### The Transposition of Zoological Names.

I WISH to say how thoroughly I agree with Mr. Lydekker in his remarks on the unwisdom of transposing zoological names, and on the confusion caused by this objectionable practice. To the instances which he has mentioned I may add the following cases relating to two well known and familiar species of animals. Linnæus called the only European hare known to him *Lepus timidus*, and for many years that name was applied to the common brown hare of Central Europe, while the northern hare, which changes to white in winter, was known by Pallas's appropriate name, *Lepus variabilis*. This was the nomenclature used by Blasius, by Bell in his "British Quadrupeds," and in all the ordinary text-books of zoology. It was, however, pointed out some years ago, first, I believe, by Lilljeborg, that the *Lepus timidus* of Linnæus had been based mainly upon the northern or variable hare, or that at all events Linnæus had confounded the two species together. In these circumstances obviously the best plan was to call the middle-European brown hare by its next given name, *Lepus europeus*, and this course has been adopted by most writers. But the advocates of unrestricted priority are not content with this, and insist upon calling the variable hare *Lepus timidus*, the consequence being that when that name is used it is impossible to know which of two perfectly distinct animals is intended by it.

Another still more objectionable transposition of two well known names has been lately suggested. Linnæus, in the *twelfth* edition of the "Systema Naturæ," gave the name *Turdus musicus* to the song-thrush and that of *Turdus iliacus* to the redwing, and these familiar terms have been used by all writers for these well known birds respectively ever since. But about a year ago it was discovered by an ardent member of the new school of priority that in his *tenth* edition of the "Systema" Linnæus had unfortunately (by some error in his MS. or of his printer) attached the diagnosis of *Turdus musicus* to *T. iliacus*, and that of *T. iliacus* to *T. musicus*. It was admitted that Linnæus had corrected the mistake in his later edition of 1760, but even Linnæus could not be allowed to correct his own errors in the face of the inviolable law of "priority." In future, therefore, it was maintained, the song-thrush must be called *T. iliacus* and the redwing *T. musicus*! This course has been actually adopted by a subsequent writer, but we may trust that it will not meet with general approval, and that the song-thrush and redwing will remain under the old names given to them by the father of scientific nomenclature in 1760, and used by every subsequent writer until 1904. P. L. SCLATER.

### Modern Algebra.

THE publication of Messrs. Grace and Young's treatise on algebra will direct attention to the importance and difficulty of the theory of the concomitants of ternary and quaternary quantics in connection with plane and solid geometry. There are one or two points on which I propose to make some remarks.

In the first place, canonical forms are sometimes deficient in generality, and this will be the case whenever the form is the analytical expression for some *special* property of an anautotomic curve. Of this defect the canonical form of a ternary cubic furnishes a striking example, for it is the analytical expression for the theorem that through each of the three real points of inflexion one real straight line can be drawn which passes through one pair of conjugate imaginary points of inflexion on an anautotomic cubic curve; and since autotomic cubics do not possess this property such curves cannot be represented by the canonical form.

In the next place, anautotomic curves are not by any means the most interesting species of curves, and to go through the process of calculating their concomitants, and then specialising them for some particular species of autotomic curves, is often very laborious. In the case of unicursal quartics, many interesting results might be obtained by calculating directly the concomitants of the quantic $(*\delta\beta\gamma, \gamma\alpha, \alpha\beta)^2$, and this would give results applicable to all unicursal quartics, except those which possess the five compound singularities called the tacnode, the rhamphoid cusp, the oscnode, the tacnode cusp, and the triple point. Also, since an evectant is the tangential equation of a curve which is related in a special manner to the original one, an examination of the evectants of the above quantic would lead to interesting results concerning conics and other curves connected with trinodal quartics.

In this subject geometrical methods are a powerful assistance to pure analysis. For example, let U be a ternary cubic in $(\alpha, \beta, \gamma)$; eliminate $\gamma$ by means of the equation $\beta = k\gamma$, and equate to zero the discriminant of the resulting cubic equation in $\alpha/\beta$. This will give a sextic equation $\Delta(k) = 0$, which determines the six tangents drawn from A to the curve. The condition that the curve $U = 0$ should have a node is that the equation $\Delta(k) = 0$ should have a double root; hence the discriminant of this binary sextic is the discriminant of the original ternary cubic U.

Many other examples of a similar kind could be mentioned, and we may observe that from the discriminant of a binary duodecimic, all the conditions that a quartic curve should possess *point* singularities may be obtained.

April 28. A. B. BASSET.

### Current Theories of the Consolidation of the Earth.

IN Lord Kelvin's philosophical and justly celebrated paper on the secular cooling of the earth (Thomson and Tait's "Nat. Phil.," vol. i., part ii., Appendix D), the assumption is made that the earth was once a fiery molten mass, liquid throughout, or melted to a great depth all round. He cites Bischof's experiments showing that "melted granite, slate, and trachyte all contract by something about 20 per cent. in freezing," and continues:—

"Hence, if, according to any relations whatever among the complicated physical circumstances concerned, freezing did really commence at the surface, either all round or in any part, before the whole globe had become solid, the solidified superficial layer must have broken up and sunk to the bottom, or to the centre, before it could have attained a sufficient thickness to rest stably on the lighter liquid below. It is quite clear, indeed, that if at any time the earth were in the condition of a thin shell of, let us suppose, 50 feet or 100 feet thick of granite, enclosing a continuous melted mass of 20 per cent. less specific gravity in its upper parts, where the pressure is small, this condition cannot have lasted many minutes. The rigidity of a solid shell of superficial extent so vast in comparison with its thickness, must be as nothing, and the slightest disturbance would cause some part to bend down, crack, and allow the liquid to run over the whole solid. The crust itself would in consequence become shattered into fragments, which would all sink to the bottom, or meet in the centre and form a nucleus there if there is none to begin with."

In adhering to these views, Lord Kelvin has been followed by Prof. G. H. Darwin (*cf.* "Tides and Kindred Phenomena of the Solar System," p. 257) and other eminent mathematicians; so that the theory that the earth consolidated by the building up of a solid nucleus through the sinking of portions of the crust of greater specific gravity is no doubt generally accepted by geologists and others interested in the physics of the earth.

Recent researches on the pressures within the planets (*cf. Astronomische Nachrichten*, No. 3992) have thrown great doubt on this mode of consolidation of the globe. The line of argument by which we reach this conclusion is a double one:—

(1) It is shown that the effect of pressure in the highly heated fluid assumed to have constituted the molten earth would have been to dissolve the portions of the sinking crust before they attained any considerable depth.

(2) The increasing density of the fluid itself would have prevented sinking of the crust below one-tenth of the radius, so that a solid central nucleus could not have been built up in this way.

To see this clearly, let us suppose that the earth were a molten mass, and that a crust of rock several kilometres in area, and a considerable fraction of a kilometre in thickness, had formed, and begun to sink in the molten fluid