When this series proceeds to infinity the terms containing x, under certain conditions, vanish. So also they vanish if any proximate number is substituted for x in them. We are thus left with x, on the left side, equated to a series containing only k and the coefficients a, b, c . . . . This explains why we may start the process described at the beginning of this paper with *any* number (under certain limitations) for x_1, because, whatever that number may be, it is gradually rendered negligible by the successive operations.

The series has been already studied to some extent in the paper referred to, and has been used for solving equations. Its coefficients are simply those of the multinomial theorem with some modifications. As it has n values depending on the n values of $\sqrt[n]{k}$, we may suppose that these values are the n roots of the original equation, though we may not be able yet to evaluate all of them. This has been proved in the previous paper to be the case, because the sums of the products of the values taken one, two, three . . . times together are equal to the successive coefficients of the original equation with the proper signs. Hence there are some reasons for thinking that the series theoretically constitutes the general *transcendental* solution of the equation of the nth degree. How far this is really the case must be discussed more fully on another occasion, together with details and developments of the method outlined above.

The method is not the same as the methods of approximation of Newton, Lagrange, and Horner. The well-known ascending power series for the reversion of a function, and cases in which certain repeated operations (such as continued fractions) converge to a root of an equation, thus solving certain functional and difference equations, are only particular instances of the above theorem.

RONALD ROSS.

The Nature of X-Rays.

IN a letter to NATURE of July 30 Prof. Bragg tries to show that his neutral-pair theory of X-rays may form the basis of an explanation of the secondary X-ray phenomena which I briefly summarised in an earlier letter (May 7). He, however, neglects the consideration of so much important evidence that I cannot attempt to reply in detail. In reply to his discussion of statements (3), (6), and (5), I need only state that he has confused two distinct types of secondary X-radiation, and that his statement of Mr. Crowther's results is inaccurate when applied, as he applies it, to the scattered radiation alone. (May I also be permitted, in passing, to point out that both the general results attributed to Mr. Crowther had been published by the writer previous to the publication of Mr. Crowther's paper?)

Again, Prof. Bragg has evidently overlooked the work to which I referred in statements (7), (8), and (9). The evidence which I put forward for consideration was not the older work of M. Sagnac, Dr. Walter, and Mr. Adams which Prof. Bragg discusses, but the results of experiments by Mr. Sadler and myself on homogeneous beams of X-rays, which have not yet been published in full, though preliminary notices had appeared in NATURE. The paper giving an account of this work was read before the London Physical Society on June 12. Prof. Bragg, as a consequence, does not discuss the points with full knowledge of experimental facts.

Of the three remaining points, one—the polarisation of a *primary* beam (1)—is not discussed, because Prof. Haga has been unable to verify it by a much cruder method than that originally employed. It is nevertheless a physical fact.

Finally, two results—the polarisation in scattered radiation (4) and the equality in the penetrating powers of primary and secondary (scattered) rays (2)—which appear possible to Prof. Bragg on the neutral-pair theory, require assumptions which, to my mind, are extremely doubtful. On the other hand, many of these results were foretold on the ether pulse theory, and, indeed, they all find an easy explanation on this theory, as I believe Prof. Bragg will readily admit when he has become fully acquainted with the experiments. For a fuller discussion I can, unfortunately, only refer to two unpublished papers, both of which, however, are in the press. These are the one already referred to and one which will appear in the forthcoming number of the "Jahrbuch der Radioaktivität und Elektronik."

In reply to Prof. Bragg's contention, may I add that the phenomena involving radiation of only one kind—X-radiation—to me appeared simpler than those involving two—X and β radiations?

Liverpool, August 8. CHARLES G. BARKLA.

IT is, of course, true that my letter (dated June 5) to which Dr. Barkla refers was written before I had had the opportunity of studying Dr. Barkla's latest results. A portion of my argument was based on his earlier work, and may need a little alteration in consequence. I have myself found by recent experiment that his older statements needed amendment. For example, the emergence and incidence secondary Röntgen radiations differ both in quality and quantity; the former is sometimes far greater than the latter.

May I take this opportunity of correcting a statement in a letter of mine which appeared in NATURE of July 23? As pointed out in an addendum to a recent paper contributed by Dr. Laub to the *Annalen der Physik*, I have been wrong in supposing that Dr. Wien still maintains that the energy of the secondary kathode ray is drawn from the energy of the atom. Had I understood Dr. Wien correctly, I should certainly not have taken so much pains to disprove a theory which he had already abandoned. W. H. BRAGG.

The University of Adelaide, September 17.

The Supposed Inheritance of Acquired Characters.

DR. FRANCIS DARWIN, in his presidential address before the British Association, writes as follows:—

"Fischer showed that when chrysalids of *Arctia caja* are subjected to a low temperature a certain number of them produce dark-coloured insects; and further that these moths mated together yield dark-coloured offspring. This has been held to prove somatic inheritance, but Weismann points out that it is explicable by the low temperature having an identical effect on the colour-determinants existing in the wing-rudiments of the pupa, and on the same determinants occurring in the germ-cells."

It occurs to me that still another explanation is possible to cover at least some such cases. In discussing various types of latency, Dr. Shull (*American Naturalist*, July) has recently defined as "latency due to fluctuation" those cases (of which many are known) in which the special characters of a race do not appear except under suitable conditions. Following this idea, it is possible to think of the dark *Arctia caja* appearing after exposure to cold as representing a variation which possessed an inherent tendency to darkness not exhibited under more ordinary conditions. Indeed, this must have been the case, since only "a certain number" were affected. Given such a variation, it is not unreasonable to suppose that when examples were mated together the tendency would be so emphasised as to appear under normal temperatures, thus producing an apparent case of the inheritance of acquired characters. T. D. A. COCKERELL.

University of Colorado, October 7.

Determination of Sex: a Correction.

MAY I correct a slip in your report of "Zoology at the British Association" (NATURE, October 22, p. 647)? The cinnamon canaries resulting from the mating green hen × cinnamon cock are all *females*, not males, as there accidentally stated. The point is critical in the interpretation of that curious case. W. BATESON.

October 26.