INTRODUCTION

Orthopaedics, like many specialties, has developed through a necessity. A necessity to correct deformity, restore function and alleviate pain. Orthopaedic surgeons have developed an ability to prevent major losses of bodily function and indeed they can prevent otherwise inevitable death. They seek perfection of their art, by ensuring that the patient reaches optimal condition in the shortest period of time by the safest possible method.

History is very important to any surgeon, particularly the Orthopaedic surgeon. The Orthopaedic surgeon has once again been presented with advancing technology. This technology must be applied to the surgeon's practice, but it is best applied only when the surgeon has an underlying knowledge of the history of his art. He must be aware of the way surgeons in the past have contributed to Orthopaedics and more importantly, of the mistakes but they have made in the process. The surgeon who makes a mistake that was made by someone before him, is surely humbled and seen as poorly educated. So is he who states that he has developed a technique that no one has thought of before, because chances are that it has been thought of in the past.

In order for Orthopaedics to advance in an optimal manner, it is clear that attention must be paid to a history of Orthopaedics. The past is our foundation for future developments, we must build upon it so that we too can act as a stable foundation for future generations.

ANCIENT ORTHOPAEDICS

PRIMITIVE MAN

Although we have no written historical accounts, primitive man provides us his fossils. These show that the same pathology affecting bone existed in primitive times, hence an environmental cause for many of our common ailments seems unlikely. Evidence of fractured bones has been found, in some of which union has occurred in very fair alignment. This is interesting to note, as it gives us an ethical manner in which we can see the effects of no treatment at all, i.e. applying rest by instinct and early motion. It is inevitable that, at some stage, primitive man created a very crude splint, and
that from that stage on, its advantages were recognised. Primitive man was probably also the first to perform crude amputations of limbs and fingers, and to trephine the skull.

ANCIENT EGYPT
Mummified bodies, wall paintings and hieroglyphics, have shown us that the people of the Egyptian age suffered from the same problems that we suffer today. They also show us some of the orthopaedic practices of that time. Splints have been found on mummies and they were made of bamboo, reeds, wood or bark, padded with linen. There is also evidence of the use of crutches, with the earliest known record of the use of a crutch coming from a carving made in 2830 BC on the entrance of a portal on Hirkouf's tomb.

Perhaps the most important source describing the practices of the Ancient Egyptians comes from a papyrus, which was stolen from a tomb in 1862. The papyrus was then sold to an American Egyptologist by the name of Edwin Smith and so is sometimes known as the Edwin Smith papyrus. The author is not known, but believed to be Imhotep. Imhotep was seen as a genius of his time. He was a physician, an architect, an astrologer, and a chief minister and there is no knowing in Egypt and Greece, with some evidence that he received this status only 100 years after his death.

In the papyrus, the examination of peripheral was described together with an understanding that pulses reflected the action of the heart from which vessels went to the limbs. In this papyrus, injuries were classified according to their prognosis into three categories: an ailment which they would treat, an ailment that they would contend and an ailment which they would not treat. The papyrus also mentioned many cases and the treatment involved. These include, reducing a dislocated mandible, the signs of spinal injuries, and the signs of torticollis, the treatment of a fractured clavicle as well as signs and treatment of other fractures. Discharge was referred to as "ryt", this is presumably the pus of osteomyelitis.

ANCIENT GREECE
Many principles behind conditions and their treatment have been attributed to the Ancient Greeks. They could be regarded as the first to use a scientific approach, however they were also the first to document in detail their history and developments. Homer alone, in his account of the Trojan war, has provided us with an adequate insight to the understanding of injuries at that time and the treatment used for those injuries. The Iliad also contains references to various deformities. The Greek anatomists of Alexandria, during the 3rd century BC were also great contributors. Herophilus, who is believed to have practised human dissection, is regarded as the first to divide nerves into sensory and motor components and also the first to distinguish arteries from veins. Hegetor also of Alexandria, but of 100 BC, described in detail the anatomical relations of the hip joint, and was the first to record a description of the ligamentum teres.

In the period between 430 and 330 BC a very important Greek text was collated and is known as the Corpus Hippocrates. It is named after Hippocrates who is known as the father of Medicine. Hippocrates was born on the island of Cos in 460 BC and died at an old age in 370 BC. He is known as having brought a systematic and scientific approach to Medicine and as having defined for the first time the position and the role of a doctor in society. Although centuries have passed, the Hippocratic oath will always remain central to our practices.

Various volumes in the Corpus Hippocrates had relevance to Orthopaedics. One such volume is the one on joints. Here dislocation of the shoulder was described together with the various methods used in reduction. There were also sections describing the reduction of acromioclavicular, temporomandibular, knee, and hip and elbow joint dislocations. The correction of club foot was described. The problem of infection after compound fractures was described and treated with pitch
cerate and wine compresses without forcible bandaging. Probing into any compound fracture was avoided.

Hippocrates had a thorough understanding of fractures. He knew of the principles of traction and counter-traction. He developed special splints for fractures of the tibia, similar to external fixation. Hippocrates also developed the Hippocratic bench or "scamnum". Of all the developments that Hippocrates has given to us, his careful clinical observation and rationale thinking must be particularly commended.

THE ROMAN ERA
Although the teachings of Hippocrates were to dominate thinking for many centuries after his death, there are several contributors to Orthopaedics worthy of mention. During the Roman era, there was another respected Greek figure by the name of Galen (129-199 BC). He was originally from Pergamon and became a gladiatorial surgeon there before travelling to Rome. Galen is often referred to as "the father of sports medicine". He gave a good account of the skeleton and the muscles that move it. In particular, the way that signals are given from the brain through the nerves and to the muscles. He first recorded a case of cervical ribs. He described bone destruction, sequestration and regeneration in osteomyelitis and sometimes performed resection in such cases. Galen is believed to be the first to have used the Greek words, kyphosis, lordosis and scoliosis for the deformities described in the Hippocratic texts. He also devised several methods for correcting these deformities.

During this Graeco-Roman period, there were also attempts to provide artificial prostheses. There are accounts of wooden legs, iron hands and artificial feet. Soranus of Ephesus is said to have first described rickets. Ruphus of Ephesus described tendon ganglia and their treatment by compression. Antyllus of the 3rd century is said to have practised subcutaneous tenotomy to relieve contractions around a joint. It is said that he used both linen and catgut sutures for these procedures. Various drills, saws and chisels were also developed during this period.
THE FOUNDATIONS OF MODERN ORTHOPAEDICS

It was not until the 12th century that Europe began to awake gradually from its Dark Ages. Universities and hospitals were beginning to be established, human dissection resumed and the great Greek texts were being translated from Arabic to Latin. However, until the 16th century, all developments remained within the shadow cast by Hippocrates.

AMBROISE PARE (1510-1590) Ambroise Pare is regarded as the most famous surgical figure of the 16th century and the father of French Surgery. He was born in Bourg Herent in France. In 1532 he became an apprentice to a Parisian barber-surgeon, then worked for four years at Hotel Dieu in Paris. In 1541, he became a master barber-surgeon and did some work as an army surgeon. In 1564, he published a monumental work on Surgery, the Dix Livres de la Chirurgie. The first part contained Anatomy and Physiology and the second, Surgery. In this, many surgical techniques were described, one of the most significant being the use of ligature for large vessels in amputations. He also used a tourniquet in his amputations, to hold the muscles retracted with the skin, prohibit the flux of blood and to dull the senses. He designed a wide variety of forceps, instruments and braces of all kinds. With the help of armourers, he made a variety of artificial limbs from iron. The majority were cosmetic, although Pare did design a scoliosis corset and a clubfoot boot.

NICHOLAS ANDRY (1658-1759)

Andry was the professor of Medicine at the University of Paris and Dean of the faculty of Physick.
In 1741, at the age of 81, he published a famous book called Orthopaedia: or the Art of Correcting and Preventing Deformities in Children. By such means that may easily be put into Correcting and Preventing Deformities in Children. By such means that may easily be put into practice by parents themselves and all such as are employed in Educating Children. In this book, Andry presents the word Orthopaedic, which derives from the Greek words straight and child. Andry was interested in postural defects and this has been reflected by his famous illustration, which is known The tree of Andry. Andry believed that skeletal deformities were due to faults of posture and shortness of muscles. Some regard Andry as the Father of Orthopaedics, but many strongly disagree, believing that his work was un-scientific and that his only contribution was the use of the word Orthopaedics.

THOMAS SYDENHAM (1624-1689)
Sydenham is likened to Hippocrates because his writings cover a large field and are characterised by good observation. Likewise, he is also known as the father of English medicine. He was born at Winford Eagle, and studied at Oxford and Montpellier. He himself suffered from gout and wrote an excellent description of the disease, detailing the attack, the changes in urine and the link with renal stones. He described acute rheumatism, chorea, and the articular manifestations of scurvy and dysentery.

PERCIVAL POTT (1714-1788)
Pott was from London and worked in St. Bartholomew's Hospital, were he received the diploma of
the Barber-Surgeons' Company in 1763. He is best known for the fracture that bears his name Pott's fracture, as he was the first to give a good description of this ankle fracture. In 1756, he received a fracture of his own. This was an oblique compound fracture of the lower third of the tibia, which was acquired after falling from his horse. He refused to be moved until he had purchased a door to be carried on, as he believed that the jolting of a carriage would have exacerbated the injury. Immediate amputation was usually conducted on such injuries, but at the last moment amputation was stopped and the limb was saved. Pott's most famous work is on the paraplegia of spinal tuberculosis, where he stressed that the condition was not related to spinal cord compression, but associated with strumous disorders in the lungs. This is known as Pott's paraplegia.

WILLIAM HEBERDEN (1710-1801)

Heberden was born in London where he also built up a busy practice. He is known for initiating the Medical Transactions in 1766, but even more so for his description of Heberden's nodes.

JOHN HUNTER (1728-1793)

Hunter worked on a Lowland farm until he was 20 years of age. Until he was 32, he was a pupil and house surgeon at St. George's Hospital in London and also worked in his brother's dissecting room in Covent Garden. In the Seven Years' War, he served as a military surgeon. He set up a research centre in London's Golden Square and taught and lectured at Leicester Square until angina eventually led to his death. Hunter's contribution was immense and even stemmed through the pupils he taught (e.g. Abernethy, Chessher, Jenner and Philip Syng Physick). Hunter himself was a pupil of Percival Pott. Although he received little formal education (unlike his brother William, an obstetrician in London) Hunter put the practice of surgery on a scientific foundation and laid the framework for the twentieth century developments. His saying Don't Think, try the experiment has inspired generations of modern surgeons.

Much of Hunter's knowledge may be attributed to his military experience and his experiments on animals. He described how to assess muscle power in a weak muscle. With joint injury and disease, he states that voluntary movement should not be permitted until inflammation has settled, otherwise contracture is promoted. He believed that healing depended on the body's innate power, and that the surgeon's task was to aid this. Hunter believed that bone disease often required mechanical assistance. He studied loose bodies in joints, pseudoarthroses and fracture healing, where he described the transformation from fracture haematoma to fibrocartilagenous callus to the deposition of new bone, trabeculation, reestablishment of the medullary canal and the resorption of excess bony tissue. Hunter wrote A Treatise on the Blood, Inflammation and Gunshot Wounds in 1794, and also made attempts at tissue grafting.

His collection of specimens (initially over 14,000 POT's; half destroyed in the bombing of London) is in the College of Surgeons, London. They describe the development of the various systems from the simplest (insects) to the most complex. It is a humbling and inspiring experience to visit the museum and see one man's monumental contribution to surgery.
JEAN-ANDRE VENEL (1740-1791)
Jean-Andre Venel was a Genevese physician who studied dissection at Montpellier at the age of 39, and in 1780, established the first orthopaedic institute in the world at Orbe, in Canton Waadt.

This was the first true hospital that dealt specifically with the treatment for crippled children's skeletal deformities. Venel recorded and published all his methods and for this was known as the first true orthopaedist. He is also regarded as the father of orthopaedics, as his institute acted as a model for hospitals throughout Europe. Venel stressed the importance of sunlight and made various braces and appliances at the workshops within the institute.

WILLIAM HEY (1736-1819)
William Hey was born in Pudsey near Leeds. At the age of 14 he was apprenticed to a surgeon and apothecary and nearly died of an overdose of opium whilst studying its effects. He was the founder of Surgery at Leeds and trained at St. George's Hospital. Hey wrote a book on Surgery which contained several chapters on Orthopaedics. Subacute Osteomyelitis of the tibia was described and he advocated deroofing of the lesion. In 1773, Hey banged his knee getting out of the bath, and many attribute his subsequent interest in the knee to this. He coined the phrase internal derangement of the knee, and described meniscal injuries. Hey described loose bodies and introduced tarso-metatarsal amputation.

GIOVANNI BATTISTA MONTEGGIA (1762-1815)
Monteggia was born at Lake Maggiore and was a Milanese pathologist who acquired syphilis by cutting himself at autopsy and became a surgeon and professor at Milan. He is particularly remembered for his description in 1814 of the fracture that bears his name, Monteggia's fracture.

ABRAHAM COLLES (1773-1843)
Colles was born in Kilkenny, Ireland, of humble origins. Nevertheless, he became professor of Surgery at the College of Surgeons in Dublin from the age of 29. He was the first to tie the subclavian artery, but is best known for his description of Colles' fracture, in 1814 (the same year as Monteggia).
BARON GUILLAUME DUPUYTREN (1777-1835)

Dupuytren was born in central France. He was kidnapped as a boy by a rich woman from Toulouse on account of his good looks. He was taken to Paris and educated, but endured great poverty throughout his studies. Dupuytren became Surgeon in chief at the Hotel Dieu and worked tremendously hard and became very rich. He was described as an unpleasant person to meet, yet his work was delightful to read. He was characterised as First among surgeons, Last among men.

He was an accurate clinical observer with a great interest in pathology. Dupuytren's name is most associated with the contracture of palmar fascia and a particular ankle fracture that he described. He wrote on many subjects, including congenital dislocation of the hip, the nature of callus formation, subungal exostosis, the Trendelenburg sign, tenotomy in torticollis and he differentiated osteosarcoma from spina ventosa.

JAMES SYME (1799-1870)

Syme was born in Edinburgh. As a student at Edinburgh University he found a way of dissolving rubber. Syme opened a school of Anatomy and later opened a very successful private clinic. In 1833, he became Professor of Surgery in Edinburgh and held that position until his death, (he had actually made an agreement with his predecessor to pay him a pension if he resigned). Syme is known for introducing conservative alternatives to the major amputations that were carried out at the time. In 1831, he released a booklet, which detailed cases where joint excision could be used instead of amputation for grossly diseased joints, as in tuberculosis, and injured joints. In 1842, Syme described an amputation at the ankle. This amputation bears his name, as it replaced a portion of below knee amputations, which were ordinary practice at that time.

SIR BENJAMIN BRODIE (1786-1862)

Brodie was a national figure. He was a surgeon at St. George's Hospital and a friend of the Thomas
family (that of Hugh Owen Thomas). He first published his book, On the Diseases of Joints in 1819, which proved to be a popular reference for many years. In 1832, he described the chronic bone abscess that has been named after him. The patient was a man of 24 who had recurring symptoms in the lower extremity of his right tibia. On examination, Brodie found a pus filled cavity, for which he believed that amputation could be avoided by trephination of that cavity. He recognised the association of arthritis with gonorrhoea and that all children's hip disorders were associated with infection. IN 1843, he introduced the Fellowship examination of the Royal College of Surgeons in order to improve the education and standing of surgeons.

JOHN RHEA BARTON (1794-1871)

Barton was born in Lancaster, Pennsylvania, U.S.A. He studied at the Pennsylvania Hospital and later worked for Physick (the father of American Surgery) who in turn was a student of Hunter's. It was said that Barton was ambidextrous and that once he had positioned himself for an operation, he did not move about. In 1826, he performed a subtrochanteric osteotomy of the femur for a severe flexion-adduction deformity of the hip. Barton is best known for his innovative corrective osteotomies for ankylosed joints. In 1834, Barton wired a fractured patella and in 1835, he described Barton's fracture of the wrist.

ROBERT WILLIAM SMITH (1807-1873)

Smith was born in Dublin, he studied and worked there. He became Professor of Surgery at Trinity College in Dublin. Smith founded the Dublin Pathological Society with Colles, Graves, Corrigan and Stokes. In 1847, Smith wrote a classic book called A Treatise on Fractures in the Vicinity of Joints, and on certain forms of Accidents and Congenital Dislocations. Here he describes the eponymous Smith's fracture, and Madelung's deformity before Madelung described it.
In 1849, he published A Treatise on the Pathology, Diagnosis and Treatment of Neuroma. This book was said to be so large that it was larger than an ordinary sized dinner-room table when opened up. Smith wrote on neurofibromatosis in great detail, much before von Recklinghausen did.

ANTONIUS MATHYSEN (1805-1878)

Mathysen was a Dutch military surgeon who in 1851, invented the plaster of Paris (POP) bandage which was to become so important to orthopaedic practice.

To this day, a POP cast is the mainstay of fracture immobilisation.

WILLIAM JOHN LITTLE (1810-1894)

Little was educated at the Jesuit seminary at St. Omer. He himself had a paralytic clubfoot. The treatment in London was amputation, however, he found a cure in Germany by tenotomy. Little was a founder of the Royal Orthopaedic Hospital. He published a detailed report, in 1862, of the then ill-understood group of deformed and partly retarded children and young adults. This type of spastic paralysis with paraplegia of the lower limbs was then called Little's disease for many years.

JOSEPH LISTER (1827-1912)
Lister studied at the University College Hospital in London. In 1853, he became Syme's house surgeon, he then married Syme's daughter, and in 1854 became assistant surgeon to the Royal Infirmary. Lister is known for the introduction of antisepsis. He first applied carbolic acid to a compound fracture in 1965. It was soon clear that the practices had had a dramatic effect in reducing in particular abscesses, pyaemia, hospital gangrene, erysipelas and amputation mortality. Lister was made a baronet in 1883, and later in his life was thought to have trialed the application of the Penicillum mould directly to wounds.

JEAN-MARTIN CHARCOT (1825-1893)
Charcot was from Salpetriere in Paris and is known worldwide as the first professor of Neurology. He wrote a thesis distinguishing gout, rheumatoid arthritis and osteoarthritis. Charcot also first described the arthropathy that bears his name. Charcot's joints. He was first to write about amyotrophic lateral sclerosis, intermittent claudication, disseminated sclerosis, intermittent hepatic fever and herpes zoster.

THEODOR KOCHER (1841-1917)
Kocher was born in Berne and studied in Berlin, London, Paris and Vienna. In 1872, he became Professor of Surgery in Berne. Kocher had a great interest in Anatomy and in 1870, he described his eponymous method of reducing a dislocated shoulder. Kocher wrote a remarkable book in which he detailed many useful surgical incisions that he had developed, such as his posterolateral exposure of the hip. He also developed several surgical instruments, but his main interest was in thyroid disease.

SIR JAMES PAGET (1814-1899)
Paget was a graduate of St. Bartholomew's Hospital in London, where he remained for the rest of his career. It was in 1877 that Paget gave the first description of what he called osteitis deformans, but what is now commonly called Paget's disease. He noted the increased incidence of
osteosarcoma, the increasing head size and deformities. (One of Paget's original drawings is shown.) Paget was also a remarkable lecturer with a great interest in bone pathology. His name is also associated with other pathological processes.

**SIR WILLIAM MACEWEN (1848-1924)**

Macewen studied in Glasgow and had Syme and Lister as teachers. The new era of antisepsis enabled him to make many contributions to Surgery. In terms of his Orthopaedic contributions, he performed many osteotomies and developed a one-piece osteotome. Macewen's main research interest was in bone growth and in 1879 he performed the first of his pioneering bone grafts. Many of his grafts were performed on people who had had portions of their bones excised, but who had otherwise normal function. Macewen was also a pioneering neurosurgeon and cardiothoracic surgeon. He worked on cerebral tumours and abscesses and also performed the first pneumonectomy.

**RICHARD VON VOLKMANN (1830-1889)**

Volkmann was from Halle, Saxony. He was the first in Germany to institute Lister's antiseptic methods. In 1881, Volkmann published his famous paper on ischaemic muscular paralyses and contractures. Here he attributed the cause of the contractures to direct changes in the muscles produced by arterial occlusion and emphasised the early warning of preliminary weakness. These contractures are otherwise known as Volkmann's ischaemic contractures. It is interesting to note that Volkmann wrote popular poems and fairy stories and also founded a surgical journal.
EDUARD ALBERT (1841-1900)
Albert was born in Bohemia and studied in Vienna. He is best known for producing artificial ankyloses in paralysed limbs and wrote a paper on this in 1881. Albert performed tarsal and shoulder arthrodesis for paralysis and recurrent dislocation, and was the first to use the term arthrodesis. Albert also described synovectomy, the transplantation of nerves, sciatic scoliosis and Achilles bursitis.

HAROLD BENNETT (1837-1907)
Bennett studied at Trinity College, Dublin. He collected specimens of bone pathology and with these wrote a paper on fractures of the metacarpal bones in 1882. In this paper Bennett described his eponymous fracture dislocation of the base of the thumb metacarpal. Bennett is said to have introduced antisepsis to Dublin and to have performed many osteotomies for rickets. He became President of the Royal College of Surgeons of Ireland.

HUGH THOMAS (1834-1891)
If you could only read about one person in the history of Orthopaedics, then you would have to read about Hugh Owen Thomas, the father of British Orthopaedics. Hugh Owen Thomas was the eldest of five sons born to a well-known bonesetter at that time. All studied Medicine. Thomas was a thin and nervous child who was somewhat delicate. His peculiar temperament in adulthood led many to ignore him and his immense contributions to Orthopaedic Surgery during his lifetime. Hugh Owen Thomas could not even work with his father and never held a hospital appointment. He treated all his patients at his home. His practice was so busy that he started his rounds at five or six in the morning and never left his home for other than professional purposes. Thomas would designate Sunday as his free day and hundreds of patients from the country would surround his house in order to be treated.

The people of Liverpool knew Thomas as a short and quick man. A man who always wore a black coat buttoned up to the neck and a sailors cap pulled over a damaged eye. A cigarette was also seen constantly in his mouth. Despite Thomas's busy schedule, Thomas wrote prolifically in the night and developed many new techniques and surgical instruments. He believed in enforced, prolonged and uninterrupted rest for the treatment of tuberculous joints. Thomas developed a great number of splints in order to achieve
this. These include, the cervical collar, metatarsal bar, heel wedge and knee splint. Many of these are still in use, such as the Thomas splint. Thomas was also able to recognise early cases of hip disease. He was the first to demonstrate concealed flexion of the hip joint and a way of unmasking this by performing the Thomas Test.

It should be remembered that Hugh Owen Thomas had studied Medicine and was interested in litholopaxy and the management of acute abdomen as well as Orthopaedics. It has been said that the medical profession might not have practised the black art of bone setting, if Hugh Owen Thomas had not graduated from a Medical school.

**SIR WILLIAM ARBUTHNOT LANE (1856-1938)**

Lane was a Scot from Inverness who trained and later worked at Guy's Hospital in London. Lane is known for his attempts at improving alignment of fractures by using internal fixation. He started off using silver wire, then he used steel screws and this was followed by the use of plates and screws. Lane was said to have been eccentric, regarding humans as machines and performed total colectomies as a cure for auto-intoxication. He also initiated the programmes of health education that are present today. Lane wrote columns in the newspapers, held public lectures and improved the distribution of fruit and vegetables.

**FRITZ DE QUERVAIN (1868-1940)**

De Quervain was born at Sion in the Valais Canton of Switzerland. He studied at Berne and succeeded Kocher as Professor of Surgery there. In 1895, de Quervain described a form of chronic tenovaginitis, which is now known as de Quervain's stenosing tenovaginitis. Like Kocher, he studied thyroid disease and is responsible for the introduction of iodised table salt.

**FRIEDRICH TRENDELENBURG (1844-1924)**

Trendelenburg was born in Berlin. He studied Medicine in Glasgow and in Berlin. Trendelenburg's name is associated with the Trendelenburg sign and the Trendelenburg gait, which he described in association with coxo-femoral incompetence in 1895. Trendelenburg also devised pulmonary embolectomy, but it was one of his pupils, Kirshner who first met success with the procedure many years later in 1924.
PIERRE MARIE (1853-1940)

Marie was born in Paris, he worked for Charcot and eventually succeeded him as Professor of Neurology at Salpetriere. Marie described peroneal muscular trophy (Charot-Marie-Tooth disease). He was the first to associate acromegaly with a pituitary tumour in 1886. In 1980, he described hypertrophic pulmonary osteoarthropathy. In 1898, he gave the first account of cranio-cleidal dystosis and noted the partial aplasia of the clavicles, the increased skull diameter, the disordered dentition and the failure of ossification at the fontanelles. Also in 1898, he published a classic paper on ankylosing spondylitis, which he refereed to as spondylosis rhizomelique. Marie believed that poliomyelitis was infectious.

LOUIS XAVIER EDOUARD LEOPOLD OLLIER (1830-1900)

Ollier was born in Vans in Ardeche and studied at Lyons and ontpellier. Ollier, like Macewen, performed pioneering bone grafts. Although both were successful, their methods and the theory behind them were in fierce opposition. In 1877, Ollier suggested that bone growth may be inhibited in order to correct certain deformities by resecting the epiphyseal plate. In 1899, Ollier first described dyschondroplasia or Ollier's Disease. Ollier researched bone growth to an enormous extent and believed that it might be possible one day to treat patients by stimulating their cartilage to ossify.

WILHELM CONRAD RÖNTGEN (1845-1923)

Although Rontgen was a professor of Physics at Wurzburg, his discovery of X-rays (Rontgen rays) and their use has provided an enormous contribution to Orthopaedics and is still of great value to Orthopaedic practice. The first radiography that Rontgen took was of his wife's hand on the 22nd of December 1895. This was allegedly her Christmas present. Rontgen received the Nobel Prize for his discovery in 1901.

THE MODERN ERA (20TH CENTURY ORTHOPAEDICS)
THE TURN OF THE CENTURY.

The early 1900's can be seen as a great turning point for Orthopaedics. The discovery of the X-ray almost marked 1900 and Orthopaedics itself was only now being seen as a true specialty of its own. The British still dominated Orthopaedic developments, but the new world had now reached maturity and there were increasingly more contributions being made by the Americans. The bloom of understanding, with the introduction of the X-ray, was not as dramatic as expected. Instead, the turn of the century was marked by new institutions and associations that sought to mark Orthopaedic Surgery as an individual and growing specialty.

One area where there was an evident surge of new information with the introduction of the X-ray was that of osteochondritis and osteonecrosis. Although the German George Clemens Perthes took the first X-rays of Perthes' disease in 1898, Perthes’ assistant did not publish these until 1914. In 1903, Robert Osgood (1873-1956) of Boston first described a lesion of the tibial tubercle occurring during adolescence. This is now known as Osgood-Schlatter's disease. The German, Albert Hoffa (1859-1907), stressed in his book of 1902, that excision of the femoral head for cases of hip disease should not be routine. He had realised that not all cases of hip disease were tuberculous. Hoffa was interested in scoliosis, but has his name associated with the hypertrophy of the infrapatellar fat pad that is now called Hoffa's disease. Another German by the name of Georg Axhausen (1877-1960), is noted as the first to use the word aseptic necrosis. It must be stressed that necrotic bone was frequent at this time, for there were no antibiotics, and any study into a non-infectious bone necrosis was innovative. In an article he published in 1910, Axhausen wrote that necrosis occurred at the bone-ends of every fracture, and that this stimulated and was replaced by periosteal proliferation. He also believed that focal necrosis of subchondral bone caused changes in the overlying articular cartilage which lead to arthritis deformans. It was not until the 1950's that Axhausen's term of aseptic necrosis was replaced by the term avascular necrosis.

Jacques Calve (1975-1954) of Berck, France, Arthur T. Legg (1874-1939) of Boston, U.S.A. and George Perthes of Tubingen, Germany, are all said to have described Perthes' disease in 1910. Hence this disease is sometimes referred to as Calve-Legg-Perthes disease. With the help of radiography, Calve realised that some cases of tuberculous hips in children were actually cases of coxa plana. He saw that these rare cases of hip irritability had X-ray evidence of coxa vara, hypertrophy of the femoral head, increased density, fragmentation and flattening of the epiphysis. He noted that the disease was of short clinical duration, had good recovery, did not relapse and was not associated with adenopathy or abscess. Calve also described vertebral osteochondritis with collapse, which he attributed to vascular changes subsequent to trauma (although we now know that eosinophil granuloma is the common cause). Legg had wide interests, but is best known for the eight papers that he published on coxa plana. He included a treatment of traction hip splint and noted the limited degrees of movement.

The early 1900's was also a time of improvement for spinal surgery. Russell A. Hibbs (1869-1932), was from the New York Orthopaedic Hospital and in 1911, published a report on a technique of spinal fusion that he had developed. Hibbs performed the first spinal fusion for tuberculosis and later performed a similar procedure for scoliosis. Joel Goldthwait (1867-1961) was another of the great Boston orthopaedists. He had a major interest in posture and in 1911, published a laminectomy from L1 to S3 performed on a man who developed bilateral sciatica followed by paraplegia after a lifting strain.
Probably the most important figure at the turn of the century was Sir Robert Jones (1855-1933). Indeed many would argue that he was the greatest orthopaedic surgeon that the world had ever seen. It was said that when Jones operated, Time stood still. Jones was a nephew of the great Hugh Owen Thomas and became one of his apprentices in Liverpool. In 1896, Jones published the first report of the clinical use of an X-ray to locate a bullet in a wrist. He founded several associations and Orthopaedic hospitals. Jones wrote several important books such as Injuries of Joints in 1915 and Notes on Military Orthopaedics in 1917. His textbook Orthopaedic Surgery is said to be the first to have dealt systematically with the diagnosis and treatment of fresh fractures. In World War I, Jones headed the orthopaedic section of the British Forces. Jones was an advocate of tendon transplantation, bone grafting, and other conservative, restorative procedures.

**WORLD WAR ONE.**

It must be noted that war has played an important part in Orthopaedic history. Many of our greatest contributors were military surgeons and it is remarkable how much we have learnt about ancient Greek orthopaedics through Homer's description of the Trojan War alone. It is interesting to note that many of the achievements during and after World War I were not related directly to traumatic injuries received at war. However, it can be said that Orthopaedics was definitely seen as a separate specialty after World War I and that this was the first major war where aseptic techniques were saving many more lives than in the past wars.

**Jules Tinel (1879-1952)**, of Rouen and Paris, was a neurologist in the First World War and first described Tinel's sign in 1917. This related to nerve injuries, and on percussion of the nerve below the site of nerve injury, formication was elicited if nerve fibres were degenerating. If this was absent, there was a bad prognosis.

**Paul Budd Magnuson (1884-1968)** was an American who assisted in orthopaedic services in World War I and with this and his own practice in the slaughterhouse area Magnuson acquired much experience in trauma. He wrote a textbook called Fractures and in this described complete debridement of the knee joint for osteoarthritis, including synovitis and other degenerative lesions. This involved the removal of osteophytes and damaged menisci, shaving of the cartilage to the bare bone and if necessary, narrowing of the patella.

Following the war, an American by the name of **Paul N. Jepson (1893-1949)** continued Volkmann's fine work and reproduced ischaemic contracture in animals. In his paper of 1921, he wrote that ischaemic contractures could be prevented by prompt surgical decompression. In 1927, a Russian called M. J. Arinkin introduced sternal puncture as a diagnostic procedure while working at the Military Medical Clinic in Leningrad. This can be applied in the study of metastatic bone disease.
In the chain of great surgeons that followed Hugh Owen Thomas, came **Thomas Porter McMurray (1888-1949)**. McMurray who worked for Robert Jones. McMurray was born in Belfast, but worked in Liverpool. His operative dexterity was renowned, for he could remove an entire meniscus in five minutes and disarticulate a hip in ten minutes! In 1928, McMurray published a paper on internal derangements of the knee. Here he introduced his sign for a torn meniscus, McMurray's sign. An operation was also named after him as McMurray was the first to perform a displacement osteotomy for un-united fractures of the femoral neck and arthrosis of the hip.

In 1932, **Winthrop Morgan Phelps (1894-)** published an important paper on cerebral birth injuries. Here he classified the different types, described the variability in its aetiology and a modern approach to managing these cases. Phelps was the professor of orthopaedic surgery at Yale University and director of the Children's Rehabilitation Centre at Baltimore. He made immense contributions to the management of cerebral palsy and stimulated needed interest in the disorder.

**Ricardo Galeazzi (1866-1952)** of Milan had great experience in congenital dislocation of the hip and structural scoliosis, but is best known for the forearm fracture that he described in 1934. This is the Galeazzi fracture, which is actually more common than Monteggia's fracture.

**WORLD WAR TWO.**

The knowledge learnt in fighting World War I helped in treating the casualties of World War II. In the Second World War, there were less amputations performed, there was less gangrene, better measures for fixation of fractures and we must not forget the importance of penicillin (whose effects were discovered by Sir Alexander Fleming in 1928). The Germans needed quick measures to restore their fighters to optimal fighting potential and developed a number of nailing procedures during this period. Together with this the Americans were now making more contributions than ever before.

One of these Americans was **Willis Campbell (1880-1941)**. William Campbellof Memphis, Tennessee who was the main advocate of interpositional arthroplasty at that time. Campbell used a free autogenous transplant of fascia lata from the thigh in a double layer, the smooth surface facing internally. He aimed not at restoring the original anatomy, but at restoring function. Campbell was also a key figure in bone grafting and performed inlay full thickness grafts for non-union fixed with screws of beef bone.
Gerhard Kuntscher (1900-1972) served in the German army during the Second World War and published his Kuntscher revolutionary procedure in the opening months of the war. His work was concerned with the intramedullary nailing of fractures of the shafts of long bones and his name is associated with the nail. Kuntscher was prejudiced academically and was never offered a chair. Martin Kirschner (1879-1942) was from Greifswald, Germany and was also known for his methods of fixation, in particular for the Kirschner or K-wire. He also performed the first successful pulmonary embolectomy.

Sir Reginald Watson-Jones (1902-1972) was another famous figure from Liverpool. During World War II, he was among the leading teacher in fracture therapy. Watson-Jones published Fractures and Joint Injuries in 1940, which remained a standard reference for several decades and was translated into many languages.

In 1942, Albert J. Schein (1910-) of New York, published a paper which established Gaucher's disease as a specific and not too rare cause of hip disease. This was very important, as many such cases were being miss-diagnosed as Perthes' disease. Also in 1942, another American, Austin T. Moore reported and performed the first metallic hip replacement. He had replaced, for the first time, the entire upper portion of the femur with a vitallium prosthesis a foot long. It had a round head, loops for muscle attachments, and a lower end, which slipped over the cut shaft and bolted to it. Over the years, the design of the prosthesis and the procedure improved. Consequently, there is one type of prosthesis called the Austin-Moore, which is still used today.

AFTER THE WARS.

In the years following the war, orthopaedic surgeons sought to perfect their treatment of fractures, in particular with the use of metallic pins and wires for fixation. With the introduction of alloys that could be used effectively, there was also a new wave of prostheses, which are developing for treatment of arthritis as well as problematic fractures. Antibiotics have greatly improved and so have our diagnostic devices.
In 1948, Knut Lindblom from Stockholm, published his technique of direct injection of the lumbar intervertebral discs with radio-opaque dye. This reproduced the symptoms if done at the level of the lesion and showed the nature of the rupture.

In 1949, H. Lowry Rush (1879-1965) used pins made of especially hardened stainless steel for treating long bone fractures.

In 1950, the great Sir John Charnley Charnley (1911-1982) of Manchester wrote a classic book on the non-operative approach to fractures, The Closed Treatment of Common Fractures. Charnley is however renowned as the effective innovator of the total hip replacement. Among other principal contributions was the development of a self-curing acrylic cement to anchor both the femoral replacement and the acetabular cup. Charnley was also interested in joint friction, replacing the Teflon with the use of high-density polyethylene. Many of the total hip replacements that he performed in the 1960's are still sound and serving their patients effectively.

As an Australian studying Orthopaedics, it is imperative that I add a great Australian Orthopaedic surgeon who is also a delightful teacher of Orthopaedics. Ronald Lawrie Huckstep (b.1926) graduated from the Middlesex Hospital, London in 1952. He then worked in Kampala, Uganda where he contributed greatly to our understanding of poliomyelitis. There he performed operations to improve the lives of people with severe congenital as well as acquired deformities. Huckstep's ingenuity also led him to develop many splints and other useful devices, as well as new methods for fracture fixation.

He became Foundation Professor of Traumatic and Orthopaedic Surgery at the University of New South Wales in 1972 and has published five books on typhoid fever, poliomyelitis, trauma and orthopaedics plus a quiz atlas.

THIS IS AN EDITED VERSION OF A HISTORY OF ORTHOPAEDICS FROM WORLD ORTHOPAEDIC CONCERN

THE ORIGINAL CAN BE FOUND AT WWW.WORLDORTHO.COM