

ceased, made use of filters, and it is highly probable that the poison was preserved and increased in amount in these filters.

It was determined to examine these filters (taken from houses where there was typhoid) to learn whether or not they contained the specific organism. As the labor of examining such an enormous number of organisms as were found in the filters is very great, only a few filters were tested. Dr. Swarts examined some, and some were sent to Dr. T. Mitchell Prudden of the College of Physicians and Surgeons, New York, and others to Dr. Harold E. Ernst of Harvard, — all gentlemen thoroughly skilled in bacteriological work. It must be remembered that all these filters were found to be filled with decomposing organic matter, and swarming with countless bacteria. The isolation of one particular species among so many is a task of extreme difficulty, and negative testimony is of little value. Even the most skilled observers abroad have failed to detect this particular organism under similar conditions, although it was known to be certainly present. In the investigations made for this department the organism which produces typhoid-fever was not found in the water itself. Bi-monthly analyses of the water to determine the number of organisms were made on the 1st of December; but, as only a few plate-cultures were made, the negative result obtained can have little value, yet, as the epidemic was rapidly diminishing by the end of the first week in December, it is probable that there were no typhoid organisms in the water itself at the time the analyses were made. The typhoid organisms were, however, found in three of the filters. One of these filters came from the west side of the city, and the others from the east side (one from the northern, and the other from the southern part). None were on the high-service supply.

Filter No. 1, a "Star" filter, was removed from the tap Dec. 8. The patient was taken sick Dec. 1, and the filtered water had not been used for drinking-purposes since that time. There was a trap in the sink-pipe of the sink where the faucet was. There was no water-closet in the house, and the stools of the patient were disinfected and thrown into the vault. Filter No. 2, a "Grant" filter, was removed Dec. 6. The patient was taken sick Nov. 29, and died of hemorrhage Dec. 17. The plumbing of the house was complicated, but perfectly trapped and in good order. Filter No. 3, an "Aborn" filter, was removed Dec. 6. The patient was taken sick Dec. 1. The plumbing was in first-class condition; and the sanitary conditions of the house, one of the finest in the city, perfect.

There is no question that the patients who used these filters were suffering from true typhoid; and there was no chance for these filters, either while in position or after they were removed, to become contaminated, except from the water which passed through them. Besides the typhoid bacilli, several organisms characteristic of fecal matter were found in the filters, indicating the source of the specific contamination. In fact, one of the filters, so far as the organic life was concerned, resembled, as Dr. Prudden said, a mixture of charcoal, water, and human feces.

These investigations demonstrated the presence of the typhoid bacillus in our public water-supply, and also the dangerous character of the domestic filters in common use, and they also prove that the short epidemic of November and December last was due to the pollution of the Pawtuxet River by the stools of typhoid-fever patients.

#### BOOK-REVIEWS.

*Mechanics of Engineering. [Fluids.]* By IRVING P. CHURCH. New York, Wiley. 8°. \$3.

IN the preparation of this treatise on hydraulics and pneumatics, which is intended mainly for use in technical schools, the same general design has been kept in view as in the preparation of the preceding and companion work on solids. The author, who is assistant professor of civil engineering at Cornell University, has succeeded in combining clearness with consistency in the setting-forth and illustration of theoretical principles, and has provided numerous and fully lettered diagrams, in which, in the greater number of cases, the notation of the accompanying text can be easily apprehended. Especial attention is invited to the proper use of systems of units in numerical examples, the latter being introduced very copiously and with de-

tailed explanations. The results of the most recent experimental investigations in hydraulics have been taken advantage of in assigning values of the numerous co-efficients necessary to the more thorough comprehension of the subject. Among the investigations thus utilized may be mentioned those of Fteley and Stearns in 1880, and of Bazin in 1887, on the flow of water over weirs; those of Clemens Herschel in testing his Venturi water-meter; and also some recent experiments in the transmission of natural gas and compressed air. Though the action of fluid motors has not been dealt with as extensively as some might have desired, sufficient matter is given in treating of the mode of working steam, gas, and hot-air engines, air-compressors, and pumping-engines, together with numerous examples, to be of considerable advantage to students not making a specialty of mechanical engineering.

*Elementary Synthetic Geometry of the Point, Line, and Circle in the Plane.* By N. F. DUPUIS. London and New York, Macmillan. 16°. \$1.10.

THIS work is a result of the author's experience in teaching geometry to junior classes in the University of Queen's College, Kingston, Canada, for a series of years. It is not an edition of "Euclid's Elements," and has, in fact, little relation to that work except in subject-matter. There are a number of points in which the book varies from the majority of modern treatises on geometry. The point, the line, and the curve, lying in a common plane, are taken as the geometric elements of plane geometry, and any one of these or any combination of them is defined as a geometric plane figure. Thus, the author defines a triangle as the combination of three points and three lines, and he claims that this mode of considering geometric figures leads naturally to the idea of a figure as a *locus*. The principle of motion and the transformation of geometric figures recommended by Sylvester, and the principle of continuity, are freely employed.

The intention in preparing the work has been to furnish the student with that kind of geometric knowledge which may enable him to take up successfully the modern works on analytic geometry.

*Go to the Ant and learn Many Wonderful Things.* By JOHN WENTWORTH SANBORN. Cincinnati, Cranston & Stowe; New York, Hunt & Eaton. 12°.

MR. SANBORN, finding that his own children were interested in his experiments with ants, and that they asked him all sorts of questions, sought every possible means for gaining information to instruct them, and as a result of the notes put down by him from time to time, of the information gathered by observation and reading, this little book was prepared. The book tells of the social life of ants, their food, the plants which they seek, the different varieties of ants, with a chapter on foraging ants and ants as social creatures.

*A Treatise on Spherical Trigonometry, and its Application to Geodesy and Astronomy.* By JOHN CASEY. London and New York, Longmans, Green, & Co. 12°. \$1.50.

THIS manual is intended as a sequel to the author's treatise on plane trigonometry, and is written on the same plan. It is believed, that, though moderate in size, it contains a large amount of matter, much of which is original; the author having turned especially to *Crelle's Journal für die reine und angewandte Mathematik*, Berlin, and *Nouvelles Annales de Mathématiques*, Paris, for recent information. Professor Neuberg of the University of Liège aided considerably in its preparation.

*A Laboratory Guide in Chemical Analysis.* By DAVID O'BRIEN. 2d ed. New York, Wiley. 8°. \$2.

THIS volume is intended for the use of students who possess some knowledge of chemistry, and is especially adapted to the wants of the college or the medical laboratory. In the second edition we note that some of the chapters which were in the first edition have in this been greatly extended, while others are entirely new. Among the items of special interest we would mention the separation of substances by electrolysis, water analysis, and the methods for the detection of ptomaines and alkaloids.