Potable Water and the Relative Efficiency of Different Methods of Detecting Impurities

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POTABLE WATER

AND THE

RELATIVE EFFICIENCY OF DIFFERENT
METHODS OF DETECTING IMPURITIES.

BY

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PREFACE.

The acknowledged fact that there is a possible difference between wholesome water and that which the chemist pronounces pure water, is a sufficient reason for publishing this essay in its present form. That it was prepared with much skill and care, is abundantly proven by the "Discussion" by eminent authorities of the essay when originally presented to the Institution of Civil Engineers, and which is also herewith presented.
The Analysis of Potable Water, with Special Reference to Previous Sewage Contamination.

As far as the examination of mineral substances is concerned, analytical chemistry is in a very advanced state. Indeed, it may be a matter of opinion as to whether any improvement is required for practical purposes. But as regards organic chemistry, especially that branch which deals with the secretions and tissues of plants and animals, the reverse is the case, and analysts are at present groping in the dark. Nor is this to be wondered at, when the enormous number, great complexity of composition, and unstable nature of these bodies are taken into account, and also the short time that has elapsed since they were first studied. It is a comparatively simple matter to estimate the percentages of the constituents of a body, in other words to make an ultimate
analysis of it; and where one element forms but a few combinations with another, the relative amounts of the constituents determine which of the compounds is under investigation. But inasmuch as hundreds of organic compounds are made up of the same three or four elements, and in many even the proportions of these elements are nearly the same, it is obvious that ultimate analysis will not afford sufficient information to allow of the presence or absence of a certain substance being predicated. If the analyst receive the substance in a pure state, or if it be capable of purification by crystallization, distillation, &c., its physical properties of specific gravity, form, color, &c., are of great assistance in ascertaining its identity. But if a solution in water is the form in which it is received, and especially if the solution be very dilute, the difficulties are greatly increased. When, in addition, the substance itself is very prone to decomposition, and is mixed with other bodies equally unstable and equally hard to de-
tect, a degree of complexity is introduced into the investigation which makes it an almost hopeless task in the present state of chemical science.

Such are the perplexities under which the Water analyst labors, and their careful consideration may serve to account for the wide differences of opinion on this important subject. It is much to be regretted that this uncertainty should exist, and it can only be hoped that in a short time a bright light (possibly by the aid of electricity) will illumine this almost untrodden ground of research.

The author proposes to divide the subject as follows:
1. The various ways in which water becomes contaminated.
2. The methods employed by analysts to detect and determine the extent of this contamination, with an opinion as to the probable value of the results obtained by the various methods.
3. The bearing of the results of biological and microscopical research on the question.