can ascertain of conditions in the past, it is clear that—in addition to the presence of the fish, which can probably be relied upon in most years—it is necessary for a prosperous herring fishery in the Isle of Man either that a local market should be constituted by competing buyers and curers from Scotland or elsewhere, or that arrangements should be made to transport the daily catch by steam-carriers to a market on the mainland, such as Liverpool, Fleetwood, or Holyhead. As a result of the lack of market facilities, it may be noted that during the greater part of this summer herrings have been sold retail at Port Erin at twenty for a shilling, while in Liverpool they cost from three-halfpence to twopence halfpenny each.

After the war it will for some time probably be just as important as it is now to prevent money from leaving the country, and with a view to this, as well as for other reasons—in brief, the production of food and the employment of men—it is obviously desirable that all home productivity should be organised and stimulated. The exploitation of minor fishing industries along our shores naturally occurs as one step in this direction, and the economic need for developing these deserving industries seems obvious and urgent.

THE LONDON MATHEMATICAL SOCIETY.[1]

IN the midst of the universal cataclysm of the war, when all interests are strained towards the national defence, the London Mathematical Society has passed, without notice, its fiftieth year of activity. The first meeting was held at University College, on January 16, 1865, and heard an address by Prof. de Morgan on the aims and prospects of the society. The de Morgan medal is a reminder for us of his predominant share in the inauguration of the society, which he did not survive long to guide. In the early days the publications consisted of a series of pamphlets separately paged, containing single communications; the names of Sylvester, Cayley, Harley, Tucker occur as authors in the first year. There followed later brief reports of meetings, along with papers by de Morgan, Sylvester, Crofton, Cayley, H. J. S. Smith, Cotterill, and others. These publications now stand as vol. i. of the first series of the Proceedings. With vol. ii., which begins with the annual general meeting of November 8, 1866, the Proceedings became crystallised into a form which has persisted substantially, except as regards size of page, to the present time. The society began operations with twenty-seven original members, nearly all of them members of University College, London; at the end of the first year the number of members was sixty-nine, rising to ninety-four in November, 1866; and the society had already become representative of British mathematical science by having on its roll most of the eminent investigators in our subject belonging to Cambridge and Oxford, as well as London.

On January 15, 1866, it was resolved "That steps be taken to ascertain on behalf of the society whether and on what terms rooms can be obtained at Burlington House," and on November 8 a report was made that "by the kindness of the Chemical Society in lending their rooms, the society had been enabled to hold their meetings at Burlington House, where they now meet for the first time." By 1868 most of the British authorities on pure and applied mathematics of that time, who were resident within reach, including de Morgan, Cayley, Sylvester, Hirst, Crofton, H. J. S. Smith, Archibald Smith, Clerk Maxwell, Spottiswoode, S. Roberts, Clifford, Stirling, had been taking active share in the work of the society by attendance and service on the council, as well as by the contribution of papers for discussion at the meetings. We must not omit from this list Lord Rayleigh, whose memoirs illuminated our Proceedings for many years; who, stimulated by the increasing importance of the society, became the donor of our most substantial benefaction, which has largely increased our resources for publication ever since the early days. In November, 1870, the society migrated to rooms occupied also by the British Association, in the house of the Royal Asiatic Society, 22 Albemarle Street, where accommodation was found for the library, of which a nucleus had been formed by the books of Sir J. W. Lubbock, the physical astronomer, presented by his son, afterwards Lord Avebury; and there by successive forms of tenancy we have remained until now.

For some years past the library, rendered valuable by accumulation of scientific journals through exchange, and by donations of books, has quite outgrown the accommodation available; and weighty complaints became frequent that, by overcrowding, the books had become, notwithstanding the zeal of successive honorary librarians, almost inaccessible to members of the society. The problem, thus pressed upon them from many sides, was taken in hand resolutely by the council during the last session, and after various plans had been proposed and closely considered, a solution was reached.

It came to the knowledge of the council that the Royal Astronomical Society would probably be willing to extend hospitality to the Mathematical Society, as regards both place of meeting and general headquarters, thereby establishing, or rather renewing, an alliance between British mathematicians and astronomers, whose activities have always interpenetrated with the closest mutual benefit. Following on the confirmation of this plan, subject to the approval of the Office of Works, arrangements have also been made with great cordiality by the authorities of the Science Museum at South Kensington, whereby our library will be deposited in their scientific library under a scheme which will maintain full use of it by the members of the society, in surroundings where the cognate scientific literature, and extensive mechanical applications of mathematical. principles, will be accessible for study.

We have, therefore, the pleasure now of holding the first of our meetings under the new conditions, at Burlington House, in very congenial surroundings.

The necessities of the national emergency have mobilised with striking success the industrial resources of science, hitherto neglected too largely in our defensive organisations. A most welcome result is the increased sense that has arisen of the national value of scientific pursuits; but danger is by no means absent that, in the haste to secure the material fruit, the welfare of the tree of knowledge, the pure and fertile source from which it springs, may be neglected or even impaired, and, like others of ancient days as well as recent times, we may succumb to the temptation "propter vitam vivendi perdere causas."

It is our duty here to take into consideration how our own special energies may best be rejuvenated and renewed, so as to become more effective in the enhanced and purified national life which, as we trust, will emerge from our present ordeal. Mathematical knowledge, in all ages the ally of sustained and exact activities, is now more indispensable than ever, when our material well-being depends so much on scientific engineering in its mechanical, electrical, and chemical forms. The highest commendation of any growing department of research is to be able to say that it is approaching the quantitative, the mathematical, form; many sciences, formerly descriptive and

[1] From an address delivered at the anniversary meeting of the London Mathematical Society on November 2 by the retiring president, Sir Joseph Larmor, M.P., F.R.S.

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classificatory, are even now struggling to assimilate a mathematical method. But if it is just to claim that other sciences, nowadays even the biological, aspire with increasing success to become mathematical—that is, exact—in structure, there is, on the other hand, a duty enjoined on mathematicians to see to it that the main stream of their discipline is kept accessible—free from specialities and complexities, which, valuable and promising as they may be, and usually are, on their own account, to those capable of cultivating them, are yet for the present outside the current of the main advances of human knowledge. The play of human thought knows of no boundaries; it can pursue and clarify itself without limitation into endless mazes. All the more, we must be careful, in reclaiming and cultivating our boundless domains of mental evolution, not to lose touch of one another; if a theorist cannot command the attention of his own generation, he is scarcely likely to attract the interest or serve the purposes of posterity. The one criterion that is available of the value of an addition to pure knowledge is the human mental interest it can excite. We have our very being inside a well-ordered cosmos, intellectual and material, which it is our highest mental pleasure to explore in all directions and learn to comprehend; and we have a not unsafe guide in trained instinct and sense of fitness and symmetry, industriously applied, to appraise aright the value of each new departure. Knowledge thus cultivated on a broad basis for its own sake, so far from obstructing industrial applications, is their profound source. The study of curves, especially the conic sections, by the Greeks, at home and afterwards at Alexandria, is not, as is sometimes asserted, an example of mere useless mental ramifications happening to receive an application in later ages; it was on the direct path of progress, and formed the material, adequate and effective because not unduly complex or abstract, on which the ideas of the infinitesimal calculus—and may we add the mechanics of Archimedes and Galileo?—were gradually matured. And if it became in Newton's hands the weapon for the elucidation of the doctrine of universal gravitation, whereby human science first reached out securely into the illimitable universe, what analyst will deny the preordained fitness of the association?

There was a time, when the annual output of the Mathematical Society was smaller in bulk than it is now, that many of us made a point of taking an interest in all the papers that it published. It would be a great thing if we could get back again towards that state of affairs. At least two of our most distinguished analysts have in my hearing traced the aloofness, and even aridity, of much recent work to the neglect of geometrical ideas, the potent source in the past of mathematical progress and consolidation, and the vehicle for the diffusion of our science. It seems a strange phase of development, when we consider the preponderant graphical, tentative, and practical bent of the national intellect, and remember how much of our most characteristic progress and originality in theoretical physics has been, for the sake of being comprehensively grasped and mastered by the mind, so concisely wrapped up in geometrical imagery, and so freed from analytical technicalities, as to have been even obscure to communities trained in more formal and syllogistic methods.

There is always risk in getting too far from the main currents of our times; there is the danger, not always avoided, that in the fog of ignorance and the lack of interest we may encourage expansion in artificial and unfruitful, and even tedious, ramifications, while criticising and suppressing with rigour worthy, but immature, attempts in the well-explored regions of our science, where improvements are so important and originality is so difficult. The contrast with the difficulty of obtaining publication at all a century ago, except in brief summary, gives ground for reflection.

Of recent years the question must have presented itself to not a few of our authors whether the Proceedings, developing in so abstract a direction, are now quite as suitable a place for the publication of mathematical physics as they were in the days when Maxwell and Kelvin, and Rayleigh and Routh, were frequent contributors. Yet the potent source of even the most abstract branches of modern analysis has lain in the seizure and orderly cultivation of the intuitional ideas, largely cast in geometrical mould, that are forged by physical science in the effort to systematise its observations of the uniformities of the rational world around us. To renew our strength for wider flights we must return frequently to mother earth. The main feature of the technique of physical mathematics is that we are seldom dealing with a completed, and therefore strictly limited, logical complex; it is of its essence that the specification of the problem is fluent and provisional, always ready to take on new features as the discussion opens out. The student of mathematical physics cannot with safety afford to be a specialist; every department of physics is dovetailed into the other departments and progresses by their aid; knowledge must be so far as possible on an intuitive basis, to prevent it from becoming top-heavy, and all the threads must be in hand. For intuition sees, however imperfectly, all round a problem at a single glance; while analysis afterwards consolidates a permanent structure by fitting brick to brick. Even the most abstract of analysts must work at a disadvantage if he has no informed interest in the problems of external nature for which his analysis might be of assistance; and conversely, even the most recondite constructions of pure analysis would be of interest to a wider audience if they could be expounded in a non-technical manner, without the great detail that is sometimes thought to be essential to the necessary degree of precision. Nature is never irrational, but our main intellectual aim is the redemption of our views of her operations from that reproach; it is the freshly detected and systematically traced concatenations of her working that enlarge our stock of ideas, and become for us a source of new generalisations in abstract procedure, giving fresh points of view to be developed and to react in their turn. It is sufficient to cite the names of Cauchy and Riemann, not to mention the supreme examples of Lagrange and Gauss, to show that the most brilliant originality in abstract analysis, and habitude in the intuitions of physical science, can go together, to great mutual advantage.

Fortunately there are signs, abundant on both sides, that the repulsion which somehow arose with us in the last decades between the tentative, yet essentially progressive, though concise, prospecting of mathematical physics, and the stern but limited rigours associated with undiluted pure analysis, is now beginning to be recognised as cramping and unnatural; it may thus melt away in a better mutual understanding, and may one even say mutual interest, to the great advantage of both disciplines. Our analysts have been turning with success, and with a zest of a kind that seems familiar to their more physical colleagues, to semi-empirical methods in the theory of numbers; speculative interest has again arisen even in divergent series, such as would have rejoiced the soul of de Morgan, logician though he was; and the time-worn problems of partitions and combinations have been yielding their secrets to the powerful leverage of an apparatus of arrays and lattices, that may remind us of crystallography and even of thermodynamics.

Our society has lost by death not a few of her veteran members during my two years of office.

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Notices of the work of Morgan W. Crofton, W. H. H. Hudson, Benjamin Williamson have already appeared in the Proceedings. In Sir James Stirling, Senior Wrangler of 1860, lately Lord Justice of Appeal, we have lost another of the survivors of our early days, whose interest in our science never flagged, whose mathematical training and gifts were the foundation of a legal and judicial eminence not often arising in a generation. In William Esson, Savilian professor, and John Griffith we have lost two Oxford mathematicians long connected with us. Though F. W. Frankland, an early member, had passed out of sight owing to distance of domicile, his combination of mathematical and philosophical interests had not become dormant. I may be permitted to add the name of John Henry Poynting; though his life-work attached him to sister societies, his wide physical outlook, combined with mental exactness and penetration, has made for him an enduring name in mathematical, as well as experimental, physics.

It is our pride and sad privilege to recall the names of the cultivators of our science who, in response to their country's appeal in time of national peril, have already laid down their lives on her behalf. In E. K. Wakeford, scholar of Trinity College, Cambridge, not a few of us had recognised a future leader in geometrical science. A colleague more senior and more widely known, S. B. McLaren, professor of mathematics at Reading, coming from Australia, and taking a high degree at Cambridge, had become a learned and philosophical inquirer in the difficult domain of statistical molecular dynamics and the relations of the æther to material systems; the work which formed the basis of the recent award of an Adams prize may remain, I fear, unpublished in any finally revised form. We are entitled also to recall the name of H. G. J. Moseley, who, though he would not have claimed to be a mathematician, had in a brief and brilliant career at Oxford and Manchester contributed fundamentally to the data of the mathematical physics of the future, by revealing the earliest universal and unmistakably quantitative relation in the fascinating domain of the correlations of the chemical elements.

Such heavy sacrifices of colleagues who could so ill be spared we must deeply deplore, but not as if they were made in vain. May we not detect beyond them, and on account of them, the promise of nobler and more disinterested times, when the vast destruction of perishable material resources will be far more than compensated in the remembrance of the heroism of the youth of our generation, and in the gain in moral and intellectual wealth that it will stimulate as an abiding possession?

The world's great age begins anew,
The golden years return.
The Earth doth like a snake renew
Her winter weeds outworn.

* * * * *

A brighter Hellas rears its mountains
From waves serener far:
A new Peneus rolls his fountains
Against the morning star.

UNIVERSITY AND EDUCATIONAL INTELLIGENCE.

LONDON.—The title of emeritus professor of physics in the University of London has been conferred by the Senate on Dr. F. T. Trouton, who held the Quain chair of physics at University College from 1902 to 1907, and after the incorporation of the college held it in the University from 1907 to 1915.

The following doctorates have been conferred:—In anthropology, Mr. B. G. Malinowski, an internal student, of the London School of Economics, for a thesis entitled "The Natives of Mailu"; in botany, Mr. F. J. F. Shaw, an internal student, of the Imperial College of Science and Technology (Royal College of Science), for a thesis consisting of five papers on mycology; in economics, Miss E. D. Proud, an internal student, of the London School of Economics, for a thesis entitled "Welfare Work: Employers' Experiments for Improving Working Conditions in Factories"; in physics, Mr. David Owen, an external student, for a thesis consisting of two papers on "Solid Rectifying Contacts," and subsidiary contributions; in psychology, Mr. G. H. Miles, an external student, for a thesis entitled "Preference and Affective Influence as Factors in Recall," and subsidiary contributions; in engineering, Mr. N. W. McLachlan, an external student, for a thesis entitled "Magnetic Properties of Iron," and subsidiary contributions.

IT is announced that friends of the University College of Wales, Aberystwyth, have expressed their intention of contributing 100,000*l.* to the funds of the college, subject to a reservation of their right to make proposals to the council as to either the capital or the income.

THE governors of the Royal Technical College, Glasgow, at the request of certain donors, offer prizes, amounting to 70*l.*, for essays on the best methods of training and employing in industries, other than agriculture, returned soldiers and sailors, maimed or otherwise. The prizes will be awarded by a committee of the governors, and may be withheld in the event of no essay of sufficient merit being submitted. Essays must be sent in not later than March 1, 1917, addressed to the director, the Royal Technical College, Glasgow.

WE learn from the issue of *Science* for November 17 that the General Education Board and the Rockefeller Foundation have each granted 200,000*l.* for the establishment of a medical department in the University of Chicago. This gift brings Mr. Rockefeller's contributions to the University up to nearly 7,400,000*l.* The University will set aside at least 400,000*l.* for the same purpose, will give a site valued at 100,000*l.*, and will raise a further sum of 660,000*l.* The medical school will therefore start with an endowment of some 1,600,000*l.*

AT the request of the Right Hon. A. Henderson, when President of the Board of Education, the Royal Drawing Society has presented to the Committee on the Teaching of Science a memorial setting forth the value to the scientific worker of drawing and the cognate crafts, and the need for including drawing as an integral part of general education. This, the society maintains, is best accomplished, not by special classes, but by encouraging the faculty which is manifested in nearly all children, and by making it a natural mode of expression in the various branches of school work, *e.g.* history, geography, nature-study, and physical science. The memorial is signed by H.R.H. the Princess Louise, as president, and by many distinguished workers in pure and applied science, some of whom are members of the society's council. In connection with the Conference of Educational Associations, the society has arranged a discussion on the subject, with lantern illustrations, at the University of London, on January 1, at 5.30 p.m. Among the speakers will be Dr. P. S. Abraham, Dr. F. A. Bather, Mr. J. P. Maginnis, and Mr. Ablett.

THE first meeting of the Senate of the new University of Mysore was held on October 12. The proceedings are reported in the *Educational Review* (Madras) for October. In 1913–14 two educational officers of the State studied modern university conditions in foreign countries; a draft scheme drawn up in November last year embodied the joint views of the

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