

line by diminution of the size of the particles. The correctness is also confirmed by a number of experiments recently carried out at the laboratory of Leyden. A preliminary note on some of these results is communicated to the Academy of Science of Amsterdam and to the French Academy of Sciences.

3. My remark in my letter to *NATURE* of November 15 regarding the experimental arrangement had, of course, no reference to the general equipment of the Toronto laboratory, but only to the special arrangement used for exciting and studying the luminosity from solidified gases, and I directed attention to the experimental arrangement to explain our points of divergence, and of course not on account of those facts on which we agree, such as the structure of the N_1 band from pure, solid nitrogen. So, for example, I thought that in this way I might possibly explain why Prof. McLennan had come to the wrong conclusion, that the N_1 band originated from a gaseous state of nitrogen, and that he had not been able to interpret rightly the luminescence from argon.

4. For a more complete discussion of the nature of the luminescence from solidified gases and its connexion with cosmic phenomena, I must refer to my publications.

L. VEGARD.

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The Elimination of Mental Defectives.

IN the May issue of the *Nineteenth Century* Prof. Punnett describes in an interesting way the general scope of the recent advances in genetic research, a subject on which the public certainly need much instructing. He repeats certain figures, however, all doubtless perfectly correct, which were calculated for him by Prof. G. H. Hardy, and on this subject we should like to direct his, and his readers', attention to the comments thereon made by Mr. R. A. Fisher in vol. 16, page 114, of the *Eugenics Review*. If those criticisms are correct, and no arguments to the contrary have been forthcoming, the elimination of the feeble in mind by segregation might, at first at all events, be a far more rapid process than Prof. Punnett's figures would lead us to suppose.

The argument is too long here to be reproduced in full, but I may mention that whilst it is truly said that on certain assumptions it is seen that it would be possible only to reduce the proportion of defectives by segregation or sterilisation from 1 in 1000 to 1 in 10,000 in 68 generations, yet on the same assumptions it can be proved that it could be reduced by more than 17 per cent. in a single generation. Moreover, the assumptions made are very questionable, and a more probable hypothesis indicates that the reduction might be so much as 36 per cent. in a single generation. Prof. Punnett also regards genius as probably a quality dependent on a recessive factor, a conclusion in regard to which doubts may also reasonably be expressed.

LEONARD DARWIN.

The Eugenics Education Society,

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London, W.C.2,

May 19.

Exaggerated Resonance.

It is well known that the amplitude of response of a syntonised arrangement to a properly timed periodic stimulus, however feeble, is limited only by friction or resistance or other source of dissipation of energy, and that if the resistance could be reduced to zero the response would be theoretically infinite.

In radio telegraphy the response of a syntonised circuit is already very considerable, and I employ a freely oscillating circuit (which I call an N circuit) to receive conductive stimulus in a special way from an aerial, and to magnify it until it operates on the grid and filament of a valve. The tuning required is very precise; no reaction or inductive connexion with the aerial is permitted; and alien vibrations can be automatically excluded. The resistance of the N circuit is kept down by stranded wire and perfect connexions, but hitherto no attempt has been made to reduce the resistance to nearly zero by liquid hydrogen or helium. I imagine that if such a circuit could be cooled to near absolute zero the response would be something astonishing. I am not acquainted with any convenience for trying the experiment in Great Britain, but perhaps Prof. McLennan at Toronto has facilities.

OLIVER LODGE.

Quantum Radiation.

IN supplement to my brother's letter in *NATURE* of May 23, I should like to point out how naturally the radiation formula is obtained, and how inevitably RT , the average energy of the atom between two emissions, enters into it, on the single assumption that the energy of each individual atom increases at a rate proportional to itself, combined with the recognised fact that energy is radiated in quanta (the quantum being called $h\nu$, and being presumably dependent on some arrangement or frequency step inside the atom unknown to me).

Let a quantum be radiated when the individual atomic energy of the right kind attains the value E_1 , and let this energy grow continuously from E_0 to E_1 , its average value between these limits being RT .

Then, assuming that $dE/E = kdt$, where k is some constant, and t is the controlling variable whether time or otherwise (probably otherwise), two equations follow, namely:

$$E_1 - E_0 = E_0(e^{kt} - 1) = h\nu$$

$$\text{and } E_1 - E_0 = k \int E dt = k \cdot RT \int dt = RT \cdot kt.$$

Thus $kt = h\nu/RT$, and everything follows.

ALFRED LODGE.

Huxley's Contributions to the Study of the Invertebrata.

I REGRET to find that in the article on "Huxley's Contributions to the Study of the Invertebrata" in *NATURE* of May 9, p. 734, I inadvertently did injustice to other naturalists past and present.

Thus I praised Huxley for having seen that *Peripatus* was an arthropod; but the credit for this conclusion really belongs to the late Prof. Moseley, who made preparations and dissections of this animal which clearly showed its arthropod nature and these he demonstrated to Huxley.

Then I credited to Huxley's insight the view which has been sustained by later embryological research, that the formation of the endoderm by delamination is a secondary modification of its original mode of formation by invagination, and also the view that the development of mesoderm by the outgrowth of masses of cells is a modification of its original mode of formation by enterocœlic pouches.

These two theories adopted by Huxley we owe to the penetration and genius of Sir Ray Lankester.

E. W. MACBRIDE.