OBITUARY NOTICES

CHARLES PRITCHARD BUTLER, son of Charles Butler, cutler and wood carver, and of Elizabeth Pritchard, was born in Sheffield on 1871 August 19 and died in Cambridge 1952 November 21.

He was educated at the Central School and Firth College, Sheffield, where he was awarded the Lancastrian Scholarship, and at the Royal College of Science, London, of which he was an Associate. He had originally planned a career in medicine but changed his plans during his student days.

He was appointed a computer by the Solar Physics Committee in 1898, working under Sir Norman Lockyer; in 1902 he became Second Assistant at the Solar Physics Observatory at South Kensington. He moved with the Observatory to Cambridge where he was placed, as a Senior Observer, in charge of the work of the spectroheliograph. At the time of the move, 1913, Butler was actually in India, acting as Director of the Kodaikanal Observatory during the interregnum between the Directorships of Michie Smith and Evershed. He retired from his Observatory post in 1937.

He published several papers in the *Monthly Notices* on an eruptive prominence, on the distribution and life history of solar calcium flocculi and on variations in the spectrum of Nova Aquilae, 1918. He was a member of expeditions to observe three total solar eclipses, 1905 in Spain, 1914 in the Crimea and 1927 in Norway. He was probably the first to isolate in a laboratory spectrum of a helium tube the line 4686 A of He II, though this was before its identification was established. He served for many years on the Council of the British Astronomical Association as Director of the Solar Section.

He was elected a Fellow of the Society on 1908 November 13.

F. J. M. STRATTON.

LESLIE JOHN COMRIE died on 1950 December 11, the Society thereby losing an outstanding individualist who was always wholeheartedly devoted to its interests, and wholeheartedly devoted to certain aspects of astronomy. It would be an untruth to say that Comrie was wholeheartedly devoted to astronomy in the general sense; his devotion was, in the nature of the man, limited to that part of our science in which he was himself interested. This excluded most of what we call astrophysics, which was perhaps his *bête noire*. On one occasion he remarked with characteristic sarcasm that he supposed that in future we should no longer have an Astronomer Royal but an "Astrophysicist Royal". But there was no doubt about his devotion to positional astronomy; when Comrie gave his allegiance he gave it completely, and, let it be said, often fanatically. He was apt to have no interest in anything unless he could devote himself to it with something like fanaticism, with the result that his range of interests was such that if he had been a normal man he would have been called "narrow". But he was not a normal man; paradoxically enough, his "narrowness" made him completely lovable to those who really understood him. A colleague once told him that he was a fanatic; Comrie regarded this as a high compliment. And there can be no doubt about what astronomers owe to his fanaticism; they are indebted to him for the complete revision and revolutionary

improvement of the *Nautical Almanac*, an achievement which can perhaps be regarded as his *magnum opus*. Many of his friends have regretted that his later career did not follow the established order of things, according to which he would have remained a respected Superintendent of the *Nautical Almanac*, adding further improvements to the offspring of his brain, and in due course retiring with honour when the time came for him to relinquish control of the Office. But it was not to be, and, as far as the interests of Science in general and Astronomy in particular are concerned, need we really regret this? His main contribution to the *Almanac* was done, its future development was assured in the hands of the competent successor whom he himself had trained, and it naturally happened that his successor's individuality had its effect on the Nautical Almanac Office and secured improvements which Comrie himself could hardly have effected (but it is most unlikely that he would have agreed with this). For the *Almanac* the change produced good results, and for Comrie there was other work to be done and other services to Science to be rendered.

Some reference to the circumstances which led to the severance of Comrie's connection with H.M. Nautical Almanac Office will serve to give insight into his character. The plain fact is that the severance was inevitable. He was, as has been indicated, a rather fanatical individualist, and for such the British Civil Service (admittedly to its occasional detriment) is apt to provide a round hole for a square peg. Comrie was appointed to the Office on 1925 October 30 with the grade of Assistant, and four months later, on 1926 March 4, he became Deputy Superintendent with a practical assurance of further early promotion, since the Superintendent, P. H. Cowell, had only a few years longer to serve. The Office at that time was almost static. Cowell had planned the routine work of preparation of the two almanacs (the standard and abridged editions) with superlative skill, with highly trained arithmeticians and the use of logarithms in mind; moreover he had gradually allowed the permanent staff to be replaced by outside workers, generally retired members of the staff. This organization worked efficiently and with little necessity for detailed supervision; but it clearly could not be continued for more than a few years. There were no facilities for training new staff, and there were immense difficulties in introducing new ideas into the almanacs and new methods of computation. To Comrie, overflowing both with original ideas in computational astronomy and with the necessary energy and drive to put them into operation, the organization was totally unsuitable. Whilst Deputy Superintendent he directed his efforts to the introduction and development of the new mechanical methods of computation. At the same time he was brought to realize the need for building up a staff suitable for the fulfilment of the wider international responsibilities of the Office and for the application of the new methods. On his promotion to Superintendent on 1930 August 8 (Cowell retired on August 7) he at once applied himself to this task, and it was at this point that friction developed with administrative authority.

This friction arose as a result of Comrie's personality. A wholehearted enthusiast himself, he failed to realize that some, at any rate, of his administrative superiors, who were accustomed to the peaceful conduct of the affairs of the Office under Cowell, needed to be convinced of the need for change. It must be said that Comrie was apt to find it somewhat difficult to understand the point of view of others, and he would certainly have misinterpreted the natural caution and deliberation with which his proposals were received. A more

tactful man would probably have secured without too long a delay the required official blessing for action which was certainly necessary, but to Comrie the circumstance that he did not get immediate response on a level with his own enthusiasm indicated what he would characterize as administrative sloth and incompetence; and, what was worse, we may well surmise that this characteristically blunt man did not hesitate to say so. This would certainly not go down well at the Admiralty. But it must not be thought that the British Civil Service does not appreciate a good man when it gets him. Comrie's work and ideas were certainly assessed at their true value by many, but he had an unfortunate knack of occasionally antagonizing those who were prepared to back him.

To understand how this came about we must try to appreciate his mental make-up, which was a paradoxical mixture of simplicity and complexity. On the one hand he could be really extraordinarily naïve and he would sometimes handle a situation calling for tact and finesse with a deplorably blunt and tactless approach. But he was also a very proud sensitive man who had a strong tendency to suspicion, and he would often, quite unjustly, attribute to others a desire to block his activities or to do him an injury in some way or the other. This trait of suspicion was probably psychologically connected with his deafness, which increased rapidly as he grew older, and with his physical incapacity (he lost a leg in the First World War while serving in France with the New Zealand Expeditionary Force). At any rate it seems to have led him, on occasion, to adopt a complicated and tortuous procedure, when a frank and straightforward attitude might well have got him all he wanted. We may well surmise that some of his superiors, who would otherwise have supported him, were antagonized by being made to feel that they were not being treated with the frank confidence to which they were undoubtedly entitled. The disagreement between Comrie and the Admiralty on the running of H.M. Nautical Almanac Office finally brought his appointment to an end in 1936 August.

Comrie was born at Pukekoke, New Zealand, on 1893 August 15. He was trained as a chemist, taking his M.A. at Auckland University in 1916 with Honours in Chemistry. In spite of his deafness, he served with the New Zealand Expeditionary Force in the First World War and, as has been recorded above, was wounded, losing a leg. At the end of the War he did not return to Chemistry but forsook it for Astronomy and Computation, subjects in which he had become interested at Auckland University. He proceeded to St. John's College, Cambridge, as a research student, and in 1920 he was elected to an Isaac Newton Studentship. He was awarded the degree of Doctor of Philosophy in 1923, the main part of his thesis consisting of a very thorough investigation of the occultations of stars by planets. This thesis has, unfortunately, never been published; it contained a complete historical account of the subject and a detailed study of the best methods of predicting these phenomena. The work led to a revival of interest in observations of planetary occultations, a revival which was welcomed by Eddington in his Presidential Address, delivered on 1922 May 30, on the occasion of the Society's Centenary Celebration (*M.N.*, **82,** 434). It was at this period of Comrie's career that the Computing Section of the British Astronomical Association was formed in 1920, and Comrie was appointed its first Director. The way in which this Section has devoted itself to what Comrie called in the first Report of the Section "the realms of computational astronomy"

is well known, and needs no comment here beyond the obvious one that the well-deserved prestige of the Section is in no small measure due to the stimulating enthusiasm of its first Director.

While Comrie was at Cambridge it was arranged that two Isaac Newton students (himself and the present writer) should each spend two months working at the Royal Observatory, Greenwich. Comrie went first and I followed immediately after. On arrival I was given to understand that I had come to learn and not to teach Greenwich its job. The fact was that Comrie did not approve of the computing methods then in use, and with characteristic reforming zeal and bluntness had told Sir Frank Dyson (then Astronomer Royal) what ought to be done. This was not too well received, but I think I ought to add that there is another side to the incident: Comrie's advice was, in my opinion, sound.

In these early years of his career Comrie had already developed the sound genius for computational science which eventually led him to do great work, and he had already formed the blunt approach which was eventually fated to create hostility and to hinder the advancement of his plans, good though the latter nearly always were. He proceeded from Cambridge to the United States, where he spent three years, teaching Astronomy and introducing Computational Science into the undergraduate course, first at Swarthmore College, and then at North Western University, Evanston, Illinois. The reputation which he had earned in his own field then led to his appointment to H.M. Nautical Almanac Office in 1925. His career at the Office has already been sketched, but we must now dwell on the technical details of his achievements there. D. H. Sadler writes as follows:—

"It was not long after Comrie's appointment that his experience of computing and table-making was felt on the work of the Office and the design of the almanacs. The *Nautical Almanac, Abridged for the use of Seamen*, introduced in 1914 as a result of consultation with the Society, had only partially surmounted in the editions for 1925 to 1928 the effects of the change from noon to midnight in the origin of measurement of mean time; Comrie redesigned it for 1929 as much as he was allowed to do, introducing the quantities E (12^h *minus* equation of time) and R (sidereal time *minus* mean time) which have remained as standard concepts ever since. This was, however, a trivial undertaking compared with the complete revision of the *Nautical Almanac* for 1931 which followed. Until 1930 the Almanac had retained the general form and arrangement introduced at the instigation of the Society in 1834, after long opposition to change from Thomas Young, then Superintendent. The chief factors that made a change desirable after nearly a hundred years were the separation of the navigational ephemeris from the astronomical ephemeris and the growing impact of modern computing methods. It is unnecessary here to give the changes in detail; their effect is evident in the present almanac. The very considerable task of revision was carried through almost single-handed, with the greatest attention to every detail of presentation and typography.

"In the Almanac for 1931 there were introduced ephemerides for the standard equinox of 1950·0, a direct consequence of Comrie's paper on 'The Use of a Standard Equinox in Astronomy' (*M.N.*, **86,** 618, 1926). This may well prove to be his most lasting contribution to Astronomy, coupled as it was with the preparation and publication of the volumes of *Planetary Co-ordinates*

referred to the Equinox 1950·0 and an enormous simplification in the computation of special perturbations.

" During this period, Comrie was actively engaged in the application of commercial calculating machines to scientific computing, and he introduced modern calculating machines into the Office, gradually changing the methods of computation. In particular, he found the routine summation of the periodic terms in Brown's *Tables of the Motion of the Moon* unduly laborious by hand, and he brilliantly applied Hollerith tabulating machines to their summation; in the course of a single year he had most of the entries in Brown's Tables punched and produced the ' sums ' of the various groups, many of them up to the year 2000. He was prevented from completing the whole work only by the inability to extend, for a short time, the hire of the machines. This work, which is fully described in *M.N.*, **92,** 694, 1932, represents one of the earliest applications of punched-card machines to scientific computation; he used the same method for evaluating the nutation and, later, for the lunar perturbations of the Earth.

" About the same time he installed in the Office a Class II Burroughs machine for which he developed the continuous methods of subtabulation using a ' bridging ' second difference. Under Comrie's direction this machine turned out tables, generally by subtabulation from already known values, at an incredible rate. He had earlier produced the new edition of Barlow's Tables, the computer's indispensable companion, and had collaborated with L. M. Milne-Thomson in the authorship of the *Standard Four-Figure Mathematical Tables*. Arising from a conversation with Professor J. Peters (of the Astronomisches Rechen-Institut and the foremost table-maker of his day) at the 1930 meeting of the Astronomisches Gesellschaft in Budapest, Comrie and Peters embarked on the enormous project of preparing tables of the natural trigonometrical functions for every second of arc. The original plan had to be modified several times, always being reduced as the difficulties of publication became apparent; it finally gave rise to two distinct tables of the four functions sin, cos, tan and cot, one to seven and the other to eight figures. Generally, Peters supplied the pivotal values and the differences to many figures, and Comrie interpolated them and made copy; in all nearly ten million values were produced on the Burroughs machine for this project alone. In 1939 Peters succeeded in getting the *Achtstellige Tafeln* published in Germany by Reichsamt für Landesaufnahme; this table has been photographically reprinted several times in this country and in the U.S.A. No publisher nor financial support has been forthcoming in this country for the 7-figure table, the copy for which is now being placed in the Royal Society depository of unpublished mathematical tables.

" Much of the above work had been started while Comrie was still Deputy Superintendent; on Cowell's retirement in 1930, Comrie was his natural successor. As Superintendent he intensified his campaign for the increased use of modern calculating machines and methods of computation, both in the Office and elsewhere; his greatest triumph in this field was the ' discovery ' of the National Accounting Machine (then the Ellis machine) and its application to scientific computation. These machines have proved invaluable to the Office during the past 16 years. It is not too much to say that during this period Comrie laid the foundations for the recent revolution in computing

practice, and that his work then will continue to influence future developments. He was not content to apply commercial machines to astronomical computation; he developed powerful new methods for use with the machines, particularly in the field of interpolation and subtabulation. The interpolation tables and explanation in the *Nautical Almanac* for 1937, which were reprinted for separate sale as *Interpolation and Allied Tables*, were merely the last of several original contributions. During most of the time he was in the Office, Comrie was the energetic secretary of the British Association Mathematical Tables Committee, which owed much to him for the design and typography of its justly acclaimed tables, as well as for a large proportion of the actual computation.

" Comrie's astronomical interests were primarily in the calculation of the phenomena of eclipses and occultations, for Sun, Moon and planets, following the post-graduate work he did at Cambridge. He had been largely instrumental in founding the Computing Section of the British Astronomical Association, partly so that it could deal with work outside the formal scope of the Office; and much of his work on occultations and the phenomena of Jupiter's and Saturn's satellites was done for the B.A.A., or in conjunction with the Computing Section. He produced the first B.A.A. *Handbook*, and was always generous with help and advice to the Section. In the course of this work he came into contact with J. D. McNeile, who had constructed in wood a machine for the prediction of occultations by the Moon. Comrie borrowed the machine for use in the Office and inaugurated a greatly enhanced programme of centralized occultation prediction; McNeile's machine was copied in metal by A. C. S. Wescott in the Royal Observatory workshop, and was used as a basis for the prediction of occultations in all parts of the world. To simplify the reduction of observations he devised the ' Occultation Reduction Elements ' first published for 1937. He also adapted Chauvenet's classical formulae for solar eclipses to machines, and completely revised the data in the Almanac concerning Saturn's satellites to allow for the prediction of their eclipse, occultation, transit and shadow transit.

" He was an active member of the International Astronomical Union and attended all the meetings from 1928 onwards, being President of Commission 4 (Ephemerides) from 1932 to 1938. At the 1932 meeting he raised the question of the duplication of publication of apparent places of stars and suggested an international volume ; this led in due course to the appearance of *Apparent Places of Fundamental Stars* and to the more efficient redistribution of astronomical calculations and publication.

" Comrie was not, and did not claim to be, a mathematician; but he possessed two great qualities that enabled him to tackle and solve problems in a practical way. Firstly he had the necessary clarity of mind to see a computing problem in its entirety, and secondly he had the courage and the energy to attack it directly. His work is characterized by an essential simplicity of approach, supplemented by an impeccable computing technique in which the greatest attention is paid to detail. Results are not obtained in this way through flashes of brilliance; they are always the outcome of steady work, in which every alternative is examined and every step tested. His energy and application were alike remarkable; the work he did in his ten years in H.M. Nautical Almanac Office is staggering in its sheer magnitude—at least, to those who can appreciate the amount of detailed work involved in the planning of a complicated piece of

computation or the typographical lay-out of a page of figures. A week-end for him often meant 18 hours' solid uninterrupted work."

The characteristics, which made Comrie one of the greatest Superintendents of H.M. Nautical Almanac Office (perhaps the greatest) as far as the technical side of its work is concerned, served him well in his subsequent career and gave his firm, Scientific Computing Service Limited, its well-deserved high reputation. This firm, which was founded by Comrie in 1937, was the first professional organization (and still the only one) to provide large-scale computation with high mathematical content. Under Comrie's leadership a powerful and experienced team was built up and major computational operations have been performed for Government Departments, for Universities and for Industry. Comrie was particularly proud, and justifiably so, of the war work of his firm.

Three hours after war was declared he was approached by the War Office who required, as a matter of urgency, some ballistic tables. The work was planned and begun within 24 hours and two volumes of 200 pages of double entry tables were computed, set, printed, indexed and bound, all in the first twelve days of the war. This characteristic display of drive combined with skill was followed, over a year later, by the successful solution of a difficult but important problem. During the winter of 1940–41 the enemy was using beam wireless stations on the north coast of France to guide his raiders, and it became important to locate the position of one of these. The available very incomplete and very imperfect data were supplied to Comrie's firm, bit by bit, after each raid. After several months' intensive work on a difficult inverse problem, rendered all the more difficult by incomplete data, an estimate of position was reached, and immediate air reconnaissance revealed the station, well camouflaged, within 100 yards of the estimate. This work was followed by the construction of a series of " wind graphs " for facilitating sound ranging. Later on the firm produced certain bombing tables and undertook the heavy task of converting 24 000 latitudes and longitudes from the Prussian Triangulation to the rectangular coordinate system used for artillery purposes.

Truly Comrie served his country well, and astronomers will be particularly interested in the results which followed as a consequence of experience developed in an astronomical institution. In the operations of his firm major emphasis was always laid on accuracy. He, the founder, was naturally during his active life the mainspring which operated the whole mechanism, but he did not forget the task of training others who would carry on his methods.

His main work was always in the application of commercial machines to computational problems and in the construction of mathematical tables. He was especially interested in table-making, and some of his activities in this field have already been mentioned. He always believed that the maker of tables not only should, but also could, provide tables that were substantially free from errors, and the tables bearing his name have set up a standard which can hardly be surpassed. But this was not all : he believed that it was his duty to give the user of tables every possible convenience, so not only were his tables checked and re-checked, but they were designed to be easy to interpolate and easy to read. This last is a much-to-be-desired characteristic which has not always been realized in the past. But Comrie had an expert knowledge of typography and he applied this knowledge, together with unrivalled experience and tireless

attention to detail, to achieve something like perfection in presentation as well as perfection in accuracy. This feature of his published tables is one which has been appreciated to the full by users afflicted with defective eyesight; often such users by reason of their lack of typographical knowledge do not realize *how* the end has been achieved, but they well know that it has been achieved and that the use of Comrie's tables involves the minimum of eyestrain. And apart from the tables bearing his own name, Comrie, in his capacity as Secretary of the British Association Mathematical Tables Committee, saw to it that the B.A. Mathematical Tables came up to his standard of presentation. During the last two years of his life he was a member of the Royal Society Committee on Mathematical Tables. His services on such committees were always of the highest value but it must be recorded that at times, at any rate in his earlier years, the proceedings were apt to engender heat.

Comrie's expert knowledge of typography was of considerable value to the Society when the general style of printing of our *Monthly Notices* was changed. The changes were worked out by a sub-committee of Council of which he was a member, and the new style, which commenced with Volume **92** (1931–32), was largely due to him. But he was annoyed because *all* his ideas were not accepted by Council, and he remarked with characteristic impatient petulance to the present writer: " Then I am finished with the R.A.S." Of course he did not really mean that; he was too devoted to the Society to mean it. He was subsequently persuaded that his efforts were really appreciated by the Society.

He had previously rendered a service to the Society of quite another kind, although his activity in its interests was not wholly appreciated at the time. A state of affairs had developed in which the Council had to a large extent become a closed caucus; there was no rule whereby members of Council retired in rotation, as they do now, and several members of Council had, by 1927, served continuously for many years. At the Annual General Meeting held on 1927 February 11, Comrie, ever a stormy petrel, proposed (acting in conjunction with the late Mr Frank Robbins) some new members of Council as alternatives to the Council nominees. In the end the Council nominees were elected on the ballot, but the protest was effective; members of Council realized that all was not well, and the much-needed reform followed shortly afterwards.

But we must return to Comrie's activities in the field of mathematical tables. He not only made new tables of a standard which had never before been attempted, but he had a profound knowledge of existing ones. He was the author of a comprehensive note on Mathematical Tables which appeared in *Monthly Notices* for 1932 February. For many years he hoped that some day he would be able to produce an index covering all existing tables. Such an index is now available, but Comrie is not its author, although he played an important part in its final production. The following extracts from the Publisher's Preface to *An Index of Mathematical Tables* by Fletcher, Miller and Rosenhead, published in 1946 by Scientific Computing Service Limited, tell the story in Comrie's own words and illustrate the generosity which was a prominent feature of his character.

" My interest was naturally aroused when I learned that the three authors of this Index were working on a subject dear to my own heart—one on which I have laboured for a quarter of a century. I realised immediately that, with their combined mathematical knowledge, their team work, and the opportunities

for research that come a little more easily in universities than to one responsible for a team of thirty computers busily engaged on war work, they had the means of bringing to early fruition what might take me a decade. I therefore resolved to offer every assistance in my power. Of the nature of that assistance the authors themselves have spoken in generous terms. It consisted mainly in seeing that the standard of printing was up to the standard of authorship. Photographic reproduction of typescript was rejected from the beginning, and a four-figure bill for typesetting faced without hesitation.

" Should there be found any who complain about the price of this book, let them be informed that the price of any book is a function (although not a tabulated one to be found in this *Index*) of the cost of production and of the estimated sales. Here the former is high, and the latter, from the specialised nature of the subject, cannot be expected to be high. Indeed the publisher faces no prospects other than financial loss, which he does calmly with the knowledge that he has served science by helping this work to see the light of day in its present dignified form."

As a matter of fact Comrie's own projects went rather further than the compilation of this very valuable *Index*. For many years he had conducted systematic and thorough searches for errors in existing tables, and he worked up to the end at this task, which he almost completed. It is good to learn that the results of his labours will appear as part of a new edition of the *Index*.

Before the publication of the *Index* Comrie had begun what was fated to be his last contribution to serious table-making. In 1944, the centenary of the first publication of *Chambers's Mathematical Tables*, the publishers, Messrs. W. & R. Chambers Ltd., had asked Comrie to report on these tables with a view to bringing them thoroughly abreast of modern requirements. Report on them he did, and his report must have been something of a shock to the publishers. The existing seven-figure tables were characterized by the difficulty of interpolation necessarily inherent in a single volume of modest dimensions (and so of modest price). Comrie was never the man to mince matters; the details of his report and of his subsequent conversations with the firm are not known, but anyone who knew him may well make some surmises. He probably said that the existing tables should be consigned to a bonfire, or words to that effect, and he probably pointed out with considerable emphasis, backed by his unrivalled experience, that there were already some excellent (and bulky) seven-figure tables in existence, but that there was a definite need for six-figure ones. The essential point however in the conversations that took place between Comrie and Messrs Chambers is that the latter were not slow to realize that they were dealing with a man who knew what he was talking about; at any rate his report was accepted, and he was commissioned to prepare the new *Chambers's Six-Figure Mathematical Tables*. The main tables comprise two volumes, one giving logarithmic and the other natural values; there is also an Abridged Edition which combines the most important tables in the two volumes; and in addition there are two sets of four-figure tables. But no serious computer can afford to be without the two main volumes, concerning which Comrie remarked in the preface that they " may fairly be described as one of the greatest of all British table-making enterprises ". It is characteristic of Comrie that he himself should have made this remark, which will be endorsed by many users. These tables exhibit all his skill in presentation as well as his high standard of accuracy. The

following extract from the preface is quoted as being typical of the author who, it will be noted, deliberately refrained from correcting a few known but immaterial errors.

" Proofs have been read against a great variety of published tables where appropriate ones exist. Where the tables are the result of original calculations, no undue steps have been taken to secure rigorous accuracy of half a unit in the last decimal. In no case should any error greater than +0·52 units of the last decimal be found. Moreover, it is confidently believed that the cases where the error exceeds +0·51 units of the last decimal could be counted on the fingers of one hand; those that are known to exist form an uncomfortable trap for any would-be plagiarist."

It should be added that the " Explanations " to these volumes are of high value in themselves and, as has been remarked by Miller (*Nature*, **167**, 14), they may also be used as a textbook on general computational techniques. A very large proportion of Comrie's computational experience has been compressed into these " Explanations ".

His contributions to table-making and computational technique represent a very substantial service to Science which was recognized by his election to Fellowship of the Royal Society in 1950 March. This election gave him great pleasure at a time when he was depressed by rapidly deteriorating health. He had been afflicted by a stroke which left him with an active mind, but which impaired his speech and left him with a reduced capacity for work. This made him definitely unhappy; the trouble was that he had practically no interests apart from his work. Actually he did work, right up to the last, but by the autumn of 1950 it had become apparent to some of his friends, and probably to himself, that the end was drawing near. On Friday, December 8, he attended the dinner of the Royal Astronomical Society Club, an institution to which he was greatly attached. He very obviously enjoyed the evening and the good companionship which is a feature of these dinners, but he seemed to think that it would be the last meeting of the Club for him. On the following morning (Saturday) he went with the present writer for a walk in Greenwich Park; he was then depressed, and it was apparent from his conversation that his will to live was vanishing. The end followed swiftly; he died in his sleep on the Sunday night as a result of another stroke.

A brief reference has already been made to his generosity. A circumstance can now be disclosed which, so far, has been known only to Officers of the Society and to its office staff. For some years Comrie paid an additional subscription to the Society and asked that it should be used to continue the Fellowship of someone who would otherwise have to resign for financial reasons. This was but one typical instance out of many. Allied to his generosity was his hospitality; in particular he took great delight in entertaining visiting astronomers, and not many such came to London without visiting his house in Blackheath.

He was a man who lived for precision in all things, and not merely in all important things. Indeed, the trouble he would take over some matters appeared to his friends as verging on the ludicrous. I well remember the care with which he would weigh out with a balance the exact amount of salt prescribed for the routine " rejuvenation " of a water softener he had installed in his house. But this was typical of the man; he lived for precision, and being prepared to go to