worked up as it occurred a hundred years before the birth of Herodotus; its evidence, whether for or against, is held to be inadmissible.

A confirmation of these results is supplied by the lunar eclipses of the Almagest. On working them up, it is found that the residuals are so large as to show that they are entitled to far less weight than the solar eclipses. Their value lies in the fact that the separate determinations from the lunar eclipses group themselves round the values derived from solar eclipses. The lunar eclipses are given in *Monthly Notices*, lxvi., pp. 6-7; they are nineteen in number, and in only ten cases is a numerical estimate of the magnitude recorded. These ten cases alone therefore test the newly-discovered fact which, in language that becomes appropriate only if the second section of results is admitted, states that the earth's orbital motion is subject to a secular acceleration of $4''$. Now of the ten lunar eclipses available, seven give accelerations lying between $2''$ and $6''$. It is therefore hard to believe that zero and not $4''$ is the correct value. The times of the lunar eclipses are equally striking in their confirmation of the result. Nearly thirty years ago a correction was introduced into Hansen's Tables based upon these eclipses. The main question is one of evidence. It is no use to point out in the third section of this paper how certain changes may be accounted for, if they are not shown to exist. On the other hand, no objections to a particular explanation of the physical reason can weaken the case for the observed fact that these changes are taking place. What is sufficient evidence? Two eclipses would suffice, if they had been described with a wealth of detail that established complete confidence in the records. A hundred eclipses of the actual sort would probably satisfy the most sceptical, even though the place assigned were always "tacitly assumed (to be) the capital where the record was made, or the place where the poet or historian lived." The smaller number of eclipses, which it has alone been possible to produce, should suffice to make a case almost if not completely amounting to certainty. P. H. COWELL.

VARIATIONS OF DOMESTIC POULTRY.¹

THE book under notice is one of an original character. It is an attempt to describe all the different races of domestic poultry that exist in various parts of the world, and as such is not without its value, as it gives us a description of the races of fowls as they exist, not only in Asia, but in the various States of Europe and the United States of America. The book treats almost solely of the races of fowls from a fancier's point of view. The plumage and external characters which would be noticed in a show-pen are those that are dwelt upon, and as a scientific treatise the work cannot be regarded as having any special value, and would be unfairly treated if it were regarded from the same standpoint as Darwin's "Variation of Animals under Domestication."

The illustrations, which are very numerous, are not original, but taken from the fancy poultry journals, where the birds are drawn with the usual exaggeration of the points valued by the fancier, and bred for securing prizes. The consequence is that some of them are good and others quite the reverse, but the plumage in many is exaggerated. To scientific ornithologists this history of the location of colour in the different parts of the plumage of birds, and the

fixture of the patterns in the races, is one of considerable interest. To those acquainted with the details of poultry breeding it is well known that any variation of the colour or texture of feathers which appears in any particular specimen can, by careful selection of the offspring, for a series of generations, be readily perpetuated, and by crossing with other varieties almost any pattern or disposition of colour can be obtained, and what is called a new breed formed. This is illustrated by the engraving, which we borrow from the work, of a German race at present but little known in this country, called the Lakenfelder. In this the colours are transposed from their general position, and a remarkable looking fowl is produced, which is correctly represented in the engraving.

It is of much scientific interest to trace the extent of the variation which can be induced by careful breeding. In the fowl, these variations have been almost exclusively confined to the plumage, which in some instances has been increased to an enormous extent, as in the production of quill feathers 8 inches long on the feet of the show Cochin, and the general

FIG. 1.—Lakenfelders. From "Races of Domestic Poultry."

increase of the plumage to a great extent, so that the modern show Cochin does not at all resemble the original birds brought from Shanghai. In other cases the plumage has been partially abolished, as in the Nackthäse or Transylvanian naked necks, in which the head and neck are entirely denuded of feathers, and the skin assumes the red colour of the comb. These variations are permanent, and are intensified by long-continued breeding. The production of spangles or dark markings at the end of the feathers, of bordered margins of black on a light ground in the whole of the body feathers, and of regular transverse bars across each feather of the plumage, have all been accomplished and perpetuated by careful selection.

The various breeds of ducks, geese, and turkeys are also treated of.

The work contains in an appendix a very elaborate and useful list of the names of the races in all the European languages, which will prove of great value to all investigating the subject of variation.

W. B. TEGETMEIER.

¹ "Races of Domestic Poultry." By Edward Brown. Pp. xi+234; illustrated. (London: Edward Arnold, 1906.) Price 6s. net.