logie, 1922, discussing a large fragment in the British Museum, was an important addition to what was known of Babylonian geometry about 2000 B. C. Articles by Weidner, Zimmern and Ungnad in 1916 seem to have made further contributions to our knowledge in discussion of what purports to be an Akkadean tablet of the same period. This contains two approximations for the length of the diagonal of a right triangle in terms of the sides.

Since the publication by the British Museum in 1900 of part IX of its "Cuneiform Texts from Babylonian Tablets" (*i.e.,* CTIX), it has been known that two tablets 85194 and 85210 contained nearly fifty mathematical problems. Till recently, however, no one could translate and interpret them. It now appears that to Dr. Neugebauer, of Göttingen, author of a monograph "Zur Entstehung des Sexagesimalsystems" in the Göttingen *Abhandlungen* (1927), must be given the credit for notable achievement not only in this regard, but also in making illuminating comment on mathematical parts of Sumerian and Babylonian texts recently published by Carl Frank in *Schriften der Strassburger Wissenschaftlichen Gesellschaft in Heidelberg,* new series, Heft 9. Some of his results are to be found in the first issue of a new publication, *Quellen und Studien zur Geschichte der Mathematik,* of which Neugebauer, Julius Stenzel, of Kiel, Otto Toeplitz, of Bonn, are the editors. This publication is to be issued in two parts, *Abteilung A: Quellen; Abteilung B: Studien.* The first part of the *Studien,* published in Berlin last April, contains new information of great interest to the student of Babylonian mathematics. This information is to be found in two articles, one by Neugebauer, "Zur Geschichte der babylonischen Mathematik," pp. 67–80; and the second by Neugebauer and Struve, "Über die Geometrie des Kreises," pp. 81–92. The first article is mainly taken up with the discussion of some problems of Frank's monograph with certain references to CTIX. Various problems connected with figures which may be derived by lines drawn parallel to a side of a right-angled triangle are discussed. In this way we get a series of trapezia (using this term as employed by every country of the world except the United States). The Babylonians and Egyptians were perfectly familiar with the fact that the area of a trapezium, such as this, is one half the sum of the parallel sides times the distance between them. One of the extraordinary conclusions arrived at in this connection is that the Babylonians of about 2000 B. C. seem to have known what is equivalent to our well-known formula for the solution of a quadratic equation of a certain form.

The second paper, apart from consideration of matters of terminology, mainly elaborates various problems of CTIX. The interpretation of one passage regarding a circle of circumference 60 and diameter 20 leads to a value 3 for π, also familiar to readers of the Bible (I *Kings,* 7, 23; II *Chronicles,* 4, 2). With this value of π the expression for the area of a circle seems to have been correctly derived by what is equivalent to the formula one twelfth of the square of its circumference. Similarly for the volume of the frustum of a right circular cone from the equivalent of the formula, one half the sum of the areas of the bases times the distance between them. In the discussion of chords of a circle it seems to be definitely suggested that Babylonians were familiar not only with the Pythagorean theorem but also with the fact that the angle in a semicircle is a right angle.

Such results regarding mathematics of nearly four thousand years ago are surely very extraordinary. It has been announced that a complete discussion of the mathematical part of CTIX is to be given in a part of *Quellen.* Its publication must be awaited with the keenest interest.

In 1928 I was informed by a noted Assyriologist that there are other Babylonian tablets which, on first reading, seem to indicate that the problems have to do with finding three parts of a triangle when three other parts are given. This, and results referred to above, suggest that the surmise with which this note opens may indeed come true, namely that it may not be very long before we know more about Babylonian than about Egyptian mathematics.

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BIOLOGICAL PUBLICATIONS IN AMERICA

IN his communication on "Biological Publication in America" in SCIENCE for March 8, your correspondent fails to take into account an important phase of the matter. One reason the biologists find publication both slow and difficult is that so many of them take up a lot of valuable space with most circumstantial accounts of work that often turns out to be but a slender contribution to our knowledge. Each feels it his duty to give a history of the project, a detailed account of his own methods and a list of all the works he has consulted.

Like other things, the cost of printing has advanced to unwarranted heights during recent years and the high mortality among biological publications that are not financed by outsiders is sufficient indication that the publishers of such journals are not getting rich.

If publishers had to depend on the average "research" paper to keep their subscription lists growing, there would soon be few biological journals in existence. Ask yourself how many of these published researches you read carefully if they are not in, or

bordering on, your special field. And ask yourself how many people there are in your field who will care to read these selected papers through. Certainly not enough to keep any technical publication running, especially if the interested readers largely peruse it in the university or public library!

There is, however, it seems to me, a simple way out of the dilemma. It is this: let the authors of research papers offer to the scientific journals, an adequate statement of anything new that their researches have discovered, in the meantime sending their more circumstantial papers to some depository where they may be consulted. Should a worker at a distance wish to see the entire paper, there are various inexpensive means by which copies of it can be made. The great trouble is, at present, that publications are filled with details that only the very few read, although the cost is as great as if everybody read them.

Moreover, the omission of all the harrowing details will serve to brighten up the technical journals, add to the subscription lists, decrease the cost of publication and interest an ever-widening circle of readers in all sorts of research problems.

WILLARD N. CLUTE,
Editor of the *American Botanist*

INTESTINAL PROTOZOA AND CECAL MATERIAL IN RATS

HEGNER[1] has recently reported that chicks normally evacuate the contents of the cecum, and that this material may be distinguished from intestinal material. The latter is "usually compact and dark in color, whereas the cecal contents are more liquid and yellowish in color." He reports that intestinal protozoa are almost entirely localized in the cecum, and accordingly diagnostic samples may be obtained by the mere selection of the fecal matter. Something of the same nature appears to be true of the albino rat. The feces of the rat are usually hard and black in color, or a dark brown which becomes black shortly after voiding. If the animal is disturbed, however, by unusual handling, shaking or rapping the metal cage, or, best of all, by merely holding it by the tip of the tail while it struggles to escape, a series of defecations usually results, of which the last are soft and yellowish. And, as Hegner reports for the chick, in the rat these soft and yellowish masses are richer in cecal protozoa than the normally passed feces. Presumably the excitement accelerates the movement of the contents through the lower part of the intestine.

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FORBESICHTHYS FOR FORBESELLA

IN the thirteenth edition of Jordan's "Manual of Vertebrates," the new generic name *Forbesella* Jordan and Evermann is proposed for transitional species of Cave-fishes "connecting *Chologaster* with *Typhlichthys*"—*Chologaster papillifer* Forbes type.

We are informed by Mr. Gilbert P. Whitley that *Forbesella* is preoccupied. The name *Forbesichthys* Jordan and Evermann will replace *Forbesella*.

DAVID STARR JORDAN

SPECIAL CORRESPONDENCE

GEOLOGICAL MAP OF NEW MEXICO

A TWO-SHEET geological map of New Mexico, prepared by N. H. Darton on the basis of work chiefly done by many other observers and edited by G. W. Stose, has lately been published by the U. S. Geological Survey on a scale of 1:500,000 in twenty-two formation colors and with 100 meter contours. It is therefore a valuable supplement to the one-sheet map of Arizona published on the same scale and in thirty-two colors four years earlier (1924) by the national survey in cooperation with the Arizona Bureau of Mines. Explanatory bulletins to accompany the maps have been prepared by Darton.

A recent automobile trip across long stretches of both these states from Tucson to Albuquerque and return, with the maps in hand, has enabled me to appreciate their great value not only in setting forth in a general way all that has been thus far learned of Arizonan and New Mexican areal geology, but also in providing a basis for further local work on a more detailed scale. A few of the more striking features shown on the New Mexico map may be here noted. The south central part of the state is traversed by the San Andres range in a gently flexed meridional course seventy-five miles in length, between the broad alluvial plain of Tularosa "Valley," famous for its White Sands, on the east, and the but little narrower alluvial plain of the Jornada del Muerto on the west. The range is a monocline, with a belt of fundamental crystalline rocks along its eastern base, overlaid by a west-dipping series of Paleozoic strata. It is continued northward by the shorter Oscura Range, an east-dipping monocline thirty miles in length, a little offset to the east, the two ranges being separated by a broken-down anticline which trends obliquely to the north-northwest; hence the crystalline complex lies along the western base of the Oscura Range and the Paleozoic strata there slant down to the east. The oblique course of the broken anticline between the

[1] SCIENCE, 69: 432–434.