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### Memoir.

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*Sir George Francis Hardy, K.C.B.*

WITH the greatest regret we have to record the death, which occurred at his residence in Kensington on the 5 October 1914, of Sir George Francis Hardy, K.C.B., F.R.A.S., F.I.A., F.F.A., F.A.S., Past President of the Institute of Actuaries. Consequent on an attack of rheumatic fever in his youth, he had for many years been the subject of heart complaint which had rendered it necessary for him to avoid exposure or any undue strain, but had not otherwise interfered with his ordinary life. Some months ago, however, the malady took a more acute form, and though it was hoped this would be only temporary it later on became evident that complete recovery was impossible. The end came suddenly and peacefully.

By his death the actuarial profession loses one of its brightest ornaments, and many of its individual members one of their dearest friends. His position in the profession and his influence on its scientific development were perhaps unique, and it is fitting that some extended memoir of his life and work should be attempted, though the writer feels that his pen is altogether inadequate to do justice either to Sir George Hardy's great intellectual gifts or to his personal charm and singular beauty of character.

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George Francis Hardy was born on the 14 December 1855 and was educated in a private school of which his father was the head. From an early age he showed the accurate and



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*Sir George Francis Hardy K.C.B.*

retentive memory and remarkable powers of mind that ultimately carried him to the top of his profession, and would have made him eminent in any sphere of mental activity. At one time it was proposed to send him to Cambridge, but this was not found practicable. Had it been otherwise, it can hardly be doubted that actuarial science would have been robbed of one who was destined to rank high among its ablest exponents, while Cambridge would have absorbed into her life one whose clearness of vision and instinctive mathematical gifts—combined as they were with that power of scientific imagination which has so often been associated with the greatest mathematical work—could hardly have failed to make a deep and enduring mark in the world of pure mathematics and physics.

In June 1871, at the age of 15½, he was appointed a clerk in the British Empire Mutual Life Office, and three years and a half later, in December 1874, he passed the first examination of the Institute of Actuaries, being placed second in the list. In the following month he gave evidence of his general knowledge by passing the London University Matriculation Examination, in the First Division of the Ordinary Pass List. In December 1876 he passed the second examination of the Institute, and in April 1880 the third, in both cases being placed first on the list, and on 12 October 1880 he was admitted a Fellow of the Institute of Actuaries. It is not a little interesting to note that, in spite of his great powers, over three years elapsed between his passing the Intermediate and Final examinations. Probably this was partly due to that thoroughness which did not allow him to present himself until he was assured that he had completely mastered the work, but partly also it was no doubt due to the fact that he was never a man of one idea, for he had wide and varied interests. From a comparatively early age he had taken a special interest in astronomy, and his copy of Herschel's "Outlines of Astronomy" was dated in his own hand when he was between fourteen and fifteen. He took up the subject originally on the side of practical observation and he was in this way led into the study of the mathematical theory. That the process was not reversed is a matter of some interest, because, similarly, in all his actuarial work mathematics was a means to an end rather than an end in itself.

One of the first things he did with his earnings after joining the staff of the British Empire Office was to buy a

good second-hand 2½-inch telescope. This he fitted up at the window of a darkened room, and thus he got a two-foot image of the sun, and made sketches of the sun's spots. Very soon he wanted a larger instrument and, as the cost of buying one was prohibitive, he set out to build one for himself. Accordingly when he was between 17 and 18, with his father's help he put together an 8-inch equatorial reflector, mounted on a concrete base in the garden of his house, with its own hut and revolving roof. In February 1874 he contributed to the "English Mechanic and World of Science" (volume xviii, page 533) an article on a new method of determining the sun's distance by means of measuring the duration of the occultation of a fixed star by one of the exterior planets. Not only was this method new in itself but he added largely to its value by an ingenious suggestion for increasing the accuracy of the measurement by means of spectroscopic observation. He spoke of the method as "far exceeding in accuracy even the method of the transit of Venus", and he added: "The phenomenon is evidently, however, less rare than transits of Venus; and combining as it does the double advantage of giving measurements of the distance of the sun and the diameter of the observed planet with an accuracy utterly unapproachable by any other method, I believe it is well worthy of the attention of Astronomers." When one reflects that at this time he was little more than 18 years of age, one cannot but feel amazed both at the ingenuity of the conception and at the clearness and power with which it was expressed in an article which gives the impression of having been written by a man of mature powers. About two years after the article appeared, he saw that attention had been called, at a meeting of the Royal Astronomical Society, to a similar proposal made by a French astronomer, who, however, made no suggestion as to improving the accuracy of the observations by means of the spectroscope. Hardy had no difficulty in proving his claim to priority, and as a result he was elected a Fellow of the Royal Astronomical Society in 1876, on an application supported by, among others, Dr. (afterwards Sir) William Huggins and Captain William Noble, both well-known astronomers. The names of his sponsors are sufficient to indicate the value of his ideas.\*

To use a finely-tempered blade to cut a block, or a delicate loom to weave a coarse fabric, can hardly be satis-

\* It is understood, however, that the method has never been applied in practice.

factory either to the instrument or in the result, and it is not surprising that the routine work that he had to perform as a clerk in the British Empire Office was uncongenial to him. While his colleagues universally liked and respected him they regarded him as somewhat of a dreamer. When the present writer joined the same Office there was a tradition which was not without significance, though probably not strictly true, to the effect that letters or documents which were missing in Hardy's day were not infrequently discovered at the back of his drawer, covered with abstruse mathematical investigations not always strictly related to the Office business. In short, his mind was not and could hardly be centred in routine work, and it was no doubt with a feeling of relief that in November 1880 he left the British Empire Office to take up actuarial tuition and private practice. It must have been about this time that he was appointed by the India Office to investigate and report upon the rates of mortality among the natives of India, as deduced from the Census Returns of 1881. This was the beginning of a long connection, lasting the whole of his life, with that and other Public Departments. The work was one of no little responsibility for a young man of 25, but the result was a masterly report which afterwards formed the basis of a paper read before the Institute on 27 April 1884. This paper (*J.I.A.*, vol. xxv, p. 217) still richly repays perusal on account of the difficulties of the problems involved and the ingenious methods which Mr. Hardy brought to bear on their solution.

His mind was now at work on original research. So early as January 1880, Mr. Hardy and Mr. George King had brought before the Institute a joint paper entitled "Notes on the practical application of Mr. Makeham's Formula to the Graduation of Mortality Tables" (*J.I.A.*, vol. xxii, p. 191) in which new and greatly improved practical methods were developed and the theory of the subject was greatly extended. The two years following his leaving the British Empire Office were remarkably fruitful in independent scientific work of the highest order. In March 1881, he brought before the Institute the first contribution from his own pen alone. This was a paper entitled "On the Mortality observed amongst various classes of Bonus Policies in the British Empire Mutual Assurance Company" (*J.I.A.*, vol. xxiii, p. 1) in which he measured the power of the policyholder's selection against the Office in a most interesting and original way. This paper is still often referred to for its valuable incidental discussion

of the relative advantages of lives, policies, and amounts as the basis of a mortality-experience investigation.

This paper was followed in the year 1882 and the early part of 1883 by a series of investigations of great power which now form an essential part of the literature of the science and are read as the work of an acknowledged master, though at the time he wrote them the author was a young man of only 26 or 27. In the paper on the determination of "The Rate of Interest in Annuities-Certain" (*J.I.A.*, vol. xxiii, p. 266) he finally replaced the existing cumbrous and unsatisfactory algebraic solutions by others which are based on finite differences and are at once more accurate in result and simpler in application. Concurrently with this he presented his memoir on "An improved Method of approximating to the Value of Annuities involving three lives" (*J.I.A.*, vol. xxiii, p. 274) in which he showed from purely scientific considerations how to secure great improvement in accuracy by the simplest means, involving little or no additional labour.

Another remarkable piece of work was his simplification of Woolhouse's method of adjusting mortality and other tables. As originally devised, this method involved a large amount of intricate calculation, a fact that Woolhouse himself recognized by putting forward in 1878 an improved method which, however, was still both lengthy and complicated. Woolhouse was probably a more highly-trained pure mathematician than Hardy, but he had not perhaps the same remarkable power of seeing things in their simplest forms and relations—a power which enabled Hardy to reduce Woolhouse's complicated process to a form which was theoretically more simple and instructive, and practically very easy to apply by a series of summations. This discovery was announced on the 24 April 1882 (*J.I.A.*, vol. xxiii, p. 351) in the discussion on a paper by Mr. J. A. Higham in which that gentleman developed a method similar indeed to Woolhouse's in its result, but expressly designed to replace it on account of its cumbrousness. It is impossible now to say whether this paper led Hardy to his own discovery, or whether it was one that he had previously made but not announced. It would not be surprising if the latter were the case, for in the course of his work he was continually throwing off the most ingenious methods which it was difficult, if not impossible, to get him to publish. Shortly after the reading of Mr. Higham's paper, Mr. Hardy deduced a number of similar graduation formulæ in a simple way

but it was not until 1896 (*J.I.A.*, vol. xxxii, p. 371) that he published his investigation, which has since done so much to help the systematic study of the subject.

On the 29 January 1883, Mr. Hardy read his paper "On Some Formulas for Approximate Summation" (*J.I.A.*, vol. xxiv, p. 95). This paper was followed by no regular discussion, but the President, Mr. (afterwards Dr.) T. B. Sprague, said, "For myself, I should like to say that I have a very high opinion of the value of the paper. It seems to me to be one of remarkable interest and to show great originality and ingenuity, and I shall anticipate that it will be practically found useful to actuaries." The nature and value of this most important paper were even more fully recognized in the following remarks by Mr. George King (*J.I.A.*, vol. xxvi, p. 277): "Mr. G. F. Hardy published a paper, the ultimate result of which will be to revolutionize our methods of dealing with complicated problems. These have hitherto been solved by resorting to a variety of expedients more or less reasonable, but the precise effects of which can never be foretold; or else the problems have been looked upon as insoluble, and mere guesses have been substituted for calculation. But Mr. Hardy, by an original and brilliant analysis, has furnished us with a number of formulas, simple, accurate, and brief, and which are applicable to functions of almost every kind. Nothing better seems to be required, and I feel sure that when these formulas come to be known and appreciated, they will be universally adopted." Mr. King's anticipations have been verified almost to the letter, largely no doubt owing to his own work in showing how Mr. Hardy's formulæ, and others derived therefrom, could be most conveniently applied, and because he included a full discussion of them in the Institute Text Book, Part II.

This paper contained some of the most characteristic, as it is now some of the most widely known, of Hardy's work. The mathematical processes involved were fundamentally not new, but it was left for him both to bring out how effectively they could be applied to actuarial problems, and to modify them so as to give the best results in that particular connection. In his original memoir the mathematical work was largely on the lines originated by Jacobi. These were somewhat advanced, but were no doubt more familiar to Mr. Hardy than they were to the profession at large, and it was natural that he should adopt them in his paper. When,

however, the formulæ were incorporated in the Text Book, Mr. Hardy produced original alternative demonstrations of a very much simpler description for the benefit of students to whom Jacobi's methods would be too difficult. As the result, the formulæ are now universally adopted, as Mr. King predicted they would be, and they form part of the everyday practice of the scientific actuary.

After leaving the British Empire Office Mr. Hardy had devoted a great deal of attention to Friendly Society work, both as an understudy to the late Mr. Ralph P. Hardy\* and also on his own account. In August 1885 he was appointed Assistant Actuary of the General Reversionary Company on the recommendation of Mr. Ralph P. Hardy, and in that position he was able to continue his coaching as well as his Friendly Society work and other private work. In June 1887 he was appointed the official tutor of the Institute of Actuaries for Part II of the Examinations. In February 1888 the President of the Institute announced that the Messenger Prize offered for an essay on Friendly Societies had been awarded to "Mr. G. F. Hardy, a Fellow of the Institute, who had done great service to the Institute in connection with the class of which he was tutor, and who had distinguished himself by the valuable papers which he had contributed to the Journal." Up to this time the very brilliance of Mr. Hardy's mathematical work had perhaps produced a slight tendency among the senior members of the profession to regard him as a purely theoretical actuary with his head well in the clouds. After the publication of his Friendly Society essay† no such feeling was possible. Rather a complete treatise than a mere essay, and the more remarkable from the fact that nothing of the same kind had previously been attempted, its largeness of scope, breadth of treatment, and the practical way in which many difficult problems were handled, showed very clearly that it was the work of a man having a wide grasp of affairs and an intimate personal knowledge of the subject on its practical as well as its theoretical side. The essay, in fact, was adopted by the profession as a text book, which still forms an essential part of the education of the student; while men who had spent their whole life on the everyday work of friendly societies were struck by its extremely practical character, of which they were the best judges.

\* Ralph P. Hardy and G. F. Hardy were not related.

† *J.I.A.*, vol. xxvii, page 161.

From this time forward, his progress to the head of the profession was steady and inevitable, in spite of the fact that his great and perhaps excessive modesty entirely precluded any attempt or desire to push himself to the front.

Mr. Hardy resigned the tutorship for Part II of the Institute Examinations in May 1893, and in the following June he was for the first time elected a Member of the Council, on which he served in all for 18 years. In the following February he left the General Reversionary Company to become the Actuary of the English and Scottish Law Life Assurance Association, a position which he held until April 1898, when he was appointed Actuary and Secretary (Principal Officer) of the Universal Life Assurance Society. About three years after he found it desirable to arrange for the union of that Office with the North British and Mercantile, and on the conclusion of the necessary arrangements he retired from official life, retaining, however, a wide and growing consulting practice, largely amongst the Government Departments. It was shortly after this time that he was first elected as one of the Vice-Presidents of the Institute.

Mr. Hardy was a prominent member of the *Joint Committee of the Institute of Actuaries and the Faculty of Actuaries in Scotland on Mortality Investigation*, which dealt with the British Offices' Experience of Assured Lives and Annuitants for the period 1863 to 1893. When the compilation of the experience had been completed and the results published, Mr. Hardy was invited by the Committee to undertake the highly responsible duty of preparing adjusted or graduated mortality tables in respect of the principal sections of the experience. This was a task which was at once highly onerous, congenial to his mind, and well fitted to display his powers. He had for some time previously been attracted by Professor Karl Pearson's new methods of curve-fitting, and he was the first to bring them to the notice of the actuarial profession.\* These methods naturally appealed to Hardy's mind by their happy combination of elegant mathematical form and practical applicability to a variety of problems, and it is largely owing to his work that they have since become much more familiar to the actuarial profession. Mr. Hardy did not, however, find it desirable to adopt Pearson's methods in

\* See his Review of Pearson's "Chances of Death" (*J.I.A.*, vol. xxxiii, p. 530 (1898)).

their entirety, since, although they might doubtless have produced a highly satisfactory graduation, they would not have had the same practical advantages to the actuary that might be obtained by other methods. So far back as 1894 (*J.I.A.*, vol. xxxi, p. 359), Mr. Hardy had announced his important discovery that Makeham's Formula, which had up to that point been regarded as applicable only to Aggregate Tables, could, by an ingenious extension and adjustment, be successfully applied to the graduation of Select Tables; and in 1898 (*J.I.A.*, vol. xxxiii, p. 493) he had given an example of its application to Sprague's Select Tables. This was the main idea underlying the whole of Mr. Hardy's graduation of the British Offices' Tables. In its practical working out he evolved many new methods, and while he adopted Pearson's basis of fitting by means of moments, he introduced what is a great practical improvement when a large mass of figures has to be dealt with, namely, the calculation of the moments by a simple process of successive summations, instead of by Pearson's actual methods.

The results of Mr. Hardy's graduations were presented to the Committee in a series of most valuable Reports, one of which is reprinted in the *Journal* (vol. xxxviii, p. 501), while in the final volume issued by the Committee (Account of Principles and Methods), he gave a full explanation of the whole of the work of graduation. An admirable review of this by Mr. Todhunter was given in the *Journal* (vol. xxxviii, pp. 359-363), and it is unnecessary here to say more than that the graduation was a brilliant piece of work, both from the elegance and power of the novel methods employed and the general excellence of the results. Speaking generally, it may be said that the  $O^{[M]}$  Select Tables, the  $O^{[NM]}$  Select Tables, the Male Annuitants' ( $O^{(am)}$ ) Select Tables and the  $O^{M(5)}$  Aggregate Table were all graduated on a strictly Makeham basis, thus securing the most important advantages in the practical calculation of Joint Life Annuities and other functions. The Female Annuitants' Select Tables ( $O^{(af)}$ ) were adjusted by a combination of two Makeham graduations which secured many of the same advantages in a modified form,\* while the important  $O^M$  (aggregate) Table bore a simple and definite functional relationship to the  $O^{M(5)}$  Table.

\* See the Memorandum as to the two-life Tables appended to the Annuitants' Tables; also an important paper by Mr. T. G. Ackland (*Transactions of the Faculty of Actuaries*, Vol. III, p. 285) which is perhaps not sufficiently widely known.

In a course of Lectures delivered before the Institute in the Session 1904-5 and published in 1909 (see Mr. Todhunter's review, *J.I.A.*, vol. xliii, p. 471), Mr. Hardy dealt systematically with his own and other methods of graduation and curve-fitting, and with the general theory of the subject, and he introduced the Pearsonian methods to actuarial students in a simplified form. At the same time he suggested also other and more elementary methods of his own, which he had long been in the habit of using with great success in his practical work, and which have perhaps not yet received the attention they deserve.

In June 1908 Mr. Hardy was elected President of the Institute, and thus became the titular head of the profession which he had done so much to adorn. His Presidential Address (*J.I.A.* vol. xliii, p. 1) will long be remembered and re-read for its originality of thought, power of expression, and stimulating quality; and probably its modest author alone had any doubt as its high place in a long series of such addresses.

During the term of his Presidency, the Government took up the question of National Insurance, with the view to preparing the scheme ultimately to be embodied in the National Insurance Bill of 1911, and it was natural that they should go to the President of the Institute of Actuaries for the advice which they required as to the financial cost of the scheme. With him was associated Mr. F. B. Wyatt, the ex-President. Mr. Hardy was exceptionally well fitted to take a leading part in such a matter, by reason of his unique actuarial skill and fertility of method—which enabled him easily to overcome difficulties that to others would be insurmountable—his wide grasp of affairs, his familiarity with the working of sickness assurance by the friendly societies, and his great sympathy with all well-founded measures of social reform.

The main Report of Messrs. Hardy and Wyatt, dated 20 May 1911, will be found in the *Journal*, vol. xlv, p. 406, and a supplementary Report, dated 28 November 1911, as to the revision or extension of the original estimates caused by changes effected in Committee, in vol. xlv, p. 64. Mr. Hardy's hand is very plainly to be seen in these Reports, and it is a liberal education to any actuary to read or rather study them, and to note the ingenuity with which he and his colleague dealt with problems that, essentially of the most difficult character, were made much more so by the unfortunate absence of reliable data and the

inconvenient form and out-of-date character of a great part of the data that were available.

When the measure became law and the great scheme had to be put into operation, the National Health Insurance Joint Committee appointed an Actuarial Advisory Committee consisting of Mr. Hardy as Chairman and four other actuaries. Some idea of the intricate and difficult questions which were submitted to this Committee may be gathered from their earlier Reports, which are reprinted as an Appendix to the first Report of the Joint Committee (Cd. 6907). But only the members of the Committee themselves can fully appreciate the remarkable knowledge and skill with which their Chairman placed these complicated questions before the Committee, reduced them to their simplest and clearest form, and, in many cases, indicated new and ingenious methods for their solution.

In recognition of his distinguished services to the British and Indian Governments, Mr. Hardy's name was placed in the New Year Honours List of January 1914 as a K.C.B. Rarely can such an honour have been more richly deserved or more modestly received. It was a source of the greatest pleasure to his friends and admirers in two hemispheres and, as has been well said, his own pleasure arose more from the joy of his friends than from any personal pride, though he naturally appreciated very highly this public recognition of his work.

Sir George Hardy was a mathematician by instinct, but though few were better fitted than he to "ride a whirlwind and direct a storm" of complicated analysis, the bent of his mind was not in the direction of theoretical enquiries tending to no practical result. Mathematics has been defined as the science of measurement—often in its higher applications of *approximate* measurement—and it was from this standpoint that most of his original work proceeded, so that nearly all of it leads to some practical result or process. It will be found too, though this may be contrary to the general belief, that ingenious and original as his work was he rarely found it necessary to use any really advanced mathematics. The secret of his work, in fact, lay in his remarkable power of seeing things in their simplest relations, and accordingly of stating a difficult problem in such a way that its difficulty seemed to disappear and comparatively simple means were sufficient for its solution. The essential qualities of his mind were its extreme quickness of perception, its clearness and precision of view, its instinctive logic, and its capacity to pierce

through unessentials to the core of the subject. His mind had, in fact, a solvent quality, which enabled it to disperse the mists concealing the truth and to reveal the truth itself in a clear light. It was this quality, combined with his evident sincerity and intellectual power, that rendered him always an effective and attractive speaker; and though his style of speech was quiet and conversational, and almost wholly free from ornament, it had the essential quality of rhetoric—the power to impress his personality and views upon his hearers.

The direct influence of Sir George Hardy's work is of course very great, as will be obvious from our somewhat detailed though far from complete record, and it has been well said that his writings had "that classic quality which renders the best work suggestive and stimulating long after its results have become part of the common stock of scientific knowledge" (*J.I.A.*, vol. xliii, p. 471). But perhaps the indirect effect of his work may be even more important and enduring than the direct. He created what we may fairly call the "Hardy touch", which could scarcely fail to be transmitted in some degree to his pupils, and, through them, to pupils of their own, and though he was cut off at a comparatively early age he enjoyed the rare privilege of seeing the widespread influence of his work. It has already been remarked that he acted as official tutor for Part II of the Institute Examinations from 1887 to 1893, and it may be added that during the greater part of that time he had also private classes for the final examination, so that many of his pupils had the great advantage of reading with him continuously for both Parts II and III. None of them will soon forget his luminous, patient and suggestive teaching, or the trouble that he would take with individual pupils to remove their difficulties or assist them to pursue an enquiry. His pupils were indeed fortunate in their master, and perhaps also he was fortunate in having to train a band of pupils of something more than average ability, who were qualified both to appreciate his work and to diffuse and transmit it. In this way he virtually founded a new school of actuarial thought. He lived to rejoice in the fact that his pupils were selected for many of the principal posts in the profession; while they, on their side, can never forget what they owe to their tutor. Many of them became his personal friends, and it would be difficult to over-rate either the privilege or the charm of association with him in his ideally happy home life. His

union with the gracious lady whom he married in 1883 was so peculiarly complete in every way that the subject can hardly be more than touched upon.

It has been natural to dwell chiefly upon Sir George Hardy's work for and in the actuarial profession, but only a very imperfect estimate of him would be formed if it were supposed that this work, great as it was, absorbed the whole of his energies. So powerful a mind could never be satisfied with so limited a field, and in fact he was a man of wide culture. Music, Art and Literature were to him both a study and a recreation. He took a keen and appreciative delight in the beauties of nature and art, and he travelled widely in search of them. A great and quick reader, he had that selective memory which throws away the dross but never forgets anything of real importance, and his was a singularly well-stored mind, which made it a pleasure and an education to converse with him on any subject. His early interest in astronomy was always kept up, and he followed all the latest developments both of practice and theory. He was also a student of Egyptology, in which he was deeply versed, and he made important original investigations and suggestions as to a means of determining the age of the great Pyramid, and hence the period of the Fourth Dynasty, from astronomical considerations.\* He took, also, great interest in all matters of social reform.

To his great qualities of mind, Sir George Hardy united a noble character, an equable temperament and a most lovable disposition. His uniform courtesy and consideration for others, his gift of quiet wit and kindly humour and his wide culture made him the most charming of companions in any surroundings. He had, in fact, a singular and magnetic attraction. To meet him was to wish to know him: to know him was to love him, and the more deeply as the knowledge increased. During a long and intimate friendship, lasting over 20 years,

\* In a letter printed in the *Academy* (1069) 29 October 1892 and reprinted in the *Insurance Record* of 15 January 1915 he presented "a chain of astronomical evidence proving the commencement of the IVth Dynasty to have been very approximately 3700 B.C." The present writer does not know whether the evidence and results have ever been properly considered by Egyptologists; but it is interesting to note that the date given, *circa* 3700 B.C., is nearly midway between the widely-differing dates given by the most modern investigators, namely, 2700-2840 B.C. by one set of authorities and 4731 B.C. by Flinders Petrie (*see* *Encycl. Brit.*, 11th Edition, volume ix, p. 79). Hardy's letter shows his intimate knowledge both of practical Astronomy and of Egyptology, and his most interesting line of argument seems to the non-expert very convincing, especially in view of the consistency of the results derived from independent data.

the writer never heard a single unkind or uncharitable remark from him, nor noticed the slightest sign of failure of temper. Intolerant of nothing but intolerance, injustice and oppression, he was yet a man of strong character, capable of righteous indignation on behalf of others when the cause arose. In spite of his great powers, of which he can hardly have been quite unconscious, one of the charms of his character was a remarkable modesty as regards his own work, combined with a constant readiness to see good in the work of others.

Looking back on what has been written, the writer is conscious that to those who did not know Sir George Hardy it must wear the appearance of a too unrestrained panegyric. Such, however, will not be the opinion of those who knew him best; to them he will always remain a brilliant example and a very dear memory.

G. J. L.

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