mon"; and the non-applicability to present visitors to the Devil's Dyke, of the remark that "there are bustards on the wide downs near Brighthelmstone"; and to those who spend their summer at Eastbourne, that "Cornish choughs abound and breed on Beachy Head, and on all the cliffs of the Sussex coast." A lengthy list of references is given with regard to the habits of the cuckoo, a subject on which further reliable information is much needed.

The typography, paper, and binding of the work are all that can be desired, and Bewick's drawings add further to its general interest.

OUR BOOK SHELF

Microscopical Notes regarding the Fungi present in Opium Blight. By D. D. Cunningham, M.B., Surgeon H.M. Indian Medical Service. (Calcutta: Office of the Superintendent of Government Printing. 1875.)

DR. CUNNINGHAM has devoted much care and attention to the study of the fungi present in the opium blight, and the results of his labours are given in the present pamphlet. The most important fungus present, and the one really causing the blight, is a species of *Peronospora*, and thus belongs to the same genus as our own too well-known potato-disease fungus. As in India the *Peronospora* affects the opium crop very seriously, it is a matter of the highest importance to have the life-history of such a pest worked out thoroughly by a competent observer. The *Peronospora arborescens*, which in India attacks the opium poppy, is to be met with in this country on the red poppy (*Papaver Rhæas*). Dr. Cunningham invariably found the *Peronospora* present in blighted leaves, and he describes fully the mycelium and the conidia of the fungus. The mycelium spreads through the intercellular spaces of the leaf, branches coming to the surface through the stomata, which ramify and produce the conidia. The conidia apparently do not produce zoospores. The sexual mode of reproduction by antheridia and oogonia was not observed, even although De Bary has already described the oogonia of this fungus. The life-history thus is imperfect, and we must urge Dr. Cunningham to persevere and not rest satisfied until he has observed the whole of the stages of this fungus.

After the parasite has done its work, the leaves of the poppy become infested with a number of other fungi, chiefly saprophytes, and Dr. Cunningham carefully describes and figures several of the forms.

W. R. M'NAB

Logarithmic and Trigonometrical Tables for Approximate Calculation. By J. T. Bottomley, M.A., F.R.S.E. (London and Glasgow: Collins and Co., 1875.)

THESE tables were primarily arranged by Mr. Bottomley for the use of the students of the Natural Philosophy Class in Glasgow University, but we believe many other students will feel grateful to the author for having published them.

An *easy*, handy book of tables such as this has been much wanted for Mathematical and Natural Philosophy Classes in the Universities and for advanced schools. There is no reason why, with a really convenient book, boys should not all learn logarithmic arithmetic as soon as they know decimals. But the books hitherto in use are too formidable. Moreover, practical calculators will find much use for four-figure logarithms, sines, &c., and many people who never use logarithms will be able to do so with ease when they have a four-figure table.

Mr. Bottomley has in this manual arranged (on the plan of De Morgan, we believe, who first applied it to logarithms) sines, tangents, logarithmic sines, and loga-

rithmic tangents, and has printed them, with the logarithms and antilogarithms, each table on *two facing pages*.

We heartily approve of Mr. Bottomley's plan, and recommend his manual to all teachers and students who wish for an easily consulted scientific ready reckoner.

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.]

A Gyrostat Problem.*—Answer

LET W be the weight of the fly-wheel.

k its radius of gyration.

ω its angular velocity in radians per second.

W' the weight of wheel and case together.

a the distance from the centre of inertia to the point of attachment of the string.

g the force of gravity.

The moment of momentum of the wheel round its axis is $\omega W k^2$.

The rate of generation of moment of momentum round a horizontal axis perpendicular to the axis of the wheel, by the couple produced by the action of gravity and the tension of the cord by which the gyrostat is suspended, is equal to the moment

of the couple (see Thomson and Tait's "Elements of Natural Philosophy," § 236), and is therefore, $g W' a$. Therefore the moment of momentum generated in a small time τ is $g W' a \tau$.

Compounding these two moments of momentum by the parallelogram of moments, we obtain—

$$\tan \theta = \frac{g W' a \tau}{\omega W k^2}$$

where θ is the angle described in azimuth by the axis of the wheel in the small time τ ; and since, when θ is small, $\tan \theta = \theta$, we have by the question—

$$g \frac{W' a \tau}{\omega W k^2} = \frac{1}{4} \tau$$

* For Problem, see NATURE, vol. xi. p. 385.