

tical mine shaft with the sun above the horizon. Venus can often be seen in midday and at such times could be seen in these latitudes from inclined mine shafts pointing exactly the proper direction. Occasionally Mars and Jupiter might be so seen in the early morning or late afternoon hours. In tropical countries Venus, Mars and Jupiter all pass overhead at certain times and might on those occasions be seen from wells, large chimneys and shallow vertical mine shafts.

CHARLES CLAYTON WYLIE

UNIVERSITY OF ILLINOIS

TWINNING IN A MOLLUSC, *SERPULOIDES VERMICULARIS*

IN view of a statement by Newman¹ it seems worth while to mention a possible case of twinning observed in embryos of *Serpuloides vermicularis*. Newman writes:

I have never seen a reference to a case of twins or double monstrosity in Mollusca . . . characterized by *determinate cleavage* in its highest form. . . . It is no wonder then that in groups with strictly determinate cleavage we find no example of twinning, for twinning requires a totipotency of blastomeres or regions of the blastoderm.

Serpuloides is a sessile tubiculous mollusc living on the under sides of rocks in shallow water along the Pacific coast. Ovoviviparity is the rule. The young individuals are "born" with a simple coiled shell resembling that of an ordinary snail. The young *Serpuloides* soon become attached to the substratum and begin to grow in length. As they grow, they keep adding material at the mouth of the shell, gradually increasing its size so that a long irregularly coiled tube, resembling that of some of the polychetes, is produced eventually. The material in question, collected on the Pacific coast during the summer of 1923, consists of three pairs of "twins." In each case, two apparently normal young individuals, each with a larval shell fully formed but below the average in size, are contained in a single intact egg "shell," or membrane. These embryos were studied in the living condition and then fixed and preserved in alcohol for future examination. During life their movements were similar to those of other embryos at corresponding stages of development. Other preserved material on hand is being examined for possible earlier stages of such a phenomenon. This communication is presented as a suggestion that twinning is not impossible in the Mollusca, in spite of the determinate cleavage so characteristic of the group.

RICHARD P. HALL

THE RICE INSTITUTE,
HOUSTON, TEXAS

¹ "The Physiology of Twinning," 1923.

SCIENTIFIC BOOKS

Laboratory Manual of the Foetal Pig. By W. J. BAUMGARTNER. New York: The Macmillan Company, 1924.

THIS is a laboratory manual that merits the consideration of every teacher of comparative vertebrate anatomy. It contains excellent directions for the dissection and study of a form hitherto largely overlooked, which presents certain obvious advantages over the dog, cat or other mammal more frequently the object of such study. Among these advantages the author calls attention to the following:

(1) The unlimited number of specimens which may be obtained at any good-sized packing plant with a minimum expenditure of time and labor.

(2) The convenient size of the specimens together with their ease of preservation.

(3) The absence of any objectionable odor or other quality that would make them objects of disgust to the most "finicky" student.

(4) The impossibility of any sentimental restrictions on their use arising from humane societies or antivivisection societies. Related to this is the fact that the student has no tender associations to be outraged as is sometimes the case where "pet" animals are used.

(5) The softness of the muscular and skeletal systems in the fetal pig make easier the dissection of the nervous and circulatory systems. And finally,

(6) The student gets a very good idea of the course of the fetal circulation in mammals.

The disadvantages in the use of this type of material are few and easily remedied. Some who have attempted it in the past have complained that the pigs become soft and "mushy." This is due to improper fixation and is readily overcome by following strictly the procedure described in this manual, which is the result of twelve years' experience. The imperfectly developed skeletal system can be readily supplemented with prepared skeletons, and the very immaturity of the pig gives the student an idea of bone development which he can not obtain from a study of mature animals only. There is left only the muscular system as a real difficulty and this can be remedied by the use of a few mature animals for the demonstration of the muscles, their arrangement and functions. This disadvantage is after all such a minor one that it is far outweighed by the greater usefulness of the pig in all other respects.

Typographically this book is up to the usual Macmillan standard. Only a very few errors have been noted, the most serious being the constant use of "foeti" as the plural form of "fetus." Not only does the correct Latin plural of this word end in "-us," as in the singular, but attention may also be called to the fact that the "oe" in the first syllable is likewise

not good usage. The Latin word is properly "*fetus*" in both singular and plural. One error in citation has been noted, *viz.*, "The Anatomy of the Domestic Animals," by Dr. Septimus Sisson, is referred to as the work of "A. Sisson." These are, however, minor errors which undoubtedly will be corrected in later editions. Professor Baumgartner, out of nearly twenty years experience in the teaching of large classes in comparative anatomy, has produced this manual for which he deserves the thanks of all teachers of that subject. He thus makes available for their use a form the availability of which has not been so widely realized as it deserves.

UNIVERSITY OF KANSAS

H. H. LANE

SCIENTIFIC APPARATUS AND LABORATORY METHODS

A SIMPLIFIED METHOD OF MICRO-COMBUSTION: THE MICRO-DENNSTEDT METHOD

WHILE we have no doubts as to the excellency of the micro-combustion methods of Pregl, we have encountered practical difficulties, which have forced us to abandon them. Micro-methods are gaining increased importance in biochemistry and a practical and easy method for determining the composition of organic substances in 5-10 mg quantities will open up new fields of research. Our work concerns mainly the determination of nitrogen according to Dumas and of carbon and hydrogen. In micro-Dumas, according to Pregl, we have obtained constantly too high results, while according to Dubsky the results were right from the start. The main difference in these two methods is the placing of the reduced copper in the tube and passing of the carbonic acid. We have combined the useful points of the two methods, namely, the combustion tube and Kipp apparatus as source of carbonic acid from Pregl, the placing of the reduced copper at the end of the tube and passing of CO_2 , after the air is expelled, in small stream according to Dubsky. The results in this way are excellent.

Our main work concerns, however, the determination of carbon and hydrogen. Here, according to Pregl's method, we had out of seventy analyses seven good results, in spite of great care exercised in keeping to the original recommendations of the author. We have adapted the Dennstedt's method for micro-work and had from the start almost 100 per cent. of good results and it seems surprising that this simple and excellent method has not been adapted before for the said purpose. The details of the method will be published elsewhere, and we wish here only to state the main advantages of our procedure: (1) An almost empty combustion tube, except for boats with absorb-

ing substances, in which all the combustion is plainly visible; (2) the capacity and constancy in weight of the absorption apparatus, which last at least for 30 combustions, if not much more; and (3) the great ease with which the method can be acquired by workers familiar with the macro-combustion. Seven to ten days' practice is entirely sufficient for this purpose.

CASIMIR FUNK

STANISLAS KON

BIOCHEMICAL DEPARTMENT,
STATE SCHOOL OF HYGIENE,
WARSAW, POLAND

SPECIAL ARTICLES

BASIN RANGE STRUCTURE AT JEROME, ARIZONA

ON a recent trip to Jerome, I was impressed, as on a much earlier visit, with the superb outlook from that town, when viewed with geological eyes, and was led to wonder why neither I nor apparently any one else had particularly called attention to the bearing of the structure, here so grandly displayed, on the problem of the origin of the Basin Ranges.

Jerome lies on the steep eastern front of a considerable mountain mass, known as the Black Hills, and overlooks to the east the Verde Valley. The town is roughly 2,000 feet higher than the Verde and nearly as great a distance below the summit of the Black Hills.

The geology of the district has been well worked out by Dr. L. E. Reber, geologist for the United Verde Copper Company, and those who wish may readily consult his paper.¹ For present purposes it is sufficient to state that at Jerome pre-Cambrian crystalline rocks are unconformably overlain by nearly horizontal Paleozoic beds with a total maximum thickness of about 1,500 feet. These in turn are overlain unconformably by basaltic flows of late Tertiary age, which still have a thickness of about 700 feet on the Black Hills, west of Jerome.

The outstanding structural feature of the district, as has been recognized by many, is a great normal fault which has a general north-northwest strike and outcrops along the eastern face of the Black Hills. The town of Jerome is situated on this fault and the major effects of the dislocation are plainly visible on the surface and in the mine workings. It is clear that the rocks east of the fissure have gone down relatively to those west of the fissure and that the throw is approximately 1,600 feet. North of Jerome, some of the same late Tertiary basalt that caps the Black Hills can be seen faulted down against

¹Reber, L. E., Jr., "Geology and ore deposits of Jerome district," Trans. Am. Inst. Min. and Met. Eng., Vol. 66, pp. 3-26, 1922.