be true the correspondence of plastid and golgi region would be even closer than at present supposed.

T. ELLIOT WEIER
FLUSHING, N. Y.

ON THE GENERA CTENOGOBIUS AND RHINOGOBIUS GILL, TUKUGOBIUS HERRE, AND DROMBUS JORDAN AND SEALE

ON my trip to the Philippines in 1931 I obtained 997 species of fishes, a wonderful testimonial to the richness of aquatic life in the waters of that favored group of islands. In studying such a large number of species it was necessary to reexamine closely numerous genera; this was especially true in studying the 88 species of gobioid fishes secured.

In 1858 Gill imperfectly defined the genus *Ctenogobius* from a Trinidad species and there has never been a satisfactory limitation of the genus since. The latest characterization by Koumans in 1932 is the best yet written, but is too inclusive and overlooks important characters.

In 1859 Gill described *Rhinogobius similis* from Japan, but he never published a description of the genus. Ever since authors have confused *Ctenogobius* and *Rhinogobius,* although an examination of the type species will show good generic differences.

In 1927 I described *Tukugobius* from the Philippines, largely on the character of the ventrals.

Recently I have examined a large series of *Rhinogobius similis* Gill, from Japan, and the related species from Japan and Formosa, and have compared them with the three species of *Tukugobius* described by me from Luzon. They are all very closely related and are all evidently true *Rhinogobius.* In all of them the ventrals are very short, forming a nearly circular powerful adhesive disk, with a characteristic thick bilobed or deeply crenate frenum. They are very much like the ventrals of the genus *Sicyopterus* and closely related genera of the *Sicydiini,* except that they are free and not adherent to the belly, as in *Sicyopterus.*

Tukugobius Herre is therefore an exact synonym of *Rhinogobius* Gill.

Ctenogobius Gill has the ventrals of the ordinary goby type, and we may refer to it most of the species given by authors under *Rhinogobius,* which have a truncate or emarginate tongue and naked opercles and cheeks.

In 1905 Jordan and Seale created the genus *Drombus* to receive a new Philippine goby, but their generic distinction was not well drawn. It is, however, a valid genus, distinguished chiefly by having 6 to 9 rows of teeth in each jaw, and having the nape scaled to the eyes.

Rhinogobius, Ctenogobius and *Acentrogobius* have been used as dumping grounds and more or less interchangeably for divers sorts of gobies. By limiting the name *Rhinogobius* to those gobies agreeing with *Rhinogobius similis* in the peculiar formation of their ventrals we can eliminate at least a part of the confusion. If gobies were two feet long, Dr. Jordan once said, they would be well known. As it is, few people are willing to scrutinize them closely enough to work out their real similarities and differences.

ALBERT W. C. T. HERRE
STANFORD UNIVERSITY

BIOLOGY AND THE PRINCIPLE OF REPRODUCIBILITY

IF a discipline is a science, *i.e.*, if the phenomena which it considers may be treated logically by the scientific method of experimentation, prediction and confirmation by further experiment, these phenomena must be reproducible. That is, if two undisturbed systems of the type being considered are at any time identical, they must remain identical through all time, or until one of them is disturbed. Furthermore, there must be a correlation between systems displaced with respect to each other in time. If system A at time t_1 is identical with system B at time t_2, then system A at a later time $(t_1 + T)$ must be identical with system B at time $(t_2 + T)$.

The phenomena of the inorganic world are reproducible in this sense, although the results of simultaneous identical experiments on identical systems are not necessarily identical. The famous indetermination principle of Heisenberg states that, if a great number of identical systems be divided into two groups, then the results of simultaneous measurement of a certain quantity on each member of a group will be distributed about a mean value: this mean and the distribution will be identical for the two groups. It states further certain relations between the widths of the distributions arising from the measurement of certain pairs of quantities. The actual uncertainty in the result of a single observation is appreciable only for systems of molecular dimensions, and in macroscopic systems the reproducibility is of the rigid type known as causality. It is well to remember, however, that an uncertainty of this type is only a necessary, and not a sufficient, condition for inferring supernatural intervention.

It is obviously of prime importance to know whether biological phenomena are reproducible. The answer of the uncompromising vitalist is "No!", the uncompromising mechanist answers "Yes: Causally so." Adherence to the extreme vitalistic view-point makes the scientific study of biology logically impossible, since the course of an event observed in the past can give us no hint of the probable course of a similar event in the future. Experimentally, also, this position is untenable, since a number of the fundamental biological processes (photosynthesis in wheat and other plants, the phototropisms of certain plants and animals, etc.) have been shown to be accurately reproducible, and a number of other fundamental processes (photosynthesis of sugars, the photodecomposition of CO_2 by chlorophyll[1]) have been isolated and repeated in inorganic systems of known reproducibility. On the other hand, it appears definitely impossible to interpret biological phenomena in terms of the now known processes in inorganic systems, and the question must be regarded as unsettled. It may be, as von Uexküll has maintained, that the production of identical biological systems is fundamentally impossible. Certainly it is impossible to the experimental technique of the present day: synthetic men with interchangeable parts are still a dramatist's dream.

Many vitalists cite the apparently purposive actions of organisms in support of their contentions. This is logically justifiable only if it can be shown that identical organisms under identical conditions exhibit diverse purposes which are not even statistically reproducible. If the reactions, though purposive, are reproducible, they are not fundamentally different from the reproducible reactions of inorganic systems, and we may suspect hitherto unrecognized natural laws, of universal application, but illustrated only by the exceedingly complex systems which constitute organisms (precisely as the laws of electrostatics are illustrated only by electrified bodies). The view-point which considers biological processes to be reproducible, and controlled by natural laws of universal validity but limited illustration, is often called "vitalism," but the name "organicism" has been proposed to distinguish it from that vitalism which sees supernatural intervention in every action of a living thing.

It is interesting to note that Professor Niels Bohr, in his latest study of the foundations of the quantum mechanics, has proposed the introduction of teleological elements into the structure of the inorganic sciences.

EUGENE W. PIKE

PALMER PHYSICAL LABORATORY
PRINCETON, N. J.

[1] According to a private communication from Dr. K. Meyer, of the University of Zurich.

"A RARE PUBLICATION"

UNDER this title Mr. Wm. J. Fox[1] has given some notes on the "Transactions of the Natural History Society of Queensland, Vol. 1, 1892–94."

Such notices as this usually invite the making of a search and often result in the valuable disclosure of copies in unexpected places. Attention is therefore called here to the fact that the journal is to be found in several libraries in Australia.

In a late catalogue by E. R. Pitt[2] copies are listed for the following:

The Commonwealth Parliament, Canberra.
Australian Museum, Sydney.
Linnaean Society of New South Wales, Sydney.
Mitchell Library, Sydney.
Royal Society of New South Wales, Sydney.
Royal Society of Queensland, Brisbane.
Public Library, Adelaide.
Royal Society of Tasmania, Hobart.
Field Naturalists' Club, Melbourne.
National Museum, Melbourne.
Royal Society of Victoria, Melbourne.
Public Library, Perth.

Evidently only one volume of *Transactions* was issued.

VERONICA J. SEXTON

LIBRARY, CALIFORNIA ACADEMY OF SCIENCES

[1] SCIENCE, n. s., 77: 1997, pp. 351–352, April 7, 1933.
[2] "Catalogue of the Scientific and Technical Periodicals in the Libraries of Australia," edited by E. R. Pitt, Melbourne, 1930, p. 707.

SCIENTIFIC APPARATUS AND LABORATORY METHODS

MANIPULATION OF THE RESEARCH MICROSCOPE

WHEN examining a smear preparation on a slide with the highest powers of the microscope (especially oil immersion) one makes a rather systematic exploration by starting at the top (or bottom) of the slide and working across in definite bands or areas.

In going from one band to another, the following procedure is usually taken: The operator selects a distinguishing or characteristic bit of material on the limit of one band and, using this object as a guide by continually keeping his eyes fixed upon it, turns the one knurled knob of the mechanical stage until another area of sufficient width (next band) comes into view. When he believes he has about the right width which his lenses will enable him to study at one time, he then uses the other knob of the mechanical stage to move said band left to right (or the reverse) for the exploration. This operation must be repeated until the entire slide is, of course, completely studied.

Such a procedure of slide examination after many hours becomes extremely tedious and rather subjec-