limiting diatom growth. The values given may be somewhat high owing to the solution of silica from the glass during storage. Tests with similar bottles leave, however, little doubt as to the substantial accuracy of the conclusions reached from the figures given here.

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Plymouth, November 6.

The Stokes-Planck Theory and the Michelson-Morley Experiment.

IT seems to have been implied, in recent discussions, that the Stokes-Planck ether theory, while correlating the facts of astronomical aberration and other first order phenomena having to do with the earth's motion, is also in harmony with Prof. Miller's recent experiments in which he concludes that there is an ether drift relative to the earth, amounting to zero at the earth's surface and to something of the order of 10 kilometres per second at the altitude of Mount Wilson. It would appear that this conclusion cannot be substantiated.

It will be recalled that the original Stokes' theory was unsatisfactory because, when the velocity normal and relative to the spherical boundary was assigned (its value being in fact zero), the problem for irrotational flow was uniquely determined, and the solution gave finite and indeed considerable tangential relative velocities at the surface. The Planck generalisation introduced the idea of a variable ether density, and, by making the ratio of the density at the surface to that at infinity sufficiently large, it was possible to make the tangential velocity as small as desired.

On looking more closely into the analysis, however, it appears that the Planck solution serves to determine the way in which the tangential velocity varies with altitude in the vicinity of the sphere, and denies the possibility of any such change as 10 kilometres per second for a change of altitude of 1·7 km.

Thus, referring to the solution as given in Note 67 of Lorentz's "Theory of Electrons," we have for the velocity potential

$$\phi = z\left[a\left(\frac{\mu\omega}{2r} - 1\right) + b\left(\frac{\mu\omega}{2r} + 1\right)e^{-\frac{\mu\omega}{r}}\right], \quad . \quad (1)$$

where

$$b - a = w_0$$

and

$$a = \left(\frac{\mu^2\omega^2}{2R^2} + \frac{\mu\omega}{R} + 1\right)e^{-\frac{\mu\omega}{R}}b,$$

and where μ and ω are constants, R is the radius of the earth, w_0 the relative velocity parallel to the axis of z at infinity. The origin is at the centre of the sphere, r is the radius vector, and z the distance from the origin parallel to w_0.

From the above it is easy to show that, if V_R and V_{R+h} are the horizontal relative ether drifts for $z = 0$ at $r = R$ and $r = R + h$ respectively, where h is a relatively small increment in r,

$$\frac{V_{R+h} - V_R}{V_R} = \frac{h}{R}.$$

Hence, if $h = 1{\cdot}7$ km., and R is the radius of the earth (6400 km.), it is obviously impossible to have the change of velocity $V_{R+h} - V_R$, which Miller concludes to be 10 kilometres per second, comparable even with the quantity V_R which the object of the large density ratio is to render negligible.

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The Chromosome Complex of *Gammarus chevreuxi* Sexton.

THE spermatogenesis of *Gammarus chevreuxi* having been investigated by me at the Plymouth Laboratory of the Marine Biological Association, it was considered desirable, in view of the genetic interest of this form, and of the fact that detailed results will not be published for some months, to summarise briefly the essential conclusions. These are:

(1) The chromosomes of *Gammarus chevreuxi* are small, ovoid and minutely heteromorphic, and have a diploid number in the male of twenty-six, this number being arrived at by the study of a large number of spermatogonia, and also of spermatocytes and synapsis stages.

(2) This chromosome number includes in the male an X and a Y chromosome, the former being larger, and the latter smaller than any of the autosomes.

(3) The spermatogonial metaphase plates fall into two distinct classes as regards chromosome size. There is considerable evidence that the large plates are merely the later stages of the spermatogonial series.

(4) While Gammarus does not provide favourable material for the detailed study of synapsis, the chromosomes appear to spin out in the typical way in the early synaptic stages.

(5) Preliminary studies of the embryonic chromosomes indicate that the somatic chromosome number is about twenty-six, but sufficiently favourable material has not yet been obtained to warrant any more definite statement.

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Worcester, November 5.

The Solar Constant and Terrestrial Magnetism.

DR. CHREE has obligingly sent me a copy of his paper entitled "The Relationship between the 'Solar Constant' and Terrestrial Magnetism" (*Proc. Roy. Soc.* A 109, 1925). He finds no indication in the solar constant data of 1918–1924 of a repetition of departures after a solar rotation period. This finding is quite in accord with ours. We have, indeed, noted the solar rotation period very plainly in some of the data, but only for a few months at a time, as in the year 1915. (See C. G. Abbot, "On Periodicity in Solar Variation," *Smithsonian Miscellaneous Collections*, vol. 69, No. 6, 1918.)

In the second place, Dr. Chree does find indications of magnetic disturbance associated with low values of the solar constant. Inasmuch as higher solar constant values are generally associated with numerous sun-spots, and abundant magnetic disturbances, he thinks this paradoxical finding of low solar constants associated with magnetic disturbances is non-significant. On the contrary, it is exactly what we should expect.

Referring to a recent paper (C. G. Abbot, "Solar Variation and Forecasting," *Smithsonian Miscellaneous Collections*, vol. 77, No. 5, page 23, Figs. 15 and 16), the passage of an individual sun-spot group over the central meridian of the solar disc is almost always associated with decreased values of the solar constant, and doubtless frequently with terrestrial magnetic disturbances. Hence, it is prevailingly with low rather than high solar constant values that individual magnetic disturbances will be found associated.

C. G. ABBOT

Smithsonian Institution,
Washington, U.S.A.,
October 26.