PROCEEDINGS AND REPORTS OF UNIVERSITIES COLLEGES, COUNCILS AND ASSOCIATIONS

GREAT BRITAIN

BRITISH ORTHOPAEDIC ASSOCIATION

ANNUAL MEETING 1965

The forty-seventh annual meeting of the British Orthopaedic Association was held in London from October 14 to 16, 1965. Mr H. Osmond-Clarke was in the chair.

Management of severe traction lesions of the brachial plexus—Dr I. Fletcher (Roehampton) said that in six years he had seen 120 patients with traction injuries of the brachial plexus at Roehampton. In only eighteen was there any functional use in the hand. It was important to have a prognosis as soon as possible so that treatment could be decided. This was done by the clinical methods described by Bonney to determine whether the lesion was pre-ganglionic or post-ganglionic. The presence of a Horner’s syndrome had a bad prognosis. Amputation was often the best solution, but the patient himself must make the decision. An alternative was a flail-arm splint. Sixty-nine amputations had already been done and eight more patients were awaiting amputation. An amputation below the elbow was more advantageous than one above, provided biceps and triceps power was adequate. The optimum stump lengths were 5 to 7 inches below the olecranon and 6 to 8 inches below the acromion. Arthrodesis of the shoulder improved function. Of forty-nine amputees traced all were back at work and all were glad they had decided upon amputation. Mr P. M. Yeoman (Bath) said that in his experience a third of the patients did not want amputation and some were worse off with amputation. A flail-arm splint was very useful and could be used early. Dr Fletcher agreed that the patient must be convinced that he needed amputation; until he did, he should use a flail-arm splint from as early as possible.

The problem of union following intertrochanteric osteotomy with internal fixation for osteoarthritis of the hip—Mr D. Rosborough and Mr P. J. Stiles (London) reported 108 intertrochanteric osteotomies in which non-union occurred in fourteen (13 per cent). Sometimes tomography was necessary to determine non-union. Non-union was seen as a slight gap with adjacent sclerosis of the bone ends. It was difficult to be certain whether pain came from the non-union or from the arthritic joint. Non-union was commoner below the age of sixty, or when the range of flexion was greater than 90 degrees. It was less common when there was bony collapse and when the neck-shaft angle was over 140 degrees. Obliguity of the osteotomy predisposed to non-union, as did displacement of more than one-third of the shaft diameter. The type of internal fixation had no effect on non-union. In ten cases the spline or nail had fractured; all these had been associated with delayed union. Both traction and weight bearing earlier than six to eight weeks tended to non-union. Mr D. Wainwright (Stoke-on-Trent) said that in ten years he had seen non-union only three times but delayed union was not uncommon. The osteotomy should be clean-cut and not jagged. The spline must penetrate the cortex of the greater trochanter. He described a compression device he now used. Mr K. I. Nissen (London) said that obliquity and displacement were the chief causes of non-union. Sir Reginald Watson-Jones (London) said compression was unnecessary. The outer cortex should be rawed and abraded before the osteotomy was done. Mr Rosborough, replying, claimed no experience with compression; the cortex had not been interfered with in this series; the joint space had improved in three of the hips with non-union.

Conservative treatment of Bennett’s fracture—Mr A. G. Pollen (Bedford) said that Bennett’s fracture-dislocation of the first metacarpal bone was easy to reduce, but difficult to hold reduced. During the past twenty years there had been an increasing tendency to rely on internal fixation, but closed reduction and conservative treatment gave results which were at least as good. The reduction could often be carried out without anaesthesia. Plaster was applied over felt padding, and, while still soft, reduction was performed by direct pressure over the base of the metacarpal which was held extended and abducted. The plaster was removed four weeks later. Heavy work was avoided for a further month. Thirty-one patients had been treated in this way, twenty-nine successfully. Of the twenty-seven reviewed all had full movement. Open reduction should be reserved for those in whom conservative treatment had failed.
Arthroplasty of the knee in rheumatoid arthritis—Dr D. L. MacIntosh (Toronto) said that in advanced rheumatoid arthritis replacement of one or both tibial condyles with metallic blocks restored a smooth surface. As little bone as possible was removed; the lateral ligaments, which were usually strong, were preserved. The intercondylar ridge was also preserved, although the cruciate ligaments were often absent, having been destroyed by disease. The condylar replacements could be used either medially or laterally or both together. In cutting the bed it was important not to break off the posterior part of the tibial condyle. Removal of this part was most safely done with an oscillating saw. Flexion deformity must be corrected if necessary by a posterior capsular release and the gliding movement of tibia on femur restored. Fifty-eight knees had been operated on, fifty-one on both sides, one lateral and six medial. There had been eight failures. Relief of pain had been good and deformity corrected. A film was presented which showed the operative technique and a number of results. Mr G. Platt (Aylesbury) said he used a mould arthroplasty of a different sort. If such an arthroplasty failed it could easily be converted into an arthrodasis. Early synovectomy should reduce the necessity for arthroplasty in the future. Dr MacIntosh said the operation was best in rheumatoid arthritis. In osteoarthritis where the bone density was good, osteotomy was to be preferred.

Effect of axial compression on the healing of bone—Mr A. W. F. Lettin (London) said that new methods and materials were always being tried to improve union in fractures. Compression of bone ends had recently raised much interest. In female white rabbits nine to twelve months of age a standard division of the tibia was carried out. Half of the fractures were fixed with plate and screws and the other half with an identical plate and screws but with compression of 45 kilograms per square centimetre. The rabbits were killed at four, six and eight weeks and the strength and rigidity of the fractured bones was measured in a tensometer. There were considerable differences within each group, but the overall pattern of the two was the same. Rigidity and strength of the bones showed no difference in the two groups. Histological examination showed that callus developed both endosteally and periosteally and extended between the bone ends. The bone ends themselves were ischaemic and no direct union took place between them. There was no difference between the two groups. The experiments suggested that compression was no better in producing union than was rigid fixation. Mr E. A. Nicoll (Mansfield) agreed that compression only acted by providing rigid immobilisation. Mr J. C. Sandeman (Liverpool) said that experimental fractures in the guinea pig all healed in the same time whatever was done. What was the normal healing time in the rabbit, and did infection make any difference? Mr Lettin replied that he could not confirm the findings in guinea pigs. In rabbits plaster fixation alone doubled the time required for union. There had been no infection.

Monitoring of traumatic shock by central catheterisation—Dr J. C. F. Simpson (Edinburgh) had carried out metabolic and circulatory studies in patients with circulatory shock from limited and definite skeletal injury. Complicated injuries had been excluded from the review. The circulatory changes had been followed by means of central arterial and venous catheterisation and radio-isotope dilution techniques. These investigations had confirmed many of the presently accepted hypotheses on which the treatment of shock was based. Biochemical changes were minimal except in a few geriatric patients in whom acid metabolites had accumulated as a result of inadequate tissue perfusion. The use of stored blood, often in large quantities with a high potassium content and low pH, had not caused a drift towards acidosis. Cardiac output had been maintained by increased rate in spite of reduced stroke volume. The haematocrit became of critical importance when it fell towards 25 volumes per cent, even if the blood volume was maintained. The restoration of blood volume by blood remained the prime basis of the treatment of shock. Irreversibility of shock might be due to persistent vaso-constriction. These experiments had shown that central catheterisation was a safe procedure during shock and produced much valuable information. Mr J. C. Scott (Oxford) said that blood oxygen tension was of the greatest importance during shock and in irreversible shock blood coagulation time needed watching. Dr Simpson agreed that blood oxygen tension still needed further investigation.

Enzyme dissolution of the nucleus pulposus—Dr Lyman Smith (Chicago) and Dr Joseph E. Brown (Cleveland) described the use of chymopapain to destroy the nucleus pulposus of intervertebral discs. The enzyme had a selective action on the mucopolysaccharide-protein complex of cartilage, but no effect on the collagen of the annulus fibrosus, longitudinal ligaments or dura mater, as well as no effect on the lipid of nerve tissue. Its effect had been demonstrated in experimental animals and it had been found that injection into the theca in animals had produced no ill effect at therapeutic dose levels. The dosage in humans had been reduced to 2 milligrams. Only those patients who would have required operation had been treated. A total of 111 discs in sixty patients had been injected. Of forty patients, not previously treated by operation, thirty-four had good results, five fair and one unimproved. Discographs were carried out before the injection to determine the level of the lesion as far as possible. Professor R. Roof (Liverpool) had found the enzyme pronase better for this treatment than chymopapain.
The treatment converted a partly degenerate disc into one which was completely degenerate. Dr Lyman Smith said he had tried many other enzymes which were less effective, but not pronase.

Reattachment of completely severed limbs—Mr J. S. Horn (Peking) said that reattachment of severed limbs was a practical possibility. He described the operative procedure in a case of forearm amputation in detail. After cleansing and wound excision, both bones were shortened by 2 centimetres. The ulna was fixed with a plate and screws and the radius, which had been splintered, was held by an intramedullary wire. The radial artery was anastomosed with interrupted sutures and the circulation was re-established four hours after the injury. Then the ulnar artery, three veins, the median and ulnar nerves and all the tendons with the exception of the flexor digitorum sublimis were sutured. A free skin graft was necessary for wound closure. Passive movements were started three weeks later. The bones united unevenly but the final functional result was excellent. Sensation and sweating returned throughout the hand, the grip was strong and the thenar muscles recovered. The patient resumed his original work. It was important to anastomose an adequate number of veins for venous stasis was a main cause of failure. Other completely severed limbs had been restored, one through the upper humerus and another just above the ankle. Subtotal amputations, even though the continuity was minimal, had a better prognosis. No refrigeration, perfusion, or systemic anticoagulants had been used, but anticoagulants had been used locally. Mr N. J. Gandhi (Bombay) reported a partial amputation through the left elbow with only a small area of skin and the ulnar nerve intact. A three-inch gap in the brachial artery had been bridged with a saphenous vein graft. The middle finger had subsequently to be amputated but the arm had regained useful function and the patient had continued to work as a carpenter.

Acute traumatic ischaemia—Mr W. M. McQuillan (Edinburgh) said that a small proportion of limb injuries were complicated by some degree of ischaemia. When this was severe it was obvious, but sometimes only the deeper structures were affected. The blood supply of muscles varied greatly. Some were supplied by end arteries on a segmental basis, so that the whole of some muscles and parts of others could become ischaemic. In some injuries the rigidly enclosing fascia could cause raised intravenous pressure and impairment of the arterial inflow. Swelling of the muscle might result from direct injury, impaired venous return and ischaemia itself, or from a return of circulation to an already ischaemic muscle. A much more vigorous attitude towards the diagnosis and prevention of ischaemia was necessary, with exploration and repair of arterial defects. In fifteen cases of total ischaemia arterial repair had given ten successes. Any limb showing ischaemic changes should be observed closely. Failure to improve, or increasing signs of hypoaesthesia, indicated the need for rapid and effective surgery. Decompression should always be considered a possible course whether arterial surgery was included or not.

Stress studies of the lumbar spine—Dr George Pennal (Toronto) presented a film demonstrating the effect of strain on the bones and discs in the lumbo-sacral region. A machine had been devised in which a cadaveric spine could be subjected to different degrees of compression force. Compression of a normal spine with normally elastic discs showed that the disc was stronger than the bone. Both withstanded 500 pounds, but above this the vertebral end plate gave way and there was a massive intrusion of the disc into the vertebral body. To test the strength of a disc it was necessary to reinforce the end-plate by filling the vertebral body with plastic. It could then be seen that at first, when under pressure, the posterior aspect of the disc became concave. Only when the pressure was greatly increased did it bulge. It was very difficult to rupture a normal disc, but easy to rupture one which was degenerate. Facet screw fixation had been tested for strength. With screws alone the facets readily fractured, but interspinous plates doubled the strength and the further addition of contour plates quadrupled it. Mr M. A. R. Freeman (London) asked if compression of multiple segments had been tried and if prolonged fatigue loading had the same effect as rapid loading. Dr Pennal replied that multiple segment compression showed no significant differences. Although it had not been possible to produce disc rupture, as seen clinically, in a normal disc it might be different if multiple stress were applied and not just compression.

Gout and pseudogout—Mr D. L. Hamblen and Dr H. F. Currey (London) compared gout due to sodium biurate crystals with pseudogout or chondrocalcinosis in which the crystals of calcium pyrophosphate or calcium oxalate were found. Symptoms occurred only when the salts were in crystalline form. When in solution or in an amorphous state they produced no reaction. In pseudogout the local reaction might vary from acute to chronic, but there was no general reaction. In joints the crystals were laid down in the articular cartilage and in the knee the menisci were commonly affected. The changes led to chronic degenerative arthritis. Apart from a raised alkaline phosphatase the blood chemistry was normal. Sir Reginald Watson-Jones (London) said that acute gout could easily be mistaken for an abscess. Pseudogout could be easily overlooked and was becoming much more commonly diagnosed.

THE JOURNAL OF BONE AND JOINT SURGERY
The surgery of arthrogryposis—Mr G. C. Lloyd-Roberts and Mr M. Heywood-Waddington (London) said that true arthrogryposis was rare. It was important not to confuse it with certain neurological diseases. There were rigid extra-articular contractures and loss of muscle substance with either absence of muscle or fibrous replacement. The condition was non-progressive and the intelligence was normal, or above average. Surgical correction was often necessary, but relapse might occur after osteotomy. Release of soft-tissue contractures, arthrodesis and fitting with calipers were the most helpful measures. When the hips were dislocated they should be left alone if they were stiff. The feet could be corrected by soft-tissue release and sometimes excision of the talus. In the upper limb rotation osteotomy of the humerus and pectoralis major transplant were often helpful. Sir Denis Browne (London) said that generalised arthrogryposis was associated with large pregnancies and partial arthrogryposis with small pregnancies. Mr W. J. W. Sharrard (Sheffield) said shortness of skin with webbing was a problem. Transplant of the triceps to restore flexion to the elbow was often better than a pectoralis major transplant. When genu recurvatum was present quadricepsplasty should be done. Mr T. J. Fairbank (Cambridge) asked about the genetic factors. Mr Heywood-Waddington replied that webbing was a problem particularly because the webs often contained nerves and arteries. Nothing was known of the genetics of the condition.

Infective arthritis of the hip in infancy—Mr J. C. Madgwick (London) said that arthritis usually but not always started from an abscess in the metaphysis. The reaction was either minimal and one joint only was involved, or the general reaction was very great and there were multiple lesions. In a series of eighteen patients, ten were under seven weeks old, fifteen were male and six were premature. The infection usually came from the umbilicus or the respiratory tract, but might be from direct spread from an intravenous transfusion or femoral venepuncture. Twenty hips were infected and of these nine were completely destroyed and seven were damaged though not dislocated. One patient died from recurrent infection. The onset in the joint was often insidious and easily missed. The joint could be aspirated, but open drainage was preferred. Traction was continued until the infection settled. Arthrography was useful in showing how much of the head and neck remained. Repair could be attempted by putting the greater trochanter into the acetabulum, or by a shelf operation or a fibular graft. Arthrodesis might be necessary later.

A method of spinal fusion—Mr J. Churchill-Davidson (London) described a method of arthrodesis of the spine by Parham’s bands which had been used sixteen times. After onlay grafts of either cancellous or Kiel bone had been screwed into position a Parham’s band was placed round the spinous processes, tightened and fixed. The patient was kept on a plaster bed for three to four weeks, and then wore a jacket. There had been success in twelve cases.

Surgical treatment of pulmonary metastases from primary tumours of bone—Mr K. Ross and Mr Rodney Sweetnam (London) said that pulmonary resection for malignant metastatic tumours had steadily increased. But it was practicable only when the metastasis was solitary, and with bone sarcoma this was seldom the case. At the Middlesex Hospital twelve patients had been collected in whom pulmonary resection of a metastasis from a malignant primary bone sarcoma had been possible. Before such resection was undertaken it was necessary that the primary tumour should be eradicated, there should be no metastases elsewhere and the pulmonary lesion must be solitary. From the experience they had gained a delay of three months was advised in order to increase the likelihood that these criteria were fulfilled. The series included seven osteosarcoma, two chondrosarcoma, two fibrosarcoma and one malignant chondroblastoma. Only four of these patients had died from recurrent malignancy. The average follow-up was six and a half years. The best prognosis had been with chondrosarcoma. Mr W. E. Tucker (London) asked if any had been treated with radiotherapy. Mr G. K. McKee (Norwich) asked why delay was not harmful. Professor R. Barnes (Glasgow) asked how many chondrosarcoma had been treated in all because these had the best prognosis anyway. Mr Sweetnam replied that although some primary tumours had been treated with radiotherapy all had also been treated surgically. The metastases had not been treated in this way because of the fibrosis it would have caused. Delay might be harmful but there was at present no other way of detecting the apparently solitary metastasis which was soon followed by others. He did not know the total number of chondrosarcoma because the series was no more than a collection of patients treated in this way.

Fractures of metacarpals and proximal and middle phalanges of the finger—Professor J. I. P. James and Mr T. A. Wright (Edinburgh) had reviewed 326 metacarpal fractures and 513 phalangeal fractures. The fractures were divided into those that were stable and those that were unstable. Stable fractures had been treated by immediate mobilisation, but it was often found helpful to strap two fingers together when the phalanges were broken. The results in this group were good: in only 8 per cent of metacarpal fractures was full function of the hand not regained. The results after phalangeal fractures
were slightly less good. Where the fractures were unstable the results were less good, but those treated by early mobilisation did better than those treated in plaster. When possible the fracture had been rendered stable by internal fixation. If the hand had to be immobilised care must be taken about the position. The metacarpal-phalangeal joints were flexed not less than 70 degrees and the interphalangeal joints considerably less. Oedema and swelling were controlled by elevation and compression in a "boxing glove" type of dressing. Mr W. E. Tucker (London) asked if multiple punctures were ever used to reduce swelling. It was most important in boxers that metacarpal fractures should unite straight. Mr Wright replied that multiple punctures had not been used and he had no knowledge of metacarpal fractures in professional boxers.

**Occipito-cervical fusion — its indications and techniques** — Mr D. L. Hamblen (London) said that in the past fifteen years thirteen patients had been operated on for occipito-cervical fusion. Seven of these had congenital abnormalities in the region of the foramen magnum, six had spontaneous atlanto-axial dislocations, five from rheumatoid arthritis. Neurological changes were present in nine patients before operation. The operations were done as combined neurosurgical and orthopaedic procedures and sometimes in two stages, suboccipital decompression being done first. Skull traction was employed before, during and after operation. The grafts, which were either single cancellous, double cancellous or double tibial, were wired into position. Mr D. Ll. Griffiths (Manchester) said that he now carried out fusion of the atlas and axis between C.1 and C.2 through the back of the mouth, posterior occipito-cervical fusion being limited to rheumatoid arthritis. Sir Reginald Watson-Jones (London) did not think it necessary to include the skull in the fusion. Grafts between C.1 and C.2 united very quickly. Mr Hamblen replied that none had been done through the mouth. If the skull was not included the graft should always include C.3

**Comparison of three methods for the treatment of congenital talipes equinovarus** — Mr N. E. Shaw (Manchester) said that in the past ten years three different methods of treating club feet had been practised at the Hospital for Sick Children, Great Ormond Street. These three groups had been reviewed. Only children with idiopathic talipes equinovarus had been included, the same treatment had been continued throughout, and all the children had been treated within the first month of life. The youngest child reviewed was two years old and the oldest ten years. In all, 221 feet in 140 patients had been reviewed. Of 105 feet treated by Denis Browne splints only twenty (19 per cent) were satisfactory. Of ninety-six feet treated by Robert Jones stretching and strapping 71 per cent were satisfactory. Twenty feet were treated by manipulation and serial plasters and all came to operation. Sir Denis Browne (London) said his splint was frequently used wrongly. When correctly applied it gave excellent results. But prolonged treatment was necessary. When the child started to crawl stretching and night splints must still be continued.

**Arthrography in acute dislocation of the shoulder** — Mr B. Reeves (London) said two types of acute dislocation of the shoulder could be distinguished by arthrography, capsular rupture and intracapsular dislocation. Of the thirty-one shoulders investigated seventeen had capsular ruptures, among which there was one recurrence and three supraspinatus ruptures. Of the fourteen intracapsular dislocations eight had healed in ten days and a further four in three weeks: there were two recurrences and two supraspinatus ruptures. Similar lesions had been produced experimentally in rhesus monkeys: of the twelve capsular ruptures all had healed in one week; healing in twelve with intracapsular dislocations was slower and less certain. It was found that the glenoid labrum remained of constant strength throughout life but the tendinous cuff became weaker with age. This was consistent with the clinical findings. Mr Noel Wilson (London) was surprised to learn that the subscapular tendon was ruptured in acute dislocation. There was no sign of it at later operation. Mr Reeves replied that in animals all divided tendons had healed and looked normal within six weeks. The shoulder could not dislocate without the lower part of the subscapularis rupturing in patients with a capsular rupture.

**Surgery of the paralysed hip** — Mr D. W. Parsons (London) had reviewed ninety-four patients with paralytic hips requiring operation. Seventy-eight of these had been followed up. Twenty-nine patients had had operations on both hips; so 123 hips were under review. Lower motor neurone lesions accounted for 118 hips and upper motor neurone lesions for five. The disabilities requiring treatment were contracture, subluxation and dipping gait. Contractures were treated by soft-tissue operations and osteotomies. Of the soft-tissue operations subcutaneous fasciectomy gave four failures out of eight, mid-thigh fasciotomies two failures out of eighteen and Souttar's slide four failures out of forty-six. The latter was better when combined with capsulotomy. Osteotomy had no failures out of ten followed up. Subluxation presented greater problems. Varus osteotomy and osteotomy of the pelvis gave unsatisfactory results, with rapid recurrence. It was suggested that these operations should always be combined with tendon transfer. The four hips followed up which were treated for dipping gait were all improved by psoas transplantation. Mr W. J. W. Sharpeard (Sheffield) said that bony operation should be accompanied by tendon transfer whenever there was imbalance, but if the imbalance was
detected early enough the transplant alone would be sufficient. Mr N. H. Harris (London) said that anteverision might be present and be confused with valgus. Some of the relapses might have occurred because this element of the deformity was never corrected.

Management of traction lesions of the lateral popliteal nerve—Mr John White (Glasgow) said this lesion, which often accompanied lateral dislocation of the knee, was said to have a bad prognosis. Either the lesion was one in continuity or the nerve had actually been divided. Delay in repair did not seem to have had an effect on recovery. Three to five months after injury seemed to be the best time to explore. It was urged that when excision of the nerve ends was necessary the stumps should be sutured with heavy material and three markers should be used instead of the usual two. With only two markers mistakes in separation could be made if standard radiographs were not taken. Three markers obviated this risk. The results of treatment were more hopeful than was often realised. Mr A. W. F. Lettin (London) said the nerve should be exposed if in doubt. If fibrosis was minimal the nerve should be left alone. If it was more extensive up to eight centimetres could be excised.

Orthopaedic complications of smallpox—Dr A. N. Srivastava (Lucknow) recalled that the virus of smallpox could attack the skeleton causing deformities which would last throughout life. Of thirty patients reviewed, fourteen were in the acute stage and sixteen had late complications. The infection usually occurred between one and five years of age. The joints affected were the elbow, hips and knees, and the swelling coincided with the separation of the scabs. The joint fluid was sterile; the synovial membrane was oedematous and there were local collections of chronic inflammatory cells. Sequestration and sinus formation were common and ankylosis or dislocation often resulted. Antibiotics were of no value, but early aspiration and splintage reduced the risk of permanent damage.

Presidential Address

Musing on forty years in orthopaedics—Mr H. Osmond-Claire considered his orthopaedic life over forty years under the headings of training, travel and changing behaviour of orthopaedic maladies and their management. He recalled that in 1927 he became house surgeon at Ancoats Hospital, Manchester, to Mr Harry Platt, which started an orthopaedic career without a dull moment. This brought him into contact with many remarkable men, Tubby, Openshaw, Laming Evans, Elmslie, Trethowan and Blundell Bankart among others. At the age of twenty-five he was appointed to Oswestry without application. During the second world war he was invited by Watson-Jones to share the organisation and supervision of the Royal Air Force Orthopaedic Service. After the war he joined Watson-Jones at the London Hospital.

This was a period when seniors picked their junior colleagues, and he was still convinced that the apprentice system in the long run produced the best practical commonsense orthopaedic surgeons. We must, however, incorporate more of the transatlantic teaching systems to encourage more time for postgraduate study and especially seminars, reading, discussion groups—and research. It was important that no man should be forced into any field of research or clinical work to which he was not suited. Travel and study abroad were important and he had been fortunate in being able to do this early in his career.

Trauma had now become the greatest epidemic of our day. The first attempt to segregate injuries had been made by Sir Robert Jones in the 1890's, but it was just before the first world war that Harry Platt, returning from his training in Boston, started the first organised fracture clinic in this country and possibly in the world. Liverpool was quick to follow, but London after sixty years had not yet caught up. But progress had been made, as shown by the British Orthopaedic Association reports of 1939 and 1943, the Accident Services Review Committee of Great Britain and Ireland, the Harry Platt Ministry of Health Committee and the establishment of a Medical Commission on Accident Prevention at the Royal College of Surgeons of England under the scientific directorship of Mr Norman Capener. Great advances had been made in the treatment of high velocity injuries. Methods of resuscitation had become so effective and complex that a highly skilled team was required, with the anaesthetist almost always in the key role. Unfortunately, the treatment of fractures had gone from one bigotry to another—from the time when it was considered that all fractures must be treated conservatively to the present time when some believed that all fractures should be openly reduced and fixed internally. There was no greater tragedy than the closed fracture converted into a compound infected fracture by surgical intervention. It simply was not true that all fractures required internal fixation. Great skill was required in determining which fractures were better treated conservatively and which by open reduction.

There had been a remarkable decrease in the incidence of skeletal tuberculosis since the discovery of antitubercular drugs. Fulminating osteomyelitis and supplicative arthritis were rarely seen since the introduction of penicillin, though the risk of drug-resistant strains was still great. Poliomyelitis had been almost eliminated by the work of Salk and Sabin and great advances were being made in
the treatment of rheumatoid arthritis and osteoarthritis. Although it was probably wise to do no more than record the events and leave judgement to a later century, surely we were justified in pride ourselves in what had been achieved to date.

ELECTION OF HONORARY FELLOW, CORRESPONDING FELLOWS, MEMBERS AND ASSOCIATES

At a meeting on October 13, 1965, the following were elected.

**Honorary Fellow**—R. J. Katrak (Bombay, India).

**Corresponding Fellows**—B. Keon-Cohen (Melbourne, Australia), M. E. Müller (Saint Gallen, Switzerland), B. N. Sinha (Lucknow, India).

**Fellows**—J. N. Aston (London), A. Axer (Tel-Aviv, Israel), G. M. Bedbrook (West Perth, Australia), P. K. Duraiswami (New Delhi, India), James Garden (Carluke), B. V. Jones (Royal Navy), M. Lunz (Johannesburg, South Africa), D. E. Macrae (Southampton), R. Merryweather (Cheltenham), B. F. Miller (Halifax, Canada), Robert Owen (Old Colwyn), J. H. Penrose (Leamington Spa), A. H. C. Ratliff (Bristol), W. Waugh (Mansfield).

**Members**—N. M. Akhtar (Multan, Pakistan), B. Oscar Barry (Addis Ababa, Ethiopia), W. R. Beetham (Ballarat, Australia), J. H. Bulmer (Wolverhampton), G. W. Burgess (Stone Creek, Canada), R. W. L. Calderwood (Pontepract), E. H. Chater (Galway, Eire), P. J. Chesterman (London), J. N. Cozens-Hardy (Sutton Coldfield), E. E. Denman (Swindon), W. Ellis (Sedgefield), J. D. Evans (Stockport), J. E. Gallagher (Dublin, Eire), Max Geiser (Berne, Switzerland), D. J. Ghadiali (Candos, Mauritius), J. G. Gill (Leeds), N. R. Greville (West Mersea), H. Harrop-Griffiths (Kirkella), D. W. M. Haw (Sifton), B. Helal (Chertsey), J. M. Hendry (Glasgow), K. T. Hesketh (Royal Navy), G. F. Hird (Huddersfield), R. J. Hochhauser (London), W. A. Hodges (Enfield), M. O. A. Jaja (Ibadan, Nigeria), K. Kambergolou (Athens, Greece), F. G. Kenny (Macclesfield), J. D. McCardel (Prestwick), Pearl A. J. Macleod (Harrogate), D. A. Macpherson (Glasgow), W. McQuillan (Edinburgh), B. B. Mandell (Welkom, South Africa), T. S. Mann (Glasgow), B. T. O’Connor (Great Milton), H. E. Piatigorsky (Buenos Aires, Argentine), K. A. Ramalingam (Madurai, India), W. M. Rigal (Edinburgh), D. J. Roebuck (Hobart, Tasmania), M. G. H. Smith (Glasgow), R. S. Sneath (Rednal), Louis Solomon (Johannesburg, South Africa), C. Sorbie (Kingston, Canada), T. G. Sprunt (St Ninians), R. M. Standish-White (Salisbury, Rhodesia), R. W. G. Stuart (Bulawayo, Rhodesia), T. S. Sundaram (Madras, India), S. Theodorou (Athens, Greece), J. A. F. de Valderrama (Madrid, Spain), T. G. Wadsworth (Liverpool), A. B. Watson (Knowle), G. A. Wetherell (Thornthoat Hough), A. T. Williams (Manchester), A. C. M. C. Yau (Hong Kong), A. B. Young (Glasgow).

**Associates**—Philip Bliss (Bath), A. T. Calder (Dundee), J. R. Clough (Bristol), N. J. Cobb (London), Peter Dewey (Oswestry), G. E. Fulford (London), D. C. Gardner (Croydon), Robert Gillespie (Dundee), Arthur Goetze (Prescot), B. T. Hammond (Wigan), C. E. A. Holden (Biggin Hill), T. P. Hopkins (Swanse), D. W. H. Hurley (Leeds), I. W. Lowe (Berkhamsted), Teja Singh Mangat (Birmingham), F. H. Merry (Perth), Walid A. Mnaymneh (Beirut, Lebanon), C. J. Moore (London), E. C. Nesar (Khartoum, Sudan), D. W. Parsons (Twickenham), D. J. Richards (London), Desmond Rosborough (London), Sisir Kumar Samanta (Calcutta, India), W. A. Souter (Edinburgh), H. E. G. Stevens (Southampton), P. J. Stiles (London), Malcolm Swann (London), Yen-Shui Tsao (Hong Kong).

ROYAL COLLEGE OF SURGEONS OF ENGLAND

THE ROBERT JONES MEMORIAL LECTURE

*Mr Norman Roberts* (Liverpool) delivered the Robert Jones Memorial Lecture at the Royal College of Surgeons of England on October 14, 1965. His title was "The Life and Work of Robert Jones." He said that it was a natural source of satisfaction to orthopaedic surgeons that the Memorial Lecture to Robert Jones should be in the keeping of the Royal College of Surgeons in whose activities orthopaedic surgeons had played an ever-increasing part. It was now a matter of history that Robert Jones and those who followed him won the battle for establishing this branch of surgery in its proper place.

At an early age Robert Jones came under the influence of his uncle, Hugh Owen Thomas, a man of very different personality, perpetually at war with authority. But it was Robert Jones, the gentle fighter, who finally won by peaceful persuasion a general acceptance of the principles for which Thomas fought.

In the treatment of tuberculosis of joints Robert Jones strongly supported the dictum of Hugh Owen Thomas of rest—prolonged, enforced and uninterrupted—and opposed the excision of joints, which had at one time been popular. But he believed in the removal of sequestrated bone and soft tissue in a manner which would have been strictly in accord with modern practice. To this day the principles of Thomas and Robert Jones were as sound as ever, but it must be remembered that they were treating virulent tuberculous infections without the aid of antibiotics. Robert Jones carried his belief in rest into the treatment of paralytic conditions. He taught that active treatment in poliomyelitis
should begin only when the tender stage was passed; until then muscles must be rested in the relaxed position. But we must disagree with him when the same doctrine was applied to peripheral nerve lesions where over-zealous splintage led to joint stiffness. In the treatment of injuries the same principles were observed but he held an open, well balanced view on the possibilities of open reduction and internal fixation of certain fractures. He supported the use of massage and early passive movements, which were at variance with the techniques of Thomas and with modern practice. His experience in the first world war led to his development of the organisation of accident services in the post-war era.

Robert Jones was responsible for the early manipulative treatment of club foot, with early soft-tissue release and tenotomy when indicated. In the treatment of pes cavus he advocated tenotomy and wrenching with talsectomy, multiple osteotomies of the metatarsals and amputation of the toes, according to the severity of the deformity. There were many more examples which could be quoted from Jones's writings which demonstrated how modern and sound were his methods and how little we had advanced from what he taught.

UNIVERSITY OF LIVERPOOL

LADY JONES LECTURE

Professor Roland Barnes gave the sixteenth Lady Jones Lecture on October 26, 1965; the subject was ischaemic necrosis of the femoral head. After describing the vascular anatomy of the head of the femur he said that in femoral neck fractures the arteries of the ligamentum teres were seldom able to keep alive the entire capital fragment if the superior epiphysial and inferior metaphysial arteries had been damaged. The arteries of the ligamentum teres were, however, of great importance because a large part of the femoral head could be revascularised from the small area of viable bone in the neighbourhood of the fovea that was often supplied by them. When these vessels were absent or thrombosed revascularisation and ossification of the ischaemic capital fragment could occur only from the viable bone in the neck, and was dependant on union of the fracture. It was difficult, with many of the present methods of nailing, to provide adequate fixation of this fracture, and union was slow if it occurred at all; consequently, revascularisation of the femoral head from the viable bone in the neck was often much slower than from any viable bone present in the foveal area. Complete revascularisation of the capital fragment seldom occurred if there was no contribution from the foveal area; so the necrotic bone of the superior and weight-bearing part of the head eventually collapsed under the stress of weight bearing after two or three years. Inadequate fixation of the fracture was not, however, the only explanation of failure of revascularisation of the ischaemic head. In caisson disease, where there was no fracture to impede revascularisation and ossification, late collapse of the necrotic segment of the head also occurred, especially when the infarct was large. There might, therefore, be a limit to the amount of bone that could be revascularised from the neck. For these reasons it was important to prevent injury to the vessels of the ligamentum teres. Injury could occur when reduction of a fracture was delayed, when excessive force was used, when the fovea capitis was penetrated by a nail or screw, or when an extreme valgus position of the femoral head was accepted which occluded the vessels by stretching the ligamentum teres. It was not possible reliably to diagnose ischaemic necrosis of the capital fragment shortly after injury. Osteocytes deprived of their blood supply stained in a normal manner for about three weeks after becoming ischaemic, although necrosis of marrow could be seen a little earlier. Radiography was of no value, for necrotic bone was not denser than surrounding bone, unless there was failure of fixation of the fracture and the patient could no longer walk normally. Most other methods of diagnosing ischaemic necrosis depended to some extent on the assumption that the femoral head was wholly dead or wholly alive; but in about one-third of patients there was a small area of viable bone near the fovea when the rest of the head was necrotic. Multiple sampling was the only way of revealing this, but it was not without risk of damaging some of the vessels entering the head from the ligamentum teres.

INSTITUTE OF DISEASES OF THE CHEST

SYMPOSIUM ON SCOLIOSIS

On July 5 and 6, 1965, a symposium on scoliosis was held at the Institute of Diseases of the Chest, Brompton Hospital, London. The meeting was supported by the National Fund for Research into Poliomyelitis and Other Crippling Diseases. Nineteen papers were read on the various aspects of scoliosis and were introduced by Professor Sir Herbert Seddon. Classification and prognosis and conservative and surgical treatment were discussed on the first morning by Professor J. I. P. James, Dr Y. Cotrel and Mr C. W. Manning. Genetic aspects were discussed by Dr J. A. Fraser Roberts, Professor P. E. Polani and Dr C. O. Carter, and other facets of this aspect were discussed by Dr Janet Anders, Dr E. C. Zorab and Dr Ruth Wynne-Davies. The biochemical aspects were discussed by Professor A. Neuberger, Dr P. Sanderson and Dr P. Benson. The respiratory physiology of scoliosis
was discussed the next day by Professor J. G. Scadding, Professor A. P. Fishman, Dr P. A. Zorab, Dr F. J. Prime and Dr G. Simon. Radioactive studies of pulmonary blood flow were described by Dr P. Gillam, and Dr Lynne Reid reported certain necropsy studies of the lungs in scoliosis. The last session was devoted to the cardiology of scoliosis and was discussed by Dr F. H. Scadding, Professor A. P. Fishman, Dr M. K. Towers, Dr E. Besteman, Professor J. Goodwin and Dr M. Platts. At the end of the meeting Professor J. G. Scadding reviewed the papers that had been given.

**Summary of the symposium—Professor J. G. Scadding (London) said that the symposium had brought together people working in many different disciplines in order to discuss their common interest in scoliosis; this had made any attempt to review the papers exceedingly difficult because more than half of the contributions had been outside the speaker’s own field. Sir Herbert Seddon had introduced the subject by referring to a paper by Cary Coombes forty years ago when physicians and orthopaedic surgeons had discussed this problem. Then Professor James had divided scoliosis into four groups, two of which were etiological—the paralytic and those associated with neurofibromatosis—and the other two congenital and idiopathic; but here it was possible to run into difficulty because the definition of “congenital” was not perhaps understood to mean the same by the various medical specialties. Also the term idiopathic sometimes meant “of unknown etiology” but it could mean “standing by itself” and “not associated with any other disease” if one referred to dictionaries. It was of great interest that on classifying the idiopathic group into infantile and adolescent varieties, with perhaps a juvenile group, the importance of this could be seen because there were real differences in the sexes in the various groups. The prognosis had been discussed fully but again there were differences of viewpoint. Prognosis in terms of structural deformity or cosmetic result was different from prognosis in regard to cardio-respiratory function.

The work of Dr Cotrel at Institut Calot was well known and the good cosmetic results that he obtained had been checked against studies of the respiratory function. It was interesting that, although some of his patients appeared to be in constrictive plasters, their ventilatory capacity increased. This suggested that it was the curvature of the spine itself which prevented the lungs from expanding as well as they should. Mr Manning had reviewed the surgical methods used. Some were mechanical and perhaps did not take into account biological facts. Fusion of the spine at the appropriate place and time was good from the functional aspect but costectomy seemed only to be justifiable on cosmetic grounds and produced no improvement functionally. In children who were deteriorating orthopaedic correction to the greatest improvement possible should be followed by fusion, and physicians were asked for help in deciding when this should be done. Views about this differed. Professor Robert Roaf had referred to the occurrence of lordosis, and he thought that this had a bearing on treatment: prevention of disproportionate growth of the anterior part of the spine in the vertebral bodies would prevent further scoliosis.

In the genetic and biochemical aspects Professor Polani and Dr Carter had discussed the transmission of genetically determined defects, and this was a very valuable contribution. Familial studies conducted in Edinburgh had been described by Dr Wynne-Davies, and these suggested that an important genetic factor in idiopathic scoliosis might be a dominant gene with incomplete penetrance rather than multi-factorial inheritance; also maternal age appeared to affect adolescent scoliosis. It was interesting also that infantile scoliosis appeared to be rarer in North America than in this country although the population as a whole was similar, but other studies on entirely different conditions had shown that, when investigated, these differences were perhaps not so great as they appeared.

Dr Anders had described chromosome studies and found nothing positive. This was disappointing but of great importance because, having been done carefully, they eliminate this aspect of the etiology. The chemistry of collagen had been clearly described by Professor Neuberger and had led to the conclusion that hydroxy-proline metabolism might be a useful marker for the metabolism of collagen. Dr Sanderson had described his work on this subject in diseases of bone because this might show some form of abnormality in its excretion in general in this condition. Dr Benson had dealt with the excessive excretion of hydroxy-proline in Marfan’s syndrome, and there were also descriptions of studies done in patients with scoliosis, which were perhaps suggestive of some abnormality in this respect in one age group. Although the contributions from the genetic and biochemical side, were somewhat inconclusive, they were of great importance because they might lead to studies in which a biochemical or chromosomal distinction might be made that would distinguish the groups of scoliosis.

Continuing, Professor Scadding recalled that the last morning had been devoted to the effect of scoliosis on respiration and circulation. Dr Fishman had given an excellent account of the concept of alveolar hypoventilation as a basis for cardio-respiratory difficulties in patients with deformed thoraces or spines. He had pointed out how these deformities might lead to abnormal patterns of breathing and hypoventilation which in turn would lead to a rise in carbon dioxide tension. Later, Dr Zorab had shown films of patients breathing, and Dr Simon had shown the diaphragmatic movement in
the same way so that the ribs also could be seen moving. These films supported Dr Fishman’s view that a fundamental difficulty here was an irregular and poorly coordinated movement of the chest wall and diaphragm. Dr Zorab had given an account of his work which was delightful and most important. He had been the prime mover in this symposium. Dr Prime had described an extensive series of tests on lung volumes and ventilatory capacity. He had found that the gas transfer factor was normal in the young patients but could be low in older patients, and that airway resistance was at the lower limit of the normal range. Dr Gillam had spoken about radioactive xenon studies in kyphoscoliosis. Dr Lynne Reid had described her necropsy studies on the lungs of patients with scoliosis, paralytic in some and idiopathic in others. The striking features were the absence of emphysema but with hypoplasia of the lower lobe.

In the discussion many important points had been raised, particularly in the difficulty of explaining ventilatory insufficiency in the presence of what seemed to be a normal or even good diaphragmatic movement. Perhaps it was the uncoordinated chest wall movement that was the important feature in this. Dr Fishman had protested against the separation of respiratory and cardiovascular systems; this of course was only a matter of convenience. Dr Fishman had gone on to explain how alveolar hypoventilation led to failure of the right cardiac ventricle. He had described how the “threshold lung could teeter along: the brink” just able to keep up with its work but easily slipping into failure. In this way a fatal vicious circle might be established which could only be broken by removing the burden of respiratory effort from the patient or by reducing ventilatory demand. Dr Towers had discussed the electrocardiographic evidence of right ventricular hypertrophy. He also used phonoangiography and he had shown that in scoliosis heart murmurs generally indicated heart disease and not simple displacement. Dr Besterman had discussed atrial septal defects and had shown that spinal deformities were common in association with them.

In trying to summarise the whole of the conference Professor Scadding said that it was important first to emphasise the importance of various specialties combining together for this study. Further research into the etiology of idiopathic, infantile and congenital scoliosis was needed. It was necessary to consider each patient in regard to prognosis and treatment and here paralytic scoliotic could be separated from the other groups. The importance of the heart and lungs in treating scoliosis had properly been emphasised, and it was interesting that vital capacity was again important. In research it would be fruitful to study, on a long term basis, patients with little or no initial functional disability to determine what happened to them and, further, to assess the established methods of treatment. Finally, the thanks of all participating were due to Dr Phillip Zorab for initiating this symposium.

SCIENTIFIC SOCIETIES AND REGIONAL ORTHOPAEDIC CLUBS

BONE AND TOOTH SOCIETY

A meeting was held at Bodington Hall, Leeds, on July 2, 1965.

Age changes in vertebral cancellous bone—Dr P. J. Atkinson (Leeds) had radiographed 2-5 millimetres thick sagittal sections of the second lumbar vertebral body on fine grain film. The trabeculae were studied quantitatively by two methods; first by counting the number of transverse trabeculae as they crossed the mid-line of the specimen, and second, by counting all bone spicules in a circular area covering the centre of the specimen. The transverse trabeculae diminished centrifugally throughout life but the area count indicated that the overall amount of trabecular bone was maintained until the age of fifty, after which progressive resorption occurred. Before that age, new bone formation in the vertical plane compensated for the diminution in the number of transverse trabeculae. No obvious sex difference was found when the total number of trabeculae in both planes was counted, but the transverse structures were resorbed at a greater rate in men than in women. A number of vertebrae from diseased patients showed that resorption was not always abnormal unless it was directly involved in the pathological process.

Relationship between “bone density” and cortical thickness and its variation with age and sex—Dr D. B. Morgan, Dr C. N. Pulvertaft and Professor P. Fourman (Leeds) had measured the metacarpal bones and phalanges of 267 normal people, 197 patients with peptic ulcer and 1,100 patients who had had an operation for peptic ulcer. They found, first, that with age trabecular and cortical bone were lost and that the loss occurred earlier and to a greater extent in women than in men. Secondly they found that the cortex contributed the greater fraction of the density measurement: the cortical thickness could be measured with a pocket ruler and density measurements gave little or no additional information. Thirdly, cortical thickness and metacarpal bone diameter were not related. Correction for metacarpal bone diameter was unnecessary for population studies and was misleading in the single person. Finally, the cortical thickness in patients with peptic ulcer did not differ from that in normal persons, but gastrectomy accelerated the loss of cortical bone.
Histological studies in osteomalacia—Dr C. G. Woods (Leeds) said that trephine specimens from the iliac crest of patients with suspected osteomalacia were "double embedded" undecalcified, cut at 5 microns and stained by the von Kossa technique with neutral red counterstain. Sections were examined by transmitted and polarised light and measurement was made of the area of osteoid proportional to the total area of bone matrix, the proportion of bone surface length covered by osteoid and the number of brightly birefringent laminae present in the osteoid seams. In fifty adults without osteomalacia the upper limit for these values was 4.5 per cent, 40 per cent and 3 per cent respectively. In twenty-three patients with osteomalacia the values ranged from 7 per cent to 62 per cent and from 22 per cent to 100 per cent, and all had seams with at least five and as many as twelve bright laminae. Second biopsies had been examined from eight patients after treatment with vitamin D for periods of six months to a year. In three patients in whom the measurements in the first biopsy were in the normal range as defined above, the measurements in the second biopsy were virtually the same. In three patients in whom the first biopsy showed an excess of osteoid the second biopsy was in the normal range. The remaining two patients, both treated with small doses of vitamin D for six months, had excessive amounts of osteoid and distorted bone architecture in both biopsies, but the area of osteoid was less in the second biopsy than in the first.

The effects of ultra-violet light on osteomalacia of steatorrhoea—Dr G. A. Rose (Leeds) said that in two patients with post-gastrectomy steatorrhoea and osteomalacia, ultra-violet light treatment had converted negative calcium and phosphorus balances to positive ones and had raised the theoretical renal threshold for inorganic phosphate. The osteomalacia was, therefore, caused by failure to absorb the normal vitamin D content of the diet. Sun-bathing was recommended for patients after partial gastrectomy. In two patients with gluten-sensitive steatorrhoea and osteomalacia, the ultra-violet light did not produce positive calcium or phosphorus balances and there was no change in the theoretical renal thresholds for inorganic phosphate. Therefore the osteomalacia was not caused only by failure to absorb vitamin D, although this was a factor. The ultra-violet light was followed by a considerable fall in the faecal phosphorus content in each patient, regardless of the change in faecal calcium; it was concluded that vitamin D promoted absorption of dietary phosphorus, independently of any effects on calcium metabolism.

Spinal densitometry in steatorrhoea—Dr B. E. C. Nordin (Leeds) said that spinal densitometry showed a general tendency towards increased spinal density in steatorrhoea associated with a marked reduction in peripheral cortical bone thickness. These observations might be related to the high rate of bone formation in osteomalacia which was sometimes observed with radioisotopes. The implications were that loss of the calcicheamic action of vitamin D increased the deposition of mineral in the spine; and that secondary hyperparathyroidism increased its resorption from the periphery.

The assessment of bone mineralisation from the relative transmission of americium$^{241}$ and caesium$^{137}$ radiations—Mr G. W. Reed (Leeds) described an apparatus in which one of two finely collimated beams of radiation could be accurately directed through a selected bone in the living subject and the transmission measured with a scintillation detector and pulse analyser. The sources of radiation were of widely differing energy; americium$^{241}$ gave a mono-energetic radiation of 60 kilo electron-volts and it was particularly sensitive to atomic number and, in bone studies, was dominated by the calcium present; caesium$^{137}$, with a mono-energetic radiation of 662 kilo electron-volts, was not affected by atomic number but was determined by the mass of material in the beam. Comparison of the two transmissions thus provided a measure of the calcium in the path traversed. The use of mono-energetic radiation and the reduction of scatter to the least possible could overcome many of the difficulties inherent in radiographic techniques in the measurement of bone mineralisation. The construction and use of the apparatus were described and its application to clinical and in vitro studies of bone specimens was outlined.

A study of bone trabeculation as a basis for determining the radiation dose from strontium-90—Professor F. W. Spiers (Leeds) said that at present the "permissible level" for strontium-90 in the body was based on radium, 0.1 microcuries of radium being judged "permissible" from the case histories of a number of persons who acquired radium occupationally or were given it as a nostrum. The level for strontium-90 was 2 microcuries because, taking bone as simple solid medium, this isotope deposit was about twenty times less energy per microcurie than radium. This simple agreement neglected, first, the fine structure of bone itself; second, the relative particle ranges—40 microns for strontium-90$\beta$ particles; and third, the different biological actions of $\alpha$ and $\beta$ particles, difficulties which were more formidable than this simple statement could indicate. Recent work indicated that osteogenic tumours induced by radioisotopes in bone arose predominantly in endostal tissues. Hence we might identify two tissue sites in bone as being relevant to potential radiation hazards: firstly, endosteal tissues lining bone shafts and the trabeculae in spongy bone for bone tumours; and secondly, active marrow
in the cavities in spongy bone for leukaemia. A new approach had therefore been made to set the level for strontium-90 by determining the dose to endosteal tissues and to marrow in spongy bone. The dose depended on the marrow cavity sizes and hence calculations had been made separately for different bones and for the adult and infant skeletons.

**Determination of ion products in the urine**—Mr W. G. Robertson (Leeds) had determined the calcium phosphate and oxalate ion products in fifty twenty-four hour urine specimens from fifty patients suffering from stones and from fifty control patients of the same age and sex. The output of calcium, phosphate and oxalate was increased in those with stones, but when concentrations were considered, only the calcium and ionic calcium concentrations showed increase. The calcium phosphate ion products tended to lie in the undersaturated and metastable regions, patients with stones having significantly higher values than did the controls. Nearly all the calcium oxalate products lay within the metastable region for calcium oxalate, again the patients with stones showing significantly higher values than the controls.

**Fractionation of calcium compounds by gel filtration**—Dr A. Hodgkinson and Mr P. M. Zarembnski (Leeds) had studied the complexing of calcium with low and high molecular weight anions in blood and urine by fractionation in a column of Sephadex G-25 (Pharmacia Limited, Uppsala, Sweden). The eluting fluid contained calcium (one millimole) as well as other inorganic constituents of urine and blood in order to prevent the dissociation of weak calcium complexes by the dextran gel. Descending elution, with a flow rate of 12 millilitres per hour, was maintained by using a peristaltic pump; three to six millilitre fractions were collected for analysis. A good separation of calcium proteinate from low molecular weight calcium compounds was obtained using human serum. Determination of the low molecular weight calcium fractions in serum by the present method and by ultrafiltration (Hodgkinson and Edwards 1963: British Journal of Urology, 35, 445) gave results that agreed well. In agreement with earlier reports (Riddle 1942: Endocrinology, 31, 498; Clegg, Ericson, Hein, McFarland and Leonard 1956: Journal of Biological Chemistry, 219, 447) a considerable rise in the protein-bound calcium fraction was found in the serum of laying hens compared to those that were not laying. Normal human urine yielded two low molecular weight peaks of calcium, one apparently associated with citric acid and inorganic sulphate, the other apparently representing free ionised calcium. In the samples used for this study there was no evidence of calcium binding to high molecular weight constituents of urine. These findings supported the conclusions of Raafflaub (1963: Helvetica Medica Acta, 30, 724). In contrast, urine from patients with nephrotic syndromes contained a high molecular weight calcium fraction which accounted for 10 to 50 per cent of the total urinary calcium.

**Excretion of inorganic pyrophosphate in hypophosphatasia**—Mr R. G. G. Russell (Leeds) said that it had been suggested recently that the role of alkaline phosphatase in bone mineralisation was to remove an inhibitor of calcification from sites that were to mineralise. Fleisch and Neuman (1961: American Journal of Physiology, 200, 1296) had found a substance in both urine and plasma that could strongly inhibit the precipitation of calcium salts in vitro. This substance was destroyed by alkaline phosphatase and was subsequently isolated and identified as inorganic pyrophosphate. If the true physiological function of alkaline phosphatase was to destroy inorganic pyrophosphate at sites of mineral deposition, then high levels ought to be found in patients who lacked alkaline phosphatase, such as those with the hereditary bone disease or hypophosphatasia (Fraser 1957: American Journal of Medicine, 22, 730). In the present study the urinary excretion of inorganic pyrophosphate had been measured in nine patients with hypophosphatasia and compared with that of thirty-three normal people of the same ages. The patients with hypophosphatasia excreted $144 \pm 90.2$ (mean $\pm$ S.D.) micromoles of inorganic pyrophosphate per twenty-four hours which was very much greater than the $38.9 \pm 18.6$ micromoles per twenty-four hours excreted by the normal persons. When pyrophosphate excretion was expressed as a percentage of the total excretion of inorganic phosphate—thus allowing for variations in phosphate intake (Fleisch, Bisaz and Care 1964: Lancet, i, 1065; Russell, Edwards and Hodgkinson 1964: Lancet, i, 1446)—all the patients were found to excrete more than 0.8 per cent of their urine inorganic phosphate as inorganic pyrophosphate. All the controls excreted less than this amount. These findings suggested that inorganic pyrophosphate may be one of the natural substrates for alkaline phosphatase, which supports the idea that it might also help in the regulation of the calcification under physiological conditions. Low levels of pyrophosphate could impede the uptake of calcium and phosphate by hydroxyapatite crystals in vitro (Fleisch, Maerki and Russell: Demonstration at Third European Bone Symposium, Davos, Switzerland, April 1965, to be published). It is possible that the hypercalcaemia often seen in patients with hypophosphatasia could be the result of excess amounts of inorganic pyrophosphate on the surface of their bone crystals.

**Magnesium equilibrium between blood and bone**—Dr F. W. Heaton and Dr L. Martindale (Leeds) said that part of the skeletal magnesium formed a reserve which could be mobilised during magnesium deficiency to supply the requirements of other tissues (Duckworth, Godden and Warnock 1940:...
The relationship between bone and magnesium in the extracellular fluid had been further investigated in vivo and in vitro using female Wistar albino rats weighing 100 grammes. A close and direct relationship was observed between the magnesium concentrations in the plasma and in the femur of rats killed at intervals during the development of magnesium deficiency. This relationship was altered after parathyroidectomy, after which rats fed on a magnesium deficient diet had lower magnesium concentrations in the plasma and higher magnesium concentrations in the femur than normal animals pair-fed on the same diet. The femora from normal and magnesium-deficient rats were sectioned and incubated in synthetic media of different magnesium concentrations, which were buffered with bicarbonate to pH 7.4 and contained glucose to give an ionic strength and mineral composition similar to normal plasma. Magnesium was lost at the same rate from fresh and boiled bone to a magnesium-free medium until an equilibrium was reached after nine hours incubation. The equilibrium established was dependent on the magnesium concentrations in both the medium and the bone. These observations suggested that the equilibrium was physico-chemical in nature and analogous to the ionisation of a poorly dissociated salt rather than to the attainment of a solubility product in the medium.

Organic and inorganic sulphate in bone—Dr J. R. Auty, Dr J. A. Weatherell and Professor S. M. Weidmann (Leeds) said that it had been shown previously that the uptake of injected S\textsuperscript{35} into different regions of bone resembled that of P\textsuperscript{32} and other bone-seeking isotopes. Total S\textsuperscript{35} counts distinguished less readily, however, between active and inactive regions of bone than did P\textsuperscript{32}. Subsequent work showed that this difference resulted from the partition of S\textsuperscript{35} between the organic and inorganic components of bone. Eighty-five to 90 per cent of labelled sulphate constituted a diffusely spread inorganic fraction; the remaining S\textsuperscript{35} was probably associated with organic material. When the S\textsuperscript{35} bound to the matrix was compared with P\textsuperscript{32} uptake by bone mineral it was shown that both differentiated between active and inactive areas of bone to the same amount. Most of the organically bound S\textsuperscript{35} was, however, released on decalcification, a conclusion supported by the demonstration of metachromatic material in the decalciying fluid. A comparison of hexosamine levels in whole bone with those in decalcified matrix showed that up to half the hexosamine content might be lost during decalcification. Modified decalcification techniques had been developed by which the loss of organically bound S\textsuperscript{35} and hexosamines from the matrix could be reduced to about 7 per cent and 15 per cent respectively.

The histology of caries and developmental faults in dental enamel—Professor H. S. M. Crabb (Leeds) had examined ground sections of approximal carious lesions and artificial lesions produced in vitro by ordinary transmitted and polarised light in media of various refractive indices. The translucent zone and the positively birefringent dark zone were found to vary in width, and the appearances in artificially produced lesions suggested that variation in the severity of attack was one of the factors responsible for such variation. In some teeth structural defects in the enamel appeared to influence the pattern of the lesion; defective enamel structure might be the factor responsible for lesions which spread rapidly and deeply before cavitation appeared clinically. White spot lesions in relation to the approximal contact area had also been examined; they appeared to be either developmental faults or early carious lesions, and differentiation seemed possible by examination under ultra-violet light, in which developmental faults fluoresced brightly while carious lesions appeared brown. Examination of ground sections of some developmental faults in enamel revealed an appearance not unlike that seen in certain forms of hereditary amelogenesis imperfecta. Recent findings in deciduous teeth (Crabb and Mortimer 1965; unpublished) indicated that rampant caries in children under four might be associated with abnormal enamel structure.

Accumulation of fluoride in enamel from permanent and deciduous teeth—Dr J. A. Weatherell and Dr J. A. Hargreaves (Leeds) said that recently developed techniques of enamel sampling and fluoride analysis had made it possible to investigate the distribution of fluoride in the surfaces of individual deciduous teeth and in single aspects of permanent teeth. Fluoride levels had been measured in the surface layers of enamel from about twenty deciduous teeth from West Hartlepool, where the fluoride content of the drinking water was 1.9 to 2.2 parts per million; in twenty deciduous teeth from West Riding of Yorkshire, where the water fluoride content was 0.1 part per million; and in the labial surfaces of about thirty permanent incisors also from the latter area. The fluoride had the same distribution in the enamel from both permanent and deciduous teeth. Its concentration was greatest in the surface of the tooth and fell, almost exponentially, to a plateau value in the interior of the enamel. The penetration of fluoride into the enamel not only varied with the fluoride content of the water supply but also was deeper where the fluoride content of the tooth surface was greater. There was considerable variation in fluoride content within each group of permanent and deciduous teeth studied. In the small number of teeth so far examined there was little or no indication of an
increase in the level of surface enamel fluoride with age. Surprisingly little fluoride was found in the labial surfaces of some permanent incisors from people in the sixth and seventh decades.

**Enamel density measurements in individual teeth**—Professor S. M. Weidmann, Dr J. A. Weatherell and Mr S. M. Hann (Leeds) said that the range and variation of density in enamel from single teeth had been measured by using density gradient columns. The advantage of this technique over the customary float-and-sink method was that, in enamel powder ground from individual teeth, the complete range of density would be visualised by a single determination, because the continuous spectrum gave a much more detailed picture of the density distribution than was hitherto obtainable. The density distribution could be estimated quantitatively in small samples of material, thus enabling measurements to be made in single teeth. The specific gravity of enamel from individual teeth was found to vary from 2.88 to 3.01. The histological variation of density was measured by removing small samples of enamel from tooth sections. The hard and brittle nature of enamel precluded the use of mechanical sampling, and a technique was developed by which small particles of enamel could be removed by acid etching from closely adjacent sites. The density of the specimens was not altered by the etching procedure. Density variations from the surface to the depths of the enamel had also been studied.

**Mineralisation of keratin**—Mr A. G. Fincham (Leeds) said that it had been shown in the last few years that mineralisation with calcium phosphate and other inorganic salts was a common property of keratinised tissues; sometimes—as in claws and hoofs—the mineralised areas were disposed so as to reflect the function of the tissue. The baleen plates of the rorqual whales were a classical example of mineralised keratin containing up to 15 per cent ash weight in certain parts. Electron micrographs of sections of the baleen fringe fibres from the plates of the sei whale (Balaenoptera borealis) showed that the inorganic crystallites were unevenly distributed within the keratinised cells, the crystallite content of each cell appearing to vary over a wide range. X-ray diffraction photographs of such baleen fibres had shown clear apatite reflexions, and chemical analyses showed calcium-phosphorus ratios in agreement with the presence of an apatite. This cell by cell nature of the mineralisation of baleen could be demonstrated further by the density fractionation, in organic solvents, of enzymically disintegrated fibre preparations. By this means it was possible to obtain whole cell fractions of widely differing inorganic content varying from 2 per cent ash weight to over 30 per cent in the denser fractions. Such preparations provided unique materials for comparative studies of mineralisation in keratins. In view of these findings mineralisation of keratins should not be neglected when considering general mechanisms of biological mineralisation.

A further meeting was held at the Royal Dental Hospital of London on October 1, 1965.

**Effect of undernutrition on the development of teeth and jaws**—Professor R. A. McCance, Mr P. D. A. O. Owens and Professor C. H. Tonge (Cambridge) said that by giving pigs very little of a diet which in all other respects was perfect they could be held at a weight of five to six kilograms until they were a year old. Healthy pigs one year old weigh 150 to 180 kilograms and five to six kilograms is the normal weight of thriving piglets only three to four weeks old. Undernutrition of such severity as this delays the development of all parts of the body, but of the teeth less than of the jaws. Consequently, the jaws alter in shape, the angle of eruption of the incisors is changed, the molars become impacted and malocclusion develops. The fine structure of the teeth may be changed (McCance, Ford and Brown 1961: British Journal of Nutrition, 15, 213; Tonge and McCance 1965: British Journal of Nutrition, 19, 361). If the undernourished animals were given unlimited amounts of food at the end of the year and allowed to complete their growth they did not become quite so large as their litter-mates and differences in the jaws and teeth persisted. The third molars in both the upper and lower jaws might be greatly misplaced and the crowns of those in the lower jaw were reduced in length. The development of the roots was interfered with more than that of the crowns and the roots were generally shorter in all the molars, and particularly variable in the third molar.

**Effect of development and undernutrition on the calcium, sodium, magnesium, citrate and phosphate exchange of the cortical bone of pigs**—Dr D. A. T. Southgate, Mr P. J. Spencer, Mr P. D. Weston, Dr R. N. Misra and Professor R. A. McCance (Cambridge) said that undernutrition delayed the growth of bone and produced well defined radiological and anatomical appearances (Pratt and McCance 1964: British Journal of Nutrition, 18, 393, 613; Pratt and McCance 1965: In Calcified Tissues, p. 135, University of Liège). It also led to a very high calcium-to-collagen ratio which is one of the chemical characteristics of old bone (Dickerson and McCance 1960: British Journal of Nutrition, 15, 567). In the reported investigation the calcium, magnesium, sodium and citrate had been investigated in the bones of newborn pigs, of healthy pigs aged about four weeks weighing five to six kilograms, of healthy pigs one year of age weighing about 160 kilograms, and of undernourished pigs a year old weighing...
five to six kilograms. The percentages of calcium, magnesium and citrate in normal bones aged four weeks were all significantly different from those in the bones of undernourished animals of the same weight and from those of normal animals a year old, but the percentages in the bones of undernourished animals were not significantly different from the values in normal animals a year old. The amount of phosphate exchangeable in vitro under standardised conditions (Smeenk 1961: Journal of Clinical Investigation, 40, 433) fell progressively with age in normal pigs. Significantly less was exchanged from the bones of undernourished than from bones of normal animals a year old. In all these respects, therefore, undernourished bone behaved like normal bone as old as or older than itself and unlike the bone of a normal animal of the same weight.

The relationship between fluoride, carbonate and citrate in individual bones in the fowl—Dr T. G. Taylor and Miss J. Kirkley (Reading) said that it had been reported (Taylor, Moore and Hertelendy 1960: British Journal of Nutrition, 14, 49) that there was an inverse relationship between the carbon dioxide and citrate content of individual bones of the skeleton of the pullet. Furthermore, the carbon dioxide content increased from a mean value of 4.15 percent of the ash to 4.73 percent when birds come into lay. In view of a report (Zipkin, McClure and Lee 1960: Archives of Oral Biology, 2, 190) that both carbon dioxide and citrate decreased with increase in fluoride in human bone, it was decided to determine fluoride in fifteen samples from each of five birds. In two immature pullets fluoride was significantly correlated with both carbon dioxide and citrate. The correlation coefficient was negative with carbon dioxide and positive with citrate. When determining the correlation coefficients between fluoride and citrate were non-significant, but one bird showed a significant correlation ($r = -0.667$) between fluoride and carbon dioxide. In all five birds the correlation coefficient between fluoride and citrate was greater for carbon dioxide than for citrate. These findings suggested that fluoride replaced carbonate of the surface of the bone crystals, but that at the relatively low levels observed in these samples (approximately 0.1 percent of the ash) it did not replace citrate.

Three-dimensional studies of calcified cementum—Mr T. J. O’Riordan (Cork) said that improvement of techniques involving elliptically polarised light had provided better means of studying calcified material. Sections about 200 microns thick of calcified cementum were examined by a combination of red, reflected, ordinary and transmitted elliptically polarised light; this was one form of double illumination. The polarised light showed the collagen fibres clearly in distinctive colours. The reflected light showed the lacunae and canaliculi of the cementoblasts clearly. The combination was remarkably three-dimensional when a binocular microscope (with single objective) was used, even with high powers. The apparatus used for the study was the high-speed polariser devised by MacConaill, which enabled the degree of polarisation to be altered in such a way as to secure the greatest contrast between the collagen fibres and the cementoblasts with their processes. The relationship of the cementoblasts to their collagen was broadly that of osteocytes to bone fibre bundles and of fibroblasts to collagen bundles in tendon. Like osteocytes and fibroblasts the cementoblasts send their processes around neighbouring bundles. In many cases the canaliculi of one cementoblast appeared to anastomose with those of others but, even with the improved picture given by this three-dimensional method, this impression had not been verified so far. The existence of cement canals, distinct from the cementoblast canalicular system, was easily demonstrated by this method; they were not fracture lines caused at sectioning.

Caries susceptibility and post-eruptive changes in enamel of rat molar teeth—Dr R. L. Speirs (London) said that caries susceptibility in rat molars was age-dependent. Newly erupted teeth had the greatest susceptibility (Volker and Klapper 1954: Oral Surgery, Oral Medicine and Oral Pathology, 7, 207; Phillips 1956: Journal of the American Dietetic Association, 32, 110; König 1965: In Caries Resistant Teeth, p. 87, edited by Wolstenholme and O’Connor. London: Churchill) and that saliva could impart some resistance to recently erupted teeth (Fanning, Shaw and Sognnaes 1954: Journal of the American Dental Association, 49, 668). An analysis of the pattern and rate of caries development in rats given a cariogenic high-sugar diet at different ages had shown that the degree of caries resistance conferred with age varied in different tissues. The actual findings were in part agreement with those reported. The degree of "maturation" or mineralisation of enamel had been followed in rats aged between thirteen and eighty-three days old by studying the uptake of dyes in intact molars in vitro. Preliminary experiments on unerupted rat incisor enamel had shown that alizarin red S in ethanol, and naphthalene black in methanol were satisfactory stains. Undecalcified sections were prepared from resin-embedded jaws. The rats were maintained on a non-cariogenic, stock diet, powdered to reduce attrition. A progressive reduction in staining of enamel occurred as the molars aged, so that in thirty-day-old rats any staining had become confined to the basal third of certain fissures and to interproximal and cervical areas. The affinity for dyes was lost in older teeth. Several factors which might influence the rate of "maturation" of enamel had been studied in trial experiments. Ligation of the salivary ducts on the twenty-first day and premature exposure of the teeth to oral fluids on the
thirteenth day possibly slowed the rate. The topical application of a fluoride containing a calcifying solution (1·6 millimoles of calcium, 2·9 millimoles of phosphorus, 0·1 millimole of fluoride at pH 7·3) from the twenty-first to thirty-fifth day possibly accelerated the rate of maturation. The ingestion of fluoride (100 parts per million in diet and 50 parts per million in water) from weaning prevented the maturation of the developing third molars. Factors affecting "maturation" in vitro were being studied.

**SOUTH-WEST ORTHOPAEDIC CLUB**

A meeting of the South-West Orthopaedic Club was held at the Prince of Wales Orthopaedic Hospital, Rhydlafar, Cardiff, on May 29, 1965.

**Chondrosarcoma of the scapula and humerus—**Mr M. Gabriel (Cardiff) described two patients in whom it had been possible to excise the scapula, with preservation of the glenoid, for chondrosarcoma; and another patient with the same condition in the head of the humerus in whom the upper two-thirds of the humerus had been resected and replaced by a fibular graft. The graft had fractured twice, four and eight months after operation.

**Gas gangrene—**Mr R. Gopal (Cardiff) described four patients with gas gangrene after road accidents. He advocated conservative treatment with antibiotics, the least surgery possible, antiserum and the use of hydrogen peroxide or other local packs. Two of the patients had been treated conservatively with success, another had had primary amputation and the fourth late amputation.

**Unusual causes of pain in the leg—**Mr Dillwyn Evans (Cardiff).

**Abdominal aneurysm as a cause of backache—**Dr M. Blayney (Cardiff) described four patients with backache caused by abdominal aneurysms; one had a dissecting aneurysm which remained undiagnosed until death despite a laparotomy. The other three had saccular aneurysms; two were treated but one patient died. He said that only seven such cases had been recorded hitherto; the notable clinical points included no exercise pain, normal peripheral pulses, atypical referred pain, and failure to respond to conservative treatment. He stressed the need for careful palpation of the abdomen in all patients with backache.

**Some aspects of bone infection in children—**Dr P. Bray (Cardiff).

**Tendon injuries around the ankle in children—**Mr R. Gopal (Cardiff).

**Osteomyelitis of femur complicating medullary nailing—**Mr C. C. Jeffery (Exeter) described the successful treatment of osteomyelitis after nailing of the femoral shaft in three patients. Two patients had had no general manifestations of infection, but had developed sinuses three to five weeks after operation. The third had had pyrexia, and there had been discharge of pus for more than a year. He advised that the nail should be left until the fracture had united, when it was removed together with any sequestra. The medullary cavity was cleaned out and irrigated and the wound was left open. In all the patients the wound had healed in about six weeks and there had been no further breakdown.

**Cervical rib syndrome—**Mr B. Mendelsohn (Cardiff).

**Multiple Z-plasties in Dupuytren's contracture—**Mr R. Merryweather (Gloucester) said that this method was excellent for the single contracture of one finger. A midline incision was made extending from the proximal part of the finger to the proximal part of the palm with multiple Z-plasties. The wound healed without contracting. This allowed a complete and easy dissection of the affected palmar aponeurosis.

**Volkmann's ischaemia in fractures of the forearm bones—**Mr G. M. Bulman (Cardiff).

**Fractures of the neck of the femur in children—**Mr A. H. C. Ratliff (Bristol) described unusual examples of this fracture from his series of eighty-two cases. A displaced fracture of the neck of a femur in a child was a serious injury, and the most important complication was avascular necrosis (43 per cent). With rare exceptions the appearance of such an avascular femoral head was quite different from that of Perthes' disease. Four transepiphysial fractures were described in young children aged four to five years; all had been caused by severe violence, and separation occurred at the epiphyseal plate. In one union occurred in a normal manner; in two there was premature fusion at the upper femoral epiphysis; in the fourth changes characteristic of Perthes' disease developed in the epiphysis. There were five patients in whom premature fusion developed at the epiphysis of the knee.

**SOUTH-EAST METROPOLITAN ORTHOPAEDIC CLUB**

The Club met on May 15, 1965, at Hôtel Cochin, Paris, through the courtesy of Professor R. Merle d'Aubigné. After a tour of this magnificent hospital members of the Club took part in a clinical
meeting of interesting and difficult orthopaedic problems. A further clinical meeting of the Club was held on November 20, 1965, at Pembury Hospital, Sussex.

Intermetatarsal bursae in rheumatoid arthritis—Mr. E. Shephard (Maidstone) said that, among patients presenting with pain at the base of the toes who also had rheumatoid arthritis, this condition must be remembered. The symptoms were pain in the affected cleft, sometimes extending into the toes, and a feeling of walking on a pebble. A boggy tender swelling was found and characteristically the toes of the affected cleft were divergent. Diagnosis was confirmed by aspiration of a small amount of fluid, by re-aspiration of injected fluid, or by operative removal of the bursa and histological examination. Treatment by hydrocortisone injection was helpful, but in patients who failed to respond excision was satisfactory.

Gluteal tendonitis—Mr. J. H. Mayer (Tunbridge Wells) said that pathological calcification in the gluteal tendons overlying the greater trochanter could cause severe pain, but this could be relieved rapidly by radiotherapy after which the calcification would disappear. The condition occurred in middle-aged patients and presented as acute pain lateral to the hip with tenderness and limitation of hip movements, especially adduction. Weight bearing was impossible because of pain. On exploration the lesion had been shown to be an aseptic bursitis in the bursa under the gluteus maximus or between the gluteus medius and gluteus minimus. It was probable that rupture of the calcifying material into the bursa caused the acute pain. In the discussion some members considered that hydrocortisone injected locally was as effective as radiotherapy.

EAST ANGLIAN ORTHOPAEDIC CLUB

A meeting of the East Anglian Orthopaedic Club was held on March 27, 1965, at the Royal Air Force Hospital, Ely.

Meniscectomy—Wing Commander J. G. Mander discussed the after-care of patients operated upon for meniscectomy. He thought that it was important to splint the knee after operation to limit effusion and pain. Patients were allowed up on the fifth day and mobilisation was begun on the tenth. Flexion was not allowed until after the fluid had been absorbed.

Lateral fusion of the lumbar and lumbo-sacral spine—Mr. J. Crawford Adams reported forty-one cases of lateral fusion by cortical grafts wedged between the transverse processes for patients with disabling spondylolisthesis, degenerative arthritis and failed posterior fusion. After operation a plaster jacket was applied including one thigh as far as the knee. Walking in this plaster was allowed after two weeks, and the plaster was retained for fourteen weeks.

Chondromalacia patellae—Air Commodore L. Mackenzie Crooks reported his experience of excision of an abnormal ridge on the medial femoral condyle in cases of chondromalacia patellae. Results were encouraging. Patients with persistent pain after patellectomy had also been relieved by ridge excision.

Intramedullary nailing of fracture of tibia—Wing Commander R. F. Stark described his use of intramedullary nailing for fracture of the tibia. He used this method in unstable fractures, bilateral fractures and fractures of the tibia with the femur fractured on the same side. He had had no trouble from delayed union, fat embolism or sepsis.

Intravenous regional anaesthesia—Wing Commander A. J. Merrifield described the technique of intravenous regional anaesthesia with Lignocaine for minor operations in the arm. He had found this method easier to apply and more certain in its action than brachial plexus block.

SHEFFIELD REGIONAL ORTHOPAEDIC CLUB

A meeting of the Sheffield Regional Orthopaedic Club was held at St Helen’s Hospital, Barnsley, on July 10, 1965.

The bones of ancient Egypt—Mr. J. Thompson Rowley (Sheffield) said that orthopaedics started in the Old Kingdom in the twenty-ninth century before Christ. Some conditions were then considered to be caused by magic and to be cured by the sorcerer. Other conditions were treated by the physicians. Fractures and wounds had an obvious cause and so were treated logically by surgeons. Fractures were common in ancient Egypt and all types had been found in mummies. Reduction was followed by immobilisation but there was a gap between theory and practice because the papyri laid down the precept of immobilisation with gum-impregnated bandages, but the mummies had their fractures splinted with wood, or more often with palm leaves. The fractures of the dead were treated as those of the living; the Pharaoh Siptah had had his forearm broken by tomb robbers, but later on priests of the XXI dynasty splinted it. Tuberculosis was frequent, and the lesions in mummies were virtually identical with those seen today, but no Egyptian tubercle bacilli have been identified. Ankylosing
spondylitis was common at all times in Egyptian history. Some specimens showed complete fusion of the whole spine. Malignant tumours were rare. In the Egyptian pantheon the goddess Sekhmet, associated with blood, death and destruction, was the patroness of the surgeons.

**Approach to the ankle joint for arthrodesis—Mr V. S. Hughes-Davies (Bath).**

**Stapling for inequality of leg length—Mr E. G. Herzog (Sheffield)** said that during the eight years from 1956 to 1964 serial scanographs were done in 168 children and epiphyseal stapling was performed in 123. Sixty-one had finished treatment and were analysed. Shortening varied between three-quarters of an inch and three inches, with an average of about an inch and a half. In about half the patients the correction obtained was between one inch and two and a half inches, and in the other half correction was less than one inch. At the end of treatment thirty-two patients had been corrected to within half an inch of limb equality. Twenty-nine patients still had shortening varying from half an inch to two inches. The reason for the incomplete correction was that, on the whole, stapling had been done too late. One hundred and thirty-six operations had been done on the sixty-one patients for straightforward insertion and removal of staples. Their reinsertion or adjustment necessitated forty-four further operations and in four children osteotomies had been done for deformity. The conclusion was that this very useful procedure produced correction of two and a half inches in several patients. The staples had to be watched carefully because extrusion could cause deformity, but early adjustment of the staples would prevent this. No staples had cut through the epiphyseal plate.

**Prognosis for paralysis in meningomyelocele—Mr T. F. Stoyte (Sheffield)** had studied all children with meningomyelocele admitted to Sheffield Children’s Hospital during 1964. The survival rate at six months of age was 64 per cent. Assessment of muscle function at birth and at six months was compared; with early closure of the spinal lesion it was possible to give a firm prognosis for a muscle clinically present or clinically and faradically absent at birth, but if it was absent clinically but responding to faradism at birth there was a varying chance of recovery from none to 80 per cent. The prognosis was better in muscles innervated by the upper four lumbar neurological segments and poorer in muscles supplied by sacral segments. The highest recovery rate was in the quadriceps muscle. The toe intrinsic muscles had the worst prognosis.

**Relief of pain in Paget’s disease—Mr E. R. Price (Barnsley)** described three patients relieved of the severe pain of Paget’s disease after excision of affected bone and its replacement as a graft, with an intramedullary nail. Relief of pain was immediate and union was rapid.

**BRITISH LIMBLESS EX-SERVICE MEN’S ASSOCIATION TRAVELLING FELLOWSHIP**

A year ago we referred on pages 190 and 200 to the establishment by the British Limbless Ex-Service Men’s Association of a Travelling Fellowship, under the aegis of the British Orthopaedic Association, which was to be in orthopaedic surgery with special reference to amputations and artificial limbs. Mr George Fulford, M.B., F.R.C.S., a Senior Orthopaedic Registrar at the Royal National Orthopaedic Hospital, was appointed and he took up his Fellowship on September 1, 1965. Having visited various research centres and establishments in the United Kingdom and on the Continent, he leaves this month for Canada and the United States of America. Through the further generosity of the British Limbless Ex-Service Men’s Association, he will be accompanied by Mr Michael J. Hall, B.Sc. (Eng.), Senior Research Assistant in the Department of Mechanical Engineering of University College, London.

Mr Fulford trained at Guy’s Hospital and thereafter held posts at Fulham Hospital. Later he became Assistant Lecturer in Anatomy at Charing Cross Hospital and held Registrarships at Fulham Hospital and the Royal National Orthopaedic Hospital before becoming Senior Registrar at the latter. He is an officer in the Territorial Army and carried out his National Service in the Royal Army Medical Corps.

Mr Hall spent a short time in industry before entering University College with a major scholarship. He obtained his degree in mechanical engineering with first class honours and was awarded the A. P. Head prize. He has been doing basic experimental work on powered prostheses for some time, and was able to make a short visit to North America last year under an award by the Wellcome Trust.

**NETHERLANDS**

**NETHERLANDS ORTHOPAEDIC SOCIETY**

A meeting was held in January 1964 at Nijmegen University Hospital.

**Experimental tenodesis—Mr T. Whiston** (Galashiels, Scotland) described experimental tendon regeneration and the marrow reaction induced by tenodesis in adult rabbits.
The function of the supraspinatus muscle—Dr J. D. Mulder (Oegstgeest) and Dr B. van Linge (Leiden). This article has been published in full (Journal of Bone and Joint Surgery, 45-B, 750).

Treatment of non-union—Dr B. E. M. Vermaart (Voorburg) said that the general and local condition of patients with non-union in a long bone might be serious contra-indications to operation. Stiff joints must be mobilised and weakness of muscles overcome. A hinged brace to allow weight bearing was advocated.

A further meeting was held in March 1964.

Psoas minor syndrome—Professor P. A. Vos (Rotterdam) said that a shortened psoas minor might sometimes cause acute abdominal symptoms simulating appendicitis. Its contracture could cause limp and sometimes scoliosis, and it could be an important cause of congenital dislocation of the hip. His first case was seen in 1935, in a seventeen-year-old girl with apparent appendicitis, and a second case in 1942, in a nineteen-year-old girl with a limp. In 1962 twenty-four patients were reviewed in whom a psoas minor contracture had been relieved by open tenotomy. Five had scoliosis. Often the psoas minor is a tendinous band, which runs from the region of the thoraco-lumbar intervertebral disc to the os pubic bone and the lesser trochanter, and during growth it may become taut, thus causing the deformities.

Cauda equina compression during operation—Dr S. Bouwer (Amersfoort) said that acute herniation of the third lumbar disc occurred during an operation on a fifty-six-year-old man with a healed compression fracture of the first lumbar vertebra who had neurological and myelographic compression of the first and fourth lumbar roots. Immediately after the operation paresis with loss of the sphincter control had developed, with a complete block at the third lumbar level, necessitating a second operation.

Experimental dislocation of the hip joint in young rats—Dr S. Sijbrandij (Almelo). This paper was published in this journal in November 1965.

Adolescent kyphosis and short hamstrings—Dr J. E. Enklaar (Amsterdam).

In June 1964 a meeting was held at the Nederlands Zeehospitium at Kijkduin, The Hague.

Stereotactic freezing in the thalamus for spastic paresis and of the hypophysis for metastatic carcinoma—Dr H. A. Walder (Nijmegen).

Slipping of the upper femoral epiphysis—Dr J. Tissink (Rijswijk) described three patients in whom a cranio-pharyngioma was associated with slipping of the upper femoral epiphysis. This was different from ordinary adolescent epiphysiolysis because it occurred after instead of during adolescence, with different radiological and histological appearances. The effect of hypophysectomy on the histological and the mechanical qualities of the epiphyses was investigated in rats, in which it was found that this did not cause weakening of the epiphyses. Weakening of the epiphysial plate had never been obtained experimentally by hormones, but had occurred after givingaminotirids. Adolescent slipping of the femoral epiphysis was, therefore, caused by some unknown metabolic disturbance and not by hypophysial dysfunction. Slipping of the epiphysis in patients with cranio-pharyngioma was the result of changes in the epiphysial plate caused by the loss of hypophysial function.

Harmon’s technique in anterior spinal fusion—Dr C. J. v. d. Bas (Den Haag).

INDIA

ORTHAPOEDIC SECTION OF THE ASSOCIATION OF SURGEONS OF INDIA

A meeting of the Orthopaedic Section of the Association of Surgeons of India was held from August 7 to 9, 1964, at Aurangabad Medical College. The president of the section, Dr B. Mukopadhyya, was in the chair.

Surgery and physiotherapy of foot drop—Dr W. M. Lennox (Vellore) described an interosseous technique for transfer of the tibialis posterior to the lateral cuneiform bone. The extensor hallucis longus tendon was taken from its retinacular tunnel and tibialis posterior tendon substituted. The distal end of the extensor hallucis longus tendon was sutured to the tibialis posterior tendon. Five weeks later physiotherapy was started. The preliminary results showed that 81 per cent were good or excellent and that 19 per cent were fair or poor in a total of thirty-seven operations in thirty-five patients.

Muscle transfer for paralysis of the flexors of elbow—Dr M. N. Katju (Bikaner) described the results of the Brooks-Seddon technique of pectoralis major transfer to the biceps brachii in thirteen patients. Results were excellent or good in six and fair in three; four operations had failed.
Radical soft-tissue operations for congenital club foot—Dr S. K. Bulchandani (Bombay).

Decompression of nerves in the treatment of leprosy neuritis—Dr K. S. Bose (Calcutta) had decompressed the ulnar nerve by longitudinal incision of the sheath, epineurium and nerve in four equidistant places so that it was divided into four strands. Caseous material and abscesses were removed. After fourteen operations there had been relief of pain and improvement in sensibility and muscle power, and ulcers had healed.

Contractures of the knee—Dr B. B. Roy (Calcutta).

Histological diagnosis of early osteomalacia—Dr H. C. Batra (Kanpur) said that in early osteomalacia without radiological confirmation the diagnosis could be established by the demonstration of osteoid tissue in a biopsy specimen of the iliac crest. The histology, which was best seen in undecalcified preparations, could also indicate the severity of the disease by revealing such changes as secondary fibrous dysplasia or other bone marrow changes.

Fat embolism after fractures—Dr J. S. Mukhani (Bareilly).

Ankylosis of temporo-mandibular joint—Dr P. Chandra (New Delhi).

The Silver Jubilee session of the Association of Surgeons of India was held at King Edward Memorial Hospital, Bombay, from December 27 to 30, 1964. There was a meeting of the orthopaedic section.

Symposium on McMurray's osteotomy after fracture of the neck of the femur—Professor P. K. Duraiswami (New Delhi) reported the results of McMurray's osteotomy for both old and recent fractures. He had had no mortality; he used a hip spica for six weeks after operation. Union of the fracture occurred in 36 per cent, but the clinical result was satisfactory in 96 per cent of those followed up. Eighty per cent of patients had full movements of the knee. Dr K. T. Dholakia (Bombay) had compared the results of different surgical procedures, and he emphasised the relatively good results of McMurray's osteotomy for fractures more than two to four months old. In fresh fracture the Smith-Petersen nail was satisfactory, but Dr Dholakia preferred nail and platz fixation. In relatively old fractures, with partial absorption of neck, valgus osteotomy with internal fixation gave good results. Dr A. K. Talwalkar (Bombay) said that operations such as replacement arthroplasty, Smith-Petersen nailing or Moore's pinning could give excellent results and that sometimes McMurray's osteotomy was done without sufficient indication, to the detriment of that procedure. Dr S. Mullick and Dr K. S. Bose (Calcutta) gave an account of all consecutive McMurray's osteotomies done since 1950. The radiology did not always follow the clinical progress, which was usually satisfactory and which improved with the passage of time. In the discussion Dr V. K. Pillay (Singapore) said that he used a sliding pin; in children McMurray's osteotomy gave good results but in old patients a prosthetic replacement was better. Dr K. S. Grewal (Amritsar) thought that Smith-Petersen nailing was better than primary osteotomy. Dr B. Sen (Calcutta) described excellent results after primary osteotomy with internal fixation. Dr R. J. Katrak (Bombay) said that the Wainwright nail was a great improvement over other methods of internal fixation. Dr S. Bhattacharyya (Calcutta) preferred abduction osteotomy. Closing, Professor Duraiswami said that a longer follow-up was necessary before definite conclusions could be drawn.

Acute osteomyelitis of long bones—Dr B. V. Mehta (Bombay) reviewed 165 cases in children from the Alder Hey Hospital, Liverpool. He said that the incidence of osteomyelitis was increasing; the peak incidence was from May to June. He discussed the problems of diagnosis and emphasised the need for early exploration: even if it revealed nothing, it did no harm.

Acute osteomyelitis—Dr M. L. Gupta (Srinagar) had surveyed 500 cases bacteriologically and had found that 50 per cent of the organisms were sensitive to terramycin. In the discussion Mrs S. Kohli (New Delhi) emphasised the need for high dosage of antibiotics from the beginning, so that high blood levels were maintained. Dr R. N. Mitra (Calcutta) had found that the use of a detergent with penicillin gave good results with penicillin-resistant organisms. Dr B. Mukopadhyya (Patna) said that, in subacute osteomyelitis, caution should be exercised because there was danger of post-operative thrombosis after operation, which should be the least possible to establish drainage. Dr Mehta in reply said that in children it was best only to drill.

Recurrent dislocation of the patella—Professor M. Natarajan (Madras) described a modified technique of operation in which the ligamentum patellae was reinserted medially without a block of bone and the quadriceps was realigned. With this he had had good results in eleven knees. The longest follow-up was four years.

Present state of lumbar disc surgery—Mr David Le Vay (London, England) said that, with good clinical assessment, the risk of a tumour being undiagnosed was rare. Patients should be carefully selected before deciding on operation, and the first operation should be the last. Myelography should not be used routinely but only when there was a recurrence or if the diagnosis was uncertain.
A statistical analysis of bone tumours—Dr A. I. Selvapandian and Dr G. C. Dass (Vellore) had reviewed bone tumours seen between 1960 and 1963 at the Christian Medical College, Vellore. There were thirty-five osteoclastoma, thirty-three osteogenic sarcoma and twenty-three chondrosarcoma, seventeen Ewing’s tumours and twenty-one osteochondroma and twenty miscellaneous tumours. Dr R. N. Mitra (Calcutta) emphasised the importance of a bone tumour registry. Dr B. Shankaran (New Delhi) said that a central registry of bone tumours had been established at the Safdarjung Hospital, New Delhi.

Ischaemic contracture of the leg—Dr N. D. Aggarwal (Patiala).

Ischaemic lesions of the median and ulnar nerves—Dr S. K. Chatterjee and Dr R. K. Banerjee (Calcutta).

Congenital deformities of the foot—Dr A. Ghooi (Bhopal).

Defunctioning osteotomy for fracture of the femoral neck in children—Dr R. M. Bhansali (Bombay) presented a small series in which the fractured neck of femur was treated by osteotomy, either alone or with internal fixation of the fracture with Moore’s pins. A double hip spica was applied. He said that the osteotomy had a defunctioning effect at the fracture site which allowed union to occur.

Genetics and orthopaedics—Dr V. K. Pillay (Singapore).

Treatment of congenital vertical talus—Professor P. K. Duraiswami (New Delhi) discussed difficulties in the treatment of this condition and described an operative technique which he had used in three feet in which anatomical restitution had been satisfactory. The talus was exposed by two incisions on the medial and lateral side of the foot; the head of the talus was reduced into position between the calcaneus and navicular bone and the position was maintained by a Kirschner wire, which passed through the navicular, talus and calcaneus. The wire was removed after four weeks but plaster fixation was maintained for three months.

Clinical study of Monteggia fracture-dislocation—Dr S. Nand (Kanpur) discussed thirty patients with this injury and found that most gave a history of direct injury. Children, and all with recent fractures, did well with closed treatment. In fractures seen late in adults, or when closed reduction had failed, treatment was by intramedullary fixation of the ulna and excision of the head of the radius.

Fractures of the forearm bones—Dr M. T. Mehta (Ahmedabad).

Experiences with a new method of bone preservation—Dr J. S. Makhani (Bareilly) had preserved healthy ribs and other bones excised at operation in anaesthetic ether at room temperature. Bacteriological studies confirmed that the bones remained sterile. More than 100 grafts had been used in various operations after three weeks’ storage. The grafts were incorporated on almost all occasions.

Release of rotator muscles of the hip for intracapsular fracture—Dr K. S. Bose (Calcutta).

Use of a neurovascular skin-island pedicle graft in the management of the anaesthetic hand in leprosy—Dr W. M. Lennox (Vellore) described this technique used to give sensation to the pulp and ulnar border of an anaesthetic little finger. Of thirteen cases eleven were satisfactory.

A page from surgical history—Dr D. P. Ghosh (Asansol).

Role of ultrasonics in orthopaedics—Dr I. B. Hingorani (New Delhi).

Compression fractures of spine in tetanus—Dr J. D. Kanakraj (Tanjore) said that of fifty-three patients who had been radiographed twenty had vertebral changes, the fifth, sixth and seventh thoracic vertebrae being those most commonly affected.

Intracapsular fractures of neck of femur—Dr R. Soeur (Brussels, Belgium) said that there were two types of fracture, one with a beak proximally and the other with one distally. The latter had the better prognosis. His own practice was to reduce the fracture accurately and to fix the fragments by two Sven Johanssen nails. In one hundred cases ten patients died, eighty-three fractures united and seven failed to unite.

Intravenous xylocaine anaesthesia—Dr S. K. Bulchandani (Bombay).

Britain’s ischio-femoral arthropdesis—Dr K. Vasavada (Baroda) discussed the result of ischio-femoral arthropdesis in eighteen patients. Nine had no limp, three had a slight limp, five had a severe limp, and one result was poor. Dr R. G. Kattrak (Bombay) warned against the use of arthropdesis of the hip in Indian patients.

Kini Memorial Lecture—Dr M. L. Chatterji (Calcutta) delivered the Kini Memorial Lecture in which he described a method of vertical femoral traction for femoral shaft fractures which gave very satisfactory results.
ANNOUNCEMENTS

BRITISH ORTHOPAEDIC ASSOCIATION

AUTUMN MEETING

The autumn meeting of the British Orthopaedic Association will be held in Edinburgh from September 29 to October 1, 1966. Those wishing to submit papers for presentation should send five copies of a short abstract (about 400 words) to the Honorary Secretary, British Orthopaedic Association, at the Royal College of Surgeons, Lincoln’s Inn Fields, London, W.C.2, not later than May 31, 1966.

BRITISH ORTHOPAEDIC ASSOCIATION TRAVELLING SCHOLARSHIPS

The British Orthopaedic Association is offering two United Kingdom Travelling Scholarships for 1966 of £200 each. Applications (twenty copies), with the name of one referee, should be sent to the Honorary Secretary of the British Orthopaedic Association, at the Royal College of Surgeons, Lincoln’s Inn Fields, London, W.C.2, to arrive not later than March 15, 1966.

ROBERT JONES PRIZE ESSAY

The subject for the Robert Jones Prize Essay for 1967 is “A Subject of Orthopaedic Interest.” Essays should be submitted not later than December 31, 1967.

S. A. S. MALKIN TRAVELLING SCHOLARSHIP

A bequest to Harlow Wood Orthopaedic Hospital by the late Mr S. A. S. Malkin is being used to establish a Travelling Scholarship.

Mr Malkin’s great interest in the training of young orthopaedic surgeons was well known and in this scholarship it is hoped to perpetuate his memory. An annual award will be made, the main purpose of which will be to provide money for a young orthopaedic surgeon to extend his training by research or travel. Preference will be given to senior registrars and registrars who are working, or have worked, at Harlow Wood Hospital. It will also be possible to make the award to nursing sisters, physiotherapists, occupational therapists and radiographers who have been similarly employed. It is hoped that the first award will be made in 1966.

SYMPOSIUM ON SCOLIOSIS

The proceedings of the symposium on scoliosis held at Brompton Hospital, London, in July 1965, and reported briefly on page 185 of this issue, will shortly be published as a monograph by the Poliomyelitis Research Fund. The book includes nineteen original papers delivered at the symposium and the subsequent discussions, and includes Professor J. G. Scadding’s address in full. Copies will be available from the Poliomyelitis Research Fund, Vincent House, Vincent Square, London, S.W.1, price two guineas.

SOUTH AFRICAN ORTHOPAEDIC ASSOCIATION

The Fifteenth Annual Congress of the South African Orthopaedic Association will be held in Durban from October 19–22, 1966. Those interested in attending should communicate with the Honorary Secretary of the South African Orthopaedic Association, 1005 Lancet Hall, Jeppe Street, Johannesburg, South Africa.