description of the pulmonary circulation, several important facts which were not in accordance with Galen. Here thus his physiological "heresy."

These facts are as follows :

A. That there is no communication through the septum of the heart "as is commonly believed" (against Galen).

B. That the blood reaches the left ventricle from the right following a long track or lengthened passage ; that the blood mixes with air in the lungs (and not, as thought by Galen, in the heart).

C. That the pulmonary artery has a remarkable calibre, which would be much in excess of that required to provide only for the metabolic requirements of the lungs (no mention of this occurs in Galen).

D. That in the foetus until the time of birth the nutrition of the lungs is not dependent on the pulmonary arteries, because of the disposition of the "little membranes" of the heart. Servetus calls them *membranules* in one place and *vulvulae cordis* in another.

E. The great number of communications in the lungs between the pulmonary arteries and pulmonary veins. He calls anastomoses the channels of union between arteries and veins (Galen had seen them, but not in the lungs).

That revolutionary concept saw the light in printed form in 1553. The book had been seized and destroyed at Vienne, but we know that at least three copies have escaped and reached our time. One is in the Imperial Library in Vienna, the second is in the National Library in Paris, and the third is in the Advocates Library in Edinburgh. Apart from these three copies which have reached our time, we know of others which have now disappeared but have existed, as, for instance, the one that was kept in the Municipal Library of Vienne and which was destroyed by the fire in the Library in the eighteenth century. The distribution of Servetus's books in Poland and Hungary is a recognized fact, for several of Servetus's contemporary physicians and humanists of the North of Italy were well acquainted with his last work, among them Gribaldi, Curione, Blandrata, Massari, and probably Sambucus. Thus the discovery was not totally unnoticed by some of the physicians and anatomists, particularly those of Italy. That may explain why the Spaniard Juan Valverde, in his book of anatomy in Spanish, *Historia de la Composicion del Cuerpo Humano*, printed in 1556 in Rome, gives the second printed description of the circulation and follows almost exactly the original description by Servetus even if he does not mention him. It is true that Valverde attributes to himself and his teacher Columbus the discovery of the pulmonary circulation and insists that it had never been described and printed before. I think he was cautious in stressing his lack of knowledge of Servetus's book because 15 years later, when Caesalpinus published his description of the circulation in *Quaestionum Peripateticorum libri V*, he was imprisoned and accused of heresy, and was saved only by Pope Clement VIII, to whom he was private doctor.

In Columbus's book *De Re Anatomica*, published in Venice in 1559, a new description of the circulation appears, the third ever to be printed, and finally, in a second edition, this time in Italian, of Valverde's *Anatomia del Corpo Humano*, Rome, 1560, the fourth description saw the light following the original pattern of Servetus. It has been said that Columbus had already discovered the circulation some time before Servetus had printed his book, but even in this case the priority of Columbus cannot be claimed, because in a manuscript of Servetus's *Christianismi Restitutio* in the National Library in Paris, which was written in 1546, the description of the circulation is already present, antedating Columbus, if we accept Valverde's evidence, by at least eight years. I have already dealt with this subject more extensively elsewhere (Trueta, 1948).

The Personality of Servetus

Which of all these works and events can be given as featuring Servetus's personality and the character of his

contributions ? It seems to me that what is notable of Servetus's life and contributions is his enormous curiosity, which brought him to inquire into all the subjects he touched undeterred by any dangers he might incur. In denying Calvin the right to impose upon him an intellectual subservience he assumed an attitude which is now characteristic of all the freedom-loving people of the West. He died, as so many have done after him, and are still doing in contemporary times, to remain true to himself. And to-day, four hundred years after his death, we should remember him, not only for what he contributed to the modern study of geography or for having been the initiator of a work which ended seventy years later by the discovery and demonstration of the general circulation of the blood by William Harvey, but for his passion to know the truth even if so frequently, like many other great men, he failed to find it.

Placing side by side the figure of Ramón y Cajal and that of Servetus, one is struck by more than one point of resemblance between these two great men, who were born less than one hundred miles from each other: more than anything by the unquenchable persistence of their will-power, their desire to penetrate into the unknown world and their lack of allegiance to established scientific creeds when they conflicted with their own findings. They were both the type of Spaniards who belong to Europe and have little in common with the picture of that fatalistic, unproductive Spaniard which some people think is almost outside the Western world.

The dictum that Pope Gregory VII wrote of himself nearly nine hundred years ago could be appropriately applied to Servetus : "I have loved justice and hated iniquity, therefore I die in exile."

REFERENCES

- O'Malley, C. D. (1953). *Michael Servetus: A Translation of his Geographical, Medical and Astrological Writings with Introductions and Notes*. Philadelphia, American Philosophical Society.
Trueta, J. (1948). *Yale J. Biol. Med.*, 21, 1.

MEDICAL EDUCATION IN THE SOVIET UNION

BY

S. V. KURASHOV

Lecturer in Psychiatry, Moscow Postgraduate Medical Institute ; Deputy Minister of Health of the U.S.S.R.

Before the October revolution of 1917 there were in Russia 13 medical faculties and five medical schools for women, from which about 1,500 doctors qualified annually, after a five-year period of medical education. In 1917 the total number of doctors in Russia was about 20,000, and the overwhelming majority were in the towns and central regions of the country. The rural population was served by the "Zemstvo" medical organization on a regional basis, and there was only one doctor to many thousands of people. Because of the shortage of doctors, "feldshers" (medical auxiliaries) formed an integral part of the service. The outlying parts of the Russian Empire, Central Asia, Transcaucasia, and Siberia were even worse off. As is well known, from a sanitary and epidemiological standpoint the condition of the whole country was extremely unsatisfactory and this was reflected in the fact that the infant mortality was one of the highest in Europe.

After the October revolution the whole question of social reform, including medical services, was raised. From the first days of Soviet power the principle of a medical service free and freely available for all was accepted and, with the active participation of the public,

widespread prophylactic and sanitary measures and a comprehensive system of maternity and child welfare were introduced. All this made it necessary to increase the number of doctors. The doors of the medical faculties of the universities were flung open to working-class youth, and by 1922 the number of faculties had increased to 34.

Reorganization

Until 1930 the medical schools remained part of the universities and therefore of the educational system. In 1930 a law was passed on the reorganization of medicine in the U.S.S.R. in accordance with which the medical faculties were separated from the universities and reorganized as institutes under the Ministry of Health. This reform made it possible to adapt teaching methods to the needs of medical practice and unite medical schools with research institutes, which had always been part of the health services of the country. The experiment of organizing medical education as part of the health service has, in our opinion, fully justified itself in the course of nearly a quarter of a century.

The new organization of medical education, however, was not without faults. Theoretical teaching was accorded significantly less time than practical teaching, and lectures were no longer the principal factor in the training of doctors. The medical course had been reduced to from four to four and a half years. The 1934 law on medical education was designed to rectify these faults. A five-year course was established, and the balance between theoretical and practical studies was adjusted. Practical work was introduced for students after the end of the fourth year. The decree established different forms of training, as follows: therapeutic and prophylactic (later reorganized as therapeutic), sanitary and prophylactic (later called sanitary and hygienic), and maternity and child welfare (later paediatric). Appropriate proportions of students were allocated to the various faculties.

In 1934 the Government passed a resolution to set up dental institutes to give a four-year course, and also a system of higher dental qualifications. The first of these institutes was opened in 1935. In Tsarist Russia most dentists were trained in schools for medical auxiliaries, so that those treating the general population were without advanced training. A small number of doctors took up dentistry, but most of these were engaged in scientific work or attached to university chairs of dentistry.

Another new departure was the setting up of pharmaceutical institutes, also with a four-year course.

At the outbreak of war in 1941 all medical and pharmaceutical education was under the direction of the Ministry of Health. The number of students in these institutes had reached 115,000 and there was a marked improvement in the standard of qualifications. The achievements of Soviet medicine during the war years are known to all. At the same time the war revealed some weak features in the training of doctors, and as a result of this the Government reconsidered medical education in 1944, and established a six-year course in medical schools. This made it possible to increase the scope of general theoretical education as well as improving clinical training of future doctors.

In 1949 courses in dental and pharmaceutical institutes were prolonged to five years.

Training the Student

At the present time all medical students, irrespective of their future specialty, have the same training for the first two years, at the end of which is a semi-State examination to determine the student's suitability for further study. After this the training differs according to the specialty, as indicated above.

Entry to the medical, pharmaceutical, and dental institutes is by a competitive examination in Russian language and literature, physics, chemistry, and the elements of philosophy. The student who receives a gold or silver medal when he

leaves secondary school is exempted from this examination. Some 26,000 students, about half of whom are women, enter the medical and pharmaceutical schools each year. Over 90% of those in the medical schools receive the State stipend, the only qualification for which is ability.

There are now in the U.S.S.R. 63 medical, four dental, and eight pharmaceutical institutes. Of the medical institutes, 37 have only one faculty—35 for training physicians and surgeons, one for paediatricians, and one for public health. The remainder have several faculties, including dental and pharmaceutical. The programme for dentists and pharmacists is the same in these faculties as in the independent institutes. The latter are set up where the number of students is sufficient.

After completing the course the student takes the appropriate State examination—that is, in medicine, surgery, paediatrics, public health, dentistry, or pharmacy. Successful candidates are entitled to be described as doctors, dentists, or pharmacists, and those who do particularly well get an honours diploma. The newly qualified doctors are assigned work which they have to do for three years under the supervision of the Ministry of Health.

We consider that the greatest achievement in medical education after the revolution has been the setting up of medical institutes in those outlying territories which were national minorities in the days of Tsarist Russia and are now national republics with equal rights. In all the vast expanse of Kazakhstan there was before the revolution only one medical institute and only about 100 doctors. Now in Soviet Kazakhstan there are three medical institutes and about 7,000 doctors. In Uzbekistan the Soviet Government has set up four medical institutes, and in Tadzhikistan the Avicenna medical institute has been created.

The problem of training national groups of doctors from the local indigenous population is very important in our multinational State. Readers will, of course, be aware of the importance of a knowledge of the language and of local customs in carrying out treatment and prophylaxis. Some republics which previously had no medical institutes—for example, Azerbaijan, Georgia, and Armenia—have now fully supplied themselves with doctors from the local population, and at present have more doctors per 1,000 of population than any other republic of the Soviet Union, not excluding the Russian Federation.

Training of Medical Teachers

In order to set up these institutes it was necessary for the health service to train professorial and teaching staff. For this the Soviet Union absorbed the experience of pre-revolutionary Russian medical schools and added new features. For hospital medical officers this training now consists of three years' work in the clinics of a medical institute, where, alongside of practical work, they take part in the research work of the professorial unit, and some doctors are able during this period to publish the results of scientific investigations. This three-year course qualifies the doctor as a specialist in some branch of the profession—for example, surgery; ear, nose, and throat work; ophthalmology; neurology; psychiatry. In 1953 the number completing such a course was 5,500. A State stipend equivalent to a doctor's salary is received during the course. The right of entry is enjoyed by those doctors who graduate with honours and by those who have completed their three years of practical work under the direction of the Ministry of Health.

There is a special postgraduate institute for the training of assistant professors and clinical directors. Entry to this is by open examination, which may be taken by recent medical graduates, doctors who have already been in practice, and doctors who have just completed their three-year postgraduate course. The doctor spends three years at the postgraduate institute, during which time he must not only acquire a minimum of knowledge necessary for his teaching, but must also carry out research and defend in public

a thesis for the degree of Candidate of Science. During the course the doctor studies not only his chosen specialty but also related subjects. He receives a State stipend for the three years. As a result of many years' experience it appears to us that the work of the postgraduate institute has justified itself.

In order to train professors from among the more able assistants and lecturers an institute for doctorates has been set up, with a two- to three-year course. Whilst engaged in this the candidate must prepare and be ready to defend publicly his thesis for an M.D. degree. During the whole period he receives a salary according to his previous post—that is, as an assistant or lecturer.

In colleges of the Soviet Union there are the following scientific titles: the assistant, who helps the professor in teaching and carries out practical work with the students; the lecturer (dotsent), who together with the professor may conduct an independent course or work under the direction of the professor, co-ordinating the work of professorial assistants; and the professor, who heads the unit. The title of assistant is awarded by secret ballot of the scientific committee of the institute. The title of lecturer or professor is awarded by a special high ministerial commission after selection by the scientific committee of the institute by secret ballot. These titles are retained for life. In order to be chosen for the post of lecturer the degree of Candidate of Medical Science is essential, and for that of professor the degree of Doctor of Medical Science is needed.

A great achievement has been the training of professorial and teaching groups from among the natives of the national republics. This has made it possible, in the Transcaucasian Republics, Azerbaijan, Georgia, and Armenia, to change over to training in the language of the particular republic in the medical schools.

The medical, dental, and pharmaceutical institutes are as a rule under the charge of the ministries of health of the local republics, and only a few are the direct responsibility of the All Union Ministry of Health. The latter is, however, responsible for the central direction of medical teaching, and, whether or not a particular institute is directly controlled by it, the All Union Ministry of Health has to approve the curriculum and textbooks. This ensures uniformity in the training of specialists.

Specialization

In the Soviet Union there is a State system for specialization and the improvement of medical qualifications. In the first stage, for those doctors who have not previously received training in one of the specialties, the general practitioner is sent for a period of four to six months to specialized clinics and hospitals at the expense of the Government.

The second stage is provided for by 11 institutes for raising medical qualifications. These establishments, situated in Moscow, Leningrad, Tbilisi, Tashkent, Kazan, Stalino, etc., are institutes of higher education with clinical and theoretical professorial units. Over 16,000 doctors enter these institutes every year for courses of from three to nine months. About one-fifth attend for a course in primary specialization, and the remaining four-fifths are doctors who have already specialized and wish to have higher qualifications.

While they are in the institute for raising medical qualifications doctors attend lectures illustrating recent advances in medical science, undertake clinical consultations, and attend and take an active part in scientific conferences. This gives the doctor the opportunity to enlarge his theoretical horizon as well as acquire the necessary practical skill. The right to enter these institutes is enjoyed by any doctor who has spent three years in rural practice or five years in urban practice. During his course at the institute he receives his normal salary plus a supplementary State stipend.

The third stage in the training of specialists is to attend the three-year course for hospital medical officers mentioned in connexion with the training of teachers.

Medical Auxiliaries

The growth of the health service has demanded the training of a large number of medical auxiliaries: nurses, "feldshers," dispensers, midwives, etc. There are now some 600 schools for this in the U.S.S.R., and the scope of training is so great in comparison with the pre-revolutionary period that there is no point in quoting figures. The schools for nurses are the most numerous and give a two-year course. For paediatric nurses, midwives, "feldshers," dental assistants, and dispensers there are three-year schools. Finally there is the four-year school for training the feldsher-midwife. The right to enter these schools, except that for dental assistants, is enjoyed by those who have had an incomplete secondary education (seven years). The dental schools take only those students who have a certificate showing that they have completed the 10-year secondary education.

A reform of this system of education of medical auxiliaries has now been prepared. All the schools will have the same length of courses, three years for students who have not completed secondary education and two years for those who have. In addition to the already mentioned auxiliaries the schools will train sanitary feldshers, feldsher laboratory technicians, female feldshers to work in children's establishments, and dental technicians. Finally, with the new academic year the schools for assistant dentists will be closed and additional dental faculties set up, so that in future dental treatment will be carried out only by fully qualified dentists.

The Soviet Government pays great attention to medical education, since the satisfactory solution of the problem of training ultimately determines the success of all the work of the health service.

GENERAL PRACTICE: NEED FOR HOSPITAL TECHNIQUE IN THE HOME

BY

JAMES M. STALKER, M.D.

*Late Physician, Dundee Royal Infirmary; Foundation
Member, College of General Practitioners*

In the last few years there has grown up a critical attitude to medical undergraduate education in respect of the applicability of that education to the needs of the general practitioner. It is being said in many quarters^{1,2,3} that the medical curriculum is lacking in education for general practice because university teachers have not themselves got the background from which such education formerly came. The corollary to this is the claim^{2,4} put forward for general practitioners of good standing that they should be assigned a part in the education of their younger colleagues of the future. In one or two schools this is already being done, but it is clear that the claim is by no means generally admitted. Before such admission can be expected, a reasoned case must be stated for these two contentions—that the undergraduate is not being educated for general practice and that G.P.s themselves should be given that responsibility. As an approach to the answer to these questions this one may be put: At what point or by what process did undergraduate education cease to provide, if indeed it ever did specifically provide, for the needs of general practice?⁵ In default of a convincing answer the case falls.

A Time of Change

In the three broad regions of surgery, medicine, and midwifery let me take the last first. Forty years ago the teaching