

that "such freedom actually exists;" and that "the very condition for its existence is seen to be the prevalence of that strict causal sequence in nature demanded by the Necessitarians." But although the suggested reconciliation shows all this, it fails to extend to the upholders of Free Will the relief which they most require, for the procuring of which their doctrine was conceived, and for the continuance of which their doctrine is continued, notwithstanding the manifest and manifold absurdities which it involves. That the supposed reconciliation here fails, seems almost too obvious to require showing. The more certainly it can be proved that every volition is the result of definite causes, and therefore that the character—even in that part of it which is formed by all previous volitions—is also the result of definite causes, the less possibility is there of justifying the sense of Responsibility.

Unless it can be shown that a man is responsible for the character of his character it is nonsense to speak of him as responsible for his actions, when these are determined by his volitions, which, in turn, are determined by his character. Can it, then, be shown that a man is responsible for the character of his character? Obviously not, either upon Clifford's view or any other. It is futile to speak of a man as "the architect of his own character"; for, according to the hypothesis before us, he is nothing of the kind: his character has been built up stage by stage, first by hereditary transmission, next by numberless unintentional influences acting both from within and from without, and lastly by numberless acts of volition, every one of which was strictly determined by causes, and therefore was what it was by way of inevitable necessity. It follows, therefore, that the supposed reconciliation between Free Will and Necessity tends rather to emphasise than to diminish the difficulty; it shows more clearly than ever that the sense of Responsibility, and the correlative sense of Praise or Blame, are alike incapable of any logical justification. No doubt the sense of Responsibility, the love of Praise, and the dread of Blame act as powerful motives to volition; but this fact clearly does not justify either the feeling of responsibility in him who acts, or the feeling of approval or disapproval in him who observes.

But it is of importance also to see that it is quite as impossible to justify these feelings by the doctrine of Free Will as it is by the doctrine of Necessity. For if volitions are uncaused, or but partly and irregularly caused, it is clear that neither moral responsibility, nor praise, nor blame can attach to the unfortunate man whose actions are not guided even by the hand of Providence, but occur by way of inexplicable caprice.

What, then, it cannot but be asked, is the psychological explanation of these deeply-rooted feelings of Responsibility, Praise, and Blame, which can never be eradicated by any evidence of their irrationality? To me it appears the only answer is that these feelings have been gradually formed as instincts, which, while undoubtedly of much benefit to the race, are destitute of any rational justification. GEORGE J. ROMANES

#### The Inevitable Test for Aurora

IN NATURE, vol. xxii, p. 33, is an implication, if not also a declaration, that the limits of height in the atmosphere, at which the *Aurora Borealis* both can, and cannot, appear, have been ascertained by those world-respected scientists, Messrs. Warren De La Rue and Hugo W. Müller, F.R.S.S. both. The skill of their experiments, the sufficiency of their exhausting apparatus, and the power of their unequalled chloride of silver battery are beyond all question; and they did, without doubt, ascertain in a very complete manner at what particular degrees of rarefaction of certain glass vessels, their electric discharges therein, took such and such appearances.

But what proof do they give that those appearances were aurora?

They mention carmine-coloured discharges in the denser air, salmon-coloured in more rarefied, and pale milky white in the highest rarefaction of all. But those colours, as judged of merely by the eye, are little proof in themselves of the presence of one and one only out of a number, of different things, elements, or manifestations somewhat similarly coloured. So that although I would not presume to be too confident of the sufficiency of the test I am about to set before those eminent men, still, as I was obliged to have the honour of presenting it to that admirable electric philosopher, M. Gaston de Planté, of Paris, three years ago, when he described with his equally wondrous collection of "secondary" galvanic-battery pots and

currents of terrific intensity, the *aurora-like* effects it produced—impartial justice demands the same test to be presented now to our best physicists on the west of the British Channel.

Now the test is simply this: did the F.R.S.S. gentlemen see in their electric lights the late M. Ångström's one citron line of aurora?—that line being so invaluable an indication of aurora's presence, though hitherto uninterpreted (see Rand Capron's laborious book of *Auroræ*<sup>1</sup>); and without which strange linear hieroglyph written from Creation most legibly on its forehead, no aurora has ever yet been seen by mortal man properly equipped for the occasion. And, inasmuch as the learned F.R.S.S. speak of so many variations of red—as carmine, rose, and salmon colours of various kinds—while I had the opportunity of calling attention in NATURE in 1872 to the remarkable fact that *maugre* all the violent variations of auroral red to the eye on that occasion, there was only one and the same red line in the spectroscope through every one of them—did the London scientists see that unique red auroral line manifesting itself through all their various artificial reddish tints; or, had each tint a line or lines peculiar to itself; or was there no red line whatever to be seen, though they looked for it never so earnestly; or is that crucial part of their experiment described elsewhere than in NATURE, vol. xxii, p. 33?

PIAZZI SMYTH

15, Royal Terrace, Edinburgh, May 17

#### Variability of 60 Cancri

I FOUND the above to be a red star in 1874, and the Rev. Mr. Webb, in the same year, made independently a similar observation. It appeared to me of 8 magnitude, as it did also to Mr. Webb. It is numbered 212 in my *Red Star Catalogue*, where, considering Årgeländer's previous estimate of about 6 mag., I remarked that it might be variable. This appears now certain, as on April 27 of the present year, and again on May 17, I found the star to be 5 mag. and red-orange in colour. Dr. Copeland, of Duncuch, replying to a letter on the subject, informs me that on referring to various authorities, he finds estimates of the star's magnitude from 5 by Lalande to 7 by Bessel, and in W. B. it is marked 8. As I have seen it in both extremes, the recorded differences cannot be ascribed to inaccuracies in different observers, and I must regard the star as a remarkable variable well worth special notice. It is now passing away from us, but I saw it so late as May 17 in very bright twilight, and its proximity to *Alpha* gives facilities for estimations of colour and magnitude.

Millbrook, Tuam, May 21

JOHN BIRMINGHAM

#### Notes of the Cuckoo

I REMARK that all the cuckoos here intone in a minor key, except one, who alone does not flatten the 3rd of the tonic. The key is in all cases precisely D of concert pitch, as proved by a tuning-fork, and the first note is F on the fifth line. In quality of voice *the Major* is not equal to the others, while he affects a certain jerkiness of style that in no small degree deteriorates his performance. It also wants the plaintive effect of the minor key. I confess I am not very learned in these matters, and a major cuckoo may not be so rare a bird on the earth after all; but I do not recollect ever having noticed one before. All the other cuckoos that I have remarked were *minors*, and whatever may be the reason of the distinction, I cannot, at least, regard it as connected with difference of sex.

Some years ago I wrote to NATURE concerning a cuckoo who used to surprise me with a third note interposed between the mediant and the key-note.

JOHN BIRMINGHAM

Millbrook, Tuam, May 21

#### Fall of Dust

EXTRACT from a letter to Sir B. C. Brodie, dated May 1:—

*Campagne, Montfeld, Mustapha Supérieur, Alger*

I WRITE to-day just to enclose you some curious red dust which fell all over Algiers last Saturday (April 24), the air quite still, and sky of a curious orange colour, everything looking as though seen through a yellow glass. The next morning this powder was swept up in large quantities in our court, all the flat roofs being also covered, and the flowers quite spoiled. It fell again the two following days, but rain followed and turned it

<sup>1</sup> "Auroræ and their Spectra," by J. Rand Capron, F.R.A.S. (London: E. and F. Spon, 46, Charing Cross, 1879.)