Some Liverpool firsts in medicine

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Introduction

Sylvester Richmond is recognised as the ‘father’ of Liverpool medicine. Born in Garstang in 1616, he arrived in Liverpool in 1642 and remained as a physician in the town for 30 years. There is no record of his medical training and his medical qualifications are dubious. He may have served as a naval surgeon with the port as his point of entry. Little is known about his clinical practice but he certainly wielded considerable influence. By the end of the 17th century a large proportion of the many doctors attracted to Liverpool were closely connected to the Richmond family. Few of this motley selection of barber-surgeons, apothecaries and physicians had any medical qualifications. During 1672, his final year in medical practice, Sylvester Richmond was elected Mayor of Liverpool. He subsequently retired to Crosby Hall where he died in 1692.

Following the arrival in 1818 of the Savannah, the first steamship to cross the Atlantic, Liverpool rapidly developed into the second largest port and commercial centre of the wealthiest empire ever known. It became a vibrant city, a magnet for talent in many spheres, including medicine. It also brought the problems of the seafarers and immigrants, in particular, infections such as tuberculosis, typhus and Asiatic cholera. These infections rapidly became endemic as amidst the great wealth of the town there was abject poverty. In 1840, 39,000 of the inhabitants were crowded in squalid airless cellars and a further 86,000 lived in small rooms in equally squalid dwellings called ‘courts’. The Great Potato Famine in Ireland in 1846 led to further deterioration of conditions. Of the 300,000 who landed in Liverpool 80,000 became resident. The absence of running water and sanitation created unprecedented health problems. In 1847, 10,000 died from a variety of infections with tuberculosis a particular scourge amongst vulnerable children and the inevitable outbreak of cholera.

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The struggle to improve the living conditions of the poor and the sanitation of the town was led by William Henry Duncan (1805-1863). Having graduated in Medicine at the University of Edinburgh in 1829 Duncan returned to Liverpool, his native city, to become a physician at one of the Dispensaries, establishments set up by Charities to provide medical services for the poor. Dr Duncan rapidly identified the definite relationship between the health of the poor and their unsanitary living conditions. He fiercely contested the popular, but fallacious, argument that Liverpool was a healthy town and destroyed the myth that commercial prominence and obvious wealth would, alone, change the situation. He eventually persuaded the wealthy businessmen and members of the local government organisation that sanitary reform was essential.\(^2\)

His first success was the Liverpool Health Improvement Act of 1842 by which Public Baths and Washhouses were provided in Upper Frederick Street. The idea of the Public Washhouse was inspired by Catherine (Kitty) Wilkinson who during the Cholera epidemic of 1832 had risked her own life by allowing her neighbours in the Vauxhall community to use her water boiler, the only one in the street, to wash their infected clothes and bed linen. Later she fitted out one of her cellars as a washhouse and disinfecting room for use by the general public. Kitty and her husband became the first superintendents of the new Public Washhouses and Baths.\(^3\)

William Duncan also collaborated with Edwin Chadwick, the Poor Law Commissioner whose report of 1842 of an ‘Inquiry into the Sanitary Conditions of the Labouring Population of Great Britain’ resulted in the formation of the Health of Towns Associations. The first branch met in Liverpool in April 1845. The deliberations of this group produced the Liverpool Sanitary Act of 1846 which became important nationally as the framework for the 1848 Public Health Act.\(^4\)

The Liverpool Sanitary Act made provision for the appointment of a borough engineer to improve drainage, build sewers and ensure the provision of adequate sanitation throughout the town. It also legislated for the appointment in 1847 of William Duncan as the city’s Medical Officer of Health, the first in the Country. In this role, which he held until his untimely death in Elgin in 1863, William Duncan was undoubtedly the

\(^2\) W. H. Duncan, On the sanitary state of Liverpool (1840) and Physical causes of mortality rate in Liverpool (1843). Pamphlets in the LMI Archives.

\(^3\) W.M.Frazer, Duncan of Liverpool (Carnegie Press, reprint 1997), pp. 2-23.

\(^4\) Ibid., p. 46.
driving force behind Liverpool’s unique record of firsts which included the establishment of a Home Nursing Service, a Horse-Drawn Ambulance Service for public use and the establishment of a Childrens’ Ward in the Southern General Hospital.

Orthopaedic Surgery

Hugh Owen Thomas (1834-1891), always attired in a thick greatcoat and gauntlet gloves as protection against the chill winds blowing up the Mersey, a Bosun’s discharge cap at a jaunty angle to obscure a large scar above his left eye, and the ever present cigarette to keep germs at bay, was undoubtedly the father of modern orthopaedic surgery.

Before his return from medical study in Edinburgh, London and Paris, the treatment of fractures and joint disease by the general surgeons of Liverpool was crude, inevitably resulting in limb shortening and gross deformity. Amputation for secondary infection was frequent. Continuity of care was lacking, rehabilitation unknown. Consequently, many patients preferred to seek help from Bonesetters, uneducated men who ‘by the gift of nature’ had acquired knowledge resulting in the development of remarkable skills of diagnosis and manipulation. Hugh Owen Thomas was a member of the fourth generation of a famous family of Anglesey Bonesetters.5

On his return to Liverpool in 1860 Thomas decided not to join his father’s bonesetting practice and established himself at 11 Nelson Street. He built a small workshop where a blacksmith and several leather workers created the splints which he designed to ensure perfect support for damaged limbs. These Thomas splints, which are still in use, completely revolutionised the management of bone and joint disease.

Prolonged rest was the hallmark of his therapy for the restoration of limb length and symmetry. Each case of disease and deformity was considered an individual problem. Splints and frames designed to provide rest for the damaged area while permitting rehabilitation exercises promoting early return to full mobility and normal activity were specially moulded in his workshop for each patient.6

A keen student of the philosophies of the 17th century physician, Thomas Sydenham, and Professor John Bennett, his mentor at Edinburgh University, Thomas firmly believed that fresh air was of utmost benefit in the management of chronic infections such as tuberculosis. All over Liverpool, in the slums and back alleys, children immobilised in the

splints fitted with meticulous care, were nursed on beds which Thomas had improvised from soapboxes and secured to the railings by chains.\(^7\) He worked tirelessly for these poor children visiting regularly to adjust the tension of the splints, driving about town, often late at night, in a scarlet-painted phaeton of his own design. He was the unsung hero of the slums of Liverpool. When he died, prematurely, of pneumonia in 1891 at the age of 57, he was deeply mourned by thousands of Liverpool poor.\(^8\)

Ignored and discountenanced by his colleagues, Thomas rarely took part in academic discussion.\(^9\) He did agree to address the Harveian Society of London while his good friend, Edmund Owen, was its President. Another friend, Rushton Parker, Professor of Surgery in Liverpool, successfully persuaded him to write one text. This book, “Hip, Knee and Ankle”, was published in 1875 receiving wide acclaim in America but, alas, not at home.\(^10\)

Portraits of Hugh Owen Thomas hang in the Royal College of Surgeons of England and the National Portrait Gallery as acknowledgement that this extraordinary, eccentric man was an outstanding pioneer of orthopaedic surgery. The Orthopaedic Library of Liverpool Medical Institution is dedicated to his memory and houses some of his memorabilia.

While completely different in character and outlook, his nephew, Sir Robert Jones (1857-1933), had a close, complimentary working relationship with Hugh Owen Thomas which endured for over 20 years and ensured the propagation of Thomas’s principles. Robert Jones, a man of prodigious energy, remarkable strength and irrepressible joviality ‘which bubbled like a bottle of champagne diffusing its stimulatory effects around him’, challenged the conventions of his age and the historical apathy to the cripple child. The ‘patch up and send home’ attitude of his colleagues which resulted in gross deformity, leaving crippled children languishing, untreated, in homes for the chronic sick and incurables was an anathema to him. Initially he encountered as much opposition as Thomas had done but, eventually his principles were accepted.

In 1905, Agnes Hunt, a crippled child, who had trained as a nurse at the Seaside Hospital and Convalescent Home in Rhyl, frequently visited by Hugh Owen Thomas, established an ‘open air’ hospital in her native village, Great Baschurch, Shropshire. Robert Jones was so impressed that he volunteered to visit and operate there each month. Baschurch, the first open air orthopaedic hospital in the world served as a

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\(^8\) Op. cit., ref 6, p. 82.


\(^10\) Ibid, p. 191.
model for, among others, the Robert Jones and Agnes Hunt Hospital in Oswestry which remains an active, specialist orthopaedic hospital.¹¹

The physician Charles John Macalister (1860-1943), who devoted much of his time to the welfare of sick children, was a staunch ally of Robert Jones. Both firmly believed that hundreds of children suffering from chronic medical and surgical diseases could be cured if prolonged residential care was provided in a suitable environment. The principal requirements were good sanitation, first-class laboratory services, a residential doctor, operating facilities, and easy access to fresh air. They campaigned ardently to raise funds for this enterprise and in 1898 were offered the sole use of 20 beds in the new wing of West Kirby Convalescent Home to which the first patients were admitted in November 1899. As the facilities available were not ideal their campaign continued until the community of Wirral had raised sufficient funds to enable the opening of the Liverpool Country Hospital for Children in Heswall in February 1909. A Royal Charter was granted in January 1910.¹²

Robert Jones did more than champion the cause of sick children. As consultant medical adviser to the Manchester Ship Canal Company during the construction of the canal between 1887 and 1893 he organised the very first Accident and Emergency service. Charged with the medical and surgical care of 20,000 manual workers and their families he administered a chain of First Aid stations and small hospitals sited strategically along the developing waterway. With unflagging tact, efficiency and enthusiasm he controlled a unified, loyal organisation of doctors, nurses and technicians capable of treating, without delay, large numbers of workmen frequently critically injured.

In 1914 at the very beginning of the First World War, Robert Jones became actively involved in the care of orthopaedic injuries and in 1915 established the first Military Orthopaedic Hospital at Alder Hey. The following year he was appointed Director of Military Orthopaedics with responsibility for 30,000 beds in Military Hospitals throughout England. His introduction of the Thomas Splint to immobilise fractures on the battlefield was slowly accepted but undoubtedly saved thousands of lives and significantly reduced morbidity. By this Hugh Owen Thomas vicariously gave an immense service to the nation.¹³

During the war, Noel Godfrey Chavasse, the twin son of the Bishop of Liverpool, who had completed his medical training in the city,

¹¹ Ibid. p.231.
assiduously promoted the role of the Thomas Splint. In April 1916 this young Medical Officer was awarded the Victoria Cross for the ‘most conspicuous bravery and devotion to duty’. In July, despite serious injury to the right side of his head he continued to carry casualties to the ‘dressing room’ which he had established in a captured German trench. Alas, on the 2 August 1916 a shell hit the trench further injuring Chavasse. He died two days later. He was posthumously awarded a Bar to his Victoria Cross. In his memory there is a plaque in Liverpool Cathedral and an English Heritage Blue Plaque on the wall of the former family home in Abercrombie Square. More recently the Chavasse Park in Liverpool City Centre was created to commemorate the short life of this great soldier.\(^\text{14}\)

In the academic world of the early 20\(^{th}\) century Robert Jones established orthopaedic surgery as an academic specialty and, in the University of Liverpool, laid the foundation of the internationally acclaimed Liverpool School of Orthopaedic Surgery. Robert Jones was knighted in 1917 and created a baronet in 1926.

**Radiology**

Roentgen described the photographic properties of “invisible rays” in Germany on the 8 November 1895. Before news of this advance had officially reached this country Robert Jones learned about it when a patient attending his free Sunday clinic at 11 Nelson Street showed him a letter which she had just received from her native Germany. On the 7 January 1896, Oliver Lodge, Professor of Physics, Charles Thurston Holland (1863-1940), a general practitioner, and Robert Jones devised a simple tube which they used to photograph a small bullet in the wrist of a young boy, probably the first successful x-ray taken in this country.\(^\text{15}\)

Later in 1896 Charles Thurston Holland became the medical officer in charge of a small radiology department in the Royal Southern Hospital, thus establishing the specialty of radiology in Liverpool. He rapidly extended the scope of radio-diagnosis, attaining national and international recognition. Then in 1901 he introduced the use of radio waves as treatment for the skin disorder, lupus, while the following year his departmental colleague Dr Mackenna pioneered their use in the treatment of skin cancer. Radiotherapy, the therapeutic use of radio waves was thus established in Liverpool.\(^\text{16}\)


Another Liverpool first in Radiology followed over 50 years later in 1948 when George Ansell, in collaboration with the atomic scientist and (later) Nobel Peace Laureate, Joseph Rotblat, performed the first clinical isotope scan using radio-active iodine to reveal the presence of an enlarged thyroid gland (goitre) behind the sternum.\(^\text{17}\)

**Medical**

In 1774 the physician Matthew Dobson found and crystallised sugar from the urine of a diabetic patient, a finding undoubtedly of benefit to Rollo who, 15 years later, promoted its use as a routine test in the diagnosis of diabetes mellitus.\(^\text{18}\)

James Currie (1756-1805), a medical graduate of Edinburgh University, arrived in Liverpool in 1780. His reputation and clinical practice grew rapidly. He was the prime mover in the establishment of the Lunatic Asylum which opened in close proximity to the Infirmary in 1792. That year Currie was elected as a Fellow of the Royal Society. His major contribution was undoubtedly his pioneering work on the treatment of high fevers. He induced deep hypothermia by deliberately submerging affected patients in massive volumes of ice-cold water to reduce their body temperature. He also made the important observation that body temperature continued to fall after discontinuation of this therapy. This so-called ‘after drop’ caused dangerous changes in the electrical activity of the heart, a problem which remains of importance to modern practitioners of hypothermia but can be controlled by re-warming slowly. In 1796 he instigated the development of the Fever Hospital but, unfortunately, died before it was completed.\(^\text{19}\)

The most distinguished Liverpool physician of the late 18\(^{\text{th}}\) century, Currie played a major role in the dissemination of medical knowledge. He was also a literary scholar, remembered by his fellow Scots as the author of the first definitive biography of their national poet, Robert Burns, and donated the income from the sales of his work to the poet’s widow.\(^\text{20}\)

James Carson, another Scot, arrived in Liverpool in 1799 after completing his MD thesis in which he had defined the role of the lungs in the return of blood to the right side of the heart.\(^\text{21}\) In 1815 after a series of


\(^{21}\) J. Carson, *An inquiry into the causes of motion of the blood (1815)* and *An inquiry into the causes of respiration: animal heat, absorption and muscular motion (1833)* LMI Archives.
animal experiments he confirmed that the elastic recoil of the lungs was the responsible factor. In 1822, firmly believing that shrinkage of abscesses and tuberculous cavities would encourage healing he promoted the idea that the creation of an air pocket or pneumothorax would be beneficial. To this end he persuaded Robert Bickersteth (1787-1857), a surgeon of repute, to create a surgical pneumothorax for a prominent Liverpool businessman known to have a large tuberculous cavity. Unfortunately the fibrous adhesions, a common feature of the disease, were too dense to be penetrated preventing collapse of the lung. Unfortunately, the patient died one month later. Carson was elected as a Fellow of the Royal Society in 1837 in recognition of his ability and originality.

The distinguished neurophysiologist, philosopher, humanist and poet, Sir Charles Scott Sherrington (1857-1952) was the Holt Professor of Physiology in the University of Liverpool between 1895 and 1913. Before his arrival in Liverpool, Sherrington had published numerous classical papers on the functions of the nervous system while Physician Superintendent of the Brown Institute of London University. During this period he was probably the first to use diphtheria antitoxin, in the successful treatment of his eight year-old nephew who had contracted this potentially lethal infection. In Liverpool, Sherrington developed a department of world renown with an outstanding laboratory in which he carried out his most important research on the analysis of motor function, the mechanism of reflex action, decerebrate rigidity and cortical localisation and published “The Integrative Action of the Nervous System”. Rather belatedly, in 1934, Sherrington shared the Nobel Prize for Medicine with Edgar Adrian, later Lord Adrian, for their work on the function of neurones. His acceptance oration was entitled “Inhibition as a Co-ordinative Factor”. His influence on the Liverpool School of Medicine is recorded in a series of memorial lectures - “Sherrington Physiologist and Poet”- of which the third was delivered by Lord Cohen in 1954. The magnificent extension to the Liverpool Medical School which was opened in 2002 is dedicated to this great scientist and teacher.

Wartime naval contacts successfully persuaded Cyril Clarke (1907-2000) to come to Liverpool in 1948 as Honorary Physician to the David Lewis Northern Hospital. Ten years later, in 1958, he succeeded Lord Henry Cohen as Professor of Medicine. Cyril Clarke’s fascination with butterflies began in early childhood when he was evacuated to the

countryside during World War I. Later, while a pupil at Oundle, which he detested, he perfected a technique for hand-mating swallowtail butterflies to produce hybrids, which he then used to study the inheritance of wing pigmentation and mimicry, inherent protection against predators. While out rambling soon after his arrival in Liverpool he had a chance encounter with the brilliant young Oxford zoologist and keen geneticist Philip Sheppard whom he ultimately persuaded to come to Liverpool where he soon became Professor of Genetics. Their joint discovery that the changes in the swallowtail butterflies were determined by a special group of genes, polygenes, led to an extensive programme of clinical research. Enthusiastic medical trainees published numerous papers on the influence of genes in gastro-intestinal disease, arthritis and disease of the thyroid gland. Most importantly, in the 1950s the recognition that Rhesus (Rh) blood grouping was determined by polygenes enabled the study of Rh incompatibility, a cause of serious morbidity and high mortality rate in susceptible neonates. His young medical registrar, Ronald Finn, established that trans-placental passage (haemorrhage) of foetal blood of a different Rh group viz. Rh+ve to an Rh-ve mother led to the development of antibodies in the maternal bloodstream where they remained posing a threat of haemolysis in vulnerable Rh-ve foeti. Under the guidance of Cyril Clarke, Ronald Finn developed an antibody which when injected into the pregnant mother significantly reduced morbidity and mortality in these vulnerable neonates.

Surgery

The extrovert Alfred Higginson (1808-1884) was a highly respected, skilful surgeon with an experimental and mechanical mind. In the early 1840s, he developed a stomach pump for which there is, alas, no surviving description. This was rapidly followed by a rubber syringe for delivering colonic enemas. The cylindrical, compressible reservoir described as an ‘elastic barrel’ had a complex system of valves analogous to those of the heart. In the Liverpool Medico-Chirurgical Journal of 1857 he described a complex system which he used, without problems, in seven vein-to-vein transfusions of blood. A conical metal cup with a capacity of six fluid ounces was placed in a metal casing filled with five fluid ounces of hot water fed through an aperture at the side of the cone. The blood then passed through a ball valve into a tubular-shaped elastic

India Rubber barrel before passing through another ball valve into a galvanised rubber tube of considerable length which terminated in a lengthy needle-like metal tube with a narrow end for insertion into the recipient’s vein. A small plug at the level of the lower valve controlled the aperture enabling variation of the rate of flow when necessary. Higginson published numerous articles promoting the role of blood transfusion in the *Liverpool Medico-Chirurgical Journal*.

In 1843 he demonstrated an ingenious apparatus, a ‘pneumatic chest’, for mechanical ventilation of the lungs. He believed that the alternative withdrawal and replacement of air by incorporated bellows promoted respiration by assisting recoil of the lungs. This apparatus became the virtual prototype of the ‘iron lung’ used in Denmark during the polio outbreak of 1954. Alas, James Carson’s son disputed the originality of this idea, claiming that his father had described similar equipment.

Higginson can, however, be credited with the development of a respirometer for measuring the vital capacity of the lungs. He became involved in the Liverpool ‘Ether Scene’. Sulphuric ether was originally synthesised in Liverpool around 1761 by the Chemist, Matthew Turner, for use by physicians. However, Morton was the first to use it in Boston on 12 October 1846 for the surgical removal of a small tumour of neck. News of this event almost certainly arrived in Liverpool when the Trans-Atlantic mail ship, *Arcadia*, docked in Liverpool on 16 December 1846.

On 28 December 1846, Felix Yaniewicz, a local dentist, the Honorary Secretary of the Liverpool Literary and Philosophical Society, recorded in the Society Minutes that Frank Asher had performed a ‘surgical operation on a human subject during insensibility to pain caused by the inhalation of sulphuric ether’. On 11 January 1847, Yaniewicz demonstrated the use of ether for dentistry to a ‘group of medical men’, including Higginson, using apparatus which he had created. Alas, there is no surviving description of this device. A few days later, Higginson publically demonstrated the use of ether using an ear trumpet as the mouthpiece attached to a leather bladder which held the ether.

On 29 January 1847, the *Liverpool Mercury* reported that during a public demonstration at the Eye and Ear Hospital, the surgeon Hugh Neill performed a ‘series of important and interesting operations of the eye

29 A.Higginson, ‘An Essay on the Subject of Suspended Animation’ [Manuscript has survived but no printed record can be traced].
with some of the patients being in a state of unconsciousness to pain produced by the inhalation of ether’. The first patient was rendered pain-free by Higginson. He administered ether to other patients with varying success before Yaniewicz unsuccessfully applied ether to a ‘very strong’ 37 year-old man which did not appear to ‘take proper effect upon him causing him to feel pain’ causing him considerable aggravation. The demonstration had to be terminated.

Frank Paul (1851-1941), described as a man of ‘high ideal, integrity and singleness of purpose’, was a skilled craftsman, and a courageous and enterprising surgeon who made substantial, original and fundamental contributions to surgical practice. A champion of Lister’s principles of antisepsis, he strove to reduce the risk of fatal infections. His colleague, William Thelwall, performed the first emergency appendicectomy on a kitchen table in Anfield, but Paul, using strict antisepsis, was the first to operate on a case of acute appendicitis with more encouraging results. Paul’s most significant contribution was the development of a two-stage procedure for the treatment of cancer of the colon and rectum, which dramatically reduced the mortality associated with peritonitis. His classical paper published in 1895 described his technique of extra-peritoneal resection and the creation of an inguinal colostomy. Using the glass rod, which bears his name, he kept the exteriorised loop of intestine lying on the skin surface for two days before dividing it to allow emptying of the proximal bowel enabling subsequent closure of the colostomy.34

In 1909, Paul reported the results of a series of radical mastectomies, successful in the management of breast cancer, which remained unchallenged for 40 years. He wrote prolifically; his educational papers describing his failures as well as successes were a model of precision, crisp, lucid and eminently readable. However, Paul never achieved academic recognition in surgery but, in 1888 he was appointed to the Chair of Medical Jurisprudence in the University College of Liverpool.

While his early research interests lay in gastric surgery, Frederick Ronald Edwards (1910-1980) became prominent in both thoracic and cardiac surgery. In 1936 he described infiltration of the splanchnic nerves to provide analgesia for gastric surgery and then in 1939 described the neurogenic origin of peptic ulcer forecasting that total vagotomy and gastro-enterostomy as a drainage procedure would replace partial or total gastrectomy in the treatment of this condition. In 1938 he graduated MD. His thesis describing the effects of pneumonectomy in rabbits undoubtedly paved the way for a career in thoracic surgery. When Hugh

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Morriston Davies was invited to establish the North West Thoracic Surgical Centre at Clatterbridge Hospital in 1941, Ronald Edwards was his obvious choice as First Assistant. His meticulous attention to detail and exceptional surgical skill changed thoracic surgical procedures from being unpredictable and hazardous to routine and safe. In his hands, intra-thoracic resection of cancerous tumours of the oesophagus became routine procedures with low morbidity and mortality. He also knew, instinctively, when heroic surgery was inappropriate.

In cardiac surgery his major contributions were in the management of congenital heart disease. In 1948 he was the first to tie off a Patent Ductus, the abnormal communication between the pulmonary artery and the aorta, and then in 1960 with the help of John Hay, Professor of Paediatrics, and the anaesthetists Jackson Rees and Alan Stead he launched open-heart surgery for the treatment of major congenital cardiac disorders at the Royal Liverpool Children’s Hospital, Myrtle Street. He maintained his involvement in adult cardiothoracic surgery, returning to this full time in the early 1970s. In this period he introduced surgical removal of the thymus gland as the ultimate form of immunosuppressive therapy for myasthenia gravis. In this pioneering work he established close collaboration with Andrew Wilson, Professor of Pharmacology, and David Roberts, Senior Lecturer in Physiology. This team, of which I was proud to be a member, made major contributions to the understanding of the aetiology and therapeutic management of this debilitating condition of progressive muscle weakness.35

**Anaesthesia**

In 1831 Chloric Ether, a sweet smelling, aromatic liquid, was produced from the distillation of alcohol with chlorinated lime by Samuel Guthrie, a surgeon in the American Army. Richard Formby (1795-1865), a physician at the Infirmary and a founder of the Liverpool Medical School, returned from a visit to America in 1836 with a sample of this liquid and then used it with apparent success in the treatment of hysteria. What he described as a ‘grateful and diffusible stimulant’ rapidly became popular among local physicians for the treatment of a variety of ‘nervous’ disorders.

Encouraged by this, Dr Formby persuaded Dr Brett, then principal chemist of Apothecaries Hall, Liverpool, to prepare this liquid. After extensive experimentation Brett produced an ‘impure spirituous solution of variable strength’, often malodorous and therefore not ideal. Late in 1839, David Waldie, a native of Linlithgow and a student contemporary

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35 Personal communication.
of James Young Simpson at the Royal College of Surgeons of Edinburgh, abandoned his medical practice in Linlithgow to pursue a career as a chemist at Liverpool’s Apothecaries’ Hall. On succeeding Dr Brett as senior chemist, Waldie perfected a method for separating and purifying this impure liquid to obtain the active constituent. He washed it thoroughly before dissolving it in a small quantity of pure spirit to produce a stable liquid of uniform strength and quality which he named chloroform. Most of the physicians who used Waldie’s chloroform found it ‘agreeable and beneficial’. In particular, Dr Imlach enthused about its rapid effect in the treatment of severe, painful neuralgia.

Unfortunately, further experimental work was hampered by a disastrous fire in his laboratories on 17 July 1846 which destroyed his apparatus and base chemicals. In particular, it delayed his discovery of its anaesthetic properties. However, undaunted by this, Waldie continued to prepare the pure chloroform in a make-shift laboratory in the attic of 87 Bold Street, the residence of his friend, John Abraham, co-founder of the pharmaceutical company, Clay and Abraham. Letters subsequently written by Waldie to the Abraham family described how both he and John Abraham had confirmed the anaesthetic properties of chloroform by self-administration of the chemical.

As the son-in-law of a Liverpool Shipping Agent, James Young Simpson, Professor of Surgery, Midwifery and Gynaecology in Edinburgh, was a frequent visitor to Liverpool and regularly attended meetings of the Liverpool Literary and Philosophical Society where he undoubtedly became aware of Dr Brett’s work. When he met Waldie in Edinburgh in October 1847 they discussed the potential properties of chloroform and most probably the method of preparation. Waldie offered to provide a sample but, before he could prepare one, Simpson had obtained some from a local source in Edinburgh, most probably the pharmaceutical company, Duncan and Flockhart. Simpson, a keen experimenter with volatile substances in his search for a suitable anaesthetic agent, and three of his junior colleagues inhaled chloroform after dinner at his home, 4 Queen Street, Edinburgh, on 10 November 1847. Introduction to his clinical practice was almost immediate.  

Despite an early interest in sulphuric ether and the availability of purified chloroform, Liverpool surgeons were slow to accept general anaesthesia. An attitude of caution and extreme conservatism punctuated

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by controversy surrounding the relative merits of chloroform versus ether or vice-versa continued into the 20\textsuperscript{th} century.\textsuperscript{37}

In 1904, Robert Jones, who eschewed general anaesthesia, tried, unsuccessfully, to promote ‘spinal cocainisation’, the technique of spinal injection popular in America. Robert Kelly, Professor of Surgery from 1922-39 was another sceptic. Following a visit to America in 1912 he promoted intra-tracheal insufflation of ether using apparatus of his own design which he considered to be superior to that used in America. This was however not popular.\textsuperscript{38}

Robert James Minnitt (1889-1974), a GP with a significant anaesthetic practice, made a major contribution to the evolving world of anaesthesia. In 1933 he pioneered relief of pain in labour by designing a simple ‘gas and air’ machine which delivered a pre-determined, safe mixture of nitrous oxide in oxygen for women to use for the self-administration of analgesia during labour.\textsuperscript{39}

Earlier, in 1925, Minnitt had graduated MD with a scholarly dissertation on the ‘Circulatory changes associated with the toxic symptoms during and after ether anaesthesia and their treatment’. This was, in fact, the first evidence of the ‘stress response’, a significant metabolic disturbance with vomiting and high blood sugar which is a common consequence of surgical trauma. Subsequently, he demonstrated that the administration of insulin was beneficial in both the treatment and prevention of this condition.\textsuperscript{40}

Minnitt actively promoted anaesthesia as an academic subject. A founder member of the Liverpool Society of Anaesthetists in 1930, he was elected as its first Honorary Secretary, an office which he held for many years producing extensive and informative hand-scrip ted Minutes. In 1932 he became Honorary Lecturer in Anaesthesia in the University of Liverpool and in January 1943 was selected to represent the Association of Anaesthetists of Great Britain and Ireland in discussions with the William Goodenough Committee investigating the possible effects that the proposed reorganisation of Medical Schools would have on the teaching of medicine and anaesthesia in particular. His proposal that every Medical School should have an academic department of anaesthesia with a full-time head was readily accepted and, in Liverpool, resulted in the immediate appointment of T. Cecil Gray as demonstrator

\textsuperscript{40} R.J.Minnitt, ‘Some toxic conditions following ether anaesthesia’, \textit{Lancet}, ii (1925), 761.
in anaesthesia and in 1947 as Reader of the newly established Academic
Department of Anaesthesia of Liverpool University.

John Blease (1906-1985), a remarkable man, erstwhile butcher’s
boy, lorry driver, market gardener, mechanical engineer, motor bicycle
enthusiast, inventor, dentist and sometime anaesthetist, deserves
recognition as one of the great pioneers of modern anaesthetic practice.
Following a brief chat across the garden fence with his neighbour Dr
Roberts, a local GP with a large practice in dental anaesthesia, Blease
developed the Roberts’ Dental Anaesthetic Machine. Manually controlled
concentrations of both oxygen and the weak anaesthetic and analgesic
nitrous oxide were bubbled through water before delivery to the patient
through a small nasal mask. To understand the exact requirements of
dental anaesthesia, Blease frequently accompanied both Roberts and John
Halton, another local GP anaesthetist, to dental surgeries. Following Dr
Roberts’ premature death Blease inherited a substantial dental anaesthetic
practice which he conducted safely and with acclaim.

His introduction to anaesthesia in general surgical practice by John
Halton led to the development of the compact, fully portable, Alfa Blease
anaesthetic machine. This apparatus incorporated several unique features:
3-inch rotameters, a simple bypass arrangement to augment oxygen
delivery when necessary, and small one-way rubber valves attached at the
end of corrugated tubing through which the flow of gases was directed
around a circle system with a minimal dead-space. A small carbon
dioxide absorber was attached to remove exhaust gas. When not in use
the machine was stored in a compact box. The oxygen and nitrous oxide
cylinders were small and detachable and the stand to which they were
attached during use was collapsible.

Frequently present with John Halton at thoracic surgical sessions,
Blease observed the mechanics of pulmonary function and the
accompanying clinical and physiological changes during one-lung
anaesthesia, a pre-requisite of thoracic surgery. These observations
resulted in the development of a large, cumbersome mechanical
ventilator, the Blease Pulmoflator, of which numerous versions were
produced. The original prototype operated on the ‘bag and bottle’
principle with the driving air delivered by an electrical rotary vacuum
pump. Adjustable spring-loaded valves controlled the pressure so that the
requisite respiratory pattern, rate and tidal volume was delivered safely
and consistently.

Despite no medical qualification, Jack Blease’s skills as an
anaesthetist had become so widely acknowledged that he was recruited
for emergency cover at Birkenhead General Hospital during the long
night blitzes of World War II, while trained anaesthetists were dealing
with the seriously wounded. His identity badge declaring him to be an
‘Emergency Anaesthetist’ remained one of his proudest possessions. The other was a letter which he had received from Hugh Morriston Davies, imploring him to anaesthetise for an extremely difficult thoracic surgical procedure during John Halton’s absence. The procedure was uneventful and the patient recovered fully.

As the advent of curare-induced respiratory paralysis increased the demand for mechanical ventilators, Blease moved to London where he developed what was to become a very successful Anaesthetic Equipment Manufacturing Company, still at the forefront of anaesthetic development.41

Joseph Esplen, a mechanical engineer who subsequently studied medicine, became a consultant anaesthetist to the original Fazackerly (Infectious Diseases) and Aintree (Chest) Hospitals where he designed two mechanical ventilators, each for a specific purpose with their particular use reflected in their names. The ‘Fazackerly’ ventilator was designed for use in the respiratory support of tetanus cases in whom curare-induced paralysis became routine treatment and later, for poliomyelitis victims, while the ‘Aintree’ was designed for use in one lung ventilation during thoracic surgery.42

Thomas Cecil Gray (1913-2008), a native of the city, graduated in medicine from the University of Liverpool in 1937. After a short period as a trainee in General Practice, he bought a practice in Wallasey in 1939. There he rapidly became fascinated by the practice of anaesthesia, at that time undertaken on a very part-time basis in the local hospitals by a group of GPs. Dr Minnitt took him under his wing and prepared him for the Diploma in Anaesthetics which he obtained in 1941, after which he soon became a full-time anaesthetist covering several Liverpool hospitals. He was appointed as a demonstrator in anaesthesia in Liverpool University in 1943. At this point, Cecil Gray and John Halton developed an interest in drug-induced neuromuscular blockade.

The paralysing properties of the South American Indian poison, Wourali, had been described in the 16th century by Sir Walter Raleigh. It was first used medicinally in Liverpool in 1845 by the physician Sir Arnold Knight for the treatment of tetanus and hydrophobia. Knight had probably obtained the Wourali from Charles Waterton of Walton Hall, Wakefield, who had returned from his ‘Wanderings’ in the wilds of Demerara with a distillate of Chondodendrum Tomentosum (curare), traditionally stored by the South Americans in a bamboo tube.

In 1935 Harold King isolated the active constituent of this distillate while working in the laboratory of the distinguished neurophysiologist Sir

41 Personal communication in 1982/83.
42 Personal communication in 1969.
Henry Dale, naming the chemical structure d-tubocurarine. It was initially manufactured in the United States and marketed as Intocostrin and was first used in clinical anaesthesia in Montreal by Drs Harold Griffith and Enid Johnson in January 1942.

John Halton, the North West Area RAF Medical Officer during World War II, frequently visited the USAAF base at Burtonwood, socialising with the personnel, and arranged for a sample of Intocostrin to be flown to the base for his use. He used it as an adjuvant to barbiturates in several patients undergoing major thoracic surgery during November 1944, finding it interesting but far from ideal. In solution it was unstable and the potency was unreliable. Cecil Gray then persuaded the physiologist, Dr Ronald Gregory, to provide some of the crystalline extract of d-tubocurarine, prepared by Burroughs-Wellcome, which was being used in animal experiments in the Department of Physiology. Halton and Gray found that this preparation of dry powder, which had to be sterilised before dissolving in water, was of constant potency, providing reliable muscle relaxation during light planes of anaesthesia. So began the pioneering work which led to the presentation by Drs Gray and Halton of ‘A Milestone in Anaesthesia – d-tubocurarine’ to the Section of Anaesthesia of the Royal Society of Medicine on 1 March 1946. They stressed that adequate ventilation and oxygenation were essential for the safety of the technique and delivered the message that ‘The road lies open before us and, with a grave and insistent warning to the inexperienced that we are dealing with one of the most potent poisons known, we venture to say that we have passed yet another milestone, and the distance to our goal is considerably shortened’. The basic principles of this pioneering work, a triad of hypnosis, muscle relaxation and reflex depression with controlled ventilation of nitrous oxide and oxygen, has survived with modification, nationally and internationally, to this day.43

Cecil Gray made a major contribution to national and international anaesthesia. On his appointment as Reader and head of the new Academic Department of Anaesthesia in 1947, he was acutely aware of the imminent changes in the practice of medicine and, in particular, anaesthesia which would inevitably follow the establishment of the new National Health Service. As there was an obvious need for the specialty of anaesthesia to develop an examination structure similar to the Medical and Surgical Royal Colleges, he considered that formal postgraduate education in anaesthesia was essential. Negotiations with the Dean of the Liverpool Medical School and the Board of Clinical Studies culminated

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in enrolment for the very first Post-graduate Course in Anaesthesia in October 1948. Most of the surgeons tacitly agreed to the presence of trainees in their operating theatres for practical training. The following year the proposal for a full-time course received official recognition by the Regional Hospital Authority empowering the Academic Department to select junior staff for employment in the hospitals of the Region. It was agreed that all trainees would be free to attend course lectures until 11.00 daily including Saturday. All participants were required to have had previous anaesthetic experience. This course, the very first in the country, proved extremely popular and by 1952 had expanded its horizons with the recruitment of students from Singapore, Malaysia, Hong Kong, South Africa and Australia. Financed by their own governments these doctors held supernumerary roles in hospitals throughout the region, providing an enthusiastic, reliable and valuable service. Many honours, national and international were bestowed upon Professor Gray.

Gordon Jackson Rees (1918-2001) became another Liverpool pioneer of international acclaim. Soon after joining the Department of Anaesthesia as a demonstrator, in 1948 Jackson was delegated, in response to a plea from the paediatric surgeon Isabelle Forshaw, to develop techniques of anaesthesia for paediatric and, in particular, neonatal surgery. He rapidly established that the technique of intravenous induction with a hypnotic agent, muscle relaxation and hyperventilation with nitrous oxide in oxygen perfected for adults by Gray and Halton could be readily adapted for even the tiniest baby using a specially designed bag which acted as an open-ended reservoir for the gas mixture. This bag was then gently squeezed to maintain respiration. To hold the bag to create an expiratory valve while controlling the inflation pressure was a feat of manual dexterity.

In the late 1950s under Jackson Rees’s guidance, two enterprising young registrars, Frank Wilson and Ian Nisbet, initiated Paediatric Intensive Care, adapting the intra-operative technique of manual ventilation for the respiratory support of critically ill babies in both the Neonatal Surgical Unit and Medical Wards. They recruited nurses and medical students to a 24-hour rota to ventilate manually these children using the Jackson Rees T-piece system. Their work, published in the British Journal of Anaesthesia in 1958, confirmed Dr Rees’s belief that prolonged positive pressure ventilation was well tolerated by infants. Further astute observation by Dr Rees proved that positive end-expiratory pressure was not only well tolerated but also positively beneficial for sick children with abnormal lungs.44

Finally, a more recent Liverpool first in anaesthesia was the appointment of Ronald S. Jones to the newly established Chair of Veterinary Anaesthesia in Liverpool in 1989. In this role he played a major role in the advancement in anaesthesia for both humans and animals.

**Conclusion**

Over three centuries members of the medical profession of Liverpool have made major contributions to the diagnosis and treatment of disease, the well-being of their fellow men, and the spread of medical knowledge both at home and overseas.