LETTERS TO THE EDITOR

[The Editor does not hold himself responsible for opinions expressed by his Correspondents. No notice is taken of anonymous communications.]

Rotation of a Rigid Body

MY previous communication about the rotating ellipsoid to this journal, has attracted the attention of M. Radau. "One touch of *Nature* makes the whole world kin." In a note addressed to me full of true dignity, this gentleman has made much more than sufficient reparation for his previous trifling act of inadvertence, and states that to his great regret he had misunderstood my meaning, in the passage of my memoir in question, and that "sa critique n'est pas fondée." I, on my part, deeply lament the unnecessary tone of acerbity in which my reference to this criticism was couched, and wish I could recall every ungracious expression which it contains. "When I spoke that, I was ill-tempered too."

I will pass over this, to me, painful topic, to say two or three words on the mode in which the rotating ellipsoid may be supposed to roll or *wobble* on a rough plane, with its centre fixed. My solution may remind the reader of Columbus's mode of supporting an egg on its point—or, rather, of a fairer mode which Columbus might have employed, and which would not have necessitated the breaking of the shell, viz., by resting the blade of a knife or rough plate on the upper end of his egg.

So, to make an ellipsoidal or spheroidal top roll, with its centre fixed—say, upon a rough horizontal plane—imagine a second horizontal plane in contact with the upper portion of its surface ; then the line joining the two points of contact will pass through the centre of the top. We may conceive a slight perforation in either or each plane at its initial point of contact with the top, and a screw wire introduced through this, and inserted into a female screw in the body to be set rolling (a mode of spinning which Sir C. Wheatstone recommends as the most elegant in any case, and in this case evidently the most eligible). On withdrawing the wire with a jerk, the top may be set in motion about its centre, in such a direction as to remain in contact with the two planes, and if these be sufficiently rough the motion will eventually be reduced to one of pure rolling between them, the axis (*i.e.*, the line joining the two points of contact) continually shifting, but the centre remaining absolutely stationary : for, vertical motion this point cannot have, so long as the top continues to touch both planes, and any slight horizontal motion (if it should chance to take on such at the outset) would be checked and ultimately destroyed by the friction, which would also keep the two points of contact stationary (like the single point of contact of a wheel rolling on a rail), in each successive atom of time. Thus the motion upon the lower plane would in the end be precisely the same as if the upper plane were withdrawn, and the centre of the top kept fixed by some mechanical adjustment. If the spin were not sufficiently vigorous, after a time the rolling top might quit the upper plane, and of course sooner or later by the diminution of the *vis-viva* due to adhesion, resistance of the air, imperfection or deformation of the surfaces, and other disturbing causes, this would take place, but abstracting from these circumstances the principal axes of the spheroidal or ellipsoidal top would move precisely in place and time like the "axes of spontaneous rotation" of any free body of which the top was the "Kinematic Exponent."

I do not pretend to offer an opinion what materials for the planes and rolling body (ground glass and ebony or roughened ebonite have been suggested to me) it would be best to employ, or whether the "wobbling top" could easily be made to exhibit its evolutions. It is enough for a non-effective, unpractical man (as unfortunately I must confess to being) to have shown that there is no intrinsic impossibility in the execution of the conception.

With regard to the friction and pressure : if W be the weight of the body, F and P the friction and pressure in the case of a single plane (the values of which are set out in my memoir, pp. 764—766, "Philosophical Transactions" 1866), it may easily be proved that eventually the friction at each point of contact will be $\frac{F}{2}$, the pressure upwards at the lower point $\frac{P+W}{2}$, and downwards at the upper one $\frac{P-W}{2}$, so that if P should become equal to W the top would quit the upper plane and the experiment come to an end. At p. 766 of my memoir the factor $\sqrt{M\Lambda}$ has accidentally dropped out of the expression for P which I mention here, in case any one should feel inclined to consult the memoir in consequence of this note. Mr. Ferrers has taken up my investigations, and given more compendious expressions than mine for F and P ; with the aid of these it would probably be not difficult to determine the maximum value of $\frac{F}{P}$ so as to assign the necessary degree of roughness of the confining planes, and also to ascertain under what circumstances P — W would become zero, but I do not feel sufficient interest in the question, nor have I the courage to undertake these calculations with the complicated forms of P and F contained in my memoir. Mr. Ferrers' results are contained in a memoir ordered to be printed in the "Philosophical Transactions," and will shortly appear.

In my memoir will be found an exact kinematical method of reckoning the time of rotation by Poinsot's ellipsoid when the lower surface is made to roll on one fixed plane at the same time that its upper surface is shapened off in a particular way (therein described) so as to roll upon a parallel plane which turns round a fixed axis; this upper plane is compelled to turn by the friction, and acts the part of a moveable dial in marking the time of the free body imaginarily associated with the ellipsoid. I have also shown there that the motion of any free body about a fixed centre may be regarded as compounded of a uniform motion of rotation and the motion of a disc, or, if one pleases, a pair of mutually bisecting cross-wires left to turn freely about their centre. But I fear that NATURE, used to a more succulent diet, has had as much as it can bear upon so dry a topic, and, although having more to say, deem it wiser to bring these remarks to an end.

J. J. SYLVESTER

"Dutch" or "Deutsch"

THERE is a short note in Mr. Huxley's lecture in the last number of NATURE, which I have read several times in the vain hope of finding out its meaning. Mr. Huxley speaks of "the much debated question, did the Germans of Cæsar and Tacitus speak 'Deutsch' (not 'Dutch,' *pace* Mr. Freeman) or Celtic." What has my "peace," or anybody else's peace—save, perhaps, the *Pax Romana*—to do with it ?

I do not see why Mr. Huxley brings in my name. He can hardly suppose that I do not know that *Deutsch* is the German form—I can hardly suppose that he does not know that *Dutch* is the English form—of the name otherwise written *Tütsch*, *Teutonicus*, *Theotonicus*, *Theotiscus*, and endless other ways. He can hardly think that I have never opened a modern German book : I can hardly think that he has never opened an English book of the sixteenth or seventeenth century. If he has opened any such book in which matters of this kind are likely to be touched upon, he must surely know that the words *Dutch* and *Dutchman* were then used in a very wide sense. A "Dutchman" might be a native of Holland ; he might be a native of Bavaria. And the division into *High Dutch* and *Low Dutch*, or *Nether Dutch*, was then perfectly well understood.

I do not know what Mr. Huxley's objection is. I use the word as one ready made, as more convenient than the Latin for *Teutonic*, and as more easily admitting the addition of the qualifying syllables *High* and *Low*. I should not use *Deutsch* in this sense for two reasons. First, it is not an English form, and I should no more, in writing English, say that certain people talked "Deutsch," than I should say that they talked "Français." Secondly, the word *Deutsch* (like the word *German*) would to most people convey the idea of one particular Teutonic tongue, while I am probably speaking of Teutonic tongues in general. Mr. Huxley's question, "Did the Germans of Cæsar and Tacitus speak *Deutsch* ?" may mean either "Did they speak a Teutonic tongue of any kind ?" or "Did they speak the particular Teutonic tongue which to most peoples' minds would be suggested by the words *German* or *Deutsch*, namely, the *High-Dutch* ?" Which Mr. Huxley means I do not know. For my own part I believe that they spoke Dutch or Teutonic, but *Low* Dutch and not *High*. EDWARD A. FREEMAN

Somerleaze, Wells, March 21

The American Eclipse

WILL you grant me space for a few words on my spectroscopic observations of the American eclipse, and what seem to me the inferences to be drawn from them ? I make the request the more freely because I have met from time to time allusions to them in your journal, and remarks, some of which seem to require my notice, if only to express my appreciation of