is dark agate, and the inscription appears to read, *Shakir Charûf*, or "Thankful Lamb," a not wholly uncommon Semitic name, there having been a noted grammarian called Charûf, while the Beni-Charûf still exist as an Arab tribe.

London Mathematical Society.—(*Thursday, February* 8.)

C. W. Merrifield, Esq., Vice-President, in the Chair. The following papers were read:—"On the Area of the Quadrangle formed by the Four Points of Intersection of two Conics," by C. Leudesdorf; "Numerical Value of a Certain Series," by J. W. L. Glaisher; "The Differential Equation $\frac{dx}{\sqrt{X}} + \frac{dy}{\sqrt{Y}} = 0$," by Prof. Cayley; "On the Classification of Loci, and on a Theorem in Residuation," by Prof. Clifford.

Royal Society.—(*Thursday, February* 8.)

Dr. Guy, Vice-President, in the Chair. The following papers were read:—"On the Hindoo Division of the Octave; with some additions to the Theory of Systems of the Higher Orders," by R. H. M. Bosanquet; "On the Transport of Solid and Liquid Particles in Sewer Gases," by Dr. Frankland; "Researches in Spectrum Analysis in connexion with the Spectrum of the Sun," by J. Norman Lockyer.

Royal Institution.—(*Friday, February* 9.)

Mr. Francis Galton, F.R.S., read a paper on "Typical Laws of Heredity." The processes of hereditary transmission work together with so much accuracy, that each generation of every large population tends to be the exact equivalent of its predecessor. Changes in external conditions may interfere with this resemblance, but with these we are not concerned; so far as regards the processes of heredity alone, there is ample evidence of perfect uniformity in their results. Yet we should not have been justified in expecting this, because different classes in each generation contribute a very different quota of representatives to the next. Giants are almost sterile; their breed is almost sure to be diluted by marriage; their scanty progeny tends strongly to revert towards mediocrity; and natural selection spares a relatively small proportion of children of abnormal growth. Giants, as a class, leave by no means an equal number of adult descendants who are giants like themselves. Nevertheless, much the same number of giants will always be found to occur in the population; and just the same is observed of every characteristic of every plant and animal. How was this to be accounted for? The object of the discourse was to solve this curious problem, which has never yet happened to have attracted attention. The lecturer showed that the widest generalisation was admissible in treating it, because observation had shown that all deviations tend to conform to the single mathematical law of frequency of deviations. This was first pointed out by Quetelet, who proved by statistics that this conformity existed more or less, not only in respect to the height of men, but in respect to all measurable characteristics of all plants and animals. Hence we are justified in imagining an ideal case, to which the law of deviation strictly applies, and in which the statistical resemblance of successive generations is exact; and we may give the name of "typical laws" to those by which such theoretical conditions are fulfilled. They will serve, with little modification, to explain the facts of all quasi-typical cases. These typical laws must co-operate, in some sense or other, with the law of deviation; and, as the properties of the latter are few and peculiar, there is little risk of false conclusions. Experiments were necessary to give a just general idea of their character. For this purpose, the lecturer had experimented largely and minutely with seeds, comparing the weight of the seed planted with that of each member of its produce. The particular seeds used were sweet-peas, because their flowers are incapable of being cross-fertilised by accident; they are prolific and easily reared, and the seeds retain the same weight in varying dampness of the air. He had careful weighings made with a good balance, of many thousand individual seeds, in order to arrive at the desired information. The results fully accorded with the theoretical requirements of the typical case. They perfectly explained the conditions of the simplest form of descent—namely: (1.) Being derived from a single parent, and not from a couple (as in the case of the sweet-peas which were not cross-fertilised). (2.) Differences of weight, or whatever the characteristic may be, having no effect on productiveness. (3.) Different weights, &c., being all affected to the same degree by natural selection. In the case of "simple descent" we only have to concern ourselves with Reversion and Family Variability, and this is dealing with the most obscure part of the general problem. Reversion was found to act according to the simplest conceivable law, the deviation of the weight of the parent seed bearing in every case the same ratio to the deviation of the mean weight of its offspring. In the typical case, the point towards which reversion tends would be the mean weight (whatever the characteristic may be) of the race. Its effect is to diminish variability; it simply reduces what is technically called the "modulus" of the original populations. Family variability was found to conform to the law of deviation, taking the mean weight of the family as the centre of dispersion. The variability—that is, the value of the modulus—was the same whether the peas were large or small (within the rather wide limits of the experiment). These conditions were expressed by a simple formula, and their combined action was fully illustrated by an apparatus, where reversion was represented by the passage of a heap of pellets through a row of converging shoots, and family dispersion by their subsequently falling through the teeth of a sort of harrow. It was explained that reversion acted precisely like an elastic spring, with greater tension the more it was stretched, and thus finally checked the step-by-step progress of dispersion due to family variability, which would otherwise cause the deviation of the race to continue indefinitely. Hence a condition of stable equilibrium was ensured, and perfect statistical resemblance between consecutive generations was maintained. He showed from the formula that if the coefficient of reversion was $\frac{1}{3}$, and if the modulus of family variability was six units, then the modulus in the population at large would be ten units. The other processes concerned in ordinary heredity were dealt with principally by general considerations, guided by theoretical exigencies. It was shown that in the typical case, such a fact as that tall men should have a tendency to marry tall women rather than short, or short women rather than tall, was inadmissible. The theoretical conditions required sexual selection in respect to each characteristic taken by itself to be nil. The effect of pairing upon the modulus of the original population, after conversion of the measurements of both sexes to a uniform standard, as explained in the lecture, would then be to divide it by the square-root of 2. Natural selection was illustrated, at first in an inverse sense, by familiar cases of destruction, by the shot-marks to the right and left of the centre of a target, which are distributed according to the law of deviation. Suppose a battering gun directed at a particular vertical line in a long rampart; its shots would batter away pieces of the wall in greatest number at or in the immediate neighbourhood of the line, while stray shot-marks would be less frequent as the distance from the line was greater. The result would be that the percentage of the thickness of the rampart that was battered away would follow the law of deviation. The action of natural selection is the precise inverse of this, as those whom it strikes it selects and preserves. It may be represented by the cast of the gap made in the rampart. Its aim is directed at the medium individuals, they being on the whole the most suitable to live. Thus, natural selection acts in strict accordance with the law of deviation. The effect on the population is expressed by a simple formula, in which the ordinates of two curves of deviation—the one referring to the population, the other to the percentage of survival, having the same centres, but different moduli, are multiplied together. This results in a third curve, which is also one of deviation, whose modulus is less than either of the previous ones, and is expressed by a simple formula. Productiveness is physiologically a mere form of natural selection, hence it is governed by the same general law. The action of it, and of natural selection, was experimentally illustrated. The final result is, that if four numbers are given, the modulus of any typical characteristic in a race can be easily determined, and its fixity is accounted for. These numbers are the coefficient of reversion, and the moduli of family variability, of productiveness, and of natural selection. The main course of descent of a population is along the axis of the race, the medium class of individuals being more prolific than the rest. Exceptional persons leave scanty issue, and these few tend to revert. There is, therefore, a constant and calculable out-throw of elements from the central axis, and a constant destruction of elements at the outer margins. Again, from these margins, a scanty remnant works back again towards the axis. The mediocre classes are the true ancestors of every population.

Royal Astronomical Society.—(*Friday, February* 9.)

Dr. Huggins, President, in the Chair. This was the annual meeting of the Society, at which the President usually delivers his address on presenting the medal, but as none was awarded this year, the proceedings were confined to the reading of the Report of the Council on the progress of Astronomy, and to the election of officers and council for the ensuing year.

New Shakspere Society.—(*Friday, February* 9.)

F. J. Furnivall, Esq., Director, in the Chair. Mr. Furnivall announced the discovery, by Prof. Guizot, of the source of the speeches of Brutus and Antony over Caesar's dead body. Dr. Ingleby read a paper "On Hamlet's 'some Dozen or Sixteen Lines;'" an attempt to rebut the arguments both of Mr. Malleson and Prof. Seeley (*New Shakspere Society's Transactions* for 1874, pp. 465–498). He contended that Shakspere's *only* object in mentioning Hamlet's speech was to give himself the chance of delivering, through Hamlet's mouth, a lesson in elocution, probably aimed at the faults of some rival actors. "If Shakspere had intended us to find the dozen or sixteen lines in the old play, we should have had a sufficient glance at their purport to serve our purpose. That there is no indication convinces me that, as soon as Hamlet has instructed the old Player, the function of the supposed insertion was fulfilled, and that they had no further part in *Hamlet*." Mr. Malleson said that Dr. Ingleby had in no way moved his (Mr. Malleson's) former positions. The very parallelism of the sub-play and main play needed a supposed alteration by Hamlet to excuse it. Mr. Furnivall could only account for Dr. Ingleby's argument by supposing that he had deliberately pasted a piece of paper over Hamlet's words to Horatio, "if his occulted guilt do not itself unkennel *in one speech*:" in them was the very "purport" of the dozen or sixteen lines which Dr. Ingleby had declared was never stated. The latter answered that he did not consider this "one speech" was the same as Hamlet's; but he admitted that if it was, his paper fell to the ground.—The second paper was by Mr. Edward Ross, on "The Division into Acts of *Hamlet*." He contended that Act III. was now wrongly divided from Act IV., in the middle of what should be the fourth scene of Act III., as the present IV. i., merely ended III. iv. He would end Act III. at the end of the present scene ii. of Act IV. This would make Act III. so long that Mr. Ross proposed to take from it its present first scene, and add that to Act II. In the first part of Mr. Ross's argument Mr. Furnivall agreed, that the end of Act III. should be at the end of IV. ii.; but he declined to alter the end of Act II., because, if III. i. were added to Act II., Hamlet's second long soliloquy, "To be, or not to be," would be brought within fifty-five lines of his much longer, "Oh, what a rogue and peasant slave am I," and have to be delivered within two or three minutes after the attention of the audience had been exhausted by it. This was an arrangement that Shakspere never could have meant, and that no stage manager would sanction.

FINE ART.

A Manual of the Historical Development of Art. By G. G. Zerffi, Ph.D., F.R.S.L. (London: Hardwicke & Bogue, 1876.)

In reading this book we were struck with the coincidence between many parts of it and what we remembered having read in Semper's *Der Stil*, but could not find from beginning to end of it a single word of acknowledgment to that writer, to whom the best of art critics in Germany very readily admit the greatest obligations. Even