ing of the house was carefully examined, and no defects were found. I visited the premises with Dr. Benedict, and found that the school sink privy in the yard was flushed by means of a branch from the Croton supwas flushed by means of a branch from the Croton sup-ply pipe, introduced in such a manner that its mouth was just under the surface of the contents of the sink when the latter was full. On account of the insuffici-ent water supply a force pump was provided in the hall of each floor of the house above the first story. No fixtures were placed in the living rooms, the occupants of the different floors being compelled to obtain the water they used from the pumps in the halls. The supply to the school sink was provided with the usual valve to cut off the water, but this valve was always valve to cut off the water, but this valve was always turned on so as to allow a stream of water to constant-ly flush the sink. When two pumps were being oper-ated at once, the suction induced was sufficient not alone to draw from the Croton main, but also to suck a portion of the privy contents into the water pipes, thus contaminating the water. The amount drawn in was not enough to attract the attention of the tenants by the taste imparted to the water. The other six cases attributable to this cause were in a house in West Thirty-seventh Street, and the conditions found were the same as those I have just described. The first case, however, in this latter instance, contracted the disease in the country. No less than eight other houses, the water supply of which was thus contaminated, have been found by inspectors of the Health Department, but only in these two instances, so far as is known, has typhoid fever been caused by such conditions.

Four cases of typhoid fever, occurring in boys, dur-ing September, who had not been out of New York, investigated by Dr. A. H. Doty, of the Health De-partment, was traced to the following cause : All were in the habit of bathing daily in the East River, near the mouth of a sewer on a line of which several cases of tuphoid fever ovisited. In these access no other cause the mouth of a sewer on a line of which several cases of typhoid fever existed. In these cases no other cause could be assigned for the sickness except the one given, which I think is doubtless correct. The 57 remaining cases not accounted for were probably due to infected ice, milk, meat, or to digital infection. You will be in-terested to learn the relative prevalence of the disease in this city during the fall of 1887 and that of 1888. It is as follows : September, October, and November, 1887, 435 cases, 105 deaths; September, October, and November, 1888, 557 cases, 132 deaths. The points I have sought to establish may be summed up as follows : First. Typhoid fever never arises *de novo*. Third. The causes of the disease, in order of their frequency, are as follows : 1st, infected water; 2d, in-

frequency, are as follows: 1st, infected water; 2d, in-fected milk; 3d, infected ice; 4th, digital infection; 5th, infected meat.

In this and in other civilized countries laws are en acted for the purpose of protecting the community from the accidental and criminal use of poisons. Yet, while wise law makers have recognized the necessity for restricting the distribution of those deadly but use ful substances produced by man from the animal and mineral and vegetable kingdoms, they have not recognized the thousandfold greater necessity for restricting the distribution, by means of polluted well water, of the more deadly and useless poison which causes typhoid fever.

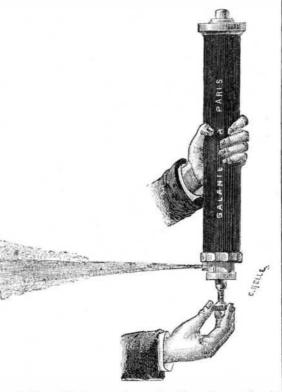
As I have already said, typhoid fever is pre-eminently a preventable disease. Its poison has been isolated; its characteristics are known. We know how and by its characteristics are known. We know how and by what circumstances it is multiplied and propagated. It is well within the bounds of possibility for a person ac-quainted with these facts to use it for criminal pur-poses, and to almost defy detection; and yet against this insidious and deadly poison in the hands of the ignorant or careless we have no safeguards. On every side we are exposed to the danger of being infected by such people with the poisonous agent that has for its effects the train of symptoms called typhoid fever. If in every case of typhoid fever the stools and bed-ding were effectually disinfected, and the person of the patient after convalescence was also disinfected, ty-

patient after convalescence was also disinfected, ty-phoid fever would soon cease to exist. Even if these measures are not observed, nevertheless the danger of taking the disease can be reduced to a minimum by such precautions as can readily be taken by any one who knows the characteristics of the poison and util-izes his knowledge to avoid its dangers, such as never drinking well or ice water, avoiding milk that has not been boiled, and by washing the hands before eating

The death from typhoid fever of those whose negli-gence or disregard of the known laws of nature indicates stupidity or indifference is a striking illustration of the operation of the law of the survival of the fit-test. It should be remembered, however, that this law applies in the economy of nature to the lower anihave applies in the economy of nature to the lower ani-mals and not to man, since the distinctive difference between man and the lower animals is found in his ability to adjust his surroundings in conformity to his actual needs and requirements; whereas the animal is unable to do so. We may therefore assume that the human being who ignorantly subjects himself to con-ditions which menage his life is reduced to a plane with

## CHLORIDE OF METHYL SPRAY IN NEURALGIA.

SINCE Dr. Deboye\* showed how valuable the spray of liquefied chloride of methyl gas was in the topical treatment of various neuralgias, the literature of the subject has grown considerably, and many cases of cure resulting from the application of the spray to the skin over the neuralgic area have been recorded. The gas, however, had to be liquefied by pressure, and the cylinders containing it were bulky and complicat-ed. Galante et Fils, of Paris, have lately made for Dr. Debove (Feb., 1888) a small portable cylinder which has brought the method into general use in France. 'The cylinder is represented in the engraving, and the reader will notice that by turning a milled headed screw at the bottom of the apparents a fine spray screw at the bottom of the apparatus, a fine spray jets out from an aperture just above it. This spray can be regulated to a nicety by the screw. A corre-spondent, who has recently tested the method (the charged cylinders being courteously supplied by Messrs. Christy & Co., of Lime Street), reports that he has em-Christy & Co., of Line Street), reports that he has em-ployed it in over fifty cases with the following result "The action of the spray upon the skin is remarkable. Such intense cold is instantaneously developed that, directly the chloride of methyl touches the skin, the latter becomes hard, iced white, and frozen. At the same time the patient feels as if he had been touched with a hot iron. Two seconds, or at the most five, are quite long enough for its application to any one patch of skin, for the skin will rapidly vesicate, and even be-come gangrenous, if the spray is continued for a longer period. It is better to play the spray obliquely over the skin, letting it glance off, rather than direct it straight at and in close proximity to the part. It has been used in France for orthonized to the part. been used in France for extracting teeth painlessly, also in minor operations for local anæsthesia, and is recommended for trigeminal neuralgia. Concerning



the last, I would at once dissuade others from using it upon the face, for the application leaves a most disfiguring brown coloration, which takes a long time to fade. Of its value in the treatment of neuralgia there rade. Of its value in the treatment of neuralgia there is no question. I have taken fifty cases of various neuralgias of the neck, back, testicle, urethra, and legs, and have relieved many temporarily and some permanently by its use. It is a rapid and effective vesicant, and has proved of value as a substitute for the often useful plan of 'firing' joints. As a 'moral' force in pownencies and weight more it will doubt force in neuromimesis and malingering it will doubt-less be most persuasive."—Lancet.

## NEW METHOD OF DETERMINING CARBONIC ACID IN SOLUTION.

## By LEO VIGNON.

CARBONIC acid in an aqueous solution, whether free or combined with the neutral carbonates, rapidly de-colorizes the red liquid formed by mixing 50 c. c. of lime water and 10 drops of a saturated alcoholic solution of pure phenolphthalein. Hence it results that carbonic acid dissolved in water, free or in a state of semi-com-bination, can be determined volumetrically by means of a student colution of acleium bidroxide using ditions which menace his life is reduced to a plane with the lower animals, since he neglects to provide such surroundings as are conducive to health and longevity. Let the principles of hygiene be carefully taught through be the control of the surface of the process are as follows: 50 c. c. of the metar is which the control of the surface of the process are as follows: 50 c. c. of the metar is which the control of the surface of the process are as follows: 50 c. c. of the metar is which the control of the surface of the process are as follows: 50 c. c. of the metar is which the control of the surface of the process are as follows: 50 c. c. of the metar is which the control of the surface of the process are as follows: 50 c. c. of the metar is which the control of the surface of the process are as follows: 50 c. c. of the metar is which the control of the surface of the process are as follows: 50 c. c. of the metar is which the control of the surface of the process are as follows: 50 c. c. of the metar is the surface of the process are as follows: 50 c. c. of the surface of the process are as follows: 50 c. c. of the surface of the surface of the process are as follows: 50 c. c. of the surface of the process are as follows: 50 c. c. of the surface of the surfac The details of the process are as follows: 50 c. c. of the water in which the carbonic acid is to be determined are mixed with 0.05 c. c. (10 drops) of a saturated alcoholic solution of phenolphthalein, and there is grad-ully added to the liquid lime water which has been previously standardized (by means of decinormal sul-phuric acid and cochineal) until it takes and retains the rose shade which is characteristic of phenolphthalein in presence of an excess of lime. In order to obtain constant results, it is necessary to compare the final tint with that of a liquid of the same composition as the water to be examined, but perfectly free from car-bonic acid. As a type there may be used either water recently distilled or a portion of the water under examination, which has been boiled long enough to expel all carbonic acid. Fifty c. c. of each of these two liquids, raised to the same temperature, are placed in two test glasses on feet, graduated, having ground glass stoppers, and not ex-ceeding 2 or 3 cm. in diameter. Into each glass are put 10 drops of the alcoholic solution of phenolphtha-

lein, and we then begin to color slightly the type liquid

lein, and we then begin to color slightly the type liquid with a measured quantity of standardized line water added from a burette graduated in tenths of a c. c., with-out reaching the maximum coloration which can be produced. 0.2 to 0.5 c. c. will mostly suffice. The solution of lime is then gradually added to the water under examination. The color produced by the contact of the lime water disappears very rapidly on agitation at the beginning, solong as carbonic acid is found in the liquid in sufficient excess. Toward the end of the reaction the combination of the lime with end of the reaction the combination of the lime with the carbonic acid takes place more slowly; it is there-fore convenient to agitate the liquid frequently and to add the lime water at longer intervals. Care must be taken not to let the color in the water in question exceed the intensity of color of the type. When the exceed the intensity of color of the type. When the coloration of the sample no longer varies, which occurs after an hour, if the precaution has been taken to agitate frequently, the type is made up to the same volume as the water to be examined, and an identity of shade between them is effected by adding lime water to that which is palest.

The two glasses are used like the tubes of a colorimeter. On examining them against a white ground we may, with a little practice, detect the shades of color due to the addition of 0.1 c. c. of lime water. When aue to the addition of 0.1 c. c. of lime water. When the colors are identical, we know that the two liquids contain the same quantities of free lime. The differ-ence between the lime consumed by the water under examination and that which has served to color the type corresponds to the carbonic acid sought for. The presence of calcium and magnesium chlorides, sulphates, and nitrates does not affect the results

subhates, and nitrates does not affect the results. Calcium carbonate, indeed, colors phenolphthalein slightly, but, besides that this coloration is not com-parable in intensity to that yielded by free lime, it is not manifested in the presence of carbonic acid. If the water contains alkaline salts, the acids of which are capable of forming insoluble salts of calcium are meansium carbonate, which is alignetic ultration be

or magnesium carbonate, which is slightly alkaline be-fore titration, a little neutral calcium chloride must be added to convert the magnesium carbonate and the alkaline salts into chlorides. This peculiarity may be detected by the color which the water, after being boiled in a platinum capsule, will take with phe-nolphthalein. If the water contains much carbonic acid, the calcium

carbonate renders the liquid opaque, and does not per-mit of a colorimetric comparison with the type. This inconvenience may be remedied by adding to the colored type a little pure calcium carbonate, or by letting the calcium carbonate in the sample under ex-amination have time to settle.—Bulletin de la Soc. Chimique de Paris; Chem. News.

## ACTION OF SODA AND VARIOUS ACIDS ON COTTON.

M. ALBERT SCHEURER has recently presented a paper on this subject to La Societe Industrielle of Mulhouse, in which the following data relating to the weakening In which the following data relating to the weakening of the cotton fiber are given. Strips of unbleached cotton cloth, 4 cm. wide, were submitted to the action of solutions of caustic soda of different degrees of con-centration, at a temperature of  $150^{\circ}$  C. for eight hours. Dynamometric tests were made on ten strips, both be-fore and after immersion, with the following results :

Strei	ngth of iution.										M	n resistance ten tests.
$10 \\ 20$	grm.	oť	soda "	per	liter	of	water					16·4 16·6
40	4 6		44				"					 15.8
80	" "											16.8
	0	rig	inal (	cloth	ı			•	•••	 •	•••	 16·9

Under these circumstances, therefore, caustic soda, even when used in solutions containing 80 grm. per liter, does not weaken cotton fibers. It had been observed in some previous experiments that the presence of air bubbles protected the cloth from the action of solutions, and in the present the the doth was resistened. and in the present instance the cloth was moistened with alcohol before being submitted to the caustic lye. By this means the absorption of the solution by the fibers was facilitated, and the effect of air bubbles avoided. The action of gaseous hydrochloric acid was next tried. A small quantity of concentrated hydro-chloric acid of commerce was poured into a vessel, and pieces of bleached cotton cloth were suspended in the vessel, above the liquid, so as to be exposed to the fumes only. The avorignments were conducted at the fumes only. The experiments were conducted at the ordinary atmospheric temperature, about 20° C. The very injurious action of these acid rumes will be realized The experiments were conducted at the from a perusal of the following figures :

		Mean resistance								
	expos	sure.							of	ten tests.
Befor	ree	sure. xposu	e			 	••			24.3
After	· 10	minut	es			 				15.0
"	20	" "				 				14.6
	40		•••			 				9.6
	80	6.6				 		• • •		6.0

It will be observed that even within the small space of ten minutes, the cloth had suffered considerably, while after an hour and twenty minutes it had become practically worthless. Similar experiments were made with gaseous nitric acid, or nitrous fumes. Commercial nitric acid, 36° Be., was employed, the experiments being otherwise the same as those with hydrochloric acid. The results were as follows:

throughout the country; let ignorance be removed in this manner, and typhoid fever will stop its work.

It has been alleged in the public press that the Health Department of this city is doing nothing to prevent the ravages of typhoid. This is not true. Every case of the disease reported is visited, and in tenement houses instruction is given by competent men concerning disinfection. Disinfectant agents are also furnished. All possible local causes are looked for, and if they are found to avist they are removed. The and if they are found to exist, they are removed. The result is that secondary cases seldom occur. During the months of September, October, and No-

vember, ten physicians employed in this work made 2,592 visits to houses containing contagious diseases. This cost the city about forty cents for each inspection. The time taken for many of these visits was not less than an hour, and some took a longer period.—Medical Record.

An excellent method for cleaning the hands is to put 1/4 pound Glauber's salt, 1/4 pound chloride of lime, and 8 ounces of water into a little wide mouthed bot tle, and when required for use pour some of the thick sediment into a saucer and rub it well over the hands with a nail brush.

\* Soc. Med. des Hop., Aug., 1884.

+ Vinay : Lyon Medical, 1885, p. 350 (twenty-one cases, with seventeen curce). Peyronnet : These de Paris, 1886. Vinard : Gaz. Med. de Nantes, 1885. Also Robin, Rendu, Letulle, Sacre, Nerval, Tenneson, and Beque, and many others.

Before exposure...... 243 

It would therefore appear that although nitrous fumes are very injurious, they do not damage cotton fiber to the same extent as hydrochloric acid fumes do, when the cotton cloth is exposed to each for the same length of time, at the same temperature and atmospheric pressure. It must, however, be remembered that the tension of the vapor of commercial hydrochloric acid at 19° Be. is greater than that of nitric acid of commerce at Be. ; therefore the latter acid would be more rarefied or dilute than the former in the atmosphere of the vessel in the above experiments. Therefore the results only represent the measure of the comparative action of the vapors emitted by the two liquids under the stipulated conditions.

The results of experiments with sulphuric acid are given in the next table. The cotton, before treatment, had a resistance of 24.4. The solution contained 2 grm.