

**A GUIDE TO THE
MICROSCOPICAL
EXAMINATION OF
DRINKING WATER**

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A Guide to the Microscopical Examination of Drinking Water by J. D. MacDonald

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BY
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WITH TWENTY-FOUR LITHOGRAPHIC PLATES.

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TO

SIR ALEXANDER ARMSTRONG, K.C.B., LL.D., F.R.S.

ETC. ETC. ETC.

DIRECTOR-GENERAL OF THE MEDICAL DEPARTMENT OF THE NAVY,

WHOSE NAME IS ESPECIALLY ASSOCIATED WITH THE CULTIVATION OF

THE SCIENCE OF HYGIENE IN HER MAJESTY'S NAVAL SERVICE,

This Work is Inscribed

WITH FEELINGS OF RESPECT AND ESTEEM,

BY HIS MOST OBEDIENT SERVANT,

THE AUTHOR.

PREFACE.

OFFICERS OF HEALTH, as well as Naval and Military Medical Officers, have often to determine the nature of the suspended matters in water used for drinking. In an Hygienic point of view, the import of these suspended matters must vary with their properties, whether mechanical, chemical, or vital.

Mineral particles may affect health, on account of their mechanical action, as for example, when mineral silt of clay, or fine sand causes diarrhœa. Dead animal and vegetable substances may have more important effects, as, when suspended fecal matter produces irritation of the whole alimentary tract. On the other hand, living things, such as the ova of Entozoa, the nematoid worms, and small leeches may give rise at once to certain grave disorders, or Algæ may act on sulphates, and disengage sulphuretted hydrogen. There are, however, numerous living creatures, both animal and vegetable, found in drinking water, to which no special effect on health can be at present assigned; they may be important only as showing the presence of organic impurities, which serve as their pabulum, or as indicating putrefaction. Farther observation may, nevertheless, prove them to be of deeper sanitary significance, and

even now, though there is no good evidence of their hurtful action, no one would hesitate to condemn a water containing Bacteria or fungi, or swarming with the lower forms of life. At any rate, whatever may be the conclusions hereafter arrived at, as to the sanitary import of the innumerable suspended matters, it cannot be doubted that Medical Officers of Health should be able to state what they are. This must be done chiefly by the microscope; but, as it is often difficult for those who are unacquainted with Natural History, even with a voluminous work of reference in their hands, to determine the nature of the various objects that may present themselves, the design of the following synopsis is to furnish a number of figures of those objects, with such a commentary as may enable them to be identified. No attempt has been made to link particular forms with special effects; it is doubtful indeed, if this be possible at present, beyond a limited extent, being rather a point for the enquiry of future times, which this little work can merely purport to aid.

The Tables and figures may also prove useful to young naturalists, who are beginning to investigate the world of waters, that wonderful world, in a single drop of which we may behold varieties of form, almost as numerous as those upon the surface of the great globe itself. Many books have been published with a similar object in view; but one more may find a place, to facilitate the study of a very interesting department of Natural Science.

In reference to the Plates, by way of apology, it may be mentioned that, with the view of lessening the expense of