volume is not intended to be exhaustive. It is such a statement of the essential principles of American water purification practise as Mr. Hazen's large experience as a consulting engineer in this field has led him to believe would be useful to beginners. There is no better text-book for persons desiring a knowledge of water purification in the United States.

There are eighteen chapters in Mr. Hazen's book, including such topics as water supplies from rivers, lakes and wells; the history of water purification in the United States; storage of filtered water; use and measurement of water; suitable pressure to be supplied in water works systems; effect of iron pipes on water, and the layout of works. The subjects dealt with include sand filters, mechanical filters, coagulation basins and aeration.

The book is well-illustrated with half-tones and is produced with the usual excellence of the Wiley press. The first edition, published seven years ago, has been revised and expanded.

Houston, the bacteriologist and director of water examination of the Metropolitan Water Board of London, has produced a book in which he has explained his views as to the extent of the danger to be apprehended from polluted river water and how that danger is avoided without filtration by London, the largest and one of the healthiest cities in the world.

The American arguments which have been built up without opposition in the last twenty years and which seek to account for much of the excessive prevalence of typhoid in American cities as caused by polluted surface water are declared to be inconclusive and not in consonance with ascertainable facts.

Dr. Houston maintains that a watershed may be exposed to manifold pollution and the river draining from it impure, as judged by ordinary chemical and bacterial tests, but the water may nevertheless be shown to contain none, or scarcely any, of the microbes of water-borne diseases when tested by methods of proved value.

The American theory to the effect that the incidence of tuberculosis, pneumonia and other diseases not otherwise suspected of being water-borne can be greatly reduced by improving a public water supply is incredible to Dr. Houston.

The book is actually, but not formally, divided into two parts: The first tends to free the River Thames and the River Lee, which supply London with 80 per cent. of its drinking water, from the full gravity of the charge of being sewage-polluted rivers, and the second presents evidence that the self-purification process employed by London to prepare the water for consumption is uniformly efficient. There are eleven short chapters. The topics include water and disease; the financial value of pure water; sterilization processes; storage in relation to purification; the question of abstraction; sources of water; bacterial methods and much information about the remarkable water supplies for London over whose quality the author has had official supervision for many years.

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Studies in Seeds and Fruits. An Investigation with the Balance. H. B. GUPPY. London: Williams and Norgate. 1912. Pp. xii + 528.

A careful reading of the research work, detailed in this volume, has abundantly repaid the reviewer. Guppy commenced the investigation, as a study of the rest-period of seeds, using in his research merely a sharp knife, pocket lens, balance and oven. The first chapter details the history of the investigation. The second chapter describes the three conditions of the seed, viz., the soft pre-resting seed, the contrasted, hard-resting seed and the soft, swollen seed on the eve of germination. Observations by means of the balance are made on seeds in all three of these stages. The third chapter is concerned with the impermeability of seeds and its significance, the fifth is a classification of seeds according to their permeability, or impermeability, while the sixth chapter gives additional evidence. The whole book is full of tables and is loaded with

detailed observations on such subjects as hygroscopicity, the régime of the shrinking and swelling seeds, the dehiscence of fruits, the proportion of parts in fruits, the abortion of ovules, seed coloration, the weight of the embryo, the rest-period of seeds and a philosophic chapter (XX.) on the cosmic adaptation of the seed in which the author states his belief that the seed is less specialized and less conditioned than the plant; that its potentialities present us with a range of life-conditions that extends beyond the earth and offers a clue to the conditions of existence in other worlds. Finally Guppy postulates a flora of the cosmos.

Although the author allows himself in the last chapter to be spirited away from things mundane, yet, the whole work is pervaded with the spirit of thorough scientific research in which no fact is overlooked which might bear on the main problem of seed investigation, and each fact is submitted to rigid examination, by the balance and other instruments of precision. The book has been overlooked apparently by other American botanic reviewers and it deserves a place on the shelves of any library that attempts to be stocked with recent important contributions to botanic science.

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Special Articles

A New Marking System and Means of Measuring Mathematical Abilities[1]

Perhaps the most noted methods of measuring the intelligence of young children are the De Sanctis and the Binet-Simon tests. These tests apply mainly to the measurement of lower levels of intelligence. It is very significant that the noted Italian and French psychologists who originated these tests did not extend the general method to be used with pupils of the secondary and higher schools. In the present state of educational psychology it does not seem practicable or possible to effect successfully such an extension; that is to say, it is improbable that such tests can be devised which can be applied to everyday use in our schools, and will be a real improvement upon our present system of examinations, in settling questions of promotion and in awarding honors in our high schools and colleges. We are able to determine certain questions of athletic proficiency by measuring the high jump or broad jump, by timing the quarter-mile or half-mile run. The fact that the candidate knows beforehand the nature of the test does not materially interfere with its efficiency. But if a candidate for promotion knows beforehand the exact nature of the test in algebra—as he easily may know, if tests are adopted to be used by all teachers at all times—then he can easily learn the few tests and make a high grade, even though his knowledge of the entire subject may be woefully deficient. It is quite evident that it is impossible to formulate specific questions in any branch of high-school mathematics, which could be used everywhere and at all times. Yet the report of the American Committee No. VII. on Examinations in Mathematics contains the following:[2]

> There seems to be a pronounced desire throughout the country for standardized tests in mathematics, that is, tests which will enable teachers to measure fairly accurately the efficiency of their instruction and to know whether their pupils are as proficient as those in other localities.

One way to meet this demand is to prepare a syllabus of essentials in high-school arithmetic, algebra and geometry, to be used in preparing the specific questions for an examination. Such a syllabus has its merits and also its demerits. Its merits are that both teachers and pupils have the territory to be covered by the examination more definitely limited to what are the essentials. Its demerits are that it leads both teachers and pupils to a disregard of the many minor facts of a science, which deserve at least passing notice.

[1] Read before the mathematics section of the Central Association of Science and Mathematics Teachers, November 29, 1913, at Des Moines, Iowa.

[2] U. S. Bureau of Educ., *Bulletin*, 1911, No. 8, p. 13.