tions the present line of inquiry was suggested. The question raised was, have all acids that have the same alkali-neutralizing strength the same sourness to the taste? For purposes of testing, a number of 'normal' solutions were made. Thus, for

Sulphuric	acid,	1	litre	contained	49.0	grams.
Hydrochloric	"	"	"	"	36.5	"
Nitric	"	"	"	"	63.0	"
Tartaric	"	"	"	"	75.0	"
Citric	"	"	"	"	64.0	"
Acetic	"	"	"	"	60.0	"

The solutions were then of such strength that one cubic centimetre of each would exactly neutralize one cubic centimetre of a normal solution of carbonate of soda.

These solutions were then diluted so that in each series one bottle was of one-half the strength of the preceding one. Of course, a point is soon reached where the acid is so dilute that it is impossible to recognize its presence by the sense of taste. The bottles containing these acids, and some bottles containing only water, were placed without regard to order, and the experimenter was requested to separate into two groups acid and water by tasting the solutions. Those who had the sense of taste more thoroughly developed would be expected to taste the more dilute of the acids. No attempt was made to distinguish between the different kinds of acids. The best method has been found to be to test the solutions rapidly, and pick out the samples about which there could be no doubt, and then to go more carefully over the rest a second time.

In order to obtain the average taste, tests were made by twenty persons, including both sexes and different ages. As the acids are of different apparent strength, the solution of the acids is best seen by a comparison of the most dilute solution tasted in order of strength. This can best be shown by a comparison of the numbers of bottles tested; viz., —

Sulphuric	acid,	7.2	Tartaric	acid,	6.5
Hydrochloric	"	7.0	Citric	"	6.8
Nitric	"	7.1	Acetic	"	6.8

These results agree as closely as could be expected, especially when we consider the unprejudiced position of the experimenter. It will be noticed that the general average of the mineral is a little higher than that of the organic acids. This may be due to a more persistent and characteristic taste in the former. There seemed to be greater uniformity in the tests for sulphuric acid than for any other, as only four detected any acid in the eighth dilution, and none failed to notice it in the seventh. The amount of acid detected, of course, varies with the molecular weights, but the average limit of delicacy is about one part in two thousand parts of water.

For these tests the solutions were frequently renewed. In one case they were allowed to stand for three weeks, when it was found that the three organic acids had lost about all their strength, and at the same time a variety of microscopic organisms had developed at the expense of the acid. These algæ were different in each acid, though some of the same species were found in all. The examination was kindly made by my friend Mr. V. L. Kellogg. It may not be in place to give here the details of this examination, but only to suggest that a great field of investigation lies open in the direction of these lower orders of life and their relation to the destruction of chemically pure substances.

In conclusion, it seems to be true, from what has been stated above, that all acids having the same alkali-neutralizing power are equally sour to the taste, and that the solutions of organic acids rapidly lose their strength. E. H. S. BAILEY.

Lawrence, Kan., July 27.

Beware of the Deadly Alternating Electric Current.

AT the School of Mines of Columbia College this morning, at eleven o'clock, experiments were undertaken, at the request of Harold P. Brown, electrical engineer, to determine the danger of alternating currents, by Dr. Cyrus Edson and Dr. Charles F. Roberts of the New York Board of Health.

The first dog operated upon was a mongrel dog weighing 61 pounds, strong, and in good condition. His height was 24 inches; length from tip of nose to base of tail, 42 inches; and resistance from the right front leg to the left hind leg, 14,000 ohms. Connection was made by binding a piece of cotton waste saturated with water round the leg with No. 20 bare copper wire. The dog was placed in a cage, and the alternating current applied by Dr. Roberts at 272.16 volts for five seconds; number of alternations, 288 per second. The dog was silent and motionless during the continuance of the current. He gave a few spasmodic gasps thirty-one seconds after current was first applied, and heart ceased beating ninety seconds after current was applied. The dog was immediately dissected by Dr. Roberts and Dr. Peterson, and section of sciatic and pneumogastric nerves, muscular fibres of diaphragm, and lungs, placed under a microscope, and no changes in structure were observed.

The second dog was a full-blooded Newfoundland, strong, and in good condition, weighing 91 pounds; length from tip of nose to base of tail, 48 inches; height, 25 inches; resistance, 8,000 ohms. Connection was made in the same manner as above. Alternating current applied by Dr. Roberts at 340.5 volts electro-motive force for five seconds. The dog was silent and motionless during continuance of current, howled and gasped for eight seconds after circuit was opened; but, in the opinion of physicians present, this was pure mechanical action, as the dog was unconscious from the instant the current first reached him. Heart stopped beating in two minutes and fifty seconds after current was first applied.

The third dog was a half-breed setter and Newfoundland, weighing 53 pounds, 42 inches long from tip of nose to base of tail, and 24 inches high; resistance, 30,000 ohms. Connections were made in the same way as before. Dr. Roberts applied the alternating current at 220 volts for five seconds. The result was not fatal at four minutes afterwards. Mr. Porter, superintendent of machinery of Columbia College, then suggested, that, as the dog was rigid and motionless during the continuance of the shock, it would be impossible for a man in the same conditions to utter a sound or to break the contact in five seconds. Dr. Edson then determined to administer the current at same number of volts for thirty seconds on this account, and on account of the high resistance of this subject. This was done, and during the period of the thirty seconds the voltage rose to 234. The dog died instantly without sound or struggle. The resistance after death was found to be 2,800 ohms.

All the physicians present expressed the opinion that a dog had a higher vitality than a man, and that therefore a current which killed a dog would be fatal to a man under the same conditions. It was their opinion that all of these deaths were painless, as the nerves were probably destroyed in less time than that required to transmit the impression to the brain of the subject.

Dr. Edson invited Prof. Elihu Thomson of Boston, and Dr. Otto A. Moses, to be present with measuring-instruments to check up the voltage, etc.; but neither of these gentlemen put in an appearance or responded.

Dr. CYRUS EDSON, *Pres. Board of Health.*
Dr. CHARLES F. ROBERTS, *Asst. Prof. Physiol., Bellevue Hospital Medical College.*
Dr. FREDERICK PETERSON.
Dr. FRANK H. INGRAM.
Dr. H. A. HAUBALD.
Dr. SCHUYLER S. WHEELER, *Electrician Board of Electrical Control.*
HAROLD P. BROWN, *Electrical Engineer.*
Mr. JOHN MURRAY MITCHELL.
Prof. C. E. COLBY, Columbia College.
Capt. E. L. ZALINSKI, U.S.A.
Prof. L. H. LAUDY, Columbia College.

New York, Aug. 3.

Note on Breeding-Habits of the Bill-Fish (Tylosurus longirostris).

ON the 25th of June last my attention was called by Mr. Ulric Dahlgren of this city to the fact that very young specimens of the bill-fish were to be found in large numbers in the 'feeder' of the Delaware and Raritan Canal, north of the town. A few days later I obtained many specimens, and their size at once showed that they had been hatched at the locality where found. In fact, many still showed traces of the yolk-sac.

So far as I have been able to ascertain, there has been no previous record of the fact that this fish breeds in fresh water, the impression with ichthyologists being that they never deposited their eggs beyond salt-water limits. CHARLES C. ABBOTT.

Trenton, N.J., July 31.