

## J. A. KOMENSKY (COMENIUS), 1592-1670

BY DR. GERALD DRUCE

THREE hundred years ago there arrived in England a Czech exile, Jan Amos Komenský, better known by the Latinized form of his name, Comenius. This refugee from an earlier persecution of his nation came at the invitation of Parliament in order to lay before contemporary men of learning his views on education and the organization of science in the service of mankind. It was, therefore, appropriate that the tercentenary of Comenius's visit was commemorated at Cambridge on October 24.

Convened by Dr. Joseph Needham and under the presidency of the vice-chancellor, Dr. J. A. Venn, the meeting was attended by representatives of the U.S.S.R., Holland, Poland and Sweden, as well as by Czechoslovak and British men of science and learning. Papers were read by President Beneš ("Comenius' Plans for Peace Leagues and his Place in History as a Great European"), Mr. J. L. Paton ("Comenius as an Educational Pioneer"), Prof. J. D. Bernal ("Comenius' 'Pansophic College' and the Rise of Scientific Societies in the 17th Century") and Prof. E. Barker ("The Debt of Europe to Czechoslovakia and to Comenius"). Others present also paid tribute to the personality and achievements of the great Czechoslovak pioneer (see NATURE of November 1, p. 518).

Born of Protestant parents at Uherský Brod, Moravia, in 1592, Comenius had a local schooling which was followed by residence at Herborn, a Calvinist academy in Nassau. Before returning home he visited Amsterdam and Heidelberg. He became a teacher in 1614 and in 1618-19 he was headmaster of a school at Fulnek in north Moravia. These were critical years in Czech history, parallel with 1938-39. Disaster followed, Bohemia lost its independence and persecution set in. Comenius first moved to the estates of Charles of Žerotín, in east Bohemia, not far from the frontier over which he escaped to Leszno, in Poland, in 1627. Here he started a very successful secondary school for the Czech colony in this part of Poland.

He was also able to print tracts and works that he had written earlier. In 1622 he had completed the first accurate map of Moravia. Then came his "Labyrinth Světa a Raj Srdce" (Labyrinth of the World and the Paradise of the Heart), an allegory written in an endeavour to escape from mental depression during anxious years. It describes a pilgrimage to an imaginary city, a method that the author adopted to direct attention to the social injustices, cruelty and dishonesty of his time. Remedies are suggested, and the consequences

likely to follow, if the evils are allowed to continue, are foreshadowed.

At Leszno Comenius produced a new type of Latin grammar, "Janua Linguarum Reserata" (1631). Its plan was to impart, as well as Latin, useful general knowledge concerning everyday life and simple science. Instead of giving grammatical rules and exceptions, Comenius's method was to begin with simple phrases and gradually progress to complex sentences. The method was very successful and the "Janua" was translated into twelve European and four Asiatic languages. Some thirty of its sections are devoted to natural history, sixteen to arts and crafts (gardening included), twenty to learning and culture, five to social affairs, ten to ethics, eleven to politics and six to religion.

Comenius began to formulate his pansophic plans as a student at Herborn under the influence of J. H. Alsted. He printed the first part of his "Great Didactic" at Leszno in 1627 under the title, "Didaktika čili umění umělého vyučování" (Didactics or the Art of Teaching), with a supplement relating to the establishment of schools in Bohemia when victory came. Though Comenius probably obtained some of his ideas from Alsted and from J. V. Andreae (whom he met at Heidelberg) and was also influenced by the works of Francis Bacon, the comprehensive conception of this educational scheme was his own and shows how much he was in advance of the times. That he possessed modern notions of the purpose and methods of education, to develop intelligence and to impart real knowledge and to maintain a progress from the known to the unknown, is apparent from the earliest edition of this work, which reached its final form and appeared in Latin as "Didactica Opera Omnia" (Amsterdam, 1657).

Comenius divided schooling into four grades: (1) In the family up to six years of age. (2) In the mother-tongue (primary) school from six to twelve. (3) In the higher (grammar) school from twelve to eighteen. (4) At the university after eighteen.

This system of education was to be available to all children without regard to station or sex, but higher education was to be based only upon merit. At school Comenius had been taught one subject, Latin, and that badly. He lamented that much useful knowledge was never taught or new discoveries (for example, those of Copernicus) even mentioned. Therefore, in his mother-school

curriculum he included observations on common objects and phenomena in most of the sciences. He claimed that in his first six years even, a boy can be brought to know something of water, earth, air, fire, rain, snow, frost, stone, metals, trees, plants, birds, fishes, etc. He can learn something of his own body and so be ready for systematic science at the grammar school. Comenius applies the same reasoning to his method of introducing the pupil to optics, astronomy, geography, history and mathematics and mechanics.

According to Comenius, the training to be completed at the university should be really universal and include every branch of knowledge. Positions of honour should be given only to those who have completed their university course and shown themselves fit to be entrusted with the management of affairs. For this final stage of education Comenius aimed at a compilation of all established facts from every branch of the sciences. The first part was published at Leipzig in 1633 under the title, "Physicæ at lumen divinum reformatæ synopsis". It included contemporary alchemy, cosmology, astronomy and anthropology, while current superstitions were not excluded. This work, in which Comenius emphasized the unity of all knowledge, was eventually translated into English by John Dury (1651). But the pansophic plans of Comenius became known here much earlier through Samuel Hartlib, a Pole from Elbing, who spent much time in England. Hartlib published two tracts, "Præcludia conatum pansophicorum Comenii" (Oxford, 1637) and an "Essay towards Compleat Wisdom" (London, 1639), so that the ground was prepared for Comenius to come to England. He was now widely known in Europe—and indeed in the New World, for there is a legend that he was invited to Harvard, and certainly his advice was sought concerning the education of American Indians, a matter in which Robert Boyle also was interested.

Comenius arrived in England in September 1641, and became acquainted with the leading men of learning, including Bishop Williams of Lincoln (later Archbishop of York and a great patron of science), Lord Brooke, John Pell, Theodor Haak, Sir Cheney Culpeper, Robert Boyle and John Selden, all of whom showed an interest in his plans. They discussed schemes for establishing an international academy or pansophic college (three sites were considered) which was to be "a living laboratory supplying sap, vitality and strength to all". The work of compiling a comprehensive encyclopædia of science was to be conducted by a number of specialists and assistants working under Comenius's direction.

At first there seemed every prospect of success,

but the outbreak of the Civil War in 1642 caused the scheme to be abandoned, and Comenius returned to the Continent. It would, however, be incorrect to suppose that Comenius's visit had been in vain. His views and objects had been well received and he continued to correspond with Hartlib, Boyle, Dury and others. When the Royal Society was founded in 1662, Comenius was overjoyed and hastened to dedicate his "Via lucis" to the fellows, whom he addressed as "the torchbearers of this enlightened age", especially urging them not to neglect metaphysics. It may be pointed out that the expression "Invisible College", applied to the periodical meetings of those who later founded the Royal Society, may have originated from Comenius's reference to the projected pansophic academy as a "Collegium Lucis".

After further visits to Sweden, Poland and Hungary, Comenius eventually settled in Holland, writing alternately educational and pansophic works. Besides his country's persecutors he had philosophical adversaries. Thus, Descartes criticized his works on the ground that he mixed theology with philosophy. This refers, no doubt, to the fact that since 1631 Comenius had been a bishop of the "Unitas Fratrum", or Bohemian Brethren. Others contended that he attempted to spread Calvinism under the cloak of pansophy, while Samuel Desmarets, a Dutch contemporary, went so far as to describe him as "a mystical beggar with a commercial instinct". Comenius replied to these unfair charges by further explanations of his pansophic principles. His intention was to organize knowledge and apply it for the moral and material benefit of his fellow-Europeans.

The Thirty Years' War came to an end in 1648 when the exhausted belligerents signed the Peace of Westphalia. The terms left the kingdom of Bohemia (which included Moravia) in the hands of her enemies. For this Comenius bitterly reproached Oxenstiern, the Swedish plenipotentiary, who had promised that Bohemia would not be forgotten. But if he had lost his fatherland, Comenius found that he had become a citizen of the world. To his Czech compatriots he addressed a "Last Testament of a Dying Mother" (Kšaft umírající matky Jednoty bratrské) in which he made his famous prophecy, "I believe that, after the tempest of God's wrath . . . shall have passed, the rule of thy country will again return unto thee, O Czech people".

It was in these circumstances, too, that he wrote ("Panegersia"), "We are all fellow-citizens of one world, all of one blood, all of us human beings. Before our eyes there is only one aim—the good of humanity". The claim to regard Comenius as a great European can also be illustrated from

his "Angelus Pacis" (Amsterdam, 1667), addressed to English and Dutch plenipotentiaries, which contains a plea to all nations to abandon war and establish courts of peace for international consultations and the direction of human affairs. Whether a pansophic academy would have achieved the objects that Comenius had in view may be doubted. He was in advance of his age, and, apart from the far-seeing savants who founded the Royal Society, there were few who showed enthusiasm for his projects. No one on the Continent was prepared to do more than support the printing of his books and, indeed, it is only in modern times that international organizations have begun to function.

G. W. Leibniz (1642-1716), who was of Slav origin, showed a sympathetic interest in Comenius and assimilated his ideas regarding encyclopædic compilations and scientific societies, restating them and implementing them as completely as the unsettled state of Europe allowed.

Nor were Comenius's educational endeavours to meet with immediate success. He was a realist at a time when his contemporaries still learned their natural history from Aristotle and Pliny. Problems were 'settled' by reference to the writings of the authorities even after Comenius had asked, "Do not we ourselves dwell in the

garden of Nature as well as the ancients? Why should not we use our eyes, ears and noses as well as they? Why should we need other teachers than these our own senses? Let the children touch, feel, see, hear and find out by experiment for themselves, draw the object, measure it and understand it".

To generations of his own countrymen Comenius has served as an inspiring example. They named the new University of Bratislava and also the Czechoslovak secondary school in Vienna after him. His energy and fortitude can serve to-day as a stimulus to us all to continue steadfastly working for those same ideals which we know to be true.

The papers read at the Cambridge tercentenary meeting are to be made available in a permanent form. Other recent works on the life and activities of Comenius are the following: "Comenius in England" by Dr. R. F. Young (Oxford University Press, 1932); "Comenius and the Red Indians of New England" by Dr. R. F. Young (1929); "Comenius" by W. M. Keatinge (McGraw Hill, 1931); and "Johannes Amos Comenius" by Dr. J. Jakubec (Orbis, Prague, 1928). Prof. R. J. Kerner's "Czechoslovakia" (University of California Press, 1940) also contains references to Comenius.

## SCIENTIFIC KNOWLEDGE AND ACTION\*

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**I**N the study of man and his activities three types of cultural development may be recognized; and they are all measured by different standards. In the fine arts the imaginative qualities of the mind appeal primarily to the emotions through stimulation of the æsthetic judgment; material culture is the province of the industrial arts; and science—the domain of reason—is systematic and formulated knowledge in all fields of human understanding—natural, moral, social and political.

Natural science, or natural philosophy, is only one division of science as thus defined, yet, in general usage, the single word 'science' signifies verifiable knowledge acquired by observation and experiment. The history of civilization from this point of view is a history of intellectual development in which science has been the chief factor in changing habits of thought from superficial observation and magical theories of causation to clear concepts, rational conclusions, and progres-

sive principles in the advancement of man and society.

It is common in these days to think of progress in terms of material development and to leave out of consideration the contacts of science with what is known as 'polite' learning—literature, religion, and other expressions of the human spirit. The noblest works of man are not, however, represented by great industrial advances, but by the search for the truths upon which they are based, and by the influence of this effort upon personal and social ethics.

In the pursuit of natural knowledge, the common object is to solve problems of life and thought; and all additions to knowledge thus gained contribute to the world's store, whether they admit of immediate practical application or are deposited in the archives of science for safe keeping. There can be scientific knowledge without action, and action without scientific knowledge; and the two are combined in applied science for practical service. There are, however, many aspects of Nature

\* From the Hinchley Memorial Lecture delivered before the Institution of Chemical Engineers on October 24.