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ADDRESS AT THE AMALGAMATION OF THE RÖNTGEN SOCIETY AND THE BRITISH INSTITUTE OF RADIOLOGY, NOVEMBER 17th, 1927.

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WHILE welcoming you here to celebrate the incorporation of the British Institute of Radiology with the Röntgen Society, our minds must naturally dwell on the memory of Sir Archibald Reid (1871-1924), who was so keenly interested in the establishment of this Institute, and to whose personality, tact, and indefatigable energy the Institute owes its present home. To the service of radiology, the future of which he had so entirely at heart, Reid unselfishly gave the time he should have devoted to the preservation of his impaired health. His painful disabilities were hidden by a light-hearted and kindly humorous manner, which made him a delightful companion, ever alert in mind and body, and withal somewhat elusive. During the War he was President of the War Office X-ray Committee (1914-19), responsible for the X-ray arrangements for the British Forces at home and abroad, and evolved out of chaos a most complete and satisfactory service for our armies on every front—a problem of enormous importance, but sore let and hindered by tiresome obstacles. He had vision, initiative, and "a way with him" of overcoming difficulties. To Archibald Reid British radiology owes much, and to remind future generations of this debt the British Institute of Radiology might well place his portrait, painted and presented by his attached friend, C. E. S. Phillips, in the Museum or the Hall to be called after him, the like of whom we shall not see again, but

the memory of whose stimulating personality will long remain a inspiration.

The conception of a Radiological Institute, first suggested by th foresight of the late Deane Butcher in 1906, was revived in 1917 by Committee of which Sir James Mackenzie-Davidson was chairman, ar Dr. R. Knox secretary, and emphasized in the Presidential Addresses the Röntgen Society given by Dr. G. W. C. Kaye (1917), Dr. R. Kno (1920), Professor J. W. Nicholson (1921), and then taken in hand wit infectious enthusiasm by Sir Archibald Reid, and by other leaders medical radiology. The aims and scope of the Institute are exceedir broad, namely, to further in all possible ways the progress of this your but rapidly growing branch—really the Cinderella—of medicine; thu it is to serve as a meeting place of all interested in the subject—medic men of every department, radiologists, physicists, technicians or radi graphers, instrument makers and manufacturers, so as to form a cent for consultation and co-ordination, and as a bureau to supply informatic of all kinds at the service of provincial, overseas, and foreign colleagu as well as of those in the Metropolis, and thus to have an internation influence. Although the medical applications of radiology are mo important, its broader bearing on industry, arts and sciences, especial physics and biology in its widest sense, cannot be too much emphasize this shows the urgent need for the frequent association or team-work workers in these various branches. Thus in medicine the clinician pathologists, anatomists, physiologists, and biochemists have much learn from radiologists, who in their turn will reap great advantage, ar a scientific position from an insight into these kindred subjects and clo co-operation with their colleagues. Part of the important functic of forming a home and centre for all interested in radiology is the exi tence of a good reference library, which was started by Lady Mackenzi Davidson's generosity in presenting the professional library of her la husband, Sir James Mackenzie-Davidson (1858-1919), the recognise leader in radiology, in whose memory his family endowed the Mackenzi Davidson Memorial Lectures under the Röntgen Society and th Electro-therapeutic Section of the Royal Society of Medicine. Equal essential is a Museum containing a collection of radiographic films ar lantern slides illustrating completely the normal and morbid anatom and physiology of the human body, and also, though this is rather f consummation in the future, of comparative radiology.

Just as the Institute helps individual workers, and brings them in touch with each other, so should it unite for their mutual advantage ar strength the various Societies concerned with the subject. This allian will enable joint action to be taken in matters vitally affecting the positic

of radiology as a scientific profession, and the status and interests of the individual workers; thus by the formation of representative special Committees, on the lines of that on the Protection of X-ray and Radium Workers, it would be able to express an authoritative opinion on various questions, such as the educational requirements to be required from those undertaking this work, and to consider delicate problems, such as the short-circuiting of radiologists when radiographers report direct to medical men, and the provision of services by voluntary hospitals to persons outside the classification properly accepted as defining hospital patients. As a centre for teaching it is of great value, as has been abundantly proved by the instruction given to candidates for the Diploma in Medical Radiology and Electrology of the University of Cambridge. Its central position renders it well adapted for its monthly and other meetings, conferences, and the organisation of congresses, as indeed was shown by its share in the success of the arrangements made for the International Congress of Radiology, attended by five hundred members, held in London, in July, 1925, under the presidency of that pioneer, C. Thurstan Holland. Further, a most essential objective of the Institute, which is yet to be brought into activity, is research work in experimental laboratories, so that team-work may be undertaken, and the Institute may become the centre of a world-wide organisation for systematic investigation of the numerous unsolved problems, which most urgently call for elucidation in the interests of mankind. For this purpose endowment to provide research fellowships and grants would obviously be required.

History of the Present Institute.

As already mentioned, those most keenly concerned in the future of radiology had for some years been anxious to establish a central institute, and in the spring of 1923, a committee with representatives from the Electro-therapeutic Section of the Royal Society of Medicine, the Röntgen Society, and the British Association for the Advancement of Radiology and Physiotherapy, was formed under the chairmanship first of Dr. R. Knox, and then of the late Sir Archibald Reid with Dr. John Muir as Secretary ; acting with admirable promptitude it was decided to found the British Institute of Radiology, and to issue a limited appeal for funds. In April of that year the British Association for the Advancement of Radiology and Physiotherapy became the British Institute of Radiology, and obtained the Board of Trade's confirmation for its Articles of Association The British Association for the Advancement of Radiology and Physiotherapy (B.A.R.P.), founded in 1917, with the late Sir James Mackenzie-Davidson as President, and Drs. R. Knox and E. P.

Cumberbatch as Secretaries, had done much good service to radiolog in its comparatively short life of seven years; thus it at once set to wor on establishing a Diploma in Medical Radiology and Electrology, an was instrumental in getting the University of Cambridge to initiate th in 1920; for this new departure and great asset to the status of radiolog the British Association for the Advancement of Radiology and Physi therapy worked out all the details of the course and undertook th teaching. It therefore formed a most suitable foundation and nucle for the British Institute of Radiology. Much help was given to the ne project by the Trustees of the Mackenzie-Davidson Fund, who hande over the money (£1,400) collected to the organising committee. As th result of Sir Archibald Reid's keen enterprise a long lease was secure of 32, Welbeck Street, two doors from his house, and in November, 192 a further and as it proved rather optimistic appeal for £6,000 was issue to pay off the bank loan of £2,000, and to provide a nucleus for furth development.

The objectives of the Institute were set forth as follows :—

> (*a*) to promote the advancement of radiology and physiotherapy on scienti lines under the direct control of the medical profession, protecting in every w possible the interests of those engaged in these subjects ; (*b*) to secure legislative i provements in this connection ; (*c*) to provide for the delivery of lectures, the holdi of classes and examinations, the establishment of scholarships, and the granting prizes, diplomas, and certificates ; (*d*) to arrange for the publication of papers, co munications, or treatises ; (*e*) to promote and provide for research in experimen work, and to establish grants and rewards in connection therewith ; (*f*) to establ and maintain a library and museum, and to organise exhibitions of apparatus ; (*g*) establish charitable and benevolent funds for the benefit of persons engaged in radiolo and physiotherapy.

The Institute opened its doors in January, 1924, almost at the tin of Sir Archibald Reid's tragic death : at any period this would have be a most serious blow, but at this critical juncture it might easily ha been disastrous had it not been for the public spirit of the remaini guarantors, A. E. Barclay, G. Harrison Orton and Stanley Melville, a for the self-sacrificing efforts of Robert Knox, G. W. C. Kaye, Gilbe Scott (Hon. Treasurer), and others. The Institute weathered the stor thanks to this help and to the devotion and skill of our Secretary, Jo Muir, O.B.E., B.Sc., M.B., who combines organising ability with t knowledge of an expert radiologist. It is to be hoped that the Institu which has been so successfully steered through its anxious periods of bir infancy, and early growth, will continue to be equally fortunate; for t numerous advances and its complicated circumstances must be sat factorily consolidated in the near future. So many of the visitors seeki information on radiological questions are medical men from the provinc and overseas that obviously the ideal Secretary or Director should

thoroughly conversant with these problems and always available. This year has seen the amalgamation of the Röntgen Society and the affiliation of the Society of Radiographers to the British Institute of Radiology.

The history of the present BRITISH JOURNAL OF RADIOLOGY was given by Dr. Barclay in his Presidential Address to the Röntgen Society (*Brit. Journ. Radiol.* (Röntgen Soc. Sect.) 1925, xxi, 13). Since 1924 it has really consisted of two journals, which are superficially alike and therefore likely to cause some confusion in the minds of the casual readers; these are those of the Röntgen Society section, appearing quarterly, and the British Institute of Radiology section, coming out monthly, edited respectively by Drs. G. W. C. Kaye and Robert Knox, with a representative Editorial Board. Now that the amalgamation of the Röntgen Society with the British Institute of Radiology has been happily accomplished, these two sections of the JOURNAL will be merged in one Journal coming out monthly, so that there will be twelve instead of sixteen numbers annually. With these two experienced and enthusiastic Editors able to call the willing members of the Editorial Board to regular meetings for consultation, or for ready help at any time, there can be no doubt that the JOURNAL will reflect the combined strength of the amalgamated bodies.

RELATIONS OF MEDICAL AND NON-MEDICAL MEMBERS.

The Röntgen Society, founded in 1897, with the late Professor Silvanus P. Thompson as President and "the oldest Society which has as its fundamental principle the study of the X rays in their relation to Medicine, the Arts and Sciences," has great traditions and played a notable part in the rise and development of radiology. In 1898 it founded the Silvanus Thompson Lectureship and Medal, its Röntgen Award was founded in 1924, and it is associated with the Electro-therapeutic section of the Royal Society of Medicine in the administration of the Mackenzie-Davidson Memorial Lectureship and Medal founded in 1920. The incorporation of the Röntgen Society with the British Institute of Radiology is a great achievement and a tower of strength to the Institute, but it was no easy task; it took two years of negotiation to settle the financial considerations and the problems raised by the special interests of the members—medical and non-medical—of the Röntgen Society. But by patience and long drawn-out discussions between the Councils of the Society and the Institute agreement was ultimately reached, and a revised form of Memorandum and Articles of Association have been sanctioned by the Board of Trade for "The British Institute of Radiology incorporated with the Röntgen Society." As a sign of their unity, peace,

and wise provision for future prosperity the Councils of the Röntgen Society and the Institute unanimously begged Mr. Geoffrey Pearce, the successful Treasurer of the Röntgen Society since 1915, to continue his valuable services to the Institute.

The Society of Radiographers, which became affiliated to the Institute in January, 1927, was formed in 1920 with the assistance of the Institute of Electrical Engineers and the British Association for the Advancement of Radiology and Physiotherapy in order "to give a definite professional status to those certified non-medical assistants who work in X-ray and Electro-therapeutic departments." It grants a certificate of Membership of the Society of Radiographers (M.S.R.) to those who pass a satisfactory examination. As evidence of the interest taken in the Society of Radiographers by medical men practising radiology (radiologists), it may be mentioned that the late Sir Archibald Reid and Dr. Stanley Melville were its first two Presidents, and Dr. Robert Knox a Vice-President. Its Articles of Association laid down that "no non-medical member (*i.e.*, no member who is without the qualifications entitling him to practice in Great Britain and Ireland as a physician or surgeon) shall accept patients for radiographic, radioscopic, or therapeutic work except under the direction and supervision of a qualified medical practitioner, and any breach of this regulation shall be deemed conduct unfitting the member guilty thereof to remain a Member of the Society." In 1924 an attempt was made to modify the restriction relating to making diagnostic reports on patients, but the General Medical Council vetoed the modification sent to them. This thorny question has several times been discussed, but the Articles of Association of the Institute of Radiology Incorporated with the Röntgen Society, to which, as already mentioned, the Society of Radiographers is now affiliated, provide that "no member or associate who is not a registered medical or dental practitioner shall accept patients for diagnosis or treatment except under the personal supervision of a registered practitioner" (Article 12). Further, as the result of the action of the General Medical Council, Section 3 of the Institute of Radiology's Memorandum of Association, which provides for granting diplomas and certificates of merit and efficiency, has been amended by the addition of the following words: "and that the holder of such diploma or certificate is not thereby entitled to undertake the medical diagnosis or treatment of patients except under the personal supervision of a registered practitioner." The medical members of the Institute of Radiology incorporated with the Röntgen Society are bound by the regulations of the General Medical Council, and the present policy of the Institute, which is in accord with the directions of the General

Medical Council, enables radiologists to be united with radiographers for their mutual advantage. But any future change that would render it impossible for medical men to remain members of the Institute would obviously wreck the scheme of the Institute which is remarkable for its exceptionally broad and democratic character. While there may not be any reason to anticipate such a calamity it is perhaps well that all possible dangers should be clearly understood.

The Institute is governed by a body representing "the high contracting parties" equally, so that no one is paramount; the interests of each must be respected and maintained, for example, purely medical matters must, on account of the control exerted by the General Medical Council and for reasons concerned with the educational activities of the Institute as regards the Diploma in Medical Radiology and Electrology of Cambridge, be in the hands of medical members, and on this account it is desirable that the Secretary or Director of the Institute should have a wide knowledge of medical regulations.

The Institute now has a roll of more than three hundred active members, and fortunately has the support of vigorous branches of the Institute in the provinces; this is only in keeping with the extraordinary conscientiousness with which country members, often from far distant centres, have attended the meetings of the Council of the Institute.

RÖNTGEN SOCIETY AND BRITISH INSTITUTE OF RADIOLOGY.

INAUGURAL MEETING.

THE Inaugural Meeting of the Röntgen Society and the British Institute of Radiology took place at the Central Hall, Westminster, on November 17th and 18th. On the first day Sir Humphry Rolleston delivered his Presidential Address, and on the second day there was a Physics Meeting in the morning, a Medical Meeting in the afternoon, and a dinner in the evening. At the Central Hall also an exhibition was held, to which some fourteen firms contributed apparatus, and five others photographic materials.

PHYSICS MEETING.

X-RAY AND RADIUM PROTECTION.

Sir WILLIAM BRAGG occupied the chair at the Physics Meeting on the morning of November 18th, when the first event was a paper by Dr. G. W. C. KAYE on "X-Ray and Radium Protection." Dr. Kaye, after mentioning that it was estimated that well over one hundred of the earlier workers in X rays had succumbed to their injuries, said that the following countries had dealt with the question of protection: England, United States, Germany, Norway, Russia, Holland, Austria—where certain protective measures had even been legalised—Sweden, and other Scandinavian countries. Very largely the recommendations worked out in England had been adopted. The Protection Committee was confronted with the fact when it began its labours in 1921 that there was no generally

accepted standard of X-ray intensity ; it was hoped, however, that this situation would be met at the Stockholm International Congress next year. During the last few years hundreds of hospitals had been tested by the National Physical Laboratory, whose reports had frequently been instrumental in assisting the radiologist to obtain a new equipment or an added protection, which on his own recommendations would not have been forthcoming. Dr. Kaye went on to show that the figures recommended by the Protection Committee were not impracticable, but had a considerable amount of reason in their favour. The last few years had shown a steady rise in the protective value of lead glass, which in earlier years was little better than soda glass. It had been possible to improve the protective quality of lead glass while retaining transparency, and of lead rubber while retaining pliability. In view of the accidents which had occurred in the past, the Protection Committee was led to stress the danger of high voltages. The question of adequate ventilation had assumed an importance secondary only to protection. Large area rooms were not in themselves sufficient. The high-tension discharge speedily vitiated the air to an extent which called for special ventilating arrangements. Ordinary ventilation was inadequate and was apt to be unsatisfactory on very windy, stagnant, or very cold days. A general ventilating scheme was often liable to have its even distribution disarranged by the untoward opening of doors and windows. If the conditions permitted the windows to be opened widely, this was to be encouraged, but to avoid the possibility of interfering with other rooms each room should be provided with its own suction fan or fans, each fan to have its own outlet, while distributed inlets would be placed near the floor. Dr. Kaye also stressed the point that the X-ray department should be as bright and cheerful as any hospital ward in its scheme of decoration. Radiographic screening and developing rooms should be opened out to sunlight and fresh air when not in use. Dark rooms were too small. He described the X-ray department at the Royal Infirmary, Edinburgh, as probably the finest of its kind in Europe. The dangers of over-exposure to X rays and radium, he concluded, could be avoided by the provision of efficient protection and suitable working conditions. Radiology was in fact no more dangerous under proper working conditions than scores of other professions. All honour to the pioneers for taking the risks they did, but it was only too true that those risks need never have been taken had the present knowledge been available. It was not to the honour of radiology that any cases of even minor casualties should be allowed to occur in future, yet within the last few months instances had come to his knowledge of young physicists who had been badly burned in X-ray spectroscopic work. These accidents were all avoidable with proper precautions.

Dr. A. E. Barclay, in the course of some discussion, said that at Manchester the dose which one of the workers in the department had received over a long period was measured out. It proved to be 0·007 of the unit skin dose per working day, and the worker had sustained no damage at all. Observations on one or two people, however, were of little value ; information should be obtained from as many workers as possible. It would be extremely valuable if the physicists could go into some of the old disgraceful departments and measure up the quantity of radiations which the workers tolerated for years. One point on which Dr. Kaye had touched was fire danger and the use of film. It was worth noting that no fire extinguisher would be of any use against celluloid once it was alight. In film fires the brigade directed their efforts to preventing the fire from spreading, they could not hope to quench the blaze.

Dr. T. A. Rowden spoke as one of the "old contemptibles" who had started X-ray work in 1898, and was still actively engaged in it. He had escaped all injury, and the sweat glands in his hands were still in a healthy condition. He believed that the recommendations of the Protection Committee had done harm in certain directions, because they had drawn attention to minor points while failing to stress sufficiently the main thing. All the damage that had been done to X-ray workers had been done through the direct rays emerging through the opening of the diaphragm. He believed that he himself was the first man who ever enclosed completely the X-ray tube in a box completely surrounded by lead. All the virulence of the X-ray would be harmless if workers would keep out of the direct fire and see that all those under them were properly educated.

Professor Sidney Russ, in defence of the Protection Committee against Dr. Rowden's observations, said that the way in which the Committee's reports had been received showed that they were badly wanted, and Dr. Kaye said that with regard to deep therapy outfits it was probably better, on the whole, for the operator to be outside the room.

X-Ray Measurement.

Several papers were read on this subject, but they were of a kind which does not lend itself readily to summary. Professor Russ spoke on some points on gamma-ray doses. He suggested that the questions which had arisen in the expression of dosage in gamma-ray technique could be fairly well met from the physical point of view, but recently in the laboratory there had been some more definite attempt at expressing the doses at different points of the body. He criticised the new departure in gamma-ray dosage by Dr. Mallet, who proposed a unit which he called "D" in honour of the late Dr. Dominici, corresponding to the energy of 100 mg. element-hour. This proposal was not considered by Professor Russ to be entirely satisfactory.

Professor E. A. Owen dealt with X-ray ionisation measurements, and drew attention to some points in the work which had been done on ionisation chambers. The construction of the small chamber that was to be used in the clinics had first to be borne in mind ; special attention must be paid to the material of its walls if consistent results were to be expected, and then these small chambers would have to be compared with a standard chamber constructed in the laboratory.

Mr. Mayneord spoke at some length on the evaluation of the pastille dose in electrostatic units, and referred to the controversy which has recently come to a head in *Strahlentherapie*. The point of importance in the definition of the unit appeared to turn on where the ionisation was being measured.

Major C. E. S. Phillips, in describing an experiment on selenium, said that he was glad to have an opportunity of calling attention to the desirability of exploring as many avenues as possible for a method of measurement other than by ionisation. He thought that everyone who had had anything to do with that kind of work would realise how difficult it was to carry out investigations of that kind easily in an X-ray department. It was very desirable to try and find some method which would bear the same relation to the ionisation method as the ordinary foot-rule did to the official standards of length. Various experiments had been made with selenium, and it was possible to make a very effective selenium cell by putting a small amount of selenium in between two blocks of aluminium, and then pressing them together tightly. This was the merest film of selenium, but the resistance might be very high. Some recent work on selenium had rather encouraged further efforts in the direction of applying it in X-rays. By drying the selenium cell its consistency was enormously improved. A great deal of the polarisation found was very largely or almost entirely due to the presence of films with moisture on the cell. A cell recently made in Vienna, known as the Thirring cell, was most interesting from the X-ray point of view, and as far as he had gone with it he had found it very useful. When the beam was shut off it went back immediately to nearly zero, and within a very short time actually to zero. It was likely to make the measurements taken in the X-ray room a great deal easier.

Professor J. A. Crowther said that in measuring a beam of X rays there were two things to consider—the wave-length or frequency of the radiation and the intensity of the beam. There was no difficulty in measuring the first ; it was around the second that the discussion always centred. He thought that the question of X-ray measurement had been held up for 10 or 15 years by the unfortunate use of the term "intensity" instead of "energy" properly defined. The need was now for the setting up of some generally accepted standard ionisation chamber in which the quantities could be measured.

Sir William Bragg said that he could not help noticing how much work had been done since the subject was approached in that hall at the International Congress of Radiology in London. It was obvious that all over the world the use of X rays and gamma rays was proceeding, and yet comparison in different parts of the world was rendered difficult by want of a proper standard ; this was one of the difficulties the physicists were trying to meet. The papers read that morning showed that progress was being made towards the end in view. Some of the work detailed appeared to be very valuable ; thanks were due to the various members who had put forward their observations, and it was to be hoped that at the meeting in Sweden something very definite would result which would be to the great gain of radiologists in all parts of the world.

Medical Meeting.

At the Medical Meeting, over which Sir Humphry Rolleston presided, the subject discussed was the use of opaque substances as an aid to X-ray diagnosis. Dr. R. A. Gibbons dealt with gynæcological conditions, Dr. L. S. T. Burrell with chest conditions, Sir John Thomson-Walker with the urinary system, and Sir James Purves-Stewart with the nervous system.

Dr. R. A. Gibbons said that X rays had practically revolutionised the means of diagnosis. In gynæcology also they had the further possible use of bringing about sterility. What he would like to know from the experts present was whether, working under definite standard conditions, a dose could be estimated which, taking into consideration the age and natural idiosyncracy of the patient, would ensure temporary sterilisation—a thing which was of vital importance to many women on medical grounds. It would also be a matter of great scientific interest, seeing that the question of the sterilisation of the unfit was becoming of practical international importance, if it could be shown that sterilisation by the X rays was efficient, permanent and harmless. It would certainly deprive many of the opponents of sterilisation of the unfit of one of the arguments against it if it could be shown that no harm was done. With regard to diagnosis, gynæcologists of late years were enormously indebted to radiologists for knowledge gained concerning the Fallopian tubes and the size of the uterine cavity as revealed by opaque injections. Since the method of insufflation had been introduced it had been a matter of routine to investigate the condition of the tubes when necessary in case of sterility. It was obvious that no such examination of the uterus and tubes became necessary until all conditions likely to cause interference with conception had been eliminated. It had been estimated that in 50 per cent. of women sterile in spite of curettage the cause would be found in the tubes. His own method of procedure was to prepare the patient exactly as for curetting, with antiseptic douches given beforehand, and the vagina and cervix thoroughly painted with iodine. He used a mixture of sulphate of barium and bromide of sodium with a mucilage. The bore of the syringe should be as wide as possible relative to the size of the canal, and very little pressure in injection should be applied. He usually injected the night before and examined next morning. No harm had resulted from the injection of the mixture he had described but some interesting results had been shown with regard to the size and condition of the uterine cavity in fibroid. Dr. Gibbons thought opaque injections would be of more real service in the diagnosis of tubular causations of sterility than anything else in the range of gynæcology.

Dr. L. S. T. Burrell explained his method of using lipiodol in the diagnosis of intra-pulmonary diseases. His practice was to inject the oil through the crico-thyroid membrane, first of all anæsthetising the skin with 2 per cent. novocaine and then injecting into the trachea $\frac{1}{2}$ cc. of 5 per cent. cocaine. As soon as the cocaine reached the mucous membrane of the trachea the patient would cough for a few minutes, and it was that cough which was liable to break the needle. He used a somewhat larger needle than would be used for an ordinary hypodermic injection and in order to prevent risk of breaking, having made certain that the needle was in the trachea, quickly plunged the piston and, instantaneously, before the patient could cough, withdrew the needle. Having got the cocaine into the trachea he put the needle connected with the lipiodol syringe through the crico-thyroid membrane ; on turning the piston upwards bubbles came very rapidly and he knew the needle was in the trachea. That method was better than the old way because it was simple ; it did not make the patient cough ; there was no discomfort or inclination to vomit. The total time occupied from the injection of the novocaine to the last drop of lipiodol was less than two minutes and perfectly painless for the patient who, during injection, was arranged in the position necessitated by the part of the bronchial tree it was wished to see. Dr. Burrell did not advocate giving more than 14 or 15 c.cm. lipiodol in a normal chest case, otherwise the oil tended to get into the smallest tubes, and perhaps also into the air-cells, and appear under X-ray as an amorphous mass obscuring the picture. The value of lipiodol in diagnosis was that it enabled one to detect an obstruction. In the case of carcinoma of the right or left bronchus it was interesting to note how the bronchial tube was dilated and quite full of lipiodol ; it was also possible to see whether a tumour was connected with the lung or outside, the latter being indicated by the lipiodol passing the tumour. In a case of artificial pneumo-

thorax lipiodol enabled one to see to what extent treatment was obliterating cavities or lung-tissue, while in spontaneous pneumo-thorax it was possible to localise the rupture in the lung. Again, in the diagnosis of bronchiectasis one could determine whether or not the eccyesis was uni- or bi-lateral. Many cases had gross disease on one side or the other, so that the speaker always put lipiodol into the trachea and determined the condition of the better lung and by that means prevented many a patient undergoing an operation when the disease was bi-lateral. While lipiodol was only interesting in many cases, in others it was essential ; for instance, in cases of bronchiectasis when one was not quite certain how much the tubes were dilated, one could prevent months, or even years, of unnecessary treatment by ascertaining the site and, at the same time, choosing one's treatment. In fact, Dr. Burrell failed to see how it was possible to diagnose for certainty the degree of bronchiectasis without the help of lipiodol.

Sir JOHN THOMSON-WALKER described the use of opaque fluids in the radiology of diseases of the urinary system and selected cases necessitating examination of the renal pelvis and ureter. The pyelographic method first successfully used by Voelcker and Lichtenberg in 1906 was now widely adopted, and was especially advantageous in aiding diagnosis of renal growths in 90 per cent. of which hæmaturia was an early symptom. At the outset, however, there were no localised symptoms : hæmaturia had sometimes ceased and it was impossible for the surgeon to decide what was the matter. At present no statistics were available as to the number of cases of renal hæmaturia without palpable tumour that gave a negative or positive pyelogram. Although a normal pyelogram of good quality was not absolutely indicative of the presence of growth, it was strong evidence that no growth was present. The changes seen on the pyelogram indicative of renal growth were flattening and obliteration of one or more of the renal calices ; exaggeration of the cupping of the calices ; elongation of the neck of the calices ; obliteration of a portion of the pelvis ; elongation and attenuation of the pelvis ; irregularity of the renal pelvis and displacement of the pelvis, the renal calices and ureter. Moreover, the axis of the pelvis might be so altered as to lie transversely or obliquely ; it might be displaced upwards, downwards, inwards or outwards, though lateral displacement was more significant, because in normal conditions the kidney could be displaced up or down. It was necessary to bear in mind that the normal pelvis and calices showed variations in structure which one might quite well take to be growths but which were really normal kidney. Congenital malformation might also have a superficial resemblance to some of the filling defects caused by growth, while there might be distortion owing to previous nephrectomy ; or pressure from growth outside the urinary tract altogether might distort the renal pelvis and displace the upper ureter. If a papilloma of the renal pelvis was modest in size the contour remained unaltered ; if the papilloma was large the whole cavity might be filled with growth. Dilatation of one or more calices was not unknown and the shadow of a dilated calix might be separate from that of a distorted pelvis. Growth on the pelvic outlet might cause dilatation of the pelvis and the pyelogram would show a hydro-nephrosis which it would be impossible to distinguish from one from other quarters. In dealing with the application of the pyelograph to the investigation of contractual power of the renal pelvis, Sir John Thomson-Walker pointed out that it was important to have some method by which the power of the renal pelvis to empty itself could be measured. When passing a ureteric catheter it was possible sometimes to draw off 2 or 3 ozs. of urine right away, and after an injection of opaque fluid it was possible to see on the film the size of and the changes in the pelvis. When there were minor degrees of hydronephrosis one sometimes doubted whether the changes in the contour of the pelvis were really due to obstruction or disease and permanent, or whether there was not some unusual form of calix, or the pelvis had been over-distended in injection of the fluid. There were cases in which pyelitis had been present and led to weakening of the pelvic wall but in which renal lethargy in emptying the renal pelvis might recover its power of expelling its contents. After a plastic operation on the wall of the pelvis and the pelvic outlet it was important to ascertain whether the renal pelvis had the power of completely evacuating its contents. For that purpose the speaker employed serial-pyelography. After the first pyelogram the catheter was withdrawn and a fresh radiogram taken at intervals until the renal pelvis was completely emptied. In some cases the pelvis emptied rapidly, and no shadow was found at the end of two minutes ; in others, without any appearance of abnormality, the evacuation was not completed until three or five minutes. Taking a considerable series, the longest time for emptying a normal pelvis proved to be five minutes or a little over. Factors quite apart

from pathological conditions might influence the contractual efforts of the pelvis. He believed that the method of sero-pyelography had a place in the examination of the renal pelvis. It was easily applied and resulted in a permanent record, but as the method was new it was necessary to study normal conditions as well as abnormal.

Sir James Purves-Stewart, the last of the four contributors to the discussion, described the use of opaque injections in connection with the investigation of the central nervous system, and expressed the view that of the various substances which were radiologically opaque, and were useful for the demonstration of cavities and obstructions, ordinary heavy lipiodol was the most valuable. There was also another type of lipiodol, known as light or ascending lipiodol, which contained only 11 per cent. of iodine in olive oil, and this, when dropped into watery fluid, floated to the top, whereas the heavier oil, more generally used, went to the bottom. He did not think that there was any great advantage when investigating the central nervous system, or at any rate the brain, in putting in this so-called ascending lipiodol. It was possible to obtain just as good pictures with air ; moreover, the ascending oil injection, even when it got into the brain, and if the patient survived, was sometimes blotchy and irrregular in its distribution, whereas with air the outlines of the cerebral ventricles were smooth and easy to see. Injection of ascending lipiodol often caused severe reaction. But the greatest objection to the use of ascending lipiodol was that whereas air in the ventricles was re-absorbed in a few hours, iodized oil was a semi-permanent deposit ; it became, so to speak, part of the furniture and lining of the chambers and its effects, good or bad, were, so far, unknown. In spite of this somewhat harsh criticism Sir James thought there was one important exception in which the use of ascending lipiodol was amply justified, namely, in determining the lower level of a compression due to a spinal cord tumour, the upper level of which had already been determined by heavier lipiodol thrown in from above, the lower level being ascertained by light lipiodol floated in from below. Such cases were uncommon, because most surgeons agreed that determination of the upper level of the tumour was the more important fact for surgical purposes.

Discussing the use of heavier lipiodol in the subarachnoid space, Sir James described the usual mode of injection by cistern puncture in the erect posture, and its occasional introduction by lumbar puncture followed by inversion of the patient. He also referred to the extra-thecal method of injection sometimes used in France : the more generally employed method of extra-thecal injection being through the sacro-coccygeal ligament, subsequently turning the patient upside-down, or placing him in the genu-pectoral posture, so that the oil percolated upwards on each side of the theca.

He pointed out that the intra-thecal use of lipiodol in selected cases was only an accessory method, not a short-cut to the diagnosis of spinal compression, nor did it replace ordinary clinical examination. In mid-thoracic lesions where it was sometimes difficult to tell the exact level at which the surgeon must expose the spinal cord, lipiodol was specially useful.

Sir James emphasized the necessity of making sure, in the case of intra-cisternal injections, that the patient was in such a position that his head and shoulders were higher than the lumbar region, and that the head was not bent too far forwards.

In conclusion, the speaker exhibited a series of radiograms illustrative of the diagnostic value of lipiodol injections in various compressive diseases of the central nervous system. Amongst these was the case of a patient suffering from paraplegia secondary to tuberculous abscess of the vertebræ compressing the spinal theca, in which the main mass of the lipiodol was seen to stop at the level of the fourth thoracic vertebræ. This abscess was evacuated, and after the operation the main mass of the oil seen to have fallen to the lumbo-sacral region.

In another case of vertebral caries with paraplegia, the lipiodol was shown to be held up at the level of the 6th thoracic vertebra (Fig. 1). A case of intra-medullary tumour in the cervical region of the spinal cord showed the lipiodol arrested at the level of the 4th cervical vertebra (Fig. 2). A case of extra-dural tumour (Fig. 3) showed arrest of the lipiodol at the level of the 8th thoracic vertebra ; after removal of this tumour the lipiodol fell to the normal position at the lower end of the spinal theca in the upper sacral region. A case of spinal compression from cervico-dorsal scoliosis, in which the level of compression was particularly difficult to locate clinically, was promptly shown to have the lipiodol held up in the upper thoracic region (Fig. 4).

A hearty vote of thanks to the four speakers terminated the proceedings.

FIG. 1.—Case of spinal cord compression with paraplegia, due to vertebral caries. Lipiodol held up at Th. 6 vertebra.

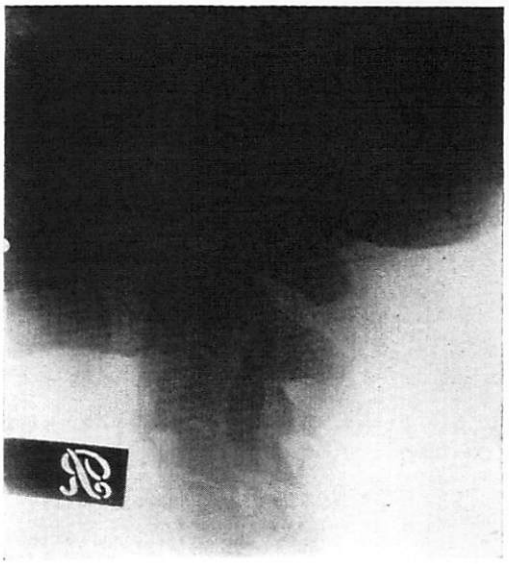


FIG. 2.—Case of intra-medullary tumour of upper spinal cord. Lipiodol held up at C 4 vertebra.

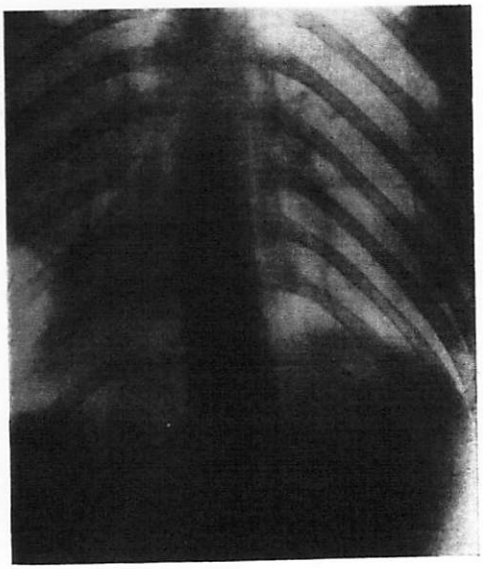


FIG. 3.—Case of extra-dural tumour of spinal theca. Lipiodol held up at level of Th. 8 vertebra.

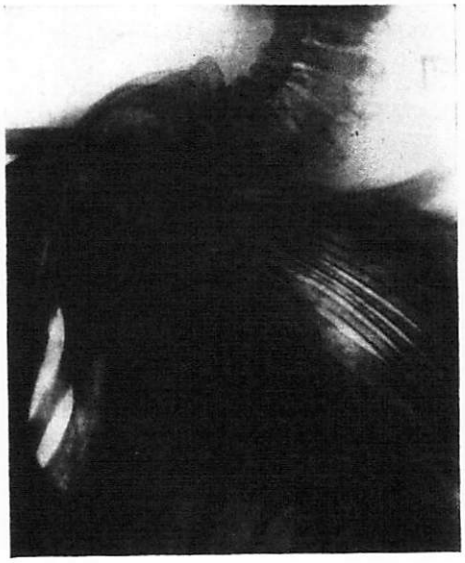


FIG. 4.—Case of spinal cord compression from vertebral scoliosis. Lipiodol held up in upper thoracic region of vertebral canal.

INAUGURAL DINNER.

The Dinner to celebrate the inauguration was held at the Wharnecliffe Rooms on the evening of November 18th, when Sir HUMPHRY ROLLESTON presided over a company numbering about 150. Above the President was some orange blossom to denote the "wedding."

The toast of "The Amalgamated Societies" was proposed by Sir FRANK DYSON, the Astronomer Royal. He remembered that in the middle nineties it was quite a common thing at scientific conversazioni to be afforded a glimpse of one's bones on the fluorescent screen. It was as big a sensation as Bleriot flying across the Channel. Röntgen's discovery really initiated a revolution, of which the medical profession took full advantage. Recently at the Miller Hospital, Greenwich, he had been struck by the way in which the radiological technique was organised, and what surprised him most was to find how short the exposures might be for the illumination even of a thick part. The progress which had taken place in this country was largely due to the Röntgen Society, founded in 1897, with Silvanus Thompson as its first president. It had its presidents alternately from the physical and medical side, and he recalled some of the distinguished men known to him in physics who had occupied that position. The combination of medical men, physicists, and instrument makers in the one Society had been of very great advantage. The Institute of Radiology was not founded until very much later; its foundation was due to Sir Archibald Reid, whose untimely death was so much regretted. Now the two bodies were combined. It was all to the good that there should be as much co-operation as possible in the furtherance of a scientific subject. Science should not be too finely divided up. He would not like to have his own subject of astronomy divided up into astronomical and industrial physics, each in its separate camp. Radiology, too, was one and indivisible, and there was the greatest good in the contact of those interested in the one branch with those interested in the other. He hoped that the two societies would have a very long and happy life together.

Sir HUMPHRY ROLLESTON, in responding to the toast, thanked Sir Frank Dyson, who that evening had deserted "stars" of an even larger magnitude than anything the amalgamated societies could offer. He proceeded to say a few words about the guests, especially two of them, namely, the Presidents of the Royal College of Physicians, and of the Royal Society of Medicine (Sir John Rose Bradford and Sir James Berry), whose dinner engagements were so many that they could hardly ever have an evening at home with their wives! But the presence of these guests was most cheering and comforting; it showed appreciation of the work which radiologists were doing. There was a danger (Sir Humphry Rolleston proceeded) in all scientific work of segregation. It was not good for man, scientifically as well as socially, to live alone. He found it very pleasant to realise that sitting at that table were many distinguished men in the fields of medicine and other sciences who had come to wish well to "relatives" on the occasion of a union, although these "relatives" were perhaps not as well off as themselves. This union between the Röntgen Society and the Institute was a great event. A great debt was owing to the Röntgen Society. Whoever might be bride or bridegroom on that occasion, there was no doubt about it that the President of the Röntgen Society was the "best man." This union was no Darby and Joan affair. The parties were not going to sit on each side of the fireplace. They were going to do more work in the future. Possibly branches might be started across the Tweed or St. George's Channel, or special sections, to deal with biology, for instance. The amalgamation would mean more activity, not less. Letters had been received from Sir Oliver Lodge, Sir J. J. Thomson, Sir Dawson Williams, Sir Herbert Jackson, Sir Ernest Rutherford, and Sir George Newman, all of them regretting that they were not able to be present on that occasion. He had also the pleasant task of reading a letter from the board of Watson and Sons (Electro-Medical) Limited, who wished the amalgamated Societies every success, and as an evidence of goodwill enclosed a cheque for 100 guineas. (Applause). He thought that the company would desire to send a most cordial letter of thanks. (More applause).

Mr. C. THURSTAN HOLLAND, in a humorous speech, proposed "The Guests," whose names he read out, intentionally mixing the qualifications of some of them, to the general amusement. He also spoke of the vast progress in radiology, which he had witnessed during the last thirty years, and the enhancement of the dignity of the radiologist. Once upon a time he had to beg his colleagues occasionally to send him a bismuth meal case; a little later

he had to beg them not to send every case that had a stomach for a bismuth meal! In coupling the name of Sir John Rose Bradford with the toast, he referred in very happy terms to his association with him long ago at University College, London.

Sir JOHN ROSE BRADFORD thanked Mr. Thurstan Holland for his kindly references, and mentioned the difficulty he was under of replying on behalf of so many distinguished guests, including one at least—Sir Frank Dyson—who represented, not things terrestrial, but things celestial. He was grateful for the hospitality extended to him, and he did not think the company wanted to hear him address them on such well-worn subjects as the great merit of radiology, and the service the Societies had rendered, and would render to the cause of medicine. Therefore, he contented himself with a sincere acknowledgment.

Dr. E. L. RAYNER, of the National Physical Laboratory, also responded to the toast, and gave some interesting reminiscences of his family's association with University College, and especially the study of anatomy there. He went on to draw attention to the need for the study of high voltages. He had been engaged upon the building of an equipment for a million volts, which he thought would be the means of greatly furthering research.

Dr. G. W. C. KAYE proposed the health of the President, and after Sir HUMPHRY ROLLESTON had replied, a happy evening terminated.

EXHIBITION OF X-RAY AND ELECTRO-MEDICAL APPARATUS.

THE Exhibition of X-Ray and Electro-Medical apparatus which was held at the Central Hall, Westminster, on November 17th and 18th, 1927, as a feature of the Inaugural Meeting of the Röntgen Society and British Institute of Radiology, proved to be a most interesting and useful display. As had been confidently anticipated by those responsible for its promotion, practically all of the firms engaged in the Electro-Medical industry in this country were represented, and in addition, there were several stands devoted to photographic films, accessories, and books. The result was that the Lower Hall was completely occupied, and everyone concerned had reason to feel profoundly satisfied with the comprehensive range of instruments which were put forward for the consideration of the Radiologist. It was evident that the exhibitors had spared neither trouble nor expense in striving to make the exhibition a success: and the fact of the attendance of Radiologists and others from the Continent, from Scotland and from Ireland shows the degree of interest which was successfully awakened by the Inaugural Meeting.

The Hall was adequately decorated and fitted to a uniform scheme which was designed to leave the exhibits themselves to act as the chief attraction, freed from the meretricious aids of elaborate stand fitting and embellishment. There were altogether 21 spaces, occupied by 20 separate firms. In the space at our disposal it is not possible to describe the exhibits in detail, but the following is a brief survey of the most noticeable features.

Amongst the stands on which artificial sunlight apparatus was shown, was that of Messrs. G. C. Aimer & Co., who had on view a range of their well-known Mercury Vapour Lamps, together with examples of the "Montana" automatic burner. This firm manufactures also the Welbec X-Ray tube, and an extensive series of High-Frequency Electrodes and similar appliances.

The exhibit of Messrs. Adair Dutt & Co. comprised apparatus made by Messrs. Koch and Sterzel of Dresden, including the Autax X-ray apparatus for general purposes, and the very useful and efficient portable diathermy set known as the "Thermidion"; and also the Hot Air apparatus of Messrs. Rossel, Schwarz & Co. and the Thermo-cautery appliances of Messrs. Emil Kohm.

So insistent was the demand for space in the Exhibition hall, that Mr. Cuthbert Andrews found room only for a few examples of gas tubes in a far corner. Here were to be found, however, such widely-known models as the Leviathan and Annulex, together with the Boiling water and ordinary water-cooled patterns, which served to reassure those workers who have been inclined of late years to lament prematurely the demise of the gas tube. A range of Andrews Protex appliances and samples of Super Protex glass were also available at this stand.

The chief interest in the exhibit of the Agfa Co. centered in a collection of negatives especially prepared to demonstrate errors resulting from faulty technique. Intensifying

screens, photographic sundries, the Rontyum opaque meal and other specialities illustrated adequately the scope of this firm's activities, the X-ray side of which is in the hands, in this country, of Messrs. Schall & Son, of New Cavendish Street, London.

The publishing houses were represented by Messrs. Bailliere Tindall & Cox, who showed books and publications of interest to the Radiologist. Practically all of the well-known publishers of technical books had co-operated with Messrs. Bailliere & Co., so that a representative range of books on all germane subjects had been brought together.

The Cox-Cavendish Electrical Co. were showing two typical power units—the one a 10 KVA. oil-immersed transformer set, and the other a 10 ma. oil-immersed transformer set, mounted as a mobile unit for bedside purposes. To the latter is fitted a Technique Director, which has for its object the simplification of exposure problems. This firm showed also Potter-Bucky Diaphragms of both the curved and flat type, "London" screens, lamps for actino-therapy (including the "Trinity" lamp which combines all of the recognised types of lamp in common use), Diathermy machines, and a range of Electro-medical appliances sufficient to meet the requirements of the most exacting worker.

On the stand of Messrs. A. E. Dean & Co. were to be seen their standard 10 KVA. apparatus, fitted with either mechanical or valve rectification. A set with single valve rectification was also shown, together with a mobile set for ward use. Besides the usual type of Couch and Vertical Screening stand, Messrs. Dean were showing apparatus designed for use with Metalix tubes, including a Potter-Bucky Couch.

Amongst the apparatus not manufactured in this country, that shown by the General Radiological Co. takes high place. The Heliodor transformers are the outcome of exact computation and highly-perfected construction, which have resulted in units noticeable for their compactness and high efficiency. The Peo apparatus, which was also on view gives an output of 100 ma. at 90 KV, or for sustained therapeutic use, 6 ma. at 120 KV. This latter unit is fitted also with a balanced filament transformer which ensures a constant filament current irrespective of voltage drop in the main supply. This firm also staged a number of other interesting appliances, including the Polyscope, which affords full facilities for examination of the patient in any position, the Sectogrid (a flat Potter-Bucky Diaphragm with motor drive), Diathermy apparatus, the Pantostat, Doneo X-ray Films, etc., etc.

Messrs. Ilford Ltd. gave especial prominence to their new Double-coated X-ray Matt Film, and showed some excellent examples of Radiographic work done on this film, as well as a number of negatives and prints for which their standard Double-coated film was used. Photographic chemicals, light filters and lantern slide material were also displayed for the information of the radiographer.

The exhibit of the Imperial Dry Plate Co. had for its chief attraction a large number of prints from Imperial Duoplex negatives, and a series of negatives showing the method of testing this same film were of considerable interest to visitors. A novel feature on this stand was a number of radiograms of optical and musical instruments, and standard products such as Imperial Fluorescent Screens and Intensifying Screens were also displayed.

Messrs. Kodak Ltd. had prepared an interesting exhibit, presented in the tasteful manner which one from experience associates with this firm's efforts. The material on view included the famous "Dupli-Tized" Film, and "Radia-Tized" Dental Film, together with negatives and positives of many interesting subjects. The X-ray reduction camera was another important feature and one likely to be of interest to many Radiologists.

A particularly comprehensive stand was that occupied by the Medical Supply Association. Ranging from the complete 1928 model of the "No-Protection Lacking" X-ray outfit, the exhibit included a Mobile X-ray set, several models of Ultra-Violet Light apparatus, two sets of Diathermy apparatus, besides a host of smaller instruments for Electro-medical purposes.

Amongst the firms showing X-ray apparatus of the most robust type, may be mentioned Messrs. Newton & Wright, who had prominently in view their latest model of Vertical Screening Stand. A point to which particular attention is directed is the separate vertical adjustment to the screen, which is especially useful in chest work, and for the observation of the digestive tract. An attachment to this screening stand of a device designed to facilitate the rapid radiography at any given moment of any object under examination is a valuable adjunct, in view of present-day technique. A subsidiary switch-table, or "Duplex control"

was another interesting item. This comprises a filament control with two operating pedals, depression of which in turn energise the tube for screen examinations, and for rapid exposure, according to predetermined settings. Other apparatus shown included the Potter-Bucky diaphragm, Floor Model Stereoscope, automatic time switch, a section of overhead leads, and various types of X-ray tubes.

The name of Philips Lamps Ltd. is associated, in the minds of X-ray workers, with the Metalix X-ray tube, and on this occasion this firm displayed the various models of that well-known instrument. The chief interest centered in the 200 KV. tube for Deep Therapy, and the 90 ma. Radiator type tube. For research workers there is a special tube, the anti-cathode of which may be changed at will.

On the stand of Messrs. Schall & Son was a range of power units, comprising a condenser plant developing 180 KV. giving 4 ma. continuously for treatment; a four-valve transformer unit with an output for instantaneous work of over 100 ma. at 150 KV.; a single valve transformer set, and a dental unit. The last named is completely controlled by means of the time-clock which is incorporated. There was shown also a new portable diathermy outfit, of large capacity, apparatus intended for use with the Metalix tube, and a combined screening stand and couch. In addition to a complete range of X-ray apparatus, Messrs. Schall specialise, as is well-known, in Electro-medical apparatus of every kind, of which this firm has a very long and wide experience.

An arresting exhibit was that staged by the Solus Electrical Company, whose apparatus is furnished in several instances with what is designated the "Famous Red Guard." Included were 10 KVA. transformer sets, one of which had the valves encased in bakelite coverings, after the fashion of "Self-protected" X-ray tubes; the War Office model Portable unit; Potter-Bucky Couch; Filing cabinets; Viewing boxes, and many interesting accessories, amongst which must be included an attractive floral display.

The activities of the American manufacturer of X-ray apparatus were well exemplified by the stand occupied by the Victor X-ray Corporation. This exhibit showed the high standard which has been attained in the United States, both in the direction of design, and of construction. Prominent was, of course, the range of Coolidge tubes, in the manufacture of which America still maintains a monopoly. Ranging from the tiny C.D.X. Dental tube, through the better-known Universal and Radiator types to the formidable Deep-therapy tube, which operates at 220 K.V.P., these instruments command the respect of all who are interested in the craftsman's side of Radiology. The mechanical aspect of construction was represented by the Victor-Bucky Table, and the Motor Driven Table, both of which showed great forethought and most careful construction; while the Electrical units comprised the Wantz Junior, which, having an output of 100 ma. at 100 K.V.P., through a 6 in. gap, occupies a floor space of but 29 by 29 inches; the Victor-Kearsley Stabiliser, the stabilised X-ray Timer, which operates at from $\frac{1}{20}$th to 20 seconds, with an accuracy of within $\frac{1}{120}$th of a second; a stabilised 30 mm. transformer set; and various accessories of interest and value.

One of the most comprehensive exhibits was that of Watson & Sons, who showed a range of five transformer units, namely Mark II with four-valve, and with mechanical rectification; Mark I with single valve, and with mechanical rectification; and the 30 ma. Pedestal Set. In addition, there were on view the Watson Dental Unit, Potter-Bucky Couch, Screening Stand, Tube Stand, and subsidiary apparatus of various kinds. A noticeable characteristic of the Watson apparatus is the cheerful colouring which the firm employs in its finishing processes, and which may be taken, perhaps, as an augury of the bright outlook of the Electro-Medical industry in this country.

An interesting feature of the exhibit of Messrs. Wellington & Ward was the Developing hanger introduced recently by the firm. This hanger is designed to be loaded from the side, which is thought to be a more convenient method for the operator. Further, the hanger has no hinged parts, and the clips which secure the film are attached without the use of solder, thus avoiding corrosion and consequent breakage. Radiographs taken on Wellington X-ray Film, together with a range of photographic sundries, completed a most useful exhibit.

X Rays Limited (which is entirely under the management of Mr. Cuthbert Andrews), was another stand where the impression gained was one of solid merit and durability. The units shown were the 10 KVA. mechanically rectified transformer, a 30 ma. transformer outfit with single valve rectification, and the firm's well-known 20 in. induction coil outfit with

mercury break and rotating rectifier. An example of the underslung type of couch was also on view, together with a massive type of tube stand designed to accommodate any X-ray tube up to 8 in. diameter, while affording full modern protection to the operator. A smaller model tube stand, Potter-Bucky diaphragm (curved and flat), the Seriascope (an instrument which facilitates the making of rapid serial pictures of objects under examination), the Taunton Model portable Diathermy set, two models of Dental units, and accessory apparatus completed an exhibit, an interesting feature of which was that the whole was computed, designed and constructed in the firm's London factory.

In conclusion, after a careful examination of the various stands, one felt that there was ample justification for a feeling of pride that such a fine collection of apparatus could be brought together in this country ; and further, that the British-made—one might quite accurately say, London-made—instruments had such obvious merit. It may not be out of place to remark here upon the general acceptance by the British makers of the suggestions formulated by the Committee on X-ray Protection. Practically every piece of British apparatus shown was guaranteed to pass the tests which the National Physical Laboratory carry out, and which are based on the Protection Committee's Report.

The examples of American and German-made appliances revealed a high standard of excellence ; and although the relative attractions of English, Continental and American styles must remain largely a question of personal inclination, there is no doubt that it can do our British makers no harm to be subjected to close comparison with the manufacturers of other countries.

An Exhibition of this character entails a large amount of work and expense to the firms participating ; and the new Institute may congratulate itself upon the very material support which it has received from the Electro-Medical industry on this occasion. The outstanding feature of the whole affair is that, whether we like this or that detail of competing apparatus, it has been amply demonstrated that British manufacturers have responded to the demands made upon them by modern developments in Radiology, and there seems to be every indication that the industry is fully alive to every phase of recent progress.

THE VALUE OF LIPIODOL IN THE DIAGNOSIS OF INTRATHORACIC DISEASE.

By L. S. T. Burrell, M.D., F.R.C.P., Physician to the Royal Free Hospital and to the Brompton Hospital for Consumption and Diseases of the Chest.

LIPIODOL is a preparation of iodine in poppy seed oil and has the advantage of being opaque to X rays.

It has been given for its supposed therapeutic effects, but for diagnosic purposes was first used for the investigation of nerve lesions by injecting it into the spinal canal. It is now also injected into the bronchial tubes to obtain a clear view of the bronchial tree by X-ray examination. In cases of bronchiectasis where there are large dilatations of the tubes, it is necessary to inject at least 30 c.cm. of the oil, but in many cases it is better to give half this dose or even less, for if one gives too much, the lipiodol gets down into the smallest tubes and forms a large amorphous mass, which destroys its value as an aid to diagnosis.

Lipiodol may be given through the mouth by means of a laryngeal syringe, in the same way that one used to give intratracheal injections in the treatment of certain diseases of the lungs and bronchial tubes.

It may also be given by injection through a syringe, the nozzle of

which is at the back of the tongue but not through the vocal cords. This method is practised by Dr. Singer of St. Louis, U.S.A., and he claims certain advantages for it.

I always inject lipiodol through the crico-thyroid membrane and I am still of the opinion that this is the best method. In the first place it does not make the patient choke or want to vomit, and it can be injected without causing any discomfort. Secondly it leaves no unpleasant taste in the mouth and causes no after effects. And thirdly it can be given more quickly by this route.

To inject lipiodol through the crico-thyroid membrane, first anæsthetise the skin over this area with $\frac{1}{4}$ c.cm. of a 2 per cent. solution of novocain. Then inject $\frac{1}{2}$ c.cm. of a solution of cocain into the trachea through this space. A larger needle should be used for this purpose and it should be withdrawn immediately after the injection for otherwise it may be broken if the patient coughs. The lipiodol may now be injected and a syringe working on a screw principle should be used, for it is difficult to force the thick oil through an ordinary 20 c.cm. syringe. Before the injection the patient must be put in position according to whether it is the right or the left side, and the upper or lower portions of the lung into which one wants the oil to flow.

A skiagram of the normal chest after lipiodol has been injected shows the trachea in the middle line and the bronchial tubes branching throughout the lung.

If a bronchus is blocked the flow of lipiodol is stopped and can be well seen by X-ray. The bronchus may be blocked by carcinoma or other neoplasm and of course the lipiodol cannot flow into the growth. If, however, the growth is from the chest wall or not connected with the lung, then the bronchi of the lung will be seen filled with lipiodol and to be separate from the growth.

Lipiodol is very useful in bronchiectasis to differentiate this condition from purulent bronchitis, to determine the extent of the disease and also to show whether it is unilateral or bilateral. This is most important, for treatment depends to a large extent on the amount of disease and also certain treatment—for example thoracoplasty—is contra-indicated in bilateral disease. Again extensive disease as seen in Fig. 1, might be treated by thoracoplasty if unilateral, but not by cauterization, whereas such a case as seen in Fig. 2 might be cured by cauterization. Figs. 1, 2, 3 show types of bronchiectasis.

Tuberculous cavities (Fig. 4, 5) can be well demonstrated by lipiodol, and I have never seen any harm follow the injection, although some authors state it is liable to aggravate tuberculous disease.

During pneumothorax treatment lipiodol gives valuable information,

FIG. 1.

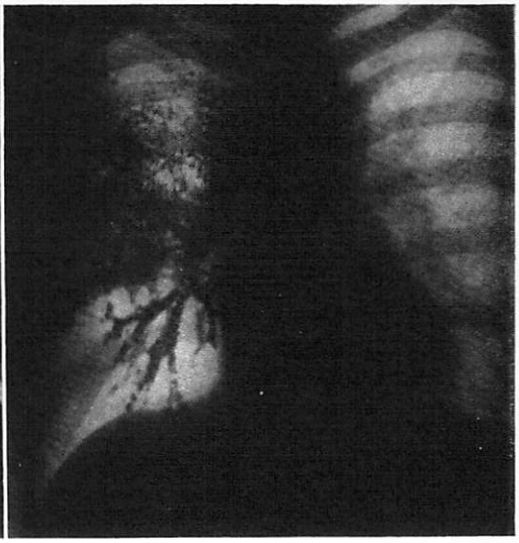


FIG. 3.

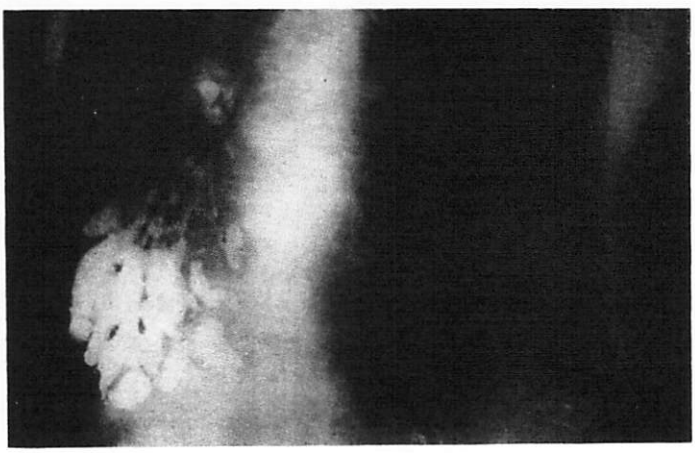


FIG. 2.

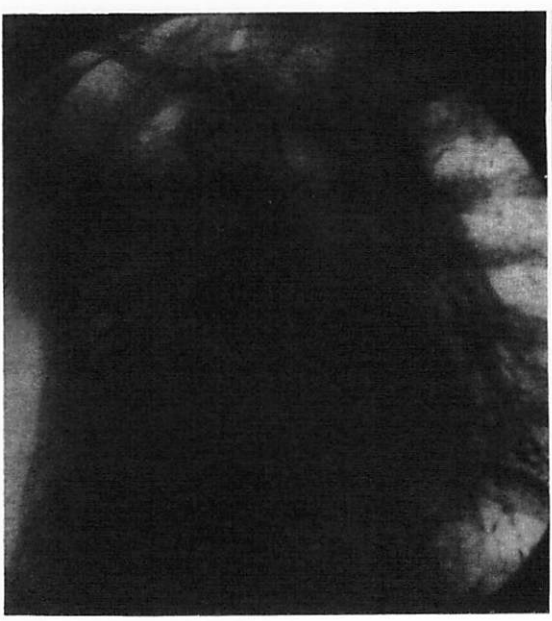


FIG. 4.

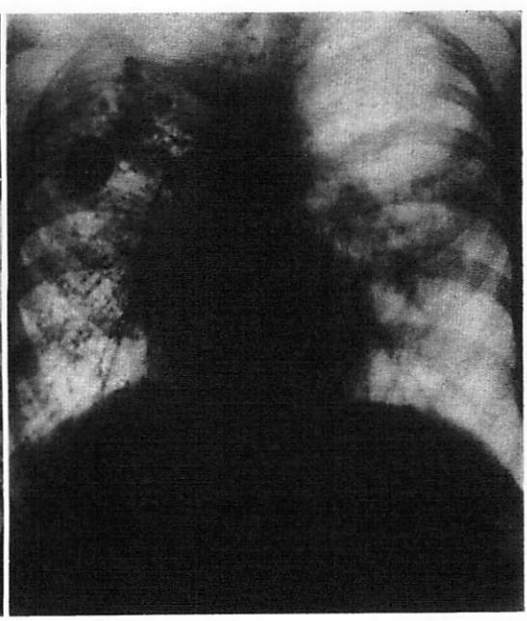
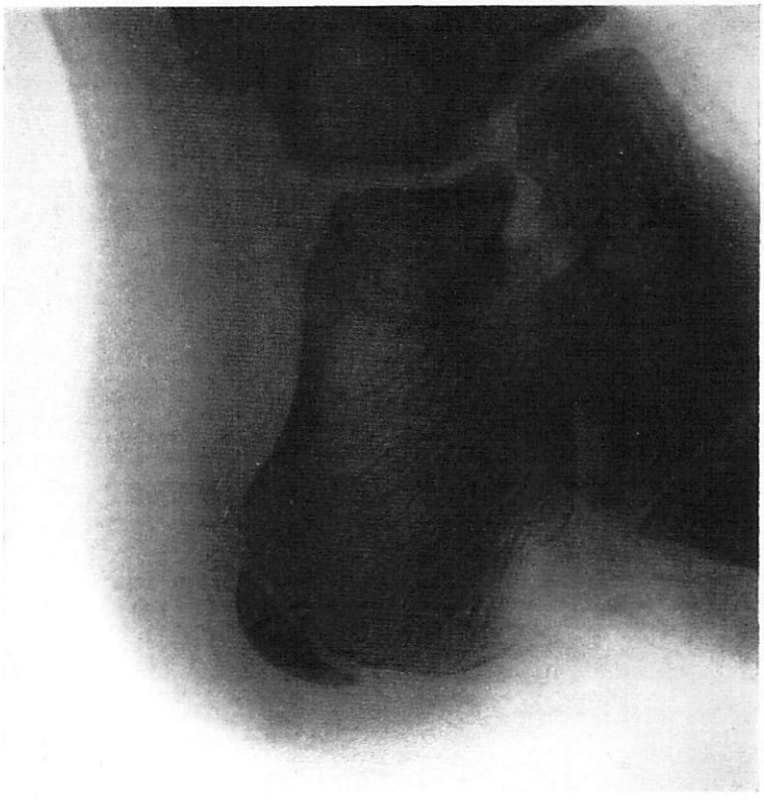


FIG. 5.

PLATE II.—The Value of Lipiodol in the Diagnosis of Intrathoracic Disease.



A Curious Case of Needle in the Heel.

showing to what extent certain parts of the lung or cavities remain uncollapsed.

In certain cases of spontaneous pneumothorax the lipiodol may be seen passing through the perforated visceral pleura and so indicate the position of the rupture.

The injection of lipiodol through the crico-thyroid membrane is perfectly harmless. Apart from two cases where the procedure was followed by an iodide rash, I have had no complications whatever in my series of cases. It should moreover be quite painless, the only discomfort being a slight dryness following the injection of cocaine.

In conclusion I should like to say that X-ray examination after the injection of lipiodol is not only a useful help to diagnosis, but in certain cases it is essential. No patient, for example, should be subjected to thoracoplasty for bronchiectasis until the condition of the other lung has been determined by this method.

I am indebted to Dr. Stanley Melville who took the skiagrams published in this paper.

A CURIOUS CASE OF NEEDLE IN THE HEEL.

By Robert Rutherford, M.R.C.S., L.R.C.P., House Surgeon, Belgrave Hospital for Children., S.W. 9.

A GIRL, aged 8 years, was brought to O.P., a needle having entered the heel. She had been jumping backwards, and it had impinged with considerable force; the father in extracting the needle remarked that it seemed to be embedded firmly. It was withdrawn with great difficulty, leaving the point behind.

Antero, posterior and lateral X-ray pictures were taken. The lateral view shows the needle point actually transfixing the epiphysis, pinning it to the bone.

An open operation was performed, and the heel flap turned down by a lateral horizontal incision, thus exposing the Os Calcis. No sign of the foreign body could be seen; and, in the light of modern surgery where bone pegs and screws are so frequently used without hurt, it was deemed unwise to disturb the Epiphysis in further search; the needle being left *in situ* as shown in the photograph taken after operation.

The case has an added interest in that the presence of an epiphysis for the Os Calcis is unusual in a child of 8 years, it being described as appearing at the tenth year, and therefore, suggests the closer co-operation of Anatomist and Radiologist.

I am indebted to Mr. Cecil P. G. Wakeley, F.R.C.S., F.R.S.E., for permission to publish this case.

Obituary.

WALTER CHARLES ORAM, M.D.

THE death occurred, on November 28th, after a short illness, of Dr. Walter Charles Oram, the well-known Liverpool X-ray specialist and radiographer.

Dr. Oram was the son of the late John Earle Oram, of the Royal University of Ireland, and was born fifty-two years ago at Windsor, Nova Scotia, where his father was Professor of Experimental Science in King's College. He received his education at the Dublin High School and at Trinity College, Dublin, where he had a record of singular brilliance. The mere catalogue of his academic distinctions is impressive. He was a Bachelor of Arts with Honour in Experimental Physics and Chemistry, and was Senior Moderator and Gold Medalist of his year. In 1900 he graduated M.B., B.Ch., and Bachelor of Obstetrics, in 1903 he took the Diploma in Public Health, and in 1905 he proceeded to the Degree of Doctor of Medicine.

One of Dr. Oram's colleagues writes:—

The late Dr. W. C. Oram came to Liverpool in 1904 after a distinguished career in Trinity College, Dublin. The son of a man distinguished in Physical Science, he had the same natural bent himself, and at Trinity College his B.A. was conferred with honours in Experimental Physics and Chemistry. He used to say that engineering was his first choice, and that he entered medicine determined to study the therapeutical applications of electricity. He devoted his talents to this study from the first, and came to Liverpool to take charge of the Electrical Department of the Skin Hospital. Radiology was then in its beginnings, and with his knowledge of Physical Science he found in this subject exactly the work for which he was naturally fitted. At first he combined this work with general practice, but after a few years he obtained important hospital appointments, and confined his work entirely to Radiology. From this time he did a phenomenal amount of work in the Voluntary Hospitals to which he was attached; the Northern Hospital and the Stanley Hospital in Liverpool, and the Infirmary in Southport owe him a very deep debt of gratitude for years of devoted service.

With this hospital work he combined a busy private practice, and there is no doubt in the minds of those who knew him well that he persistently over-taxed a physique that was not naturally very robust. He gave himself few holidays, and those few he often cut short, because

of some duty which he fancied he was neglecting or not completely fulfilling. This was characteristic of the man, a devotion to his work, which did not allow him to spare any pains or energy.

At the time of his death his hospital appointments were Physician-in-charge of the Radiological Department of the Northern Hospital, Honorary Radiologist to the Stanley Hospital, Honorary Radiologist to St. Paul's Eye Hospital, and Radiologist to the Southport Infirmary. This catalogue is an indication of the amount of Voluntary work which he contrived to do. During the War he was on the staff of the 1st Western General Hospital, and for six months was with the 57th General Hospital in France as Radiologist.

His death at the early age of 52 was certainly in great part due to the overtaxing of his physical powers. His many friends will remember him as a man whose modesty and devotion were outstanding features of his life. Although his contributions to the literature of his subject were not many, he always took part in discussions on Radiological subjects at the Liverpool Medical Institution, and contributed several papers of importance to the Society.

THE SOCIETY OF RADIOGRAPHERS.

A MEETING of the Society of Radiographers was held at 32, Welbeck Street, on Tuesday the 13th December, the President, Mr. H. J. Ede in the chair.

The Minutes to the last Meeting were read and confirmed, and the President then called upon Mr. Gough and Mr. Holbeach to give their papers on Transformer Design and its effect on radiographic results.

Mr. GOUGH said :—

Mr. PRESIDENT, LADIES and GENTLEMEN,

It is not our intention to present to you a paper, but merely to talk to you about various apparatus and its effect on the radiographic results, and we hope that what we have to say will lead to lively discussion on the relative merits of the different types of plant and the different technique employed in radiography.

As the transformer is now almost universally used for the production of high voltages for radiographic work, it may be interesting to you if the design of this part of an X-ray equipment is briefly dealt with, particularly in regard to those details effecting the output of the transformer from the radiographic standpoint.

In designing a transformer for X-ray work the most important considerations are high efficiency, close regulation, size and weight to be as small as possible, and the cost reasonable. It is, therefore, rather a difficult problem for the designing engineers to reconcile all these requirements.

By the efficiency of a transformer is meant the percentage of the output to the input and this may be calculated as follows :—

$$\text{Percentage efficiency} = \frac{\text{Output}}{\text{Output} \times \text{losses}} \times 100$$

In a well-designed transformer the efficiency should be round about 95 per cent.

The losses may be divided into two parts, losses in the iron and losses in the copper. The iron losses should approximately equal the copper losses.

Another factor which has to be taken into consideration is that of insulation. The high voltages used in X-ray work necessitate, inside the transformer, comparatively large clearances between those parts of the winding which are at high potential and those parts of the transformer which are at low potential. In order to obtain sufficient clearances, it is necessary to make the core larger than that of a transformer having a similar output, but for a low voltage, and in so doing the regulation of the transformer is affected. By regulation is meant the difference between the voltage output when the transformer is working at no load, and full load, and the percentage regulation may be calculated from the following formula :—

$$\text{If } E = \text{no load voltage.}$$
$$V = \text{full load voltage.}$$

then the voltage regulation as a percentage of the no load voltage is :—

$$E = \frac{E-V}{E} \times 100 \text{ per cent.}$$

It is essential therefore that the magnetic leakage of a transformer, the internal resistance, and the mean iron path should all be kept as small as possible.

By dividing the secondary winding into two sections only, the inside of each section being at earth potential and the outside at high potential, it is possible to construct a transformer where magnetic leakage between windings is small. In this type of transformer the secondary sections are accommodated immediately over the primary winding. This system of construction may be used for either Shell or Core type transformers, but is most convenient in the case of the Shell type.

In order to reduce the amount of clearance between the high tension winding and the core use may be made of sheets of insulating material which can be placed between the core and the winding to form "barriers." These barriers prevent breakdown between windings and the core due to local heating caused by the lining up of any small impurities in the oil, such as pieces of cotton, etc., in the electrostatic field. In addition to improvement in the actual efficiency and regulation of the transformer, the total size is reduced, showing an overall saving in weight and cost.

A further most important point in regard to obtaining close regulation is that the windings themselves should be of low resistance, and so prevent volt drop due to the copper losses. The volt drop on a transformer winding may be easily calculated, knowing the resistance of the windings and the value of the current.

It is obvious that the size and cost of a transformer are closely allied, although by the use of materials of an inferior class an overall saving may be obtained even though the size is increased somewhat. The use of inferior insulating material is, however, a false economy and sooner or later will lead to a breakdown of the transformer. Always the very finest insulating material procurable should be used in the construction of transformers of this class for high voltage work.

It would be thought that by the use of an iron core of small cross section, saving in weight and cost might be made. If the size of the iron is small, the amount of copper used is proportionately high. On the other hand, if a large sized core is used, the saving in copper due to the reduced number of turns is not as much as might be expected owing to the fact that the diameter of each turn is greater. There is for every transformer an optimum value of the iron—copper ratio and it is only by experience that the designer can obtain factors which will, when he finally completes the design, give him the best possible transformer in regard to performance and cost, etc.

In recent years, the perfection of the iron known as Stalloy has led to an all-round decrease in the size of transformer as this iron may be operated at a higher flux density than the older type of soft iron.

A good starting point in designing a transformer is to work upon volts per turn per K.V.A. factor. This factor is obtained from the result of experience and varies according to

the type of transformer which it is proposed to design. In ordinary X-ray work for a 5 K.V.A. transformer the factor is about 1·25.

Knowing the factor it is a simple matter to calculate the number of primary turns in the transformer by the formula :—

$$T_p = \frac{V}{F}$$

where T_p = primary turns
V = supply voltage.
F = volts per turn per K.V.A.

The next step is to select a value of B, *i.e.*, the number of lines of flux per unit area of the cross section of the core. This factor may be obtained from the curves issued by the manufacturers of the iron, and the usual practice is to adopt a value of 65,000 lines per square inch. At this value the iron losses equal 0·8 watt per pound for Stalloy.

The fundamental formula of a transformer is :—

$$E = T_p.f.\ 4{\cdot}44.\ A.B.\ 10^{-8}$$

where E = pressure applied to primary winding.
T_p = number of turns primary winding.
f = frequency of supply.
A = cross sectional area of core.
B = number of lines of flux per square inch.

By merely changing round this formula it is a simple matter to calculate the value of A.

$$A = \frac{E \times 10^{-8}}{T_p.f.\ 4{\cdot}44.B.}$$

Knowing now the size of the cross section of the iron and the primary turns, we can proceed to calculate the number of turns of the secondary winding. This is obtained from the formula :—

$$\frac{V_p}{T_p} = \frac{V_s}{T_s}$$

where V_p = voltage applied to primary winding.
T_p = turns primary winding.
V_s = voltage output secondary winding.
T_p = turns secondary winding.

The calculation of the primary input current may be arrived at from the formula :—

$$\frac{V_s \times M \times f}{V}$$

where V_s = secondary voltage R.M.S.
M = mean milliamperes.
V = supply voltage.
f = factor which is dependent upon the type of rectification it is proposed to use in conjunction with the transformer.

This factor "f" varies as to the type of rectifier and also to the current and voltage applied to the X-ray tube. It is the relationship between the R.M.S. and the mean current, *i.e.* :—

$$\frac{I_r}{I_m}$$

where I_r = R.M.S. current.

I_m = mean current.

For a transformer equipment utilising the 4-valve method of rectification this factor varies between 1 and 1·3, whilst with a mechanical rectifier the factor varies from 2 to 4 according to the loading of the transformer.

The gauge of wire to be used for the winding of the transformer depends on the total permissible resistance and the maximum current, but it is usually found that allowing 1500 amperes per square inch of copper, a suitable value is obtained, the copper losses and volt drop being kept within reasonable limits. The form of the secondary winding is next decided upon and whether the transformer shall be of the "Shell" or "Core" type. Having made these decisions it is necessary to calculate the clearances which should be allowed between the high tension windings and the other parts of the transformer. This is again largely a matter of experience, and depends to a very great extent on the disposition of the windings, shape of the core and so on, but a rough guide giving distance in inches may be obtained from the following formulæ :—

Surface	K.V. × ·08 + ·2″
Oil	K.V. × ·035 + ·2″
Oil plus solid	K.V. × ·025 + ·2″

The core and windings of the transformer after assembly are clamped with suitable fixing irons into a cast-iron or steel tank. If a steel top is fitted to the tank, high tension bushings of the condenser type should be used, whilst ebonite, porcelain or bakelite insulators can be used with a top of some insulating material such as paxolin.

These brief notes are of necessity very incomplete but will give some idea as to the many details in transformer design which must be given due consideration. A transformer with bad regulation owing to high internal resistance or poor design in regard to the disposition of windings, etc., is of little value from the radiographic standpoint. It is possible to obtain a radiograph with a badly designed transformer as the high tension generator, but the process is complicated and is hardly desirable in a busy X-ray department.

At the conclusion of this paper Mr. HOLBEACH gave his paper as follows :—

There can be no doubt that transformer design has a very decided effect on the efficient working of an X-ray department. At the same time there are other factors which can be considered of greater importance—for instance :—

1. A thorough understanding by the operator of the control and origin of X-radiation.
2. The provision of adequate accessory equipment.

It is really astonishing how little is generally known about the physics of the operation of X-ray tubes, and more particularly the actual working conditions governing their output. There is definitely only one possible way of standardising radiographic technique, and that is by intelligently varying the relation between current, voltage, distance and time. More often than not, beyond a hazy knowledge of approximately what the tube current may be, little else is known as to the other and far more important factors.

In reply to a query as to what is the measure of penetration or voltage, the answer is generally given : "Oh ! we use stud 6 on the auto. and stud 8 of resistance." What precisely this information is intended to convey is usually as mysterious as some of the results obtained.

It is obviously the first essential that the voltage across the tube be not only varied with the radiographic conditions, but it should be very precisely controlled. If as much care were given to this factor as is usually applied to the standardisation of Dark Room processes,

very much finer results would be obtained. The best method of achieving this condition is to have a transformer equipment calibrated in respect of voltage, at various current outputs in terms of primary voltage as read on the control board meter. A pre-reading primary voltmeter is a great convenience, particularly as it renders calibration more effective.

Time and distance can be kept constant, but the latter only where a reliable time-switch is being used. Obviously no reliance can possibly be placed on the judgment of even the most experienced operators when dealing with the shorter fractional exposures.

There appears to be some controversy as to the best method of applying the heavy outputs now available with the powerful transformer equipment on the market. The maximum transformer energy can only be applied where instantaneous radiography is an essential factor, such as kidney, gastro-intestinal, heart, chest work, etc. Contrast in flash pictures is not of importance as one is usually concerned with a differential diagnosis without taking into account the finer graduations of bone detail. In bone work and all extremities, the longer the exposure the more contrasty and the better the radiograph. There is no good reason why exposures of as long a duration as 30 seconds should not be practised for all bone radiography, where a patient can be effectively immobilised by compressors, sand-bags, and so-forth. A common fault in modern X-ray Departments producing flat radiographs showing little or no contrast, is due to the use of excessive voltages across the tube. Nearly all radiographs, other than instantaneous work, can be efficiently obtained with a penetration equivalent to not more than a 5″ gap between points. In this connection it should be emphasized that when using Coolidge or Metalix Tubes, the auto-transformer control should be employed, and all resistance cut out.

Turning to the provision of adequate accessory equipment, deplorable conditions are again evident in some X-ray Departments. Many are still working with gas tubes, others have not been provided with Potter-Bucky Diaphragms, and localising cones, immobilising devices, various casettes and screens, angle tilting boards, etc., are often conspicuous by their absence. Even such simple accessories as sand-bags and supporting blocks are not available. Efficient radiography, and more particularly duplication of results, is only possible by the intelligent use of subsidiary equipment, amongst which one may count the provision of the correct type of X-ray Tube.

A number of X-ray workers report that the radiograph obtained with a self-rectifying tube apparatus, or that utilising one or four thermionic valves for rectification is better radiographically than that obtained with a mechanically rectified set. As far as the transformer design is concerned, there is no reason why this should be so. The solution, therefore, seems to be in the type of rectifier used. In the case of thermionic rectifier equipment, the tube current rises comparatively slowly until saturation point is reached, and during this time it would appear that there is a proportion of soft X-radiation generated, which may help to produce a superior or more "contrasty" radiograph.

In the same way in a Department having a small unrectified transformer equipment for mobile ward service, as well as the more powerful 10 K.V.A. Transformer Machine, those responsible often prefer to use the former in preference to the latter claiming that better results are obtained. An answer to such a statement is that precisely the same quality radiograph can be obtained with both equipments, but not by working *on auto stud No. 6 and resistance stud No.* 10. Precision of control and absolute grasp of radiographic factors is, however, essential.

A short and interesting discussion followed, and the meeting then closed with a hearty vote of thanks to Mr. Gough and Mr. Holbeach.

NOTICE.

Will Members of the Society of Radiographers kindly note the following change of address :—

Mr. C. W. Furby,
"Hillsboro,"
107, Tottenham Lane,
Hornsey, N. 8.

To whom all editorial communications should be sent.

SECOND INTERNATIONAL CONGRESS OF RADIOLOGY.
INSTRUCTION AND TRAINING IN MEDICAL RADIOLOGY.

In the Roentgen rays and in radiating matter medicine has found a means for diagnosis and therapy, which has become indispensable for the healing art and which is growing in importance every day. Through research and systematic elaboration of experience gained, roentgen diagnostics, no less than radiotherapy have developed into extensive scientific specialities with their own working methods. In practical medicine radiology has in fact acquired a secure position as an independent discipline with its own institutions, lead by specially trained radiologists. At the same time as medical radiology has developed and greater and greater tasks have been allotted to it, it has become clear to the representatives of practical medicine no less than to the universities, that a thorough special instruction and training in medical radiology is essential, not only to those intending to devote themselves entirely to radiology, but also to specialists in different branches of medicine to whom radiology constitutes a necessary accessory science. The conviction that a survey of medical radiology should also be included in the general medical curriculum has more and more gained in force.

The organisation of the instruction, however, has not in all countries kept time with the development of radiology in medicine, and the question of suitable forms of instruction and training in this science is everywhere on the programme.

The Executive Committee of the Second International Congress of Radiology to be held in Stockholm, July 23rd-27th, 1928, has therefore resolved to take up *instruction and training in medical radiology* as the main subject of the Congress, medical radiology to include roentgen diagnostics and radiotherapy with its sub-divisions, roentgen-, radium- and heliotherapy.

Primarily the Committee had decided to invite a few representatives only from some of the biggest radiological societies, to put forth the experiences gained on this question, and to make suggestions for the organisation of the teaching and special training in medical radiology.

No sooner did it become known, however, that the question of instruction and training in radiology would be taken up at the Congress than a wish was expressed from different quarters that the Congress should take up this great problem as extensively and completely as possible. This question of instruction is evidently acute in all countries where radiology has reached a certain degree of development. The teaching, however, requires different forms of organisation in different places, according to inter alia, the existing organisation of medical instruction and hospital service, as well as to financial means.

We have therefore considered it advisable that the question of teaching should be taken up on a wider basis, and that the Congress should collect instructive material concerning radiological teaching in the whole world. We have thought the best possible result to be attained by inviting a lecturer on medical radiology, from each of those countries where organised instruction in medical radiology is known to exist, to give a short account of the historical development of the present organisation of radiological teaching and training in the country to which he belongs, and to put forward views and suggestions for the organisation of instruction and training in medical radiology for students, as well as for those wishing to take up special branches of radiology.

All these papers will be published immediately after the Congress as a separate volume of the proceedings, and will constitute an important source of information and stimulus for all those teachers and authorities responsible for the organisation and further development of radiological teaching.

At a common session immediately after the inauguration of the Congress brief extracts—not exceeding 15 minutes—of as many of these papers as time will permit, will be read. The Committee reserves the right to decide the order of these oral extracts and to limit their number.

By the arrangement suggested, the question of radiological teaching is likely to be elucidated as extensively and thoroughly as possible. Time will not permit of any discussion after these papers. However, to give others, beside those specially invited to speak on the subject, an opportunity of bringing forth their views on the organisation of radiological teaching, written contributions to the discussion in English, French or German, not exceeding one octavo page (400 words) will be accepted and published in the special volume of the proceedings, if received not later than the last day of the Congress.

Gösta Forssell, *President*
Alex Renander, *Secretary-General.*

AMERICAN ROENTGEN RAY SOCIETY AND THE AMERICAN RADIUM SOCIETY.

The Twenty-eighth Annual Meeting of the American Roentgen Ray Society took place at the Mount Royal Hotel, Montreal, from 20th to 23rd September, 1927, under the Presidency of Dr. A. H. Pirie.

There was a registered attendance of 250 members and guests. Dr. Kaye, Dr. Reynolds, Dr. Rowden, Dr. McGrigor, Dr. Taylor and Dr. Petit came from England to attend the Meeting. The lectures were well attended, and papers were delivered by specialists hailing from coast to coast. Advances in diagnosis of gall-bladder disease, by refinements in the Graham method, were dealt with by Dr. Stewart of New York and Dr. Skinner of Kansas City. A lesion at the pyloric end of the stomach may interfere with the test's value.

The Caldwell Lecture, which was established in memory of Eugene Caldwell, a pioneer in X-ray work, was delivered by Dr. Kaye, of the National Physical Laboratory, England. The lecture included a review of the early history of the discharge tube, and a summary of the present position of our knowledge of the nature of X rays. This was followed by a thorough discussion of X-ray protection.

The Moyse Hall of McGill University was used for the Caldwell Lecture. The dignity and learning of the speaker in the dignified surroundings of the Hall, speaking without notes for an hour and a half to a spell-bound audience, is a memory that will live with the audience for many a day.

There were forty papers on subjects of interest to every medical man. In fact, for those who do not make a practice of systematically studying the literature, these lectures are the next best thing for keeping up to date. There was a physical session at McGill at which Dr. Coolidge's communication on cathode rays activated by 900,000 volts was epochal, and excited great interest.

The members combined study and pleasure for, though the lectures began at 9.30 and finished at 5, with an interval for lunch, and began again at 8.30, and continued to 11 or 12, yet there were some who went golfing—in fact, a Tournament on the Course at Royal Montreal drew 12 entrants. A banquet at which Dr. Coolidge was the principal guest drew an attendance of 120 guests—the largest attendance in the history of the Society. A feature at this banquet was the passing of the loving cup—the ancient Scottish custom which began at the Court of Malcolm Canmore, and continues to-day at Scottish gatherings. The presentation to Dr. James Case of a Pergamino, signed by representatives of about a dozen South American States, Cuba, etc., was carried out by Dr. Farinas, who came from Havana to present it, in recognition of Dr. Case's lectures delivered on various occasions at these various states.

Discussions on papers were opened by Drs. Keenan, Bauld, Duncan and McKenzie.

An excellent scientific and manufacturers' exhibition occupied the ballroom of the Mount Royal Hotel, and overflowed to the passage outside. Mr. Judah, who managed this exhibit, did so in his usual efficient and artistic manner, and he had worthy material to work with. The Royal Victoria Hospital had an afternoon tea for the members, and the ladies of the Society were entertained at "Dorwal" by Mrs. J. W. McConnell, and at "Baie d'Urfa" by Mrs. A. H. Pirie. A smoking concert to which the medical teaching faculty of McGill, and the Medico-Chirurgical Society were invited finished up a programme in which every minute of the four days was used in a strenuous manner, whether in the cause of science, or for enjoyment and relaxation.

Finally, mention should be made of the way the Presidential duties were discharged by Dr. Pirie with characteristic conscientiousness, judgment and good fellowship. In short a very admirable and enjoyable Congress.

CURRENT LITERATURE.

RAPPORT SUR LES DANGERS DES RAYONS X ET DES SUBSTANCES RADIO-ACTIVES POUR LES PROFESSIONELS ; MOYENS DE S'EN PRESERVER. (Report on the Dangers of X rays and Radio-actives Substances to Professional Workers ; Methods of Protection.)—JAULIN (*Journ. de Radiol. et d'Electrol.*, 1927, XI, 193).—Seventeen fatal cases collected from the literature ; in each radiant energy was blamed for the result. There were eight cases of leukæmia, and the remainder were acute aplastic anæmia. The author is not convinced that all the cases can justly be attributed to the action of radiant energy, because it is difficult to determine how frequently these diseases occur in the general population. He is of opinion that the much less severe changes occurring in the professional workers are really much more instructive. He quotes the observations of numerous writers. Aubertin states that there are two characteristic types of change, *viz.*, persistent reduction of polymorphonuclears and occasionally leucopenia ; and slight polymorphonuclear leucocytosis with eosinophilia. Caffarati reported on 50 professional workers and always found slight anisocytosis and sometimes poikilocytosis. The red corpuscles showed slight reduction except in some of the older workers where slight increase in number was sometimes found. There was a tendency to leucopenia and lymphocytosis and monocytosis with decrease of neutrophiles. Others found similar changes. Lavedan and Lacassagne state that, even if extensive protective measures be adopted, some persons will still develop such changes, whereas others will not do so even in the absence of adequate protection. No evidence of injury of the general health has been detected in persons in whom such blood changes have persisted for years.

The author states that the adoption of protective measures of the standard regarded as correct in Germany has resulted in a great decrease in frequency of blood changes in professional radiologists.

ACTA RADIOLOGICA.

[*Published by the Societies for Medical Radiology in Denmark, Finland, Norway and Sweden.*

Editor : GÖSTA FORSSELL, M.D., Stockholm.]

THE RADIOLOGICAL TREATMENT OF THE TONSILLAR SARCOMA.—ELIS BERVEN (*Acta Radiologica*, Vol. VI).

1. The various ideas concerning the nature of lympho-sarcomata as genuine tumours are reviewed briefly, with especial reference to the clinical signs and symptoms of sarcomata of the tonsils.

2. The chief diagnostic features of tonsillar sarcomata are differentiated from involvement of the tonsils by : (*a*) benign inflammatory or ulcerative processes ; (*b*) diphtheria ; (*c*) actinomycosis ; (*d*) tuberculosis ; (*e*) syphilis (leutic ulcerations and tumours) ; (*f*) cancer ; and (*g*) leucemic and pseudo-leucemic processes.

3. Special stress is laid upon the extreme difficulty of making a correct differential diagnosis in a tumour where lues and malignancy are combined. The danger of procrastinating with antiluetic treatment in this combination is pointed out, together with the necessity of beginning radiological treatment early.

4. The various views as to the risk of operative interference in sarcoma of the tonsil and the influence of operating upon the prognosis in these cases are discussed. The serious result of operation which is not combined with immediate post-operative radiological treatment is demonstrated by the rapid growth of the sarcoma after tonsillectomy in a number of cases from the writer's series. These had to be controlled by radiation treatment.

5. The difficulty of establishing the diagnosis of sarcoma even by microscopical examination is emphasized, and in the writer's experience with malignant tonsillar tumours a diagnosis of the absence of malignancy is not conclusive, unless supported by all the clinical factors as well. The writer maintains that the microscopical examination forms only a part of the clinical investigation. When positive it supports the diagnosis, but when doubtful or negative it does not rule out the presence of malignancy. Nevertheless, in order to be able to judge the results statistically and scientifically, a microscopical diagnosis is necessary.

The writer's technique is described for making a biopsy with the least possible risk of the spread of the tumour.

6. In treatment of tonsillar sarcomata the writer employs the following method, combining radium and the roentgen-rays: The roentgen-ray treatment is administered to the neck over a field about 10 by 10 cm. square, corresponding to the location of the tonsils and the lymph nodes in their immediate neighbourhood, at a skin-target distance of 40 cm., with a filter of 4 mm. of Al. or ½ mm. of Cu., using 180 K.W. in nine treatments of ⅙ H.E.D. or six treatments of ¼ H.E.D. within the course of 10 to 14 days. The total dose is about 1½ H.E.D. Using the same technique, a second and third series of treatments, totalling 1 H.E.D. even is given at intervals of two months.

The radium treatment takes place between the first and second roentgen-ray series, about three weeks after the beginning of the treatment. By means of an apparatus designed by the writer, and described in *Acta Radiologica* for 1923, p. 213, the radium tubes are applied to the surface of the tumour, 500—1,500 mgr. hours of radium element being employed according to the size and spread of the tumour. The filter used is equivalent to 1-2 mm. of lead.

7. Of 32 cases of tonsillar tumours treated, most of which have been microscopically diagnosed as lymphosarcomata :—

Seven (21 per cent.) have been free from symptoms for 3-9 years (Table II), all living.

Eleven (34 per cent.) have been free from symptoms for one year or more (Table II), all living.

Seventeen (53 per cent.) have been free from symptoms ½-9 years. Four dead. (Tables II and III.)

Fifteen have had only a brief relief or no improvement from the treatment. (Table IV.)

A Case of Intramedullary Tumour of the Spinal Cord.—G. Bohmansson and G. Runström (*Acta Radiologica*, Vol. VI).—Man, aged 27. Clinical diagnosis: Tumour, localised to the caudal end of the spinal cord. Diagnosis radiologically verified, after injection of lipiodol through lumbar puncture, by a defect in the lipiodol shadow corresponding to the impression of the tumour in the sub-arachnoid space.

The tumour, intramedullary in type, was extirpated, since when the symptoms have for the most part disappeared.

Notes on the Treatment of Recurrent Endothelioma of the Parotid Gland.—Arthur Burrows (*Acta Radiologica*, Vol. VI).—All cases of mixed parotid tumours should be regarded as malignant. The operation of choice is enucleation, with application of radium tubes to the cavity.

Excision of the tumour with the surrounding parotid tissue is the ideal operation, but it may be difficult, and involves the risk of a parotid fistula, and possible damage to a section of the facial nerve.

Injection of Lipiodol in the Duct of the Salivary Gland.—D. B. Carlsten (*Acta Radiologica*, Vol. VI).—The author describes a case of bilateral dilatation of the parotid ducts, and indicates the possibility of radiologically demonstrating, after injection of lipiodol, certain pathological conditions of the ducts of the salivary glands.

Further Observations on the Roentgenologic Diagnosis of Gastrojejunal Ulcer.—Russell D. Carman (*Acta Radiologica*, Vol. VI).—Two hundred cases of gastrojejunal ulcer have been examined with the X-ray and operated on at the Mayo Clinic from 1915 to the present.

In 97 cases the original gastro-enterostomy had been performed at the Clinic. These constitute 2.3 per cent. of the total number of cases in which gastro-enterostomy was performed at the Clinic during the ten year period.

Ninety-three per cent. of the cases were in men. Duodenal ulcer was the original lesion in 89 per cent., and gastric ulcer in 4.5 per cent. In 96 per cent. the primary operation was a posterior gastro-enterostomy, and in 4 per cent. an anterior gastro-enterostomy. The interval between the primary operation, and the discovery of the gastrojejunal ulcer varied from six weeks to twenty-one years, but more than half the ulcers were found in from one to four years.

Exact roentgenologic diagnosis of gastrojejunal ulcer is difficult, but in about 80 per cent. of the series, the examiner was able either to make the diagnosis, or to report definitely abnormal findings.

Manifestations of ulcer fall into two groups, namely, those which denote malfunction of the gastro-enterostomy, and those which are charactertistic of ulcer. Of the indirect signs, a relative enlargement of the stomach and six hour retention are perhaps the most important. Direct signs include the niche, deformity and narrowing of the stoma, and irregular narrowing of the efferent jejunal loop. Gastrocolic fistulas resulting from perforated ulcer are sometimes apparent at examination with the opaque meal, but they are best demonstrated by the enema.

Jejuno-Ileal Diverticula.—James T. Case (*Acta Radiologica*, Vol VI).—The author has previously written extensively on diverticula of the duodenum and of the colon (1913—1915—1920); and he has ten years ago operated his first case of jejunal diverticula, previously correctly diagnosticated with the X rays. He later (1920) reported a second case correctly diagnosed before operation. He now reports eight additional cases. In the literature he has found more than 70 cases but in only two others (Breathwaite and Stetten) was the diagnosis correctly made before operation.

Many of these cases of small intestine diverticula exhibit no symptoms, but about one fourth of them caused symptoms bringing the patient to operation or death, usually on account of intestinal obstruction. The chief subjective symptoms are: mild and prolonged indigestion; bilious attacks, more accurately described as autointoxication; loss of appetite, nausea, and sometimes vomiting; coated tongue; intermittent abdominal distention; mild but persisting indefinite pain; muddy complexion and general debility; constipation, sometimes alternating with diarrhœa. Acute intestinal obstruction sometimes supervenes, through inflammatory changes in the sac, peridiverticular peritonitis and adhesions. Enteroliths sometimes form or lodge within diverticula.

The roentgen signs are: an ovoid area, which in the upright position shows a fluid level, with gas above and opaque material below. Each such area represents a diverticulum; only the larger ones will be detected. Differential diagnosis must be made between peritoneal tuberculosis with multiple small intestine obstruction; diverticula of stomach or of duodenum, especially of the duodeno-jejunal angle, and Meckel's diverticulum. Duodenal ulcer is a rather frequent accompaniment of jejuno-ileal sacculations. Many cases show diverticula elsewhere in the digestive tract as well as in the urinary bladder.

Problems of the Biological Effect of Irradiation.—Wilh. Caspari and Friedrich Dessauer (*Acta Radiologica*, Vol. VI).—In the foregoing we have developed two hypotheses: one physical, *the hypothesis of the pointheat* (Punktwärmenhypothese), and one biological, *the hypothesis of the necrohormones*. We believe that these hypotheses are supplementary one to the other and together give a pretty clear picture of the processes which are brought about in the organism by radiation. But the two conceptions are not mutually dependent on one another. The hypothesis of pointheat may quite well hold good even if the hypothesis of necrohormones does not survive the further progress of research and *vice versa*. Each of these hypotheses is so far independent of the other as they were originally set up independent of one another. But the attractiveness of these hypothetical questions seems to us not least to be founded on the fact that in their very interconnection, theoretically as well as practically, and till now also heuristically they give us a unitary picture of the greatly discussed question of the working mechanism of roentgen and radium rays on the organism.

Roentgen Therapy with Very Small Doses.—W. Edward Chamberlain (*Acta Radiologica*, Vol. VI).—For a period of five years our routine treatment of lymphadenitis, tuberculosis (except pulmonary), furunculosis and paronychia has consisted in local administration of five per cent. of the erythema dose at weekly intervals.

During the same period we have treated our cases of leukemia by administering ten per cent. of the erythema dose to the region of the spleen, at intervals varied from three to four weeks.

For the past year we have routinely treated Hodgkin's disease by administering five per cent. doses over very wide areas to practically the entire trunk, at intervals varied from one to four weeks.

We have used this treatment in the above conditions in 340 cases. The results of the treatment in the 125 cases which we have been able to follow up are tabulated.

A study of these cases suggests that the results are, on the whole, satisfactory, and that very spectacular results are occasionally observed, possibly not obtainable with large doses.

ROENTGENOLOGY IN NORTH AMERICA.—ARTHUR CHRISTIE (*Acta Radiologica*, Vol. VI).—This paper is a brief historical sketch of the development of roentgenology in North America. It contains brief accounts of the life and work of the most important of the pioneers in clinical roentgenology, and recounts the contributions of Americans to the apparatus used by the roentgenologist. Among the latter are the "interrupterless machine," the Coolidge tube, and the Bucky-Potter diaphragm.

SOME NOTES ON RADIOGRAPHY IN THE DEMONSTRATION OF SYRINGOMYELITIC ARTHROPATHY.—G. CLAESSEN (*Acta Radiologica*, Vol. VI).—Two cases are reported of syringomyelitic arthropathy—in the shoulder-joint and the wrist, respectively—involving extensive destruction of the bones. In the first of these cases the patient was a female aged 47. There occurred a spontaneous fracture of the humerus, and the latter was found to be largely destroyed. The glenoid cavity and the neck of the scapula, also, were completely gone. The neurologic examination showed the abnormalities of sensation characteristic of syringomyelia. The second case was that of a seaman, 47 years old, who had for some time been suffering from a fistula on the back of his hand. Skiagraphic examination revealed a state of enormous destruction in the carpus, metacarpus, ulna and radius, with volar subluxation of the hand. There was analgesia of the hand and forearm. The symptoms appeared in both patients suddenly after trauma.

The author calls attention to the remarkable disproportion, in these cases, between the slightness of the brief symptoms, and the enormousness of the bone destruction.

Mention is made of the, respectively, atrophic and hypertrophic character of the anatomical changes; and it is pointed out what diseases should be particularly borne in mind with reference to the differential diagnosis.

ETIOLOGY OF GASTRIC ULCER.—LEWIS GREGORY COLE (*Acta Radiologica*, Vol. VI).—The sulcus angularis is a mucosal apron that hangs down or projects about $\frac{1}{3}$ the distance across the lumen of the stomach between the corpus and the pyloric canal.

The sulcus is a functional contraction rather than an organic fold, and therefore, it is not easily studied surgically or by necropsy. It may be observed fluoroscopically or by single films, but it is best studied by means of serial roentgenography with the patient in the erect posture after the administration of barium suspended in a fluid menstrum rather than in a pap.

This apron-like fold of mucosa is attached to the lesser curvature at the exact point where Aschoff says the blood supply is already taxed to its limit. At this area about four square centimeters of mucosa are supplied with blood by about one square centimeter of gastric wall at this most anæmic area.

The cramping of the blood vessels considered by Bergmann as an important factor in his spasmogenic theory of gastric ulcer, is a constant factor in this long apron-like fold whether or not the stomach is in a state of spasm.

There are four types of gastric spasm, each briefly described, but not considered in detail. All the peristaltic sulci relax during diastole, and move from one area to another during each gastric cycle, except the sulcus angularis, which "marks time" during systole, and does not relax during diastole. Therefore, the blood vessels in this region of the sulcus are kinked during diastole as well as during systole. Therefore, in addition to the diminished blood supply of Aschoff, there is also the kinking of Bergmann.

The concentrated digestive secretions of the peptic glands follow the rugæ from the fundus, and impinge on the proximal surface of the apron-like fold (the sulcus angularis), which in turn deflects this secretion into the chyme in the sinus of Forssell. The proximal surface of the fold thereby being subjected to the strongest gastric secretions before they were diluted by chyme.

Trauma, particularly the trauma associated with vomiting referred to by Virchow, is the greatest on the proximal surface of this mucosal fold as it is pressed against the pyloric canal, which according to Klee is closed during the act of vomiting.

The mechanical trauma of the gastroscope, the stomach tube and particularly the string, as employed in the string test for the diagnosis of gastric ulcer should be avoided.

Infection may be a factor in the etiology of gastric ulcer, but infection alone causes only a temporary ulcer which heals rapidly.

The apron-like fold (sulcus angularis) is particularly susceptible to the anæmic areas of Aschoff, the spasm of Bergmann, the trauma of Virchow, and the infection of Moskowicz and Konjetzny and Rosenow, and is worthy of serious consideration as a factor in the etiology and pathogenesis of gastric ulcer.

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