygidium of *Anomocare vittata*, which he collected from the Cambrian of Cherokee County, Alabama, in 1921, and which shows retention of color markings. I personally recall having seen this specimen while a student of Raymond's.

BRADFORD WILLARD
Department of Geology, Lehigh University

β-Glucuronidase and Catalysis

IN a recent exchange of comments with Levvy (SCIENCE, **116**, 285 [1952]), Fishman reiterated his view that the enzyme β-glucuronidase catalyzes the biosynthesis of conjugated glucuronides. Certain aspects of this question merit further comment. The Fishman hypothesis is representative of a waning genre which perhaps culminated with Bergman's espousal of the peptidases as the agents directly responsible for protein synthesis. Before the role of adenosine triphosphate (ATP) in the transfer of energy was appreciated, it was not possible to discover the rather complex experimental conditions necessary to demonstrate biological syntheses with crude tissue preparations. On the other hand, much information was available on amidases, esterases, and glycosidases, and it was a fashionable presumption, still encountered occasionally in other instances than the case under discussion, that these hydrolytic enzymes, because of some vague, unknown, and rather mysterious special environmental situation within the cell, caused a synthesis of the compounds which in prosaic *in vitro* experiments were cleaved rather than created. This presumption had a special advantage for its advocates in that, by asserting the necessity for a duplication of an unknown condition existing intracellularly if synthesis was to be demonstrated, it became impossible to bring direct experiments to bear on the problem, and the presence of a hydrolytic enzyme in a tissue could be invoked to argue either for the synthesis or the hydrolysis of a given substrate, depending upon which side the investigator desired to lean toward. One can agree with Fishman that these questions, along with adherence to the atomic theory, are matters of personal opinion, but not that his hypothesis is innocuous, even if fallacious. As an example, anyone who utilizes changes in tissue glucuronidase activity under varying experimental conditions as an index of changes in the ability to conjugate steroids is wasting his time if the Fishman hypothesis is wrong.

In addition to the convincing objections advanced by Levvy, attention should be drawn to the necessity of differing routes of synthesis and hydrolysis if the cell is to exist in a dynamic state. At a given moment a single enzyme cannot be catalyzing a net reaction in opposite directions. Further, a hydrolytic process, even if thermodynamically reversible at reasonable concentrations, is at the mercy of changing levels of intracellular constituents. This is perhaps why cells have evolved mechanisms of synthesis linked to highly exergonic reactions, thus enabling the processes of metabolism to continue at low substrate levels. It should be remembered that all cells employ the uronic acids as structural components, and the formation of these more important glycosides, in addition to the rather special hormone conjugates with which Fishman has been concerned, must also be accounted for.

R. W. MCGILVERY
Department of Physiological Chemistry
University of Wisconsin Medical School