shape of even a condensed account of the matters specially selected by Dr. Garrod, and so one need only mention that the anomalies treated at length are albinism, cystmaria, alkaptonuria, and pentosuria.

It must not be supposed that the examination of these comparatively rare conditions is devoid of general interest, for it is often just these curious accidents of perverted tissue change which form the opportunity of the keen observer in unravelling the perplexities of the normal state. The natural sequence of study is physiology first, pathology next. But very often an inversion of this order leads to important accessions to knowledge. Dr. Garrod is to be congratulated on having been successful in such an experiment, and those interested in metabolism cannot do better than study his lucid and bright exposition of the subject. W. D. H.

Practical Testing of Gas and Gas-meters. By C. H. Stone. Pp. x+337. (New York: John Wiley and Sons; London: Chapman and Hall, Ltd., 1909.) Price 15*s*. net.

THIS is a laboriously complete compilation of the various methods of testing gas for illuminating power, purity, chemical composition, and calorific value, and of proving the accuracy of the indications of gas-meters. The subject is one mainly of technical interest only, and very specially so even for that, and hardly suitable, therefore, for detailed consideration in these columns. An examination of the book shows how great a diversity of apparatus has been devised and thrust upon the innocent gas-producing world, and how gratuitous some of the diversity is. Where apparatus has been designed for official testings, the objection to protecting the manufacture by patents has given the constructor liberty to alter and "improve" or spoil an instrument, as the case may be.

The American has a great opinion of the English official ten-candle lamp designed by Mr. Harcourt, but he will not take it as he finds it, and so he makes an American pattern. The English official calorimeter, too, judging by the observations made, has also gone through a metamorphosis in crossing the Atlantic. As is to be expected, the book is well got up and illustrated, and its value is increased by the inclusion of a number of tables of value to those whose business is to test and examine gas.

A Compendium of Food-microscopy. By E. G. Clayton. With sections on Drugs, Water, and Tobacco. Compiled, with additions and revision, from the late Dr. A. H. Hassall's works on Food. Pp. xxxix+431. (London: Baillière, Tindall and Cox, 1909.) Price 10*s*. 6*d*. net.

THIS book, written by an ardent disciple of the late Dr. Hassall, is largely based on Dr. Hassall's works on food and its adulteration. An account is given of the microscopical characters of all the principal vegetable food-stuffs, beverages such as tea and coffee, fruit preserves and condiments, and of tobacco, opium, and a few other drugs, together with those of the chief adulterants of these substances. In addition, chapters are devoted to foods of animal origin and the parasites which may infect them, milk, cream, butter, and cheese, and to the microscopical flora and fauna of water. The book is profusely illustrated with line drawings to scale, which usually reproduce very clearly the characteristics of the substances they are intended to depict, though occasionally there is an irritating want of systematic arrangement of the figures, Fig. A, for instance, sometimes being on the right, sometimes on the left, of the page. Though the botanical terminology is not always that used nowadays, on the whole the book should form a useful addition to the library of the analyst and microscopist.

LETTERS TO THE EDITOR.

[The Editor does not hold himself responsible for opinions expressed by his correspondents. Neither can he undertake to return, or to correspond with the writers of, rejected manuscripts intended for this or any other part of NATURE. *No notice is taken of anonymous communications.]*

Molecular Scattering and Atmospheric Absorption.

SINCE Lord Rayleigh discussed the question of molecular scattering, and its bearing on the explanation of the blue colour of the sky, our experimental and observational data have become much more trustworthy. While our knowledge of the number of molecules in a gas allows us now to calculate with sufficient accuracy the amount of direct sunlight which is diverted by scattering, Mr. Abbot's series of measurements at Washington and on Mount Wilson gives us the actual observed opacity of the air for different wave-lengths.

Lord Rayleigh showed that, on the hypothesis of the elastic solid theory of light, small particles of matter, which act simply by adding inertia to the æther, scatter light and retard the passage of a wave passing over them in such a way that the relation

$$k=\frac{32\pi^3(\mu-1)^2}{3N}$$

holds, where k is the coefficient of extinction of energy, μ the refractive index, and N the number of molecules per cubic centimetre. He showed, further, that the same equation may be deduced from the electromagnetic theory if the particles locally affect the inductive capacity of the medium. In the forthcoming new edition of my "Optics" it will be proved that the equation is independent of theory, provided μ is nearly equal to unity; the limit of its applicability is only reached when there is a retardation of phase at the origin of the scattered light the square of which is appreciable, and it can be shown that this is actually the case except within the region of anomalous dispersion. The range of the formula may be further increased if $\frac{1}{4}(\mu^2-1)^2$ is written for $(\mu-1)^2$.

For N I have used Rutherford and Geiger's value $2{\cdot}72\times10^{19}$, and with the known value of the refractive index of air, k may be calculated. If h is the height of the homogeneous atmosphere above the point of observation, e^{-kh} is the fraction of light which would reach the observer if no light were lost in any other way than by molecular scattering. In the following table the transmitted light calculated in this manner is compared with Abbot's observed figures. The first column gives the wave-length, the second column contains the observed values of the transmitted energy for Washington, taking all observations into account, while the third column gives the number calculated from the observations on February 15, 1907, when the air was exceptionally clear. The calculated values are entered into the fourth column. The last three columns give the corresponding numbers for Mount Wilson. The selected clear day in this case was October 11, 1906.

	Washington			Mount Wilson		
Wave-length	Observed mean	Observed clear day	Calculated	Observed mean	Observed clear day	Calculated
4×10^{-5}	0·55	0·72	0·71	0·73	0·76	0·76
5	0·70	0·84	0·87	0·85	0·89	0·89
6	0·76	0·87	0·94	0·89	0·92	0·95
7	0·84	0·90	0·96	0·94	0·96	0·97
8	0·87	0·94	0·98	0·96	0·99	0·98
10	0·90	0·96	0·99	0·97	0·99	0·99

The close agreement between the two last columns shows that on a clear day on Mount Wilson atmospheric absorption is practically accounted for by molecular scattering. There is a slight indication of selective absorption in the red, but otherwise the columns are in complete agreement. On the average day there seems an additional absorption of about 2 per cent. It is remarkable that, even at Washington, the calculated absorption for blue light should so nearly agree with the calculated value; this means that even at the sea-level the greater part of the absorption on a clear day is due to scattering by the molecules of air. The large diminution in the