THE MATHEMATICAL ASSOCIATION REACHES ITS FIRST CENTURY

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In this second article Mr Combridge completes the History of the Association from 1897 to 1971

In January 1901 the annual general meeting was held for the first time at King's College London. The retiring president, Sir Robert Ball, F.R.S., gave an address entitled "Some Contributions to Geometry from recent Dynamical Work." The wheel had indeed come full circle. The original A.I.G.T. target looked as inaccessible as ever, but success was not far away, and it was to come with the second educational milestone, the Balfour Act of 1902. Again, there was no direct causal connexion, but undoubtedly both events reflected changes in public opinion.

On Saturday 14 September 1901, at the annual meeting of the British Association in Glasgow, a joint session was held between the Mathematics section and the newly-created Education section. It was introduced by a paper from Professor John Perry, F.R.S., a great teacher of engineers. He severely criticised existing mathematics teaching and put forward a number of proposed syllabuses. He alleged that "it is usefulness which must determine what subjects ought to be taught to children, and in what ways" and complained of those who could see only one form of usefulness — that of mind training.

As a result the British Association set up a strong committee with Professor A. R. Forsyth as chairman. A series of very practical communications also appeared in Volume II of the *Gazette*, and in 1902 the M.A. Council, at the invitation of the B.A., set up a committee — the General Teaching Committee, with A. W. Siddons as its secretary — to co-operate with the B.A. The B.A. committee reported to the B.A. in September 1902, making only a series of general suggestions. The General Teaching Committee had by then published in the *Gazette* for May 1902 a preliminary syllabus for Geometry. Godfrey and Siddons, however, on holiday together, saw that what was needed was a text-book embodying the syllabus; they immediately wrote one, and their *Elementary Geometry* was published on 15 September 1903. Siddons was at a reception given by the C.U.P. in 1953 to mark the jubilee of publication; Godfrey had died (aged 50) after a short illness in 1924. With this book began the continuous interchange of ideas between committees and text-books which has characterised the life of the Association ever since. One thinks of Robson and Durell, and especially of C. O. Tuckey

who was a member of that first Teaching Committee and was made an honorary member of it in 1962 after sixty years of continuous and productive service to it.

The first eighteen months of the Teaching Committee coincided with intensive lobbying at the universities of Oxford and Cambridge, and at last to the collapse of the opposition there. In the end this was due partly to some very skilful steering in Cambridge by Professor Forsyth, and partly to careful diplomatic deportment by Siddons who was brought into the final discussions both there and in Oxford. The many years of spadework by the early A.I.G.T. had at last borne fruit, and in the summer of 1903 both universities agreed to accept proofs and orders of propositions other than Euclid's in their entrance examinations.

The A.I.G.T. had recorded 61 members after its inaugural meeting in 1871. The number rose steadily to nearly 200 in 1897. The events of 1902, and a decision to publicise the *Gazette*, led to a further increase to about 700 in 1913. The first branch — that in North Wales at Bangor — was formed in 1907. London and Southampton followed suit in 1909; then there was a lull until the twenties.

A Board of Education circular (no. 711) in March 1909 made an authoritative attempt to give a lead in the new teaching of Geometry; it recognised three stages: familiarity with concepts; acquaintance with outstanding theorems; systematisation. W. C. Fletcher (made an Honorary Member in 1958, along with A. W. Siddons and C. O. Tuckey) was largely responsible for it.

First Geometry Report

The General Teaching Committee in 1902 had formed sub committees for separate subjects, but after the Geometry syllabus submitted in May 1902 no full-scale report was issued until after the war. The first *Report on the Teaching of Geometry in Schools* came out in 1923; it was written mainly by E. H. Neville and T. P. (later Sir Percy) Nunn. Reports followed on Mechanics (1930), Arithmetic (1932) and Algebra (1934), and a much amplified form of the 1923 report was issued as *A Second Report on the Teaching of Geometry in Schools* in 1938. Membership had now increased to over 1,750, but in 1939 came the second world war.

Meanwhile, in November 1929, Council had appointed a special committee to report on the relation of the Branches to the Association. One outcome was the setting up of the Branches Committee in 1932, one aim being that it should work closely with the Teaching Committee in the publication of reports. Co-operation tended to take the form of discussions on newly published reports, rather than on consultation while reports were being prepared — which last is what the Policy Committee of 1969-70 has recommended.

The third educational milestone, the Butler Act, was reached in 1944. It brought in secondary modern and comprehensive schools, and a change from the old school leaving certificates to the General Certificate of Education. Mathematics lost its status as a compulsory subject for a leaving certificate. At about the same time a committee reported which had been set up at a conference convened in 1943 by the Cambridge Local Examinations Syndicate; its chairman was Professor G. B. Jeffery, F.R.S., and at least four of its seven members were representatives of the Mathematical Association. The report recommended an Alternative Syllabus from which the traditional division of mathematics into separate subjects would be missing; in any paper questions might be set on any part of the syllabus, and any solution might involve more than one branch of mathematics. Questions on the Calculus might be set in the optional parts. These were reforms long desired by the Association and, like its predecessor with Forsyth, Council nominated Jeffery as President for 1947.

This new unification of mathematics, however, did not prevent the Teaching Committee from completing reports on Trigonometry (1950), Calculus (1951) and Higher Geometry in Schools in 1953. But the committee showed its awareness of developments by bringing out a report on the use of visual methods in that same year, and one on the teaching of mathematics in Technical Colleges in 1955.

Computers

Loss of status as a compulsory subject was compensated for by a rise in status due to the electronic computer. This created a demand for mathematically able acolytes but also, more indirectly, it led to careers more lucrative than that of teaching. The first reactions were efforts to make mathematics in schools more relevant and interesting by acquainting teachers with its uses in commerce and industry. Hence came the conference in Oxford in 1957, widely supported by industry and organised by Dr. J. M. Hammersley; this was followed by conferences for mathematics masters run by the big oil companies, and by a growing demand, which became vocal about 1959, for an Institute of Mathematics. But already in 1958 W. J. Langford in his presidential address uttered a warning about the forthcoming shortage of not only pupils but also teachers of mathematics. This was repeated by Professor Thwaites in his inaugural lecture at Southampton in 1961, and followed by the launching of the School Mathematics Project in which, under Thwaites's directorship, H. M. Cundy and D. A. Quadling — to mention two M.A. stalwarts among others — were to take a leading part.

Meanwhile, owing to a movement associated with the name of Bourbaki, new ways of regarding the structure of mathematics were becoming prevalent in the universities and attracting attention first of all in the higher forms in schools. At the same time there had been, throughout the 1950's, an increasing awareness of the value of a "discovery approach" (to use an inadequate portmanteau phrase) at all ages. Possible repercussions of this for primary schools were spelt out very fully in the Association's *Report on the Teaching of Mathematics in Primary Schools* which was published as early as 1955. A confluence of these two movements resulted from an international seminar at Royaumont in France in 1959, and was usually referred to as "modern mathematics". Various new projects sprang into life, and two or three bandwagons materialised and made direction-keeping difficult. The Teaching Committee brought out a report for secondary modern schools in 1959. The *Gazette* in December 1960 printed an article by J. A. P. Hall summarising the Bourbaki concepts, and finally no. 362 (December 1963) was devoted to a symposium on "modern mathematics" which did much to put into perspective the relationship of the new ideas to school teaching.

Joint Mathematical Council

A conference for schoolmasters in November 1961, organised by the British Petroleum Company, resulted in the establishment by the Mathematical Association of its Schools and Industry Committee in 1962. In the same year, a letter signed by the immediate past-president of the M.A. and two distinguished past presidents — Professor Sir William Hodge, F.R.S. (then Physical Secretary of the Royal Society), and Dr. (later Dame) Mary Cartwright, F.R.S. (then President of the London Mathematical Society) led to the inauguration in January 1963 of the Joint Mathematical Council of the United Kingdom. This has done much to bring together the numerous activities in the mathematical world in this country resulting from the general ferment of ideas. It also responded to the call for an Institute, the office of the M.A. playing an indispensable part in the execution of plans formulated under the leadership of Dr. M. J. Lighthill, F.R.S. and Professor A. Geary.

Following up its concern with the shortage of teachers of mathematics the Association produced a *Report on the Supply and Training of Teachers of Mathematics* in 1963. The J.M.C. in 1965 issued a brief pamphlet on in-service training for teachers of mathematics. The problem was next taken up by the Institute, and is now being attacked by all through the Royal Society's Joint Committee on Mathematical Education.

As a constructive act the Association in 1960 set up a Board under the chairmanship of W. J. Langford (to whose inspiration and work it owed much) to award by examination a Diploma in Mathematics for teachers who wished to add this subject to their qualifications. This Diploma is now recognised for salary purposes. A year or two later, to help others who needed some qualification in the subject, another examination was instituted — the Diploma in Mathematics (Technology). This was continued until it could be taken over by the Institute as providing a qualification for membership for non-graduates. Incidentally, it was Langford who in 1964-65 initiated and carried through the first negotiations for the assignment of a coat of arms to the Association. At the same time the Universities and Schools Committee was set up under the late A. P. Rollett to provide a permanent connexion between sixth forms and university teaching and entrance requirements.

Mathematical Contests

In 1961 some English schools accepted an invitation to participate in the Mathematics Contest being run in the U.S.A. The number of schools and candidates respectively increased from 2 and 60 in 1961 to 109 and 5,000 in 1965. In that year, at the suggestion of Professor and Mrs. Hayman, a British Mathematical Olympiad was started for contestants selected on the National contest. The Guinness Awards for Science and Mathematics teachers gave assistance with both competitions, and gave much-needed administrative assistance to Mr. F. R. Watson who had voluntarily carried the burden until then, with the full agreement of the Association. In 1967 a team chosen on the basis of the British Olympiad participated for the first time in the International Olympiad. Through a Committee for National Awards the Association and Guinness Awards are now jointly responsible for the national contests and the British Olympiad, still relying heavily on help from voluntary and hard-working regional secretaries who first helped Mr. Watson in 1963.

This is one striking example of co-operation between the Association and other bodies concerned with mathematical developments. The Association appoints representatives on more than twenty different such bodies, not least those connected with the implications — social as well as technical — of the growth of computers, the last being a partial function of the Teaching Committee.

As a matter of policy the Association now, through the Teaching Committee, publishes reports which are much shorter than the older ones, confined to much more specialised topics and more rapidly prepared. A notable exception is the 1970 report on Mathematics in Primary Schools, a follow-up to the 1955 report.

Both the Teaching Committee and the Branches Committee are being given increased responsibility for their several activities, subject to Council's overriding control, and include among their functions that of watching over developments in all fields where the teaching of mathematics is involved and taking or recommending appropriate action. Much of this greater freedom for action results from the detailed report from the Policy Committee set up by Council in 1968. It is no bad sign that the centenarian Association is still able to renew its life as readily and effectively as it was able to do just before its sixtieth anniversary.

It was recalled earlier that the membership had risen to over 1,750 when the second world war broke out. It began to rise again in 1946, reaching more than 2,700 in 1950. Then an increase in subscription caused a slight fall, but the 2,700 mark was reached again in 1955. The publication of the Primary Report then brought a large increase, and the 6,000 total was recorded in 1965.

No mention has been made of the Problem Bureau or of the Examinations committee. Both kept a useful check on university entrance examinations and others, and the Bureau is as healthy as ever.

Birth of this Magazine

The birth (but not the conception) of the periodical in which this review appears falls outside the hundred years in question; it should be the first item in the next article of this kind. It remains only to mention two features of the Association which, like one's own face, are so familiar as to be readily overlooked. The *Mathematical Gazette* began (as was noted above) in 1894 and has continued in its present format since 1896; no. 400 is not far away. Its production has been a constant fight against two drawbacks: lack of space and the failure of its critics to write the articles whose absence they deplore. The other feature is the Library, begun in the nineteenth century but nursed to its present status by the late Professor E. H. Neville, augmented by large and valuable runs of mathematical periodicals presented in exchange for the *Gazette*, and now housed on most generous terms by the University of Leicester under the loving and efficient care of Professor R. L. Goodstein. This care, and that shown by the four major editors of the *Gazette* — W. J. Greenstreet, T. A. A. Broadbent, R. L. Goodstein, and now Dr. E. A. Maxwell on his last fling — is a living reminder of the close connection between universities and schools that has characterised the Association since its earliest days. The associations with industry to which reference has been made are perhaps more in the nature of portents of the future.