through some omission, not easily to be explained, if it be not the effect of a mere accident, geographical proficiency has never hitherto been adequately encouraged. Consequently, the Geographical Society has thought it right to step in to supply the needful encouragement. There is another good reason for the interference of the Society, in the fact that facilities of travel have rendered our interests much more cosmopolitan than formerly, while the public schools of the old-established type, have made no corresponding change in their curriculum. Mere youths now-a-days have exhausted the grand tour of two generations back, and a year or two of early manhood is often spent in America, Australia, and India, while books of travel load our library tables. It seems monstrous that a so-called liberal education should not qualify men to journey themselves, or to read the journeys of others, in an intelligent manner.

Mr. Wilson remarks, and his remark deserves respect, that the masters of Rugby were almost unanimous in rejecting the invitation of the Geographical Society, but I can fairly retort that other scholars no less practised in education and no less competent to decide, pronounced our system of prizes to be a valuable and much-needed institution.

It would be easy to write at great length in support of what we have done, and I might perhaps be expected to say something on the respective objects of the political and physical geography prizes, but I do not wish to provoke a discussion in your pages, because I am on the point of going abroad and should be unable to take further part in it. FRANCIS GALTON

"Kinetic" and "Transmutation"

1. WHEN, in 1864, I wrote for the *Reader* the history of the Baconian Philosophy of Heat, I found in use, in connection with the subject, the term "dynamical theory of heat," in English, which was employed as an equivalent for the expression "mechanische Wärmetheorie," current in German. The word "dynamical," already so vague from frequent abuse, corresponded but little, when used in its proper meaning, to the real intent of the theory in question; and the same remark applies, with at least equal force, to the word "mechanisch," even wider in its scope and as often misused. I was thus led to adopt the word "Kinetic," to supersede the above; and that in preference to the current word, "cinematic," which, in conjunction with "theory," would imply a tautology.

I am glad to see that Sir W. Thomson and Professor Tait, in their treatises on Natural Philosophy and on Heat, as well as in some remarkable papers on Atoms which have appeared in NATURE, frequently make use of the same word, "Kinetic," in connection with the theory of heat and of gases, as also in conjunction with "energy." Instead of the expression, "actual energy," originally introduced, I believe, by Mr. Rankine, Sir W. Thomson and Mr. Tait employ the term "Kinetic energy;" and from various motives, linguistic as well as strictly scientific, I venture to think that the original wording of Mr. Rankine in the case of "potential energy," should be likewise superseded, viz., by "dynamic energy."

2. In the *Philosophical Magazine*, I have been rated, indirectly, by Professor Challis, (for no mention is made of my name in connection with the subject), for having applied the word "transmutation" to rays, without recalling the fact of his having done so before me. I considered the expression "transmutation of rays" as the abbreviated and thoroughly English rendering of the words, "change of the refrangibility of rays, or light," used by Professor Stokes; and as such, requiring no authority but the precedent furnished by the existence of the analogous expression of "transmutation of matter." If, however, an authority had to be cited, it would have been Euler, in whose "Nova theoria lucis et colorum" (Opusc. var. argum.) the following passage occurs:—"Cum igitur a corporibus rubris radii tantum rubri, et a violaceis violacei ad nos pertingant, etiamsi radii albi in ea incidissent, manifestum est istam transmutationem a sola reflectione proficisci non posse."

As I have returned to this subject, I may be permitted to express my astonishment that Professor Challis, who thought it due to him that his name should be mentioned for being the author of the expression "transmutation of rays," should have on his part omitted, in speaking of the transmutation of Herschelic rays into Newtonic, a reference to my own share in the *res gestæ*. When I see the same thing being done in so widely circulated a treatise as that of Mr. Brooke on Natural Philosophy, and in one intended for even more popular reading, reproducing the teaching of the Polytechnic, I might think of entering a protest, if experience had not convinced me of its uselessness.

C. K. AKIN

Parturition of the Kangaroo

I BEG leave to call your attention to certain comments in your issue of the 23rd of June on the proceedings of the last meeting of the Royal Geological and Zoological Societies of Ireland. It is usual when parenthetical observations are made in any journal without the customary affix "Ed." to ascribe them to the printer's devil. Now, your devil, in commenting on an *imperfect* report of your Dublin correspondent, would lead your readers erroneously to infer that I had adopted the ideas which he has been pleased to call "absolute nonsense," and takes me to task for saying "that the actual passage of the fœtal kangaroo from the uterus to the pouch was not yet proved;" he himself stating that my remarks were "in contradiction to the facts observed by the late Earl of Derby's father or by the present Professor Owen." Now, a critic calling in question the words of others should be careful of his own. No facts on the subject were observed by the late Earl of Derby's father, and Professor Owen, after elaborate arrangements for the observation, states that "as parturition took place in the night, the mode of transmission to the pouch was not observed." (Phil. Trans. for 1834, p. 344.) There have been four observers in this matter especially worthy of being noticed:—(1) the keeper at the Zoological Gardens, Knowsley, who, according to Lord Derby's statement, saw the young kangaroo born, and that it was placed in the pouch by the paws of the mother (Proceedings of Zoological Society for 1833, p. 132); (2) Professor Owen, as referred to above; (3) Mr. E. G. Hill, who, at thirty yards' distance, saw the kangaroo with her mouth take up what he thought was a stone, open the pouch with her paws, and place it in the marsupium, and that he shot the animal and found a newly-born fœtus in the pouch (Proceedings of Zoological Society for 1867, p. 476); (4) M. Jules Verreaux, who is mentioned by M. E. Alix as having seen the kangaroo remove the fœtus from the vulva with her mouth, and place it in the pouch (Annals of Natural History for 1866, p. 316). These all differ as to the actual facts observed, and would seem sufficient to justify me in the statement I had made. That Professor Owen does not consider the question settled, may be inferred from his concluding observations on the subject, "whether the circumstance of the parturition is constant, viz, the dropping on the ground, or whether the fœtus may occasionally be received by the mouth from the vulva, I am disposed to regard as a matter for further observation; but the main fact of the conveyance of the fœtus to the pouch by means of the mouth may now be held as the more probable (at least the more usual, if not the constant) way in the genus Macropus" (Proceedings of Zoological Society for 1866, page 382). I refrain from any comments, but I thought it right to remonstrate against statements which I felt were injurious to me, to the Society to which I have the honour to belong, and to the advancement of science. JOHN BARKER, M.D.

Dublin, July 1

The Extinction of Stars

IF you will kindly permit an amateur to rush in where astronomers fear to tread, I shall be glad to offer a few remarks on the above subject.

The progress of science enables us to trace, with a probability almost amounting to certainty, the career of a star from its birth; from the most diffused condition of its parent nebula; through the stage of primary agglomeration when it shines as our sun; through the process of cooling into a dim and cloudy spheroid, such as Jupiter or our earth; until cold rules supreme, and the once glowing orb rolls on, barren as our moon.

But when we have reached this stage, we have by no means done with the star. It must continue on its course, and, though in obscurity, it must retain its momentum and its attractive force. Our sun will thus one day travel in darkness, attended by a cohort of funereal planets, and perpetual night will reign over the solar system. This result appears to be but a question of time, and we are, therefore, led to the consideration that many systems must, in all probability, be already extinct, and wandering unnoticed. But as extinction is a gradual process, there will be multitudes of stars in various stages of dimness,