

LETTERS TO THE EDITOR.

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The Royal Society.

At the special meeting of the Royal Society held on January 21, when the constitution and functions of the sectional committees were under consideration, the opinion was expressed by more than one speaker that the usefulness of the society in encouraging and advancing scientific work is not what it might be; but no very definite suggestions were made with a view to its improvement.

It seemed to me that the functions of these sectional committees had a good deal to do with the lack of scientific enterprise which we observe in the Royal Society, and that they might with advantage be done away with.

As many of the fellows had left the meeting before I spoke, and as everything that affects the efficiency of the Royal Society concerns the public, I crave the hospitality of the columns of NATURE to develop as shortly as possible my views on this matter.

The main function of the sectional committees is to refer papers received by the society from fellows, to some other fellow or fellows of the society to be certified that they are or are not fit to be accepted and published by the society.

It is well known that the fellows of the society are *de facto* chosen by the council after rigid scrutiny and the most careful inquiry, and the only object of this scrutiny and inquiry is to satisfy the council that the candidate whom it recommends is a man of eminence in his own science, and that the work which he is likely to do will be a credit to the society. So convinced is the society of the thoroughness and impartiality with which the council discharges this duty that the confirmation of its selection by election has come to be a pure formality. This being so, it cannot fail to surprise the newly elected fellow, when he proceeds to justify his election by doing work and communicating the results of it to the society, to find that he is now in no better position than he was before he was elected. His work is referred in the same way as that of any outsider. His recent selection by the council is ignored by that body or is regarded as having no weight, and it treats him, scientifically, as a perfect stranger.

Furthermore, this reference, which amounts to neither more nor less than a secret revision of the title of the fellow to the privileges of the society, is repeated on every occasion when he comes under the notice of the society by offering it work. So long as he is content to be a passive fellow, or at least an inactive one, he is spared this injustice and indignity. It is no wonder then that the fellowship of the Royal Society has come to be looked on as an invitation to repose rather than as an incentive to work.

How different is the state of things which we observe in the parallel society in France, the Academy of Sciences. Its constitution is thoroughly democratic, and all its proceedings are inspired by enlightened self-respect. But we need only contemplate the work which it puts through in the year and compare it with what is turned out by the Royal Society to see that there is something for us to learn by its study.

First and foremost the academy meets fifty-two times in the year, namely, on every Monday, with the exception of Easter Monday and Whit Monday, and then it meets on the following Tuesdays. By the time-table of the current year the Royal Society is to meet twenty times.

Papers by members, or communicated by members of the academy, are not obliged to be sent in before the meeting. The agenda of the meeting is compiled at the meeting, each member who has a paper to communicate giving notice of it to the secretary on his arrival in the room, and the papers are taken strictly in the order of their intimation. If the paper communicated by the member is to be published in the *Comptes rendus* of the sitting, it has to be handed in to the secretary at the sitting; the corrected proof has to be returned to the printer on the Wednesday evening, and it is then published without fail on the Sunday.

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The communication, reading, and publication of a paper presented to the academy is therefore an affair of the inside of a week, and it is a certainty. This promptitude in the putting through of work is due to the fundamental fact that when a man is elected a member of the academy he enters at once into the full enjoyment of all its privileges, and one of the chief of these is the complete confidence of all his fellow-members. When he communicates a paper, whether it be by himself or by someone not a member of the academy, it is accepted without question. The only limitation in the privileges of members is with regard to the space that they are entitled to claim in the *Comptes rendus*. A paper by a member or foreign associate of the academy may fill six pages per number, and his communications in the year may fill fifty pages in all, and this as a matter of right.

It is unnecessary to occupy more space in order to show what a powerful engine the Academy of Sciences is in the production and encouragement of work, or to indicate how easily the Royal Society may successfully rival it. Let every fellow of the society, whether he be on the council or not, have complete confidence in his fellow-fellows and give practical effect to it, and the thing is done. The rest will follow of itself.

J. Y. BUCHANAN.

January 23.

The Radiation from an Electron describing a Circular Orbit.

THE complete formula for the radiation may be useful to some of those who are now indulging in atomic speculations. It is derived from the general formula I gave a year ago in NATURE (October 30, 1902), expressing the electromagnetic field everywhere due to an electron moving anyhow. Put in the special value of R required, which is a matter of elementary geometry, and the result is the complete finite formula. But only the part depending on  $R^{-1}$  is required for the radiation; and, in fact, we only want the  $r^{-1}$  term (if  $r$ =distance from the centre of the orbit), if the ratio of the radius of the orbit to the distance is insensible, and that, of course, is quite easy, on account of the extreme smallness of electronic orbits. The magnetic force is given by

$$H_{\phi} = \frac{Quv}{4\pi r^2} \alpha^3 \cos \theta \cos \phi_1, \tag{1}$$

$$H_{\theta} = \frac{Quv}{4\pi r^2} \alpha^3 (\sin \phi_1 - \beta), \tag{2}$$

subject to

$$\alpha = \frac{1}{1 - \beta \sin \phi_1}, \quad \beta = \frac{u}{v} \sin \theta, \tag{3}$$

$$\phi_0 = \phi_1 + \beta \cos \phi_1, \quad \phi_1 = \phi - ut + nr/v. \tag{4}$$

There is no limitation upon the size of  $u/v$ , save that it must be less than 1. But there is a limitation regarding the acceleration. If the change in the acceleration is sensible in the time taken by light to traverse the diameter of the electron, it will sensibly alter the results. The size of the electron itself will then have to be considered. But this is very extreme. To explain the symbols: the (surface) charge is Q moving at speed  $u$  and angular speed  $n$  in a circle in the plane perpendicular to the axis from which  $\theta$  is measured. It revolves positively round this axis, and its position when  $t=0$  is  $\phi=0$ . Also,  $r, \theta, \phi$  are the usual spherical coordinates of the point of observation, and  $H_{\phi}, H_{\theta}$  are the  $\phi$  and  $\theta$  components of the magnetic force at that point at the moment  $t$ . The coefficient  $\alpha^3$  shows the Doppler effect on  $H$ . The difference between  $\phi_0$  and  $\phi_1$  must be noted.

It will be readily seen what an important part the Doppler effect plays if, as has been sometimes assumed, subatomic motions of electrons involve values of  $u$  which are not insensible fractions of  $v$ . For instance, in the plane of the orbit,  $H_{\phi}=0$ , and

$$H_{\theta} = \frac{Quv}{4\pi r^2} \frac{\sin \phi_1 - u/v}{[1 - (u/v) \sin \phi_1]^3} \tag{5}$$