catches from one to six other forms were present (three species of diatoms and three species of dinoflagellates in one). The largest number of *Ceratium tripos* found in a single drop was two, but the number of *Prorocentrum* in that drop was 146. The general evidence of drop studies of the fourteen days suggests that the ratio of numerical representation of the two leading species was about fifty to one in favor of the smaller form.

These experiences show distinctly the unreliability of results of treating differing organisms alike, and the futility of applying methods of handling to those of smaller size merely because they have been successful with those of larger size and are convenient. They also show the possibility that *Prorocentrum* is more frequently prominent in production of "red water" than reports have indicated.

Worm larvae of undetermined affinities were the only animals actually seen using *Prorocentrum* for food. Many of them were gorged with intact specimens.

In the tall tubes used for daily collecting by the settling method, it was noted that a large percentage of killed material was held by the surface films and by the sides of the tubes. Microscopic examination of some of the supported particles showed them to consist mainly of clumps of three to six *Prorocentrums,* a most convincing illustration of the way in which agglutination or adhesiveness of small organisms may reduce accuracy of collecting by any method.

Because of their general interest these points are presented for publication now, since it is improbable that a full report can be prepared soon.

W. E. ALLEN

SCRIPPS INSTITUTION OF OCEANOGRAPHY
LA JOLLA, CALIFORNIA

INTERBED—A CONVENIENT STRATIGRAPHIC EXPRESSION

SEDIMENTARY formations are commonly made up of one dominant rock type in which occur interbedded layers of distinctive lithology; a shale formation may contain interbedded limestone layers; a sandstone may include interbedded shales. In many cases each interbedded layer consists of a single bed, an inch or more in thickness. Where such thin layers of different lithology are regularly and repeatedly interbedded a banded appearance is attained. In stratigraphic description these features have been referred to as "interbedded layers" or "intercalated beds," or some such expression that, when frequently repeated, as is necessary in some cases, becomes exceedingly awkward. In their place the term "interbed" can be used to advantage.

An interbed is strictly a single bed lying between other beds from which it differs somewhat in lithology. The term can be used for more than one bed in the case of thinly laminated layers of small thickness, such as shale interbeds. It does not refer to a collection of beds that on account of their thickness or continuity can properly be called a tongue, a member or a formation.

Fossiliferous limestone interbeds occur in a late Ordovician series near Matapedia, Quebec, and it was to facilitate reference to these important layers that I first had occasion to use the word. In the form of a noun, "interbed" can be modified by descriptive adjectives which appear cumbersome when used with the adjective "interbedded." The expression "varve-like interbeds" has been used by C. L. Baker in describing portions of the Haymond formation in western Texas.[1] To my knowledge this is the only occasion that the expression "interbed" has appeared in print.

GEOFFREY W. CRICKMAY

ATLANTA, GEORGIA

ON THE EFFECT OF MOCCASIN VENOM UPON A RATTLESNAKE

LITTLE or no definite information on inter-generic or inter-specific venom susceptibility among American crotalid snakes seems to be available. Beyond a few brief and general comments, such as "poisonous snakes are immune to their own venoms and to the venoms of each other" and "snakes are immune to the venom of their own species but may be susceptible to that of a closely related species," the literature is silent on this subject. As a matter of general interest, and because of its suggestiveness in this little-worked field, it seems desirable to record an instance in which the venom of a cottonmouth moccasin, *Agkistrodon piscivorus* (Lacepede), is known to have been fatal to a rattlesnake, *Crotalus atrox* Baird and Girard.

In connection with a demonstration of venomous snakes for a boy scout troop about 9:15 P. M., November 18, 1932, a four-foot western diamond rattlesnake was severely bitten by a thirty-inch cottonmouth, as the former was being lifted from a box in which both had been confined. The bite was lateral in position and about five inches anterior to the tail. Both fangs of the moccasin are thought to have penetrated the body of the rattlesnake, although the punctures could not be found. Little attention was given to the matter at the time, but the following morning, when the snakes were returned to their enclosures in an animal room of the Zoological Laboratories, it was noticed that the body of the rattlesnake was swollen near the region of the bite and that the skin visible between the scales was of a dark

[1] C. L. Baker, "Erratics and Arkoses in the Middle Pennsylvania Haymond Formation of the Marathon Area, Trans-Pecos, Texas," *Jour. Geol.*, xl: 580, 1932.

greenish-blue color. No further change was noticed until the third day, about seventy-one hours after the bite, when the snake was found bleeding from the mouth with its head inclining over the edge of an empty water pan into which approximately 20 cc of bloody fluid had fallen. It was very sluggish and responded only slightly when touched. When removed from the cage and examined, it was evidently almost dead. Occasional spasmodic twitchings of small portions of the body occurred, however, over a subsequent period of two and a half hours.

Post-mortem examination of the region of the bite revealed much discoloration, extravasation of blood and lymph, and evidence of general histolysis in all tissues of the body wall. Extending along the left side of the body cavity adjacent to the lung was another area which seemed to have been attacked by venom from another bite which probably occurred as the rattlesnake was being replaced in the box. Marked histolysis was evident in this region also. The lung was filled with blood which did not coagulate, extravasation in this organ being responsible for the bleeding at the mouth before death.

Almost every one who has kept living venomous snakes for study has observed that on occasion they fortuitously bite themselves or others of their own or closely related species without the occurrence of noticeable reactions. I have seen a timber rattlesnake, *Crotalus horridus* Linn., sink its fangs deeply into its own writhing body when pinned to the ground by a collecting hook; a western diamond rattlesnake, *Crotalus atrox* Baird and Girard, bite another of its own species, giving it two powerful strikes in quick succession; and a prairie rattlesnake, *Crotalus confluentus confluentus* (Say), bitten by a copperhead, *Agkistrodon mokasen* Beauvois, the fangs penetrating deeply enough to cause a distinct flow of blood from the wounds. Each of these snakes was examined frequently during the two or three days following the bites and none suffered apparent effect.

From the fact that the cottonmouth moccasin feeds very largely upon more or less aquatic, cold-blooded prey, it is perhaps to be expected that its venom would prove to be more toxic to other crotalids than that of species feeding chiefly or exclusively upon warm-blooded animals.

It is unfortunate that on a matter of so much popular interest so little definite knowledge exists. Some carefully controlled experiments by a properly qualified and adequately equipped investigator could be expected to produce interesting and useful results.

H. K. GLOYD

UNIVERSITY OF MICHIGAN

THE EFFECT OF MORPHINE ON THE ANAL SPHINCTERS

IT is a well-known fact that moderate doses of morphine produce sustained contractions of the cardiac and pyloric sphincters of the stomach and of the sphincter of the urinary bladder. We could not find any data in the literature relative to morphine action on the internal and external sphincters of the anus.

In three cats and three dogs it was shown that doses of morphine varying from three to ten mgm per kgm of body weight administered intravenously produced marked and sustained contractions of both sphincters of the anus. The animals were under moderate ether anesthesia, the trachea clamped, and thus asphyxia was produced with simultaneous relaxation of the sphincters ani. This relaxation is maintained for some time after the animals are again allowed to breathe. However, if the animals had received morphine previously, there was either no or only an evanescent relaxation of the sphincters during and after asphyxia.

Double vagotomy had no influence on the effect of morphine on the sphincters, nor did the high thoracic transection of the cord at the level of the second thoracic vertebra prevent the contraction of the relaxed sphincters upon the administration of morphine. In one dog with high thoracic transection of the cord following morphine administration the relaxed sphincters immediately contracted but relaxed again upon induction of asphyxia.

These results might have some bearing on certain surgical routine procedures and throw doubt on the reliability of the state of the anal sphincters as an indication of the degree of anesthesia following premedication with morphine.

THEODORE KOPPANYI
WILLIAM S. MURPHY

GEORGETOWN UNIVERSITY SCHOOL OF MEDICINE

QUOTATIONS

SIR WALTER FLETCHER

BY the death of Sir Walter Fletcher this country has lost one of the most devoted and most distinguished of its public servants. Alone, perhaps, among his contemporaries Fletcher recognized fully the need which existed for organization in the field of medical research. The opportunity to effect this organization came to him with his appointment as secretary of the newly constituted Medical Research