him to direct his course with confidence towards his point of destination. Whilst, however, giving Mr. Rosser credit for his advocacy, we cannot but regret he has thought it necessary to pad his pamphlet with problems which are in every good treatise on navigation, and with tables which are either useless or are to be found in a more complete form elsewhere.

In "Stellar Navigation," Problems I. to X. are simply repetitions from works already published, and we notice that in the examples given of obtaining hour angle and azimuth (pp. 9, 10, and 11), Mr. Rosser seems to be unaware of the existence of Raper's tables of logarithms of the log. sine square. Problem XI. is an example of Sumner's method, and is well explained, excepting that we think it far better and quite as quick a process to calculate the azimuth with the hour angle rather than refer to another set of tables. Problem XII. is what is called the new navigation, and is merely another, and in our opinion less simple, way of arriving at the same result as Sumner. Problem XIII., or Pagel's method, is merely to obtain the position by calculation instead of by plotting on a chart the two circles of altitude, and as this can be done by two plane triangles we should hardly have thought it required explanation. Problem XIV., to compute the altitude of a heavenly body, will be found in all treatises on navigation.

The Tables A and B are useless, for they are merely a complicated method of finding the error of longitude due to an error of one mile of latitude, which can be readily ascertained by the ordinary traverse-table. Table C., on azimuths, may be, as before stated, as readily and more accurately calculated at the same time as the hour angle. Table D is a combination of two tables invariably given in all treatises on navigation.

Table I., or mean places of stars, is given in the *Nautical Almanac*, which every navigator possesses; Table II. is given more elaborately in Jean's handbook for the stars, which every navigator should possess; and Tables III. and IV. are given in the *Nautical Almanac*.

THE STUDENT'S MECHANICS

The Student's Mechanics. By W. R. Browne. (London: C. Griffin and Co., 1883.)

THIS work, we are told in the Preface, "differs from the many previous works on the subject mainly in the fulness and care with which the foundations" (of mechanics) "have been considered," and it aims at such a treatment of the subject that the student may apply its principles "confidently in attacking questions of practical importance."

The book is characterised by a considerable amount of original and independent thought, especially in the earlier portion treating of First Principles. This is largely due to the definition of matter which is given:—"Matter consists of a collection of centres of force distributed in space, &c." We are not aware of any writer who has employed this hypothesis to deduce and explain the fundamental laws of mechanics in an elementary treatise. Nor does it seem to us at all well adapted to elementary students. It is so very important that they should see that mechanics depends, at every stage, in the establishment of its fundamental laws, on experiment, and also that they should know what the experiments are and in what way they serve to establish the laws, that the deductive method adopted by Mr. Browne, which does not sufficiently exhibit this connection, would seem to be unsuitable for the purpose he has in view. For though he explicitly states, once or twice, that the science of mechanics rests on experimental evidence, he does not point out the way in which it so rests, nor where the necessity for experiments comes in. As a specimen of his purely deductive method and, at the same time, of poor logic, we have a proof given on p. 9 which reads thus:—"We have defined a force as a cause of motion. Hence we see that, if a force has produced motion, it will be represented to us by the motion it has produced. . . . But motion is measured in terms of velocity. Hence, other things being equal, forces are measured by the velocities which they cause or generate." By the expression "other things being equal" must be understood (Art. 30) that "the things they act upon must be equal" (in what respect—of weight, volume, or mass—is not stated, although, from an illustration previously given, we are, presumably, to infer that their weights must be equal). If we substitute for *force*, *amplitude of vibration*, and for *motion generated*, *intensity of illumination*, all through the above proof, the reasoning will be equally plausible, and the conclusion false. Of course all that can be inferred from the fact of force having caused motion, apart from experiment, would be that the velocity might be expressed as a function of the force.

A possible source of much confusion to the student exists in the old-fashioned division of forces adopted in this book into statical, moving, and accelerating forces. The confusion will be increased by the introduction, in addition, of the more modern word "acceleration." In Art. 348 we have f called the acceleration in the formula $P = Mf$, whilst g is called the accelerating force of gravity; whilst in Art. 422 the actual tractive force P exerted by an engine on the following train is called an accelerating force.

The proof in Art. 359 is incomplete, owing to its not recognising the fact that the sum of an infinite series of vanishing quantities may be a finite quantity.

A valuable feature of the book is the prominence that is given to, and the early introduction of, the theory of the conservation of energy. The friction of machines is deduced from this principle in a very simple manner. The theorems of statics are very clearly put before the reader, and much that is suggestive and valuable is contained in the articles on elasticity and on the action of railway-brakes.

The book is one which may be read with profit by a student who is already familiar with elementary mechanics and is not liable to be confused by the peculiarities alluded to above, but does not seem to be adapted to students who approach the subject for the first time.

OUR BOOK SHELF

Manual of Taxidermy. A Complete Guide in Collecting and Preserving Birds and Mammals. By C. J. Maynard. Illustrated. (Boston: S. E. Cassino and Company, 1883; London: Trübner and Co.)

THIS small volume of 100 pages of thick paper contains the ordinary instructions for skinning, preserving, and

mounting birds and mammals, given very briefly, but probably with sufficient detail to serve as a guide to beginners. The author appears to be a dealer in natural history accessories, and the book has rather the aspect of a trade advertisement from its recommending the almost exclusive use of a "preservative" prepared and sold by the author, the composition of which he keeps secret. As a practical guide to English collectors in foreign countries it is very inferior to Mr. Ward's "Sportsman's Handbook," which was reviewed in NATURE last year (vol. xxvii. p. 146). A. R. W.

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. No notice is taken of anonymous communications.*

[*The Editor urgently requests correspondents to keep their letters as short as possible. The pressure on his space is so great that it is impossible otherwise to insure the appearance even of communications containing interesting and novel facts.*]

The Meteorological Council and Falmouth Observatory

THE Meteorological Council contemplate closing on December 31 next the Primary Observatories at Glasgow, Armagh, Stonyhurst, and Falmouth, which have been in full operation since 1868, and continuing only those at Kew, Aberdeen, and Valentia.

The Falmouth Observatory has a geographical position which insures it the first record from the south, and the position of the instruments is considered satisfactory by scientific men. It is superintended and managed by the Royal Cornwall Polytechnic Society, who for the small sum of 250*l.* per annum provide suitable buildings, an observer, assistant observer, gas, and the other necessary outgoings, thus supplementing by local effort the Treasury grant.

The Meteorological Office have been satisfied with the manner in which the Observatory has been managed. The accompanying report, which Prof. J. Couch Adams of Cambridge sent to the Meteorological Council at their own request, deprecates, on scientific grounds, the retrograde step contemplated by the Council, and I am requested by my Committee to invite through you the assistance of scientific men generally to prevent the discontinuance of so important an observatory as the one at Falmouth.

EDWARD KITTO,
Secretary to the Royal Cornwall Polytechnic Society
Falmouth, July 30

Copy of the Document submitted to the Meteorological Council by Prof. J. Couch Adams, F.R.S., on July 5, 1883.

To the Members of the Meteorological Council.

In compliance with the wish expressed by some members of the Council at the interview of June 27, I have great pleasure in explaining my view on the matter then discussed more fully and clearly than I was able to do *viva voce*.

1. First I will say a few words about the relative value from a scientific point of view of a continuous record of meteorological phenomena when compared with occasional observations of the same phenomena.

In my opinion the continuous record would be in this case incomparably the more valuable. When we know the laws of variation of an observed quantity, occasional observations at intervals which may be settled beforehand are sufficient to determine all the constant quantities which enter into the expression of the law. On the other hand, when the law of variation is in a great measure or altogether unknown, as is the case with most meteorological phenomena, a continuous record may throw more light on the law or laws of variation than would be afforded by any amount of occasional observations.

I have no hesitation in expressing my belief that if we ever attain to a knowledge of the principal laws which regulate the weather, it will be as a result from continuous records, and not from occasional observations.

2. In the second place, in order to study the laws of variation of any particular phenomena, it is important to have continuous observations at different places which are not so far distant from each other as to make the circumstances of the phenomena at the different stations differ too widely from one another.

In this way only will it be practicable to study and trace the progress of a wave of disturbance of any kind across a given country. From this point of view I do not think that seven stations judiciously distributed over the surface of the British Isles are at all too many. Hence I should regard the proposed abandonment of four out of these seven stations as a retrograde step which is greatly to be deprecated.

3. In the first place I come to the circumstances which relate to the Falmouth Observatory in particular. The unique situation of Falmouth, nearly at the mouth of the English Channel, and considerably to the south-west of any of the other meteorological stations will render continuous observations made there peculiarly valuable. Most of our storms and other atmospheric disturbances come from the south-west, and therefore they would first affect and be recorded by the instruments at Falmouth. Valentia is the only other station which can compare with Falmouth in this respect, and I should consider the observations at Falmouth more valuable, as its more southerly situation enables us better to trace the progress of any disturbance across the southern and the central parts of England by comparison with other observations in those parts, while Valentia is too much to the north to answer this purpose.

4. Next I will consider the objection which has been brought against further continuing these observations, viz. that they have already been continued for twelve years, and nothing of importance has been deduced from them. Considering the complicated nature of the phenomena we are concerned with, it is not to be wondered at that little or no progress has been made in twelve years in unravelling their laws. Even in astronomy, if the fate of the Greenwich Observatory had depended on the results deduced during the first twelve years of its existence from the observations made there, the consequences to the progress of the science might have been disastrous. The fact that we already have twelve years' continuous observations at a given place makes any additional observations at the same place much more valuable. Thus twenty-four years' continuous observations at the same place would be much more valuable for any theoretical deductions than twelve years' observations at one place and other twelve years' observations at a different place.

5. There can be no doubt that one of the principal astronomical conditions by which meteorological phenomena are affected consists in the varying motion of the moon in declination, and this again depends on the position of the moon's node, which takes between eighteen and nineteen years to perform a complete revolution.

Hence it would be desirable that meteorological observations should be continued at the same place during one or more revolutions of the moon's node.

This is already well recognised to be necessary in the case of tidal observations. And here I may incidentally remark, though it does not directly affect the Meteorological Council, that Falmouth would be a very important station for making continuous observations of the tides.

6. If the present grant were withdrawn from the Falmouth Observatory, the Cornwall Polytechnic Society have not the means of keeping it up, and the abandonment of the Observatory would be a heavy blow to the cultivation of meteorological science in Cornwall and the West of England generally, where there are many local stations which regard Falmouth as their scientific centre. This is a matter which ought not to be indifferent to the Meteorological Council. No doubt it is no part of the duty of the Council to subsidise local efforts, unless indeed by means of such efforts the objects of the Council can be better and more economically carried out than would otherwise be done. I submit that this is the case in the present instance. The difference between the expenditure at Valentia, where the Meteorological Office has to defray the whole cost of the establishment, and the expenditure at Falmouth affords some indication of the advantages to be derived from local efforts.

7. Lastly, if it is absolutely necessary to reduce the expenditure on some branches of the work undertaken by the Meteorological Office, it may be inferred from what I have already said that in my opinion the continuous records are almost the last branch in which any reduction should take place.

(Signed) J. C. ADAMS

Determination of "*H*"

IT has occurred to me that the following notes of a rough determination of the value of the horizontal component of the