SCIENCE.

FRIDAY, JULY 10, 1885.

A WESTERN SCHOOL OF BOTANY.

In anticipation of the full development of his noble foundation for botany and horticulture at St. Louis, Mo., Mr. Henry Shaw, the venerable founder, has specially endowed a school of botany in Washington university, which will for the present be served by a professor and a laboratory assistant. Professor William Trelease of the Wisconsin state university, a doctor of science of Harvard, has been called to this chair; and we understand that he will accept this hopeful position. When, in the course of time, the Missouri botanic garden, which Mr. Shaw originated, and has for many years so sedulously nourished and supported, comes with its generous endowment into completer connection with this school of botany, it will be seen that this central city in the valley of the Mississippi, happily placed for the purpose, is to have within its bounds an ample establishment for the promotion of botany and its dependent branches (such as arboriculture and horticulture), in the way of scientific advancement as well as of practical and educational teaching.

We understand that a laboratory and its appliances, sufficient for the present, will be supplied at once at the university in the city. But eventually the principal work of the school will probably be carried on at the garden at Tower Grove, adjacent to the park (a gift of Mr. Shaw to the city), which of itself will nearly serve for an arboretum. Here an adequate botanical library and an herbarium (both essentials) will doubtless be provided: we believe there is already a foundation for them. And so, if Mr. Shaw's long-cherished intentions and bountiful provisions are wisely carried into effect, the city in which Engelmann, alone and unaided, pursued his botanical investigations for a lifetime, may before long rejoice in the possession of much better facilities and larger means for botany than any other part of our country has now, or is likely to have. May the success of the new school of botany be commensurate with such advantages!

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SANITATION AND SCIENCE.

Practical sanitation is devoted to the prevention, avoidance, or destruction of the causes of disease and death, and is founded on our knowledge of these causes. This knowledge is the scientific aspect of hygiene, or what many call sanitary science. It is at present very fragmentary and imperfect. Our powers of prediction as to the effect which certain circumstances will produce on the health of an individual or a community are limited, and in many cases we cannot, with any approach to scientific precision, explain why a given locality is, or is not, unhealthy. The first step towards a scientific investigation of a phenomenon must be the verification of its existence; but in much the larger portion of this country we can obtain little positive information as to the extent to which the inhabitants of a given place are liable to special forms of disease, or even as to the death-rate to which they are subject.

Until within a comparatively recent period, the method which has been almost exclusively employed in the investigation of problems of public hygiene has been that of observation of general and special mortality rates in different communities, and of endeavoring to connect the results of such observations with the circumstances of the environment in order to discover the causal relation between the two. But in such complicated biological problems as these, in which the result observed may depend on the concurrence of many causes or circum-

stances, it is usually very difficult, and often impossible, to obtain precise knowledge by mere observation of results, even when such observation can be made accurately. The most rapid and satisfactory progress is made when we can subject the problem to the test of experiment, and, by varying the conditions at our pleasure, can thus determine those which are essential to any particular result which may appear.

This experimental method is now being applied to sanitary questions, and especially to those connected with the prevention or suppression of the infective or spreading diseases, which are those of most interest in public hygiene. We can now study the causes of splenic-fever, erysipelas, infectious pneumonia, tuberculosis, glanders, and probably cholera, in the laboratory as well as in the sick-room; their causes may be cultivated, like plants, and the effects of various foods, temperatures, etc., upon them determined; and the efficacy of means proposed for eradicating them may be tested by direct experiment.

It is true that as yet comparatively few diseases can be thus investigated; because for the majority we have not yet found any animals, other than man, who are susceptible to them, and we cannot use man for inoculation experiments. We cannot say whether we have present in a specimen of water or a piece of clothing the specific cause of typhoid-fever, or of yellow-fever, or of scarlet-fever, except by tests applied to man; and hence we can only surmise with more or less probability as to whether such causes exist in a given well, or ship, or bale of rags. Nevertheless, the progress has been so great during the last five years, that we have every reason to hope that science will before long be able to use her right hand (experiment) to aid her left hand (observation) in unravelling not a few of these tangled skeins.

It is no longer a satisfactory explanation of an outbreak of diphtheria or typhoid to say that the place was filthy: if that were a sufficient cause, there are few towns that would not soon suffer from epidemics of these diseases. The apparent anomalies in the distribution of disease, which are apparent to every one who has investigated the subject, — the good health of persons who work in the midst of offensive effluvia and typical filth, the progress of an epidemic along one side of a street while the other side is free from disease, the people who drink dilute sewage with impunity and enjoyment, — all these things are illustrations of our own ignorance, and not of variability in natural law, to which all alike must be subject.

For every person who is affected with typhoid, or cholera, or tubercle, there are fifty who, so far as we can see, have been exposed to the same causes, and remain unaffected. It is easy to find instances where children have slept with others affected with scarlet-fever without contracting the disease. We cannot say to a person, "If you let your child visit his playmate sick with scarlet-fever, he will contract the disease:" we can only say that it is very probable that he will do so. In like manner, we cannot say to the inhabitants of a town or village where the wells are within a few yards of leaky privy-vaults, "You will have typhoid or cholera:" the probabilities may be only one out of four or out of ten that this will happen.

Sensible people take some precautions when their cattle are in such danger: they insure their houses and barns against much smaller probabilities of loss, but they have not yet learned that it also pays to insure against disease.

This instruction must be given them, not in the form of spasmodic declamation and vague threats, but as clear, definite information, distinguishing carefully between that which is known, or sanitary science, and that which is only more or less probable; and scientific investigators, whether chemists, geologists, biologists, or physicians, must all aid in the work. Their special knowledge gives them power, and it also imposes on them responsibility, — a responsibility which, if neglected, may result in crippling their chosen work and filling their own homes with sorrow.