modern sense of *minus* are German. In the *Bamberger Rechenbuch* (1483) the tare to be deducted from the weight of a package is called *das Minus*. An Italian writer of the fourteenth century used *meno* to indicate the subtraction of a number to which it was prefixed. The symbol itself, —, De Morgan, most sound and erudite of mathematicians, says arose as a merchant's mark. Its adoption was helped by its likeness to the *obelus* used by ancient critics to indicate that a passage should be removed from the text. This obelus or obelisk was a straight horizontal stroke, either simple (—), or with a dot above and one below (÷), and in Denmark the sign ÷ is used for *minus*.

English examples of *plus* do not occur so early as those of *minus; e. g.,* 1481–90 *Howard Househ. Bks.* (Roxb.) 417, v. yerdys, mynus the nayle, welwet blake. Cajori says Eneström shows "that with Widman + meant simply 'und' (and)," but how can this be brought to tally with the fact that Widman explicitly directs that the signs — and + be read *minus* and *mer* (mehr)? He uses them as signs already well known in his "Behende und hübsche Rechnung auf allen Kauffmannschafft" (1489); "was — ist, das ist minus, und das + ist das mer."

The adoption of the form + would be greatly helped by its likeness to a form of & = et, and Widman seems to have used the long preexistent form + in the two senses, *mehr* and *et*.

GEORGE BRUCE HALSTED

SCIENTIFIC BOOKS

Schutzfermente des tierischen Organismus. Ein Beitrag zur Kenntnis der Abwehrmassregeln des tierischen Organismus gegen Körper-, blut- und zellfremde Stoffe. By EMIL ABDERHALDEN. Berlin, Julius Springer. Eight text figures; pp. xi + 110. Paper cover, 3.20 M.; bound, 3.80 M.

In this little pamphlet Abderhalden gives an interesting survey of a method which the living organism employs to protect itself from the effects of foreign soluble substances which have entered its circulating juices. Under normal conditions, for example, proteids do not reach the tissue cells in their native state, but only as fragments. This degradation of proteids is normally accomplished by the ferments of the gastro-intestinal canal, and some of the degradation products, after absorption, are then synthesized by the tissues into its own characteristic proteid. Native foreign proteids in the circulation are useless and often directly harmful to the tissue cells. However, when this contingency occurs experimentally or through disease, the invaded body is not entirely helpless, but digestive ferments are formed in the circulation, possibly from the leucocytes, which attack the foreign proteid and digest it. These protective ferments are formed very swiftly and have been demonstrated by Abderhalden in the plasma or serum twenty-four hours after the subcutaneous injection of the foreign proteid, while the plasma or serum of normal, non-injected individuals shows no trace of this ferment.

Similar results were obtained by Abderhalden when carbohydrates were injected, or when fats were driven unchanged into the blood by forced feeding. Here again he was able to show the presence of ferments in the blood which were able to split the foreign substance.

These facts were established by Abderhalden and his pupils largely through the use of the polariscope. When optically active or racemic substances are split by ferment action, the optical activity of the mixture changes and this change shows, in the first place, that a decomposition has occurred; in the second place, the character of the change may show what substances have been formed, provided that the chemical structure of the original substance used is accurately known, which is the case with many of the optically active polypeptids.

The facts briefly mentioned above have received an important application in the diagnosis of pregnancy. The circulation of the pregnant organism contains cells from the chorionic villi, and the maternal body reacts to these cells by forming peptolytic enzymes

not present in the non-pregnant individual. If now the serum or plasma of a pregnant woman is added to peptone prepared from human placental tissue and the mixture observed by the optical method, the initial rotation changes, while with serum from a non-pregnant woman, the initial rotation remains unaltered. As this phenomenon could be detected as early as the first month of pregnancy, the procedure promises to be of great value in the differential diagnosis between extra-uterine pregnancy and tumors of the adnexa. It may, perhaps, be added that this ingenious method apparently does not remove all the difficulties and doubts which surround the early diagnosis of pregnancy, for recent investigations seem to show that a positive reaction may also be obtained under other conditions than pregnancy.

The booklet may be recommended as a very readable, stimulating summary of a large number of investigations by Abderhalden and his pupils.

J. Auer

Rockefeller Institute

Methods for Sugar Analysis and Allied Determinations. By Arthur Given, B.S. Philadelphia, P. Blakiston's Son & Co. 1912. Pp. 75. Price $2.00 net.

According to the preface, this book has been made, because, as the result of ten years' experience, the author has found that "it has become increasingly evident that the present methods as given in many of the books on sugar analysis and in the A. O. A. C. methods are not sufficiently explicit as to the proper method for a particular case, thereby confusing the novice, and making it difficult to secure uniform results. . . ."

The methods presented by the author are those which he, "from long practise on a very large variety of substances, considers to be best adapted for the purposes in hand."

In its limited range of seventy-five pages the book endeavors to cover the analysis of sugar-cane, cane-sugar and beet-sugar and their derived products, maple-sugar and maple-syrup, honey, commercial glucose, dextrin, starch, condensed milk, milk chocolate, etc. A few tables and illustrations are scattered through the text.

There is undoubtedly room on the shelf of many an analyst for a work which shall give tested and tried methods for the analysis of sugar and allied, saccharine, products. The author has brought together some material of value for this purpose; there is however—in spite of his conviction—room for considerable doubt as to whether his choice of methods would always commend itself to the approval of other experienced analysts.

In discussing the determination of sucrose in raw sugars, the use of Wiley's correction factor is recommended to obtain "the true polarization in sugars polarizing over 90°," if the temperature of polarization varies from 20° C., and then the author goes on to state that such correction is not applicable "where the reducing sugars exceed 3 per cent., as differences in temperature affect the reducing sugars more strongly than sucrose."

It would be interesting to learn why and how this arbitrary limitation of 3 per cent. has been decided upon by the author, and how he would obviate the disturbing influence of the precipitate-error in clarification which tends to offset the reduction in the specific rotatory power of sucrose caused by an elevation of temperature above the temperature at which the polariscope has been graduated.

The concise, not to say terse, manner of expression employed in the book is a good feature, yet a few additional words of explanation would not have been out of place in several instances, for example in giving the formula to be used in the Clerget method (p. 11). The novel way of printing the names of several of the more common sugars (p. 36) is apt to introduce more confusion in this already troublesome issue and the data given in that table are not always correct—thus, f. i. raffinose is hydrolyzed by invertase into d-fructose and melibiose, and not into d-glucose and d-galactose, as stated. Hydrolization of raffinose into d-galactose and sucrose is effected by emulsin.

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