West North Central States				
Minnesota	443	17.8	8.9	15.9
Iowa	319	11.9	2.7	12.6
Missouri	447	0.7	4.3	11.8
North Dakota	43	−4.4	−5.7	6.7
South Dakota	40	17.6	−7.2	6.2
Nebraska	170	23.2	−4.5	12.9
Kansas	191	11.7	−4.3	10.6
	1,653	10.7	1.7	12.2
East South Central States				
Kentucky	168	20.9	8.8	5.9
Tennessee	177	12.0	11.4	6.1
Alabama	124	39.3	7.1	4.4
Mississippi	52	18.2	8.7	2.4
	521	21.2	10.9	4.8
West South Central States				
Arkansas	56	43.6	5.1	2.9
Louisiana	179	12.6	12.5	7.6
Oklahoma	166	31.7	−2.5	7.1
Texas	485	22.8	10.1	7.6
	886	30.5	7.3	6.8
Mountain States				
Montana	61	1.6	4.1	10.8
Idaho	33	−19.5	17.9	6.3
Wyoming	33	17.9	11.2	13.2
Colorado	186	−1.1	8.4	16.6
New Mexico	83	23.9	25.6	15.6
Arizona	98	5.4	14.6	19.6
Utah	93	29.1	8.4	16.9
Nevada	37	2.8	21.1	33.6
	624	6.6	11.2	15.0
Pacific States				
Washington	218	20.4	11.1	12.5
Oregon	153	19.5	14.2	14.0
California	1,601	11.2	21.7	23.2
	1,972	12.8	18.8	20.3

OTHER AREAS

	June 1, 1934	*July 1, 1940*	*Increase Per cent.*
Other U. S. Areas			
District of Columbia	842	938	11.4
Alaska	11	15	36.4
Hawaii	89	94	5.6
Total	942	1,047	11.1
U. S. Possessions			
Puerto Rico	35	61	74.3
Philippines	56	61	8.9
Canal Zone	13	13	0.0
Total	104	135	29.8
Foreign Countries and Areas[4]			
Canada	338	441	30.5
Mexico	29	32	10.3
Central and South America	66	123	86.4
European countries	157	127	−19.1
African countries	22	24	9.1
Asiatic countries	118	124	5.1
Australasia	12	15	25.0
Total	742	886	19.4

[1] Statistics for members are for September 30, 1940, the close of the fiscal year.

[2] Increase in membership is from September, 30, 1936, to September 30, 1940.

[3] The population changes are for the decade 1930–1940.

[4] On July 1, 1940, there were members of the association resident in 75 foreign countries. They are decreasing rapidly in Europe as a consequence of the war.

OBITUARY

SIR JOSEPH JOHN THOMSON

IT is characteristic of the progress of science that periodically stages are reached at which possibilities of new discoveries seem to have come to an end. The wonders of the days which have passed have become moulded into a theory in terms of which the understanding of man is content. And the theory, having in its new-born state contributed to progress by suggesting further possibilities, finally reaches a point at which it has no more to say. In its old age it sits down, claims that all is finished, that there will be nothing new, and spends its declining years in grumbling about the impossibility of anything which, in the mind of some enthusiast, seems as though it might be possible. And then some new upstart does find new phenomena uncontemplated by the theory. A minor revolution in thought has to be created and while the new epoch is being stabilized many new things are born. Freed from restraint, discovery runs ahead of the warnings of the theories as to what can and can not be discovered. Science has a new lease of life, and a new generation of its workers is born.

It was in such a period of transition that J. J. Thomson came upon the scene. He came thoroughly trained in the old school of mathematical analysis, the school of Newton and of Maxwell and of Kelvin and of Rayleigh, but he came to an orchard in which all the good fruit seemed to have been picked. After a few early flutters in which his genius enabled him to find a little more fruit even among the trees which had already yielded so much and in which he wrote on "vortex rings" and on "application of dynamics to physics and chemistry," he became attracted to that curious realm of phenomena so dishearteningly complex, and without meaning to the school of thought of the day, phenomena having to do with the discharge of electricity in gases. His earlier work along the conventional lines had already brought him recognition in the form of election to the Cavendish professorship of physics in the University of Cambridge, so that at the age of 28 years he was able to start out upon that new field which was to bring immortality to his name and to give birth to a new school of physics and of physicists destined to carry science through a greater revolution of thought and phenomena in the space of half a century than had been achieved during the whole previous history of the human race.

At the time when Thomson commenced his work, science had acquired almost an inferiority complex in expression to its utterances. Dynamics, so dignified by the illustrious Newton and his followers, was always admitted with respect in all the halls of learning provided that it did not talk about anything too concrete. The more generalized the coordinates the happier the mathematical physicist, who was thereby relieved from the necessity of saying what he was talking about and was able to feel something of the exhilaration of a pure mathematician who, as Sylvester, one of its great exponents, once remarked, was never so happy as when he did not know what he was talking about.

In this age one was permitted to speak of a current of electricity, but woe betide the young man who thereby implied that he thought anything was moving along the wire carrying the current. The guilt of such a thought would almost threaten in his dreams, a nightmare in which the white whiskers of Kelvin, and even the less white whiskers of Maxwell trembled in pious condemnation. Even molecules and atoms were spoken of in whispers, and as for things smaller than atoms, even the great Kelvin complained that the very word "atom" implied that the entity was indivisible. The concept of an ether had been admitted with a mixture of fear and joy; fear because it lay in the realm of the intangibles like the atoms and molecules, but joy in that the mathematical physicist promised that it would behave according to all the respectable canons of dynamics. Much time did they spend in trying to make the newcomer live up to his promises. The desire for a substantial ether and a conventional one is illustrated by such remarks as that of the eminent contemporary of J. J. Thomson, Arthur Schuster, who, as late as 1904, writes: "The study of physics must be based on a knowledge of mechanics, and the problem of light will only be solved when we have discovered the mechanical properties of the ether." Writing, in another place, of Maxwell's equation, he remarks: "The fact that this evasive school of philosophy has received some countenance from the writings of Heinrich Hertz renders it all the more necessary that it should be treated seriously and resisted strenuously."

At Cambridge, Thomson created a "school" of research which was in a sense unique in the annals of the time. It was a school of men and ideas rather than of buildings and equipment. It was a school of primitive pumps and sealing wax, of makeshift appliances in which the maximum of ingenuity was called upon to supplement the resources. It was a school strange to the experimental conventions of the times; for physics, having, as it thought, sensed the ultimate end of its possibiilties, was engaged in pursuing the last decimal in thermal constants and the like, with the use of more and more precise measuring apparatus. Then this new school faced the doubtful eye of the traditional dons of the university, who had many misgivings as to experimental research even with dignified apparatus, regarding it as representative of a kind of glorified plumbing. They were moved almost to consternation when such work laid claims to academic distinction and when, moreover, the whole business was being conducted by a young man less than 30 years of age in whom, according to the traditions of the times, the fundamentals of academic solemnity could hardly be regarded as having been formed.

However, the "school" of research thrived, a host of new phenomena burst from their prisons amid the shouts of others waiting to be released. The stimulus of the times crystallized to a maximum the genius of those who were the participants of the new hunt for truth. Rutherfords were born, the children of the new school spread to all parts of the world, and it became almost impossible to obtain any sort of a worthwhile job in physics in any part of the British Empire unless one had the seal of the Cavendish Laboratory upon him.

The great outpouring of new phenomena following the first discoveries in the field, the youth of the great leader himself, and the continuity in the richness of discovery since, have hardly allowed breath to take note of the passage of time, and it is hard to realize that J. J. Thomson was 83 years of age when he died. He is still symbolized in the thoughts of many as "a young man."

Thomson himself was a unique mixture of the old school from which he was born and the new school which he had created. Trained in the rigid domains of classical mathematical physics, he possessed all the powers of that heavy artillery when necessary. Moreover, his early inoculation with the spirit of the classical age kept strong in him the desire to understand phenomena in terms of mechanical pictures. Even the Bohr-Sommerfeld theory did not appeal to him very strongly at its birth, and one has the feeling that when the new wave mechanics developed, he felt a certain comfort in his age that it relieved him of the necessity of meddling with it. In spite of this conservatism, he himself was extremely bold in speculation and it adds only to the weight of his genius that those of his accomplishments which were successful were so great in their success as to cast into shadow many things and ideas which, taken by themselves, could by no means be regarded as successes. Thomson was a radical in physics, but like many radicals in science, he became extremely conservative in his own radicalism.

As an experimenter he was apt to rely for manipulation upon his assistants and, in harmony with the whole "school" of his creation, he was interested more in results than in the methods of obtaining them. He was a man of broad interests and his "Recollections and Reflections" show many sidelights upon his character, and contain much that could well be digested with profit by those who become too narrow in their views of academic training or in the importance of stereotyped routine. In one place he writes:

There is no better way of getting a good grasp of your subject, or one more likely to start more ideas for research, than teaching it or lecturing about it, especially if your hearers know very little about it, and it is all to the good if they are rather stupid. You have then to keep looking at your subject from different angles until you find the one which gives the simplest outline, and this may give you new views about it and lead to further investigations. I believe, too, that new ideas come more freely if the mind does not dwell too long on one subject without interruption, but when the thread of one's thoughts is broken from time to time. It is, I think, a general experience that new ideas about a subject generally come when one is not thinking about it at the time, though one must have thought about it a good deal before.

J. J. Thomson was born at Cheetham Hill, near Manchester, England, on December 18, 1856. He attended Owen's College, Manchester, in the 70's, and entered Trinity College, Cambridge University, in 1876. With Kelvin and Clerk Maxwell he formed one of an illustrious trio, none of whom succeeded in being Senior Wrangler. He was Second Wrangler and Second Smith's prize man in 1880, and he was elected as a fellow of Trinity College in the same year. In 1883 he was made lecturer at the college. In 1884 he became a fellow of the Royal Society, of which he was president from 1916 to 1920. From 1884–1918 he was Cavendish professor of experimental physics at Cambridge University, from which position he retired to become master of Trinity College. Naturally he was the recipient of numerous honors and distinctions, the author of countless papers and of several books, the most famous of which is his "Conduction of Electricity through Gases."

When a man dies one thinks of the spirit as vanishing and only of the body as remaining; but in the case of J. J. Thomson there is much of the reverse in the picture, for the spirit of the great leader is the thing which, born to science half a century ago when he founded his new school, lives still in his students and in their students, a spirit enthroned for all time in the empires of natural philosophy.

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SCIENTIFIC EVENTS

SCIENTIFIC DEVELOPMENTS IN THE U.S.S.R.

Nature gives the following information concerning the new botanical gardens in Armenia and the construction of a cyclotron in Moscow.

The construction of a powerful cyclotron, capable of producing 50 million electron volt deuterons, will be commenced in Moscow early in 1941, according to a decision of the Academy of Sciences of the U.S.S.R., based on a report submitted by the Physical Institute of the Academy. A magnet, the core of which weighs about 1,000 tons and solenoid of 18 tons, is to be installed. A special building to house the cyclotron will be erected in the grounds of the new home of the Physical Institute of the Academy, being built on the Bolshaya Kaluzhskaya Ulitsa in Moscow. The old apparatus in the Soviet Union, which is in the Radium Institute of Leningrad, is capable of giving an energy of 4 million electron volts to particles; another, nearing completion at the Physico-Technical Institute, also in Leningrad, will be capable of imparting an energy of 10–12 million electron volts.

New botanical gardens, attached to the Armenian Branch of the Academy of Sciences of the U.S.S.R., were recently opened in Erivan, capital of the Soviet republic of Armenia. The gardens, which have some three thousand species of plants, have grown up during the course of five years on the dry, stony, desert soil between the settlements of Avan and Kanaker, near Erivan, which has been reclaimed. One of the most interesting departments of the gardens is the section devoted to the plants of Armenia. Ultimately, some 2,600 specimens of the flora of this republic will be collected there; the section already has 350 specimens. In the center of this section has been built a pond, resembling the high mountain lake of Sevan. In the pond have been planted specimens of water plants of Armenia. In the southern part of the gardens the Geographical Department is concentrated. More than half the area of the gardens is occupied by arboreal plants. The flower gardens are exceptionally rich; in the Avenue of Roses and Fountains more than a hundred varieties of roses have been planted.

THE DIVISIONAL PROGRAMS FOR THE ST. LOUIS MEETING OF THE AMERICAN CHEMICAL SOCIETY

ACCORDING to the *News Edition* of the American Chemical Society, all divisions except the Division of Fertilizer Chemistry have programs planned for the St. Louis meeting, which will be held from April 7 to 11.

The Division of Agricultural and Food Chemistry is planning two symposia, one on "Fortification of Foods with Minerals and Vitamins" and the other on "Fats." The division plans to participate in the vitamin program