section of Professor Abbe's paper concerns *Climatology and its Aims and Methods*, and deals chiefly with the relations of climate to vegetation. Some years ago Professor Abbe made a careful study of the latter subject, and, although he has never published any extended report upon it, he has often referred to the results to which his studies led him. We take it that these pages of the Maryland Weather Service volume contain a summary of the results which Professor Abbe reached, and we welcome them as giving the best brief statement of the most important facts in the complicated interrelations of climate and the products of the soil. Soil temperatures; the climatic influence of forests and agriculture; reforestation; the geographical distribution of plants, etc., are considered. The third section of Professor Abbe's report deals with *Apparatus and Methods*, and is the first publication on this subject we have yet seen which illustrates the different instruments altogether by means of photographic reproductions.

A Sketch of the Progress of Meteorology in Maryland and Delaware, by Dr. Fassig, follows, and is an extremely interesting historical account. We note, in passing, that Dr. Fassig reproduces Lewis Evans's map of 1749, which contained the famous statement concerning the movements of northeast storms from the southwest. A copy of the original map, published in 1747, Dr. Fassig was unable to find; he has therefore reproduced the second map, dated two years later. Credit has sometimes been given to Evans for the first statement of this important discovery, but it justly belongs to Franklin, as Dr. Fassig says. This paper contains a valuable bibliography of publications relating to the climatology of Maryland.

The final report, by Mr. F. J. Walz, an *Outline of Present Knowledge of the Meteorology and Climatology of Maryland*, is a very complete account, containing full tables and many figures and charts. We note, with pleasure, a classification of Maryland weather into types, illustrated by means of weather maps, for climatology does not become a living study until the weather phenomena which go to make it up are understood. Mr. Walz has given us a climatic account of Maryland which is brought quite down to date, and which may well be adopted as a model by those who discuss the climates of other states. Excellent shaded charts showing precipitation and isotherms for each month, for the seasons, and for the year, accompany the report. Figures 35–40 are new. They are weather wind roses, and show the weather and wind conditions when Baltimore is under the influence of a cyclone and anticyclone in different seasons. Figure 55, the advent of spring in Maryland, is also an interesting addition to our knowledge of the climate of the state.

We have exceeded the limits which we set for this review at the outset, but we believe that the volume under discussion has been given no more space in this JOURNAL than it deserves. Paper, press-work and illustrations are all of the highest grade.

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Indicators and Test Papers, their Source, Preparation, Application and Tests for Sensitiveness. By ALFRED I. COHN, PH.G. New York, John Wiley & Sons. 1899. Pp. 224.

As stated on the title page, this work is "a *résumé* of the current facts regarding the action and application of the indicators and test papers which have been proposed from time to time, and are in present use in chemical manipulations."

Part I. (pp. 19) deals with the general considerations determining the choice of indicators, their applications and limitations, behavior in other than aqueous solutions, dissociating effect of solvents, theory of their action, etc.

Part II. (pp. 154) is devoted to a discussion of a great number (76) of indicators, including not only those in common use, but also a great many others whose use has been recommended from time to time. The arrangement is alphabetical throughout, the data for each indicator being arranged under the following headings: Synonyms, Source, Preparation, Properties, and Application.

Part III. (pp. 51), on Test Papers, records the preparations and properties of 74 varieties, and is followed by tables showing the relative sensitiveness of indicators and test papers, and a

tabular summary of the behavior of the most important indicators toward the more common acids and bases.

On the whole, the book is likely to prove useful in the laboratory for reference, as it is carefully compiled and brings into a compact and systematized form a great mass of scattered detail. Although 75 per cent. of the indicators and test papers recorded would probably never be used by the average chemist, yet, in special cases, where the ordinary indicators fail, it may prove a great convenience to have at hand such a compilation from which a suitable one may be selected. The educational value of the book, however, might in many cases be increased by the use of graphic formulas, especially in several of the syntheses which the author represents merely by equations.

The book is of a convenient size and attractive in form, the subject-matter is well arranged, printed on good paper with very clear type, but the proof-reading has been only fairly well done.

M. T. B.

Zur Analyse der Unterschiedsempfindlichkeit. By Lillie J. Martin und G. E. Müller. Leipzig, J. A. Barth. 1899. Pp. vii + 233. M. 7.50.

It is a psychological sign of the times that this work on the perception of weight does not in the least concern itself with Weber's law, but leaves that issue entirely aside in order to consider the psychological and physiological elements in the process. Instead of looking for the bare statistical result of a large number of judgments, it asks *how* a judgment is carried out. Accepting as a fundamental answer the theory of Müller and Schumann—according to which the process consists in lifting with equal muscular force the two objects to be compared, and inferring their relative weights from their resulting movements—accepting this theory without serious discussion, the authors seek for minor factors in the process. Their method is two-fold: to collect introspective observations made during the experiments, and to vary the conditions and contrast the statistical results. By these methods they have detected the following factors:

First, fatigue and its opposite, namely, excitation or 'Bahnung.' It may happen that lifting the first of a pair of weights fatigues the motor centers; if so the energy of the second lift will involuntarily be less than that of the first, and the second weight will seem heavier than it is. In other conditions of the neuro-muscular system, lifting the first weight does not fatigue but stimulates; the second lift is then more energetic than the first, and the second weight feels correspondingly lighter. This theory—for it is not so well established as the other points made by the authors—is advanced in explanation of the 'time-error.'

Many judgments, though purporting to consist in the comparison of two given weights, were found to be something quite different. Often they were based on 'side-comparisons.' The actual comparison was not between the two weights given to be compared, but between one of them and the corresponding weight of the preceding pair. Though this seems an indirect and far-fetched manner of judging, it is often more readily adopted than the direct comparison. And in other cases no genuine comparison at all takes place, but the judgment is based on an *impression of the absolute weight* of one of the lifted objects. After growing accustomed to the series of weights used in an experiment and getting one's movements adjusted to the average run of those weights, one often finds that a weight on being lifted feels light, or feels heavy. This feeling is not a definite comparison of the given weight with the average; it is a mere impression, yet often very reliable. The impression is stronger the more the given weight differs from the average; which means that the easiest and most confident and correct judgments are the most apt to be determined by the mere impression, and the least apt to be genuine comparisons. Practice by no means eliminates this way of judging; on the contrary, the best demonstrated effect of practice was to increase the dependence on these impressions.

The impression of absolute weight operates differently in two classes of persons. Those of strong muscles and energetic movements are more subject to the impression of lightness; the less energetic to the impression of heaviness.

A large part of the monograph is occupied with an attempt to follow in detail the combined