

assertion should be mistaken, he explicitly tells us that "Space and Time are not merely forms of sensuous intuition, but intuitions themselves" (Meiklejohn's Trans., p. 98): that is, *sensuous* intuitions, as he has been just before asserting that all human intuitions must be. It is precisely on this distinction of pure sensibility and pure thought that Kant founds the possibility of Mathematics—a science which could never be derived from a mere analysis of the concepts employed, but only from the construction of them in intuition. He ridicules, for example, the idea of attempting to deduce the proposition, "Two right lines cannot enclose a space," from the mere concepts or notions of a straight line and the number two. "All your endeavours," says he, "are in vain, and you find yourself compelled to have recourse to intuition, as in fact Geometry always does." (Meiklejohn, p. 39: see also his long contrast of Mathematical and dogmatical methods in the beginning of the "Methodology.") And not only is Kant's Mathematical theory founded on this distinction but his Physical theory also, since it is only by means of pure intuition that he connects pure thought with sensations (see the "Schematism" and still more the "General Remark on the System of Principles," Meiklejohn, pp. 174-7); and when he fails to make out this connection he regards the Ideas of Pure Reason as possessed of no objective validity (Transcendental Dialectic). In the first edition of the "Critick" he went still further, and in his remarks on the Second Paralogism of Rational Psychology he speaks of "that something which lies at the basis of external phenomena, which so affects our sense as to give it the representations of space, matter, form, &c." And while he abbreviated his discussion in the second edition he tells us in his preface that he found nothing to alter in the views put forward in the previous one.

I might quote whole pages of the "Critick" in proof of these views, but I ought rather to apologise for writing so much after the letters which you have already published. I believe the mistakes as to Kant's doctrine of Space and Time, his refutation of Idealism, and his discussion of the Antinomies of the Pure Reason, are almost without a parallel in the History of Philosophy. Trinity College, Jan. 22 W. H. STANLEY MONCK

State Aid to Science

I OBSERVE that both in your leading article and in the correspondence upon Mr. Wallace's letter, the soundness of his theory of taxation seems to be conceded, though you quarrel with his inference that Science ought not to receive Government aid. But will his theory hold water for a moment? The theory as I understand it is this: "No money raised by general taxation ought to be applied for any purpose which does not directly benefit everybody." In other words, "It is not fair to take A's money and use it for the benefit of B." Why not, if at the same time you take a proportionate amount of B's money and use it for the benefit of A? Suppose you tax people who don't want gratuitous education for themselves, and spend the money on primary schools. This is expenditure for the direct benefit of one class only; and indirect benefits, according to Mr. Wallace, are not to be taken into account. This, according to the theory, would be an unfair application of public money. But if at the same time you apply a proportionate amount of public money for the benefit of all those who reap no direct good from gratuitous schools, you exactly redress the injustice; and, so far as it goes, expenditure on Science is an expenditure of this character.

If Mr. Wallace's theory were sound, there is no conceivable application of public money which it would not condemn. There is no public expenditure which directly benefits all. Take the payment of dividends on Consols, which eats up a third of our revenue. How does an agricultural labourer benefit by this? Not directly, certainly, and I am not sure that he does even indirectly. The only indirect good is, that it maintains public credit, and enables the Government to borrow again and to go to war on the strength of it. What good does that do to the labourer? Perhaps it may be said it is the fulfilment of a moral obligation. But whose moral obligation? Not Hodge the ploughman's. Even the least exceptionable of all outlay, that on police, is of very doubtful benefit to those who have nothing to lose. And the theory, if sound, must go a step further than Mr. Wallace carries it. If all public expenditure ought to benefit all, it ought by the same reasoning to benefit each in exact proportion to his contribution, and no system of taxation and expenditure even pretends to approach this condition.

Obviously Mr. Wallace could not have meant what he said. He must have meant this: "Public expenditure as a whole

ought to benefit taxpayers in proportion to what they pay." Put in this way it is a fair doctrine, to which our actual adjustment of taxation and expenditure ought to approximate as nearly as may be. But this is quite consistent with special expenditure for the benefit of special classes, provided it is fairly balanced by other special expenditure for all other classes. If, on the whole, men of science are getting more than their share of the good things going, by all means stop the supply; if they are getting less than their share, give them something more. This is surely fair, and it is an intelligible working principle. Mr. Wallace's principle has only this to recommend it, that it would be impossible to find any object which would justify the levying of a single sixpence from your humble servant or any other

TAXPAYER

P.S.—I hope that in discussing Mr. Wallace's argument on his own grounds, I shall not be supposed to agree with him that the direct and immediate benefit is the only thing to be looked to. If a man or a class gets a benefit, it does not lose its value by coming indirectly. And, as a matter of fact, expenditure on Science does, as you and others have sufficiently pointed out, confer indirect benefits on the non-scientific classes, incomparably beyond any little direct advantage to the scientific students whose work is promoted by it.

Use of the word "Correlation"

I OBSERVE in your last number you adopt the phrase of Mr. Barrett, "Correlation of colour and music." Will you and Mr. Barrett pardon a criticism on the application of the word "correlation"?

I believe I was the first who ever used the word at all as an English word, though the words "correlate," "correlative," &c., are to be found in Johnson. At all events, I stretched the meaning, and apologised for so doing in my essay on the "Correlation of Physical Forces." Wherever the word "correlative" was used to express a mutual and inseparable relation of two ideas, such as parent and offspring, height and depth, &c., I ventured, for want of a better term, to apply it, and the new substantive "correlation" to reciprocal relations of phenomena, such as heat and electricity, electricity and magnetism, &c.—not then (1842) supposed, except by me, to be relations of necessity, and not even now supposed to be inseparable in idea.

The application of the word has latterly been much extended, and we hear of correlation of growth, correlation of diseases, correlation of sciences, &c. I rather regret this; there is nothing of greater importance, especially for works on physical science, than accuracy, as far as may be, in the use of words: perfect accuracy is impossible.

Mr. Barrett has, I think, extended the import of the word beyond reasonable limits. There is no correlation between colour and music, further than there is a correlation between anything and everything. The word "analogy," used also by Mr. Barrett, is, in my humble judgment, far more accurate as applied to the classes of phenomena he treats of. I hope he will excuse a "parent" when complaining of ill-treatment to his "offspring," although the offspring may have had a little congenital deformity.

January 22

W. R. GROVE

Rainbow Colours

I AM reminded by Mr. Grove's statement at p. 314 (that he has seen three repetitions of the spectrum within the primary) of a splendid rainbow, which I saw at the Falls of the Handeck, near Meyringen, last summer.

The sun was very bright, about midday, and looking down at the Fall there appeared the most beautiful rainbow I ever saw. The colours were intense, probably from the spray being in fine drops; and I observed between the primary and secondary, *i.e.* between the two violets, a band of a *fine rich brown colour*.

I have often observed when rainbows are bright, that there is a dark band of a neutral tint between the two. This effect was shown very beautifully in a drawing by Mr. Alfred W. Hunt, exhibited at the Water Colour Society two or three years ago. He appears to have seen the same effect, but I had never seen the rich brown colour before. It was no effect of background, for when I varied my position the brown moved with the bows.

I have also often seen four or five, what may be called tertiary bows, inside the primary. They are grouped together as it were, and form a band of alternate red and green, becoming fainter as they recede from the primary. They appear to be a repetition of the primary in which the red and green are the most prominent colours.

Gateshead, January 23

R. S. NEWALL