

with phosphates, potash, and nitrogen. The valuation of unexhausted manurial residues, whether derived directly from manures or from foods, might well receive more attention.

The book is a genuine effort to treat the subject scientifically, and at the same time in a manner intelligible and interesting to the farmer of good education. We think it has succeeded. E. K.

LATITUDE BY EX-MERIDIAN ALTITUDE.

The "Ex-Meridian" treated as a Problem in Dynamics, &c. By H. B. Goodwin. (London: George Philip and Son, 1894.)

THE author of this brochure, with a tinge of satire, seems to apologise for its containing nothing about the already exhaustively developed Sumner method. In doing this he alludes to "the too just Aristides." This reminds us of a saying of that practical philosopher, that "the best way to appear just is to be so." The proverb may teach us that the way to obtain dependable results is to have a firm grasp of principles, that the most reliable navigator is one who understands the theory of his problems.

This remark is apposite, for we can conceive many a "simple sailor" being rather frightened at the title of this pamphlet which will first meet his eye, and we hear him say—"Cannot the seaman continue to navigate his ship without learning dynamics?" If he has courage to read a little further on, he finds that his belovedly simple "Sun Mer. Alt." connected with such words as "maximum" and "minimum." Hitherto he has banished the word "maximum" from his thoughts by avoiding the use of the moon and planets for finding the latitude at their culmination; considering that the problem—"To find the time when the moon and planets are at their maximum altitudes" to belong to "the gymnasium of the examination room" rather than to "the arena of everyday practical utility." But now he finds that modern ships require this problem to be considered with reference to all the celestial bodies, and that even the sun may be capricious enough not to "dip" at noon, that, in fact, instead of this phenomenon giving a meridian altitude it gives an ex-meridian altitude which has to be reduced to the meridian.

There is reason to be thankful for this new feature, because it will attract more attention to the hitherto shamefully neglected method of the ex-meridian among ordinary navigators. That this can be no longer thus relegated is exemplified by Mr. Goodwin, as follows:—

"In the *Standard* newspaper of October 23, 1893, it is stated that H.M.S. *Royal Sovereign*, flag ship of the Channel Squadron, had arrived at Gibraltar, having made the passage in less than seventy hours. Such a passage as this has ceased to be regarded as phenomenal, and is looked upon as quite an every-day occurrence. For a portion of the voyage a speed of over fifteen knots was maintained, and on board a ship steaming at this rate nearly due south, at that time of year, the sun would not appear to 'dip' until more than five minutes after noon, and a correction of nearly 45" would be necessary to reduce the maximum altitude to the meridian."

As the ship moves south a fresh horizon comes into view, and the sun will appear to rise until this shift of the

horizon (the rate of which depends upon the rate of the ship towards the sun) is less than the rate of his motion in altitude.

There is another reason for being thankful for the sun having to be thus treated at the noon-day observation. It will lead to the moon and planets being no longer avoided for finding the latitude at the time of their culmination. No celestial bodies are more useful for such a purpose, especially at twilight, when a well-defined horizon is frequently available.

Every practical navigator daily uses the *Nautical Almanac*: it would be well if he devoted a short time also to study the "Explanation" at the end of the volume. In explaining "*Var. in 1 hour*" which occurs on every page I. of the book, it is stated that this "is the variation at noon, and requires to be reduced to midway between noon and the time at which the R.A., Dec., or Eq. of time is required"; in other words, the reduction of the quantities from apparent noon to any other time is a problem in dynamics. The moving body is subject to a uniform acceleration in the direction of its motion, and the space described in a given time is found by multiplying the *mean velocity* during the time by the given time. The same principle applied to the ex-meridian problem gives the result that the reduction is equal to the rate of change of altitude per half-minute of time, multiplied by the number of minutes of time from the meridian.

So far from decrying the rapid methods now so needful in practice, the author advocates their further use. He gives a "Method of solving the Ex-meridian Problem practically by the Azimuth Tables," which are, or should be, in the hands of every navigator, and also "Practical Rules for finding Time of Maximum Altitude," and ends with "Application of the Azimuth Tables to other Problems."

We can heartily recommend this short contribution to the science of nautical astronomy in its application to the practical requirements of modern navigation.

PERFUMERY.

Odorographia: a Natural History of Raw Materials and Drugs used in the Perfume Industry, including the Aromatics used in flavouring. Intended for the use of Growers, Manufacturers, and Consumers. By J. Ch. Sawyer, F.L.S. Second Series. (London: Gurney and Jackson, 1894.)

THIS book is a continuation of the subject of odour-yielding products treated of by Mr. Sawyer in a volume bearing the same title and issued in 1892. Though the present book is a companion volume in every respect to its predecessor, and might well have been designated as the second volume, the author has preferred to call it the second series, thus implying, and indeed distinguishing, the former book as the first series—a little peculiarity which does not in itself affect the value of the work, but which tends to confusion lest the second series might be taken for an extended or enlarged edition of the first; whereas the term volume would have implied that it is an entirely new book, which is really what the author wishes his readers to understand, as he tells us in the preface to the new