

## Report of a Discussion on International Organization in Medical Physics

Munich, July 1959

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A ONE-DAY discussion on international organization in the field of medical physics and biophysics was held in Munich on July 31, 1959, and was attended by over 80 people from 20 different countries. Invitations to the meeting had been issued by the Hospital Physicists' Association of Great Britain.

### MORNING SESSION

**Professor Dr. B. Rajewsky**, President of the IXth International Congress of Radiology, had accepted an invitation to be Honorary President of this meeting. The joint Chairmen at the morning session were Dr. J. W. Boag (U.K.) and Professor Dr. F. Wachsmann (Germany).

The meeting began with an address of welcome by the Honorary President, **Professor Dr. B. Rajewsky**. Professor Rajewsky spoke of the growing importance of physical methods and physical principles in medicine and biology. Biophysicists in the academic field were in a position similar to that which biochemists had occupied some thirty years ago. In some countries the subject of biophysics had been recognized as a separate discipline for many years and a number of University Chairs already existed. In others, the biophysicist was still considered to be on a different plane from the medical man. One of the tasks of any international organization would be to obtain full recognition for the subject in those places where it was not yet recognized. The subjects of medical physics and of health physics were both parts of the wider field of biophysics. In welcoming those who were attending the present meeting he hoped that any decisions taken would further the development of this relatively new and rapidly expanding field of scientific work.

**Dr. J. W. Boag (Northwood, U.K.)** thanked Professor Rajewsky for his address of welcome and explained in some detail the circumstances which had led the Hospital Physicists' Association to issue invitations to this meeting. Correspondence which Dr. H. Miller had had with medical physicists in many parts of the world during his year as President of the H.P.A. had revealed an interest in some kind of international link. The H.P.A., as probably the largest and oldest established of the medical physics organizations, had been asked to accept responsibility for calling the meeting, but the proposed arrangements had been agreed by an *ad hoc* committee, including members from several countries. To avoid unnecessary expense and thus secure the largest possible number of participants, it was decided to hold this first meeting immediately after the

IXth International Congress of Radiology. There was, however, no intention of limiting the scope of the subject to radiological physics. At the present time most medical physicists had some interest in the radiological field but many had already extended their work into other fields and this trend would continue. All local arrangements for the meeting had been made by the German association, and the International Congress of Radiology had generously made the hall available without charge.

The purpose of the meeting was to discuss whether a need existed for any form of international organization, and only if an affirmative answer were given to this question, need one consider what form any such organization should take. Some survey of the field of medical physics seemed desirable and the morning session had therefore been set aside for this purpose. Many international organizations—some would say too many—were already in existence and before adding to their number one must consider carefully whether any of the established organizations could meet the need. Several moves had been made in related fields within the past year. An international meeting of biophysicists took place in Cambridge in July at which the possibility of setting up an International Society for Biophysics was discussed. A report on this meeting would be given later. In June of this year an International Conference on Medical Electronics met in Paris and this organization had sent a representative to the present meeting. There were also representatives or observers present from the American Biophysical Society, the Health Physics Society and the World Health Organization.

**Professor F. W. Spiers (Leeds University, U.K.)** spoke on *The pattern of Medical Physics in Britain*. He said that the participation of the physicist in medical work began gradually through the formal teaching of physics to the medical student—in England, somewhere about 1880—and turned naturally to the field of radiation following the discoveries of Roentgen, Becquerel, and Madame Curie.

With the availability of much larger amounts of radium, and more powerful x-ray machines, came the necessity for the physicist to work actively in collaboration with the doctor to evolve satisfactory and safe methods of treatment and dosimetry. Considerable impetus was given in these formative years by the interest stimulated by the early International Congresses of Radiology. At this time a few physicists worked full time in some of the large radiotherapy centres in Britain; their number increased, but the character of their work remained almost unchanged until after World War II. Advances in nuclear science and in electronics changed and greatly extended the scope of the application of physics in medicine.

At the present time, about 200 physicists were engaged in a variety of physical work in some 80 centres and hospitals throughout Britain. The network was now so wide that, in the recent investigation of the gonadal doses from the medical use of x-rays, some 40 physicists in the regions of England, Scotland and Wales could provide an adequate statistical survey

on a nation-wide basis. The departments varied greatly in size and about one-half operated with only one or two physicists with supporting technicians. In the smaller centres, the physics service was a part of the radiotherapy centre and in many, including some of the larger departments, the work concerned radiotherapy only. In a number of the larger hospitals, particularly the teaching hospitals, the departments were largely or completely autonomous and participated in work in the field of general medicine. In some half dozen centres there were University departments of medical physics with wide terms of reference to apply physical methods to clinical research, diagnosis and treatment.

This growing change of emphasis towards a wide concept of the functions of a medical physics department was likely to continue and in this direction, and particularly with regard to research, lay the chief interest of today's meeting and the ground for its international appeal. Much of the work on radiation dosimetry could now be delegated to competent technicians, and in many departments the physicist was turning to collaboration with the specialists in the field of experimental medicine, and to other physical investigations of a more fundamental nature. Research was a peculiarly difficult occupation to analyse, the manner of its pursuit being highly individual and the outcome necessarily indeterminate. It was, however, of great importance to the physicist and to his department, that active research should be part of the activities of a medical physics unit.

The expansion of interests shown in the programme of the International Congress of Radiology gave some indication of the increasing diversity of the medical physicist's activities. In Britain, no complete list could easily be given, but examples, outside the immediate field of radiotherapy, would include:

1. Many collaborative metabolic studies, with physicians and physiologists, using radioactive tracers.
2. Radiobiology, particularly studies of direct and indirect action, and of the oxygen effect.
3. Solid state phenomena associated with irradiation.
4. Physics of the fluorescent image and its intensification.
5. Fundamental studies of the properties of scintillator-photomultiplier systems.
6. Measurements of the natural gamma ray emission of the body and the determination, thereby, of the amount of potassium in the body.
7. Applications of electronics in cardio-respiratory problems.
8. Research on ultrasonics and its application to medicine.

There was evidence that the emphasis and general direction of medical physics was somewhat different in different countries, and this gave hope that mutual benefit and a cross stimulation of ideas would result from meetings of an international character. Certainly there was a wealth of

material to interest us which transcended the barriers of nations, race and language.

**Professor J. S. Laughlin (Memorial Center, New York, U.S.A.)** spoke on *The Scope and Development of Medical Physics in the U.S.A.* He said that physicists and physical methods had made extensive contributions to many branches of medicine. It would be useful to make a general division between work which was not primarily associated with radiation, and work which was.

In the former class one would include physiological studies on whole organisms; researches on cell structure and functions employing electron microscopy; studies on photosynthesis and on the occurrence of free radicals in living systems; research on enzyme mechanisms; the determination of the structure of biological molecules by physical methods; applications of ultrasonics; and, of course innumerable applications of electronics. Physicists engaged in these investigations usually worked as individual members of some clinical department, or department of biochemistry or biology. Indeed much of the work had been done by chemists or biologists who had had to acquire for themselves the necessary familiarity with physics. The number of trained physicists interested in these fields was not yet equal to the opportunities arising. Investigators in the fields referred to above might belong to various clinically oriented scientific societies and also, in many cases, to the American Biophysical Society.

As examples of biophysical work related to radiation one might take theoretical studies of radiation interactions; methods of measuring radiation dose; the many applications of radioisotopes in biology, etc. Physicists had also participated in numerous investigations of the biological actions of radiation on systems ranging from macromolecules to mammals. In the field of the clinical uses of radiation there had been a progressive improvement in dosimetry and treatment planning, while the radiations now available included electrons, neutrons, and positively charged nuclei as well as x- and gamma-rays. Historically, much of this radiation research in the U.S.A. had originated in the pioneer work of Drs. Failla and Quimby with x-rays and radioisotopes but the work was now widely distributed in hospitals and research laboratories throughout the entire country.

Medical physicists had always been interested in radiological protection in clinical work but they were now having to extend this interest into the rapidly expanding field of the non-medical uses of radiation.

In the U.S.A. medical physicists whose main work was concerned with radiation could be subdivided into two groups: those who were employed in hospitals and those who worked in Universities or Government Laboratories. Members of the former group were usually closely associated with the professional radiological societies, while members of the latter group had usually been associated with other medical societies, or with the Radiation Research Society, the Health Physics Society, the Nuclear Medicine Society.

There were now some 60 *certified* hospital physicists in the U.S.A. and a larger number who had not as yet requested certification. 'Certification' implied recognition by the American Board of Radiology that their qualifications and experience were at least adequate for routine work in hospital radiation physics.

**Dr. K. Lidén (Lund, Sweden)** spoke on *The Scope and Development of Medical Physics in Sweden*. He said that before 1907 medical students in Sweden had had to pass preparatory examinations in physics, chemistry, botany, and zoology. The Course in physics was not specially adapted to medicine. These preparatory courses were abolished in 1907. The physical background of physiology and other medical subjects was then taught by the medical lecturers. The enormous progress in physics in the 1930's and 1940's had led to a revival of medical physics in the 1950's. The students now took a one month's course in general medical physics during their second year at the medical school. During their clinical training in radiology they also took a short course in radiation protection and in the use of radioisotopes. A postgraduate course was held every year in radiological physics, one course in roentgen physics and dosimetry and one in radioisotopes and detectors. Attendance was voluntary.

Radiation physics was the only branch of medical physics that had found routine application in Swedish hospitals. There were now well organized hospital physics departments at three of the four Swedish Universities and there was an increasing demand for physicists trained in this subject. The Universities offered courses in medical radiation physics for a bachelor's or a master's degree. It was also possible to take a Ph.D. in this subject.

The lack of trained physicists had frequently impaired or retarded medical research. This lack was partly due to the difficulties met with in cooperation between physicians and physicists, the doctors automatically regarding assistance and help by non-medical persons as a service on a lower level. Successful scientific research work had been carried out in Sweden in radiological physics since the 1920's. Today there were departments of medical radiation physics at three Universities, and these cooperated successfully with the medical radiologists.

General medical physics had recently been recognized as a special subject at all four Swedish medical schools but important research work had been performed long before then. At present the heads of these four departments were all doctors of medicine. In some institutes there was close cooperation between physicians and pure physicists, often with good results.

During the last few years there had been a fair amount of discussion in Sweden about the most suitable training for a medical physicist. Medical men usually considered that a training in medicine was the more important factor. Nevertheless, in medical radiation physics, which was undeniably a branch of medical physics, applicants for university and hospital positions had to be physicists. Research work in physics

required a high degree of critical ability, and encouraged a careful examination of the inevitable errors in measurement and in calculations. This gave the physicist an excellent basis for tackling the new problems set by biological variability. The development of medical physics in Sweden would, he hoped, result in even closer cooperation between physicians and physicists. At present many more physicists were required in medicine.

**Professor F. Wachsmann (Erlangen, Germany)** spoke on *The Position of Medical Physics in Germany*. He said that in Germany, as in other countries, physics was being employed to an ever increasing extent in medicine. This was true not only in medical radiology and in the field of radioisotopes. Radiation protection work, for instance, was carried on in Germany almost exclusively by non-medical men. In electrotherapy and electrodiagnosis the cooperation of physicists was essential. Methods of physical therapy which employed light, ultrasonics, vacuum massage, hydrotherapy, ultraviolet or infra-red radiations also required such cooperation. There were many other applications of physics to physiology for the purposes of measuring action potentials in muscles, or pressure, flow rates, and temperatures inside the body.

In view of these developments, and of the fact that doctors in Germany had to enter these new experimental fields but were not, in general, adequately trained in mathematics or physics, there was a great need for medical physicists in hospitals. This need was recognized by many progressive doctors in Germany. Nevertheless, at the present time only a few clinics had official appointments for physicists. At some universities, especially in the radiotherapy departments, physicists had been employed in recent years as private consultants. There were about eight such appointments in West Germany and three more had very recently been made by large municipal hospitals. In East Germany the position of hospital physicists might be better than in the West since Medical Physics was recognized there as a special branch of physics.

Medical physicists in West Germany were still discouraged from embarking on an academic career by the difficulty of obtaining higher academic appointments. To qualify for the title of professor, a medical physicist had to satisfy the academic requirements in the faculty of natural science, and this faculty was generally unwilling to sponsor some one whose work lay in the faculty of medicine. To obtain a chair in medical physics was at present almost hopeless. (Professor Rajewsky intervened at this point and some discussion ensued about academic appointments in Germany. This turned on the distinction between Biophysics and Medical Physics.) Continuing, Professor Wachsmann remarked that economically, too, the medical physicist in a hospital was usually badly placed and few had adequate provision for pension. In view of all this, and of the great demand for physicists in industry and research, it was very difficult to attract young graduates into the career of medical physicist in a hospital.

The situation in Germany with regard to research in medical physics and biophysics was, however, better. There were several very good institutes—as, for example, the Max-Planck Institute for Biophysics in Frankfurt—with good working conditions for physicists. These institutes, however, sometimes lacked the close contact with medical problems which was necessary for real collaboration. In spite of the existing difficulties of which he had spoken, Professor Wachsmann believed that there was a more promising future for medical physicists in Germany. The need for physicist colleagues was gradually becoming recognized not only by medical men but even by university and hospital administrators. He had therefore established at Erlangen a training centre for medical physicists so that recruits to the field might be well prepared before entering upon hospital work. Finally he hoped that the proposed German Association of Medical Physicists might soon be formed.

#### DISCUSSION

Opening the general discussion, **Professor E. C. Pollard (Yale, U.S.A.)** said that one of the difficulties in the matter of biophysics was to define the subject. In his view it was a mistake to attempt too accurate a definition of a biophysicist. The American Biophysical Society had decreed that anyone who considered himself to be a biophysicist, and who could get two of his friends who were already members of the Society to agree with him, should be admitted. Perhaps the most important characteristic of the new subject was a different approach to biological materials from the classical one. A biophysicist brought to bear on the subject of biology the physicist's habit of exact thought and deduction as well as the numerous special techniques and instruments for exploring microscopic objects. Although the American Biophysical Society was only two years old it already had some 600 members and was increasing at the rate of 200 per year. The Society held one general meeting each year at which about 200 papers were presented.

**Professor J. Rotblat (London, U.K.)** spoke briefly about the arrangements for training medical physicists in Britain. The biophysicist, or medical physicist, was following the same path as had the biochemist and was departing further and further from the classical lines of investigation of pure physics. In due course, biophysicists would have to form a group as distinct from general physics as biochemistry already was from general chemistry. At the present time the special training was given in post-graduate courses leading to the degree of M.Sc. Several such courses are given at medical schools.

**Mr. K. Koren (Oslo, Norway)** gave a brief account of the status of medical physics in Norway. Within recent years a few hospitals had engaged full-time physicists for work involving radiations or radio-isotopes. A central radiological protection service had been set up twenty years ago, which sent consultants to all parts of the country as required. Although the population of the country was small the distances involved

were large and this had, at least, the advantage that one could sometimes mix winter sports with business. The radiological protection service undertook an inspection of all x-ray therapy departments at least twice a year (including dose evaluations), diagnostic departments every three years, industrial plant every three years plus a field survey of the occupational exposure to personnel. In this field one needed scientific personnel who had a wide knowledge of both physics and biology and special training courses would be required. Norway had welcomed the help she had already received from other countries and would be glad to collaborate in any international organization.

**Dr. W. Degner (Berlin-East, G.D.R.)** said that much of Professor Wachsmann's survey of medical physics in Germany applied equally to the East and West. He was glad to confirm that in the scientific field the cooperation between the two parts of Germany was cordial. There were, however, some differences in the legal and economic status of physicists. In East Germany scientists working in the medical field were on an entirely equal footing with medical men. In the radiation treatment and research centres the work was carried on by a team of workers trained in different disciplines. The radiation physicist had the right to initiate and carry out his own researches within the field of work of the particular team of which he was a member. The financial status of the medical physicist was a good one and some of the larger institutes employed a large number of qualified medical radiation physicists.

**Dr. L. H. Gray (Northwood, U.K.)** said that, while the physicist had usually entered the medical field by way of collaboration in radiological work, there was evidence that this situation was changing. The physicist had always found his collaboration with biologists and medical men both interesting and stimulating. In cancer research the differences between normal and malignant cells required a much more detailed and intensive study than they had received, and the collaboration between physicist and biologist was probably the best hope of success in this field. There were many problems in the fields of medicine and biology to which the physicist, through his special training, could make a contribution, and it was therefore important that he kept his interests broad and maintained effective contacts with biophysicists of all kinds.

**Dr. K. Z. Morgan (Oak Ridge, U.S.A.)** spoke as the representative of the Health Physics Society. This Society had some 1200 members, drawn from 25 countries, and plans were being made to form regional groups in Europe, Japan and India. Some 600 members had attended the last annual meeting. Their members were required to have at least a B.A. degree or its equivalent and to work in the field of radiation protection or some closely related field. This field of work was growing rapidly both in size and in importance. The responsibility of the health physicist in any large organization was a heavy one and he must be given adequate status and powers, if one were to attract independent and intelligent people into the field. There must also be opportunities for



research. The Health Physics Society wished to have close relations with other associations in related fields and would welcome the opportunity of being represented on any international organization of medical physicists.

**Professor J. C. Roucayrol (Paris, France)** said that, in France, they were very fortunate in having had for many years chairs in Medical Physics in the medical faculties and schools of all French Universities. There were more than twenty such chairs, often with associate professors and several assistants in the department. In France the qualifications normally expected in a medical physicist were an M.D. degree and at least an M.S. with principal subject Physics. Both these were necessary if one were to achieve any high position in the academic field. It was impossible to describe all the lines of research which were going on. Lectures in Medical Physics had long been included in the undergraduate syllabus for medical degrees. In the first and second years of the course a total of some 80 hours of lectures were given on Medical Physics, including radiological Physics. As yet there were hardly any medical physicists working in general hospitals. In cancer centres physicists were needed to develop the dosimetric aspects of the subject.

**Professor M. Marchal (Ecole des Hautes Etudes, Paris, France)** had come to the meeting as the representative of the International Federation on Medical Electronics and of the 2nd International Conference on Medical Electronics which had recently met in Paris. Professor Marchal was a Vice-President of both these organizations. Biophysical research in France was carried on in the universities, in the state supported laboratories of the C.N.R.S. and in the numerous laboratories of the Ecole Nationale des Hautes Etudes. The subject was already so extensive that no individual could be familiar with all aspects of it. Successful experimental work required the collaboration of medical men with physicists and electronic engineers and it was the purpose of the 2nd International Conference on Medical Electronics, Paris—UNESCO, June 1959, to bring together such people. The permanent object of the International Federation, whose president is Dr. Zworykin of the Rockefeller Institute in New York, was the same, i.e. close collaboration between the medical and technical world. Other societies already existed in the U.S.A., in Great Britain, etc. Any international organization in medical physics must be built around these existing societies.

**Dr. N. G. Trott (London, U.K.)** spoke of the programme for training biophysicists which was in operation at the Institute of Cancer Research in London. This was a postgraduate training course for the degree of M.Sc. and Ph.D. They had found that physicists were more easily given the necessary grounding in biology than biologists the necessary grounding in mathematics and physics. It would be a mistake if conditions for entry into medical physics were too rigidly drawn at the present time. It was better for entry to be very open so that individuals with widely different backgrounds and training could enter and contribute to the subject.

There was a need, at any rate in Britain, for a supply of well-trained technical assistants to take over many of the routine duties now associated with the applications of physics in medicine.

**Dr. Y. Stuckenberg (Moscow, U.S.S.R.)** said that in the U.S.S.R. biophysical research was carried on in several different institutes, including two Institutes of the Academy of Sciences situated in Moscow and in Kiev. There was not yet any adequate coordination of medical physics although there did exist several Commissions on particular aspects of radiological physics. For instance, one Commission covered the subject of dosimetry, another covered apparatus and techniques, and there were various other special commissions. A great many people were working in the field of biophysics. Some of these had had a biological or medical training, others a physical training. What hindered the work, as a rule, was that the physicists knew too little about the medical and biological matters and vice versa. There were two University Chairs in Moscow—one of these had the task of teaching biophysics to those who had had a basic training in physics; the other was concerned with training medical men and biologists in the necessary physics. On the whole, they had found in the U.S.S.R. that it was easier to make a biophysicist out of a physicist than out of a biologist. Explaining that he did not represent at this meeting any organization from the U.S.S.R., Dr. Stuckenberg nevertheless gave his personal opinion that some international link between medical physicists in different countries would be valuable and he hoped that this would come about as a result of the present meeting.

**Dr. L. Bozoky (Budapest, Hungary)** said that in Hungary there had been two Chairs in Biophysics at the Medical Universities for some twenty years. A third Chair at a University had been in existence for more than ten years. One of these departments was concerned mainly with medical questions. Among the scientific institutes of the Academy of Sciences there was a large division for radiation physics and for radiation protection. There were three large hospitals, each of which employed one or more medical physicists. The availability of radioactive isotopes had changed the position greatly and many medical men who had been abroad and were aware of developments in other countries were now asking for the help of physicists. Other doctors appeared to be somewhat reluctant to allow the physicist into the medical field. This discussion had recently turned in the direction of increasing the number of hospital physicists.

**Dr. V. Slouka (Hradec Králové, Czechoslovakia)** spoke in the name of the Biophysical Society of Czechoslovakia. This was a very active society with some 180 members. The society recognized five divisions of this subject: (1) radiobiology, (2) isotope methods, (3) radiation protection, (4) molecular biology, (5) low-temperature research. Each of these working groups arranged annually a meeting called 'The Biophysical Day'. In 1961 the fourth Conference of Biophysics was to be held.

There were in Czechoslovakia seven Chairs in medical physics, five of these were occupied by medical men and two by physicists. The Biophysical Institute of the Academy of Sciences was directed by Professor Hércik and there was also a Biophysics Laboratory supported by the Ministry of Health. Some medical physicists were also employed in the local health centres and in hospitals.

The Czechoslovak Biophysical Society would welcome any form of international cooperation among medical physicists.

#### AFTERNOON SESSION

The Conference met again in the afternoon under the joint Chairmanship of **Dr. S. Benner (Gothenburg, Sweden)** and **Dr. G. D. Adams (San Francisco, U.S.A.)** to consider the question of international organization. In his introductory remarks Dr. Benner expressed the view that the sphere of activity of any international organization should be wholly scientific. Professional matters could only be settled satisfactorily at the national level. If it were decided to set up some form of association one must consider how wide its scope should be. The meeting of biophysicists in Cambridge some weeks earlier had discussed a very comprehensive organization in which there might well be a place for medical physicists, and which might in due course grow into a new International Union. Any such development, however, lay at least six years in the future, as this was the minimum time required to secure recognition by the I.C.S.U.

**Dr. Lauriston S. Taylor (Washington, D.C., U.S.A.)** who spoke about International Organizations, confessed that he viewed any increase in their number with misgivings. On the one hand they could help scientists in different countries to get to know one another, to exchange ideas, and to have good human fellowship—all excellent aims. On the other hand, every new organization imposed an extra load of work on its voluntary officers and thus interfered with their own scientific work. If it could be shown in an expanding field of science that there was real need for a new organization, there were certain principles to be followed in setting it up. One should not attempt to make the field it covered too wide, otherwise the meetings would become too large and diffuse and the interest and stimulation be lost. The international body must rest firmly on existing national organizations in the same field. Unless there were already well established national organizations it was difficult to see what purpose an international body could serve. Medical physics was a borderland between physics and medicine in which both physicists and medical men had legitimate interests, but this created some organizational difficulties which would have to be resolved if full cooperation were to be achieved. The American Radiological Societies still excluded physicists from full membership and from holding office. There were also problems of communication—not only the need for translation from one language

into another, but also for making the technical terms and ideas used in the one field comprehensible to workers in the other. In the field of medical physics and biophysics there were already several vigorous national societies—in Britain, the U.S.A., Sweden and several other countries represented at the meeting. There was also the Health Physics Society, which had European groups. Any international organization in medical physics must be built around these existing societies.

**Professor M. Marchal (Paris, France)** reported on the International Conference of Medical Electronics which had held its first large meeting in Paris in June 1958 with assistance from the World Health Organization and the UNESCO. The organizations he represented would wish to have the closest cooperation with any international organization in the field of medical physics, and hoped that each might be officially represented at the other's meetings. The next meeting, that is the 3rd conference was to be held in London in 1960. The International Federation would be glad to have a list of the members of the societies for medical physics, to send them the programme of the next Congress on Medical Electronics.

**Dr. H. Miller (Sheffield, U.K.)** speaking on *Is an international organization of medical physicists desirable?* also emphasized that before setting up any new international association one must be sure that its purposes were not already served by some existing organization.

A medical physicist could be defined as a scientist working in a medical unit on problems involving the application of physics to the treatment of disease. His contact with clinical work might be close or might be very indirect. Any international organization in medical physics should be concerned with scientific questions and not with professional matters.

In the U.K. part of the work of a medical physicist was connected with day-to-day treatment of patients and part of it was research. To an increasing extent the work was concerned with problems outside radiotherapy.

The International Congress of Radiology did not meet the needs of the non-radiological worker, nor indeed did it satisfy all the needs of the radiological physicist. More personal contact between medical physicists in different countries was needed and more contact with fundamental research into the physical properties of biological materials. Better contact between workers could be achieved by exchange of staff, by an international news bulletin, by exchange of data and by small conferences.

Many medical physicists were already concerned with biophysical problems. It was part of their responsibility to see that any new physical ideas or methods were introduced without delay into medical practice. An international organization of medical physicists might help its younger members to retain their initial interests in the application of the whole field of physics to medicine by keeping them in contact with developments in fundamental biophysics.

A new organization would not take the place of the many others with which medical physicists must always be associated, but by cooperating with other organizations such as the Conference on Medical Electronics, it could seek to prevent unnecessary overlap.

Dr. Miller suggested that a committee be formed, representative of existing national organizations in medical physics with co-opted members to represent those who have no such national body. Its duties should be to explore the possibilities of increasing international cooperation (*a*) by exchanges of staff, (*b*) by a bulletin, (*c*) by exchange of data and standards, (*d*) by conferences which may be international, national or regional. It should aim at keeping in touch with any International Organization in Biophysics so that in the event of an International Union of Biophysics ultimately being formed medical physicists might be linked with this. Its work would be mainly carried on by correspondence and the necessary finance for this would have to come from the existing national organizations.

**Dr. A. Reuss (Erlangen, Germany)** said that an international organization could be of great assistance to those countries which had no national association or were now in process of founding one, as they were in Germany. They would therefore be glad to see some form of international body set up.

**Dr. J. W. Boag (Northwood, U.K.)** reported briefly on the International Biophysics Meeting held in Cambridge, England, from July 6-9, 1959. This meeting had been organized by a small committee set up by the International Union of Pure and Applied Physics. A number of scientific sessions were held in which different aspects of biophysics were reviewed and discussed. One session was devoted to a discussion on the need for international organization in biophysics. The meeting decided that an international organization was desirable and that it should be on a very broad basis. No steps were taken at Cambridge to elect a committee but it was likely that further moves would be made in the near future. From informal conversations at the Cambridge meeting, he had gained the impression that cooperation with any organization of medical physicists which might be set up would be welcomed.

Dr. Boag then put forward the following composite motion:

1. *That the meeting decide to form an international link between medical physicists in different countries pending the formation of any more comprehensive international organization covering the field of both pure and applied biophysics.*
2. *That this link be maintained through the societies participating in the present meeting and that those countries which have not, as yet, any national societies for medical physicists should be kept informed through their representatives at this meeting.*
3. *That the corresponding committee be called 'The International Liaison Committee on Medical Physics'.*

4. *That a condensed account of the proceedings of this meeting be prepared and circulated to those participating and, if possible, published in some appropriate journal.*

The motion was seconded by Dr. L. H. Gray.

**Dr. F. T. Farmer (Newcastle, U.K.)** stressed the need for active national associations, without which the international committee could not function, and for which it was certainly no substitute. Valuable scientific discussions were usually held in small groups and the liaison committee proposed in the motion, besides keeping the national associations in touch with one another and with individual medical physicists in countries where no such association existed, could from time to time organize small colloquia on particular topics. He supported Dr. Boag's motion.

**Dr. D. H. Bekkering (The Hague, Holland)** said that one advantage of living in a small country was that one knew all the people working in the fields of medical physics and biophysics and met them frequently. He thought that one should not attempt to divide them into two groups and that the international organization should be wide enough to cover both fundamental biophysics and the applied branch—medical physics. Although they did not have large numbers of people working in the field in Holland they would be very interested to participate in an international organization.

**Professor J. E. Roberts (London, U.K.)** spoke as Editor of the *Journal Physics in Medicine and Biology*. This journal had been founded to provide a forum for workers in the fields of medical physics and biophysics, and was the official journal of the Hospital Physicists' Association. The Journal already had an international Editorial Board and he believed it could assist the proposed Liaison Committee to fulfil its task. He would be pleased to publish a full report of the present meeting in the Journal and to publish information from time to time on other national or international activities in the field.

**Dr. J. H. Martin (Melbourne, Australia)** had at first been doubtful about the wisdom of launching a new international organization but was prepared to support the proposed Liaison Committee. He hoped that the committee would include members from countries which had not yet formed national associations. In Australia although numbers were still small, there was a very keen interest in the field.

**Dr. L. Lanzl (Chicago, U.S.A.)** said that the Radiation and Medical Physics Society of Illinois, which he represented, had originally hoped that an international organization capable of dealing with professional as well as scientific questions would be formed. He would, however, support the proposal to form a Liaison Committee.

**Professor P. Blanquet (Bordeaux, France)** said that probably the first Biophysical Society had been formed in Strasbourg in 1929 and had published its proceedings in Archives of Biophysics until 1943. This

society has ceased to exist but they hoped to hold the first meetings of a new one during the coming winter. A Colloquium on Biophysics had been held in October 1958 in Bordeaux which had been attended by over 100 French biophysicists and had been a very successful meeting. There was a need in France for a special journal in which papers on biophysical subjects could be published. He hoped that the Liaison Committee proposed in the motion would be established, and French biophysicists would be glad to cooperate with it.

**Dr. W. K. Sinclair (Houston, U.S.A.)** thought that it would be undesirable to form an international association for medical physics alone, at this time, as the limits of the subject were still so ill-defined and many of the branches of medical physics had rather little in common with one another. He believed that the ultimate objective should be the formation of a comprehensive organization covering both pure and applied biophysics and he supported the proposed Liaison Committee as a step in that direction. He hoped the proposed Liaison Committee would address itself particularly to studying the objectives that such an international group might set out to achieve and that a clear statement of these would eventually be possible. He believed that it was more profitable to organize small specialized symposia than large general meetings.

**Dr. Gail Adams (San Francisco, U.S.A.)** then put the motion to the vote and it was carried unanimously, all members present voting. The initiative in implementing the motion was left with the Hospital Physicists' Association which was willing to act in the interim as a central clearing house for correspondence and information.