History of Medicine

The Jewish contribution to medicine

Part II. The 19th and 20th centuries

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Summary

Despite the opening of German universities to Jews in the 1860s, they were restricted to fields not attractive to their gentile colleagues, e.g. the basic sciences, dermatology, psychiatry, neurology, paediatrics and venereology. They pioneered these specialties when the latter were still in their infancies and made fundamental discoveries. This brilliant period of Jewish medicine in Germany included the renowned immunologists Ehrlich and Wassermann and neurologists Romberg and Freud. Eminent workers from France were Metchnikoff, who discovered phagocytosis, Haffkine for his plague vaccine and Widal, who discovered bacterial agglutination. Chain, the biochemist, shared the Nobel Prize for medicine for his part in the discovery of penicillin in England.

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This era saw Jewish involvement in medicine rise to great heights with two peaks of achievement — a German one over the latter half of the 19th century and an American one after the 1930s, both associated with medical discovery.

The German era

This was the more spectacular with a burst of brilliance as if to compensate for the enforced restrictions of centuries. German and Austrian universities were opened to Jews in the 1860s but the great number who entered created a 'problem' for the German medical profession. This was noted by William Osler[1] on a visit and prompted a letter to the *Canadian Surgical Journal* in 1884. 'The modern "hep, hep, hep" [*Hierosolyma est perdita* 'Jerusalem is destroyed', a toast used by the Crusaders after the fall of Jerusalem] shrieked in Berlin for some years has by no means died out to judge of the papers devoted to the Jewish question . . . . Should another Moses arise and preach a Semitic Exodus from Germany . . . there is not a profession that would suffer the serious loss of its most brilliant ornaments than our own . . .. The number of professors and docents of Hebrew extraction in the German Medical Faculties is very great and I know their positions have been won by hard and honourable work. I fear . . . that the present agitation will help to make the attainment of university professorships additionally difficult.'[1]

While the German universities were open to Jews, the inner corridors of power were closed to them, e.g. the established specialties of internal medicine and surgery. They had to enter fields not attractive to their gentile colleagues, such as the basic sciences, e.g. anatomy, histology, physiology, pathology and bacteriology. On the clinical side they entered the relatively new fields of dermatology, psychiatry, neurology and venereology.

The personalities of this and subsequent sections are limited to those who made fundamental discoveries.

German basic scientists

Friedrich Gustav Jakob Henle (1809 - 1885) was one of the greatest anatomists and histologists of all time, particularly in respect of his research into epithelial structures. More than a dozen eponyms are attributed to him, e.g. the loops of Henle in the kidney. He held professorships at Gottingen and other universities and wrote three textbooks of anatomy. His parents renounced Judaism when he was a child.

Gabriel Gustav Valentin (1810 - 1883) was one of the most brilliant experimental physiologists of that era and was a pupil of Johannes Evangelista von Purkinje (1787-1869) at Breslau and a founder in his field. His particular contribution was the discovery of the function of ciliary epithelium for which the Academy of Sciences of France awarded him a gold medal. Refusing offers of academic appointment in Germany provided he was baptised, Valentin accepted a professorship at Berne where his wide-ranging research included the discovery of the accelerator effect of sympathetic stimulation on the heart and its constrictor effect on blood vessels and lymphatics.

Robert Remak (1815 - 1865) was Polish born but Berlin qualified. Under the influence of his teacher, Johannes Müller, as a student he discovered the microscopic structures of the nervous system, e.g. the axis cylinder and the non-medullated fibres (Remak's fibres) as also the structure and function of the autonomic nervous system. As an embryologist he formulated the concept of ectoderm, mesoderm and endoderm. All his postgraduate research work was done in private practice since religious prejudice prevented him from receiving an academic appointment until 6 years before his death.

Ludwig Traube (1818 - 1876) was a graduate of Breslau. Influenced by von Purkinje, Müller, Skoda, von Rokitansky and Virchow, he became an outstanding experimental pathologist. One of the few Jews to receive an early academic appointment he reached full professorship in Berlin in 1872. He is particularly known for his description of pulsus alternans, the relationship of renal and cardiac disease and work on fever.

Moritz Schiff (1823 - 1896), the German-born founder of experimental physiology, was denied academic appointment there because of his liberal views, but he held professorships in Switzerland and Italy and was known particularly for his work in endocrinology where his classic experiment of inducing myxoedema in a dog by removing the thyroid gland led to an understanding of the function of that organ.

Leopold Auerbach (1828 - 1897) performed basic research on the nervous system, and that of the intestines bears his name — Auerbach's plexus. This research was done while in

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Ferdinand Julius Cohn (1828 - 1898) was denied higher medical study as a Jew and so he became a professor of botany at Breslau with an interest in lower plant life and bacteria. He predicted in an 1873 treatise that bacteria caused disease before Pasteur proved this to be so. He further promoted the science of bacteriology, of which he could be considered the founder, by publishing in his private botanical journal in 1876 the discovery by Robert Koch, then an unknown country practitioner, of the role of spore formation in disease transmission — for example anthrax in animals. This journal also published Koch's work on wound sepsis, the staphylococcus and the first photographs of bacteria.

Julius Friedrich Cohnheim (1839 - 1884) was a pathologist and protégé of Virchow. He held a professorship in Berlin and revolutionised current thinking on inflammation by discovering the role white blood cells play in this process. He paved the way for Koch's discovery of the tubercle bacillus by causing the disease in a rabbit's eye by implanting autopsy material.

Paul Ehrlich (1854 - 1915) was the greatest of the German basic scientists and pioneered several fields. As an immunologist he evolved the famous side-chain theory of antibody formation and defence mechanism in infection. His haematological studies included the classification of the leucocytes and he established that leucocytes originated in the bone marrow. As a bacteriologist he played an important role in the discovery of the tubercle bacillus by Koch by staining it with acid fuchsin and so demonstrating that it was acid-fast. Ehrlich's greatest discovery was in chemotherapy; he developed '606', an organic arsenical, for treating syphilis; this was the first effective chemical compound against an infection and the greatest treatment advance at that time. The world had to wait 50 years for the next chemotherapeutic agent, the sulphonamides. Ehrlich shared with Elie Metchnikoff the Nobel Prize in 1908 for medicine and physiology in recognition of his work in immunology.

August Paul von Wassermann (1866 - 1925), a fellow worker with Ehrlich at Koch's Institute, acknowledged that without the side-chain theory he could not have devised the blood test for syphilis in 1906. Along with Jewish co-worker Albert Neisser he also discovered the gonococcus in 1879. Despite his enoblement in 1913, Wassermann retained his link with Judaism all his life. With the American Reuben Leon Kahn devising an easier serological test for syphilis in 1927, one can say that only name of rank in the history of venereology who was not a Jew was Fritz Richard Schaudinn (1871 -1906), who discovered the spirochaete in 1905.

Alfred Fröhlich (1871 - 1953) was a pharmacologist at Vienna and held professorial status from 1912 to 1939, when he fled to the USA because of the Nazi take-over of Austria. He described the syndrome that bears his name (adiposogenital dystrophy due to a hypothalamic-pituitary disorder). This contributed to our knowledge of the pathways of visceral pain. With Lothar von Frankl-Hochwart (1862 - 1915) Fröhlich's work on the rabbit led to the use of posterior-lobe pituitary extract in childbirth.

Otto Loewi (1873 - 1961) was Professor of Pharmacology at Graz and was co-winner with Sir Henry Hallett Dale of the Nobel prize in 1936 for physiology and medicine for their work on the chemical transmission of nerve impulses, notably acetylcholine. Arrested by the Austrian Nazis in 1938 and imprisoned for 2 months, Loewi was allowed to leave after he had been deprived of all his possessions. He later obtained posts at Oxford University and in the USA.

Otto Heinrich Warburg (1883 - 1970), a biochemist, was for 30 years the director of the Kaizer Wilhelm Institute for Cell Physiology in Berlin. He was awarded the Nobel prize for medicine and physiology in 1931 for his research on the chemistry of respiration and on enzymes. His parents had accepted baptism and Warburg was the only Jewish physician of rank left undisturbed in his post by the Nazis.

Otto Fritz Meyerhof (1884 - 1951) was head of the Department of Physiology at the Institute of Medical Research at Heidelberg. He shared the Nobel prize for medicine and physiology in 1923 with Archibald Vivian Hill of Cambridge University for their independent discoveries on the metabolism of muscles. The study of enzymes and the metabolic process of cells were his main interests and he continued this work as a refugee from Nazi Germany in Paris in 1938 and in the USA from 1940.

German clinicians

Dermatology

Jews dominated this field, which German gentile colleagues referred to as *Judenhaut*.

Ferdinand von Hebra (1816 - 1880) was trained in Vienna and he made the city the centre of a new era of dermatology basing the science for the first time on histological grounds. He described several new skin diseases, e.g. erythema multiforme and dermatitis exfoliativa, and published a monumental skin atlas. His son-in-law, Moritz Kaposi, born Kohn (1837 - 1902), described the skin sarcoma which bears his name.

Paul Gerson Unna (1850 - 1929) was von Hebra's counterpart in Germany and the leading dermatologist of his day. He wrote several textbooks, and one on histopathology was translated into English. Despite being seriously wounded as a student Prussian soldier in the 1870 war with France, he was not accorded academic recognition until shortly before his death.

Otology

This was another field pioneered by German Jews.

Adam Politzer (1835 - 1920), a Hungarian Jew, was the first professor of otology at the University of Vienna. As a student he discovered the nerve supply of the intrinsic muscles of the ear and the variations in air pressure on the tympanic cavity. He devised an instrument for correcting the imbalance of air pressure between the inner ear and the atmosphere. Politzer's textbook on diseases of the ear ran to 5 editions between 1878 and 1908.

Robert Bárány (1887 - 1936) was another famous Viennese whose great contribution was in the investigation of disease in the labyrinth by the Bárány caloric test using the hot and cold water irrigation method, and the chair test based on counter rotation of the orbit. He was the first to operate on otosclerosis. While serving with the Austrian forces, Bárány was captured by the Russians in 1915 but was released when it became known that he had won the Nobel Prize for medicine in 1914 for his work on vestibular function. Anti-Jewish feeling prevented his appointment as a full professor at Vienna, but he accepted a chair at Uppsala in 1917. Sweden bestowed several honours on him, including Commander of the Northern Star, First Class, in 1927. The Nazi era brought him back to Judaism. He bequeathed his valuable library to the National Hospital in Jerusalem.

Paediatrics

This branch of medicine has been considered to be in large measure the creation of German Jews such as Heinrich Finkelstein (1865 - 1942), who made basic discoveries in infant feeding, Alois Epstein (1849 - 1918), the founder of the world-renowned Foundling Hospital in Prague that paid particular attention to the prevention of infection, and Kurt Huldchinsky

(b. 1883), who in 1919 first published a paper on the use of artifical sunlight (ultraviolet irradiation) to cure rickets, then very prevalent in Berlin.

Edouard Heinrich Henoch (1820 - 1910) was a professor at the age of 40 years and head of the paediatric clinic at the Charité Hospital in Berlin. He is best known for his original description of non-thrombocytopenic purpura, sharing the eponym Henoch-Schönlein purpura with his departmental head at the time (Johann Lukas Schönlein, 1793 - 1864). Regarded as the leading paediatrician of Germany in his day, the title *Geheimrat* was bestowed on him.

Adolf Baginsky (1843 - 1918) is regarded as the founder of modern paediatrics. An associate professor in 1892 at the University of Berlin, he introduced a community health approach to the promotion of child welfare and the role of milk in child nutrition. He was the founder and editor of a paediatric journal and the writer of a textbook of paediatrics translated into several languages. He remained an active member of the Jewish community in Berlin.

Neurology

There were two prominent Jewish physicians in this field.

Moritz Heinrich Romberg (1795 - 1873), an uncle of Edouard Henoch, is regarded as the founder of modern neurology and compiler of the first classification of nervous diseases. He originally described Romberg's sign and his handbook on nervous diseases was translated into English. He became a professor of medicine in Berlin.

Sigmund Freud (1856 - 1939) was a professor of medicine in Vienna, a general physician, and the founder of psychoanalysis. His theories on the dynamic subconscious have had a profound effect on every branch of intellectual life, philosophy, art and music and have provided insights into primitive mentality in the field of anthropology. Jewish associates of the Viennese school were **Joseph Breuer** (1834 - 1918), known for using hypnosis for the treatment of hysterical symptoms and for the Hering-Breuer reflex in respiration, and **Alfred Adler** (1870 - 1937), who stressed the inferiority complex as a cause of neuroses.

Hermann Zondek (1887 - 1979) and **Bernhard Zondek** (1891 - 1966)[2] were two brothers who left Berlin for Palestine in 1934 because of the rise of Nazism. Hermann had held a professorship in medicine at the University of Berlin from 1921 to 1933 and pioneered the physiopathology of endocrine disorders, particularly the thyroid and its relation to the pituitary gland in dysfunction. Bernhard was an associate professor in gynaecology in Berlin. A researcher into hormones, he developed — with **Selmar Ascheim** (b. 1878) — in 1927 the first pregnancy test of its kind: injecting urine from the patient into an immature mouse. If the woman was pregnant the ovaries of the mouse enlarged and showed follicular maturation.

France

Jewish contributions to medicine in France in the 19th and 20th centuries took place in the contemporary aura of Louis Pasteur (1822 - 1895), who discovered that germs cause disease.

Georges Hayem[3] (1841 - 1933) had a brilliant student career and was a gold medallist of the Paris Academy of Medicine. He held a professorship in medicine in Paris at the age of 45 years, which was unusual at that time. He established haematology as a clinical entity and is regarded as its founder. He investigated the red cell, created the idea of the colour index, discovered platelets and demonstrated their role in coagulation. He published the first textbook on haematology and made the first classification of the anaemias and the haemorrhagic diseases. His preparation — 'Hayem's fluid' — for the preservation of red cells in counting is still in use.

Elie Metchnikoff (1845 - 1916) is considered to be one of the world's great biologists. He spent the last years of his career under Pasteur at the Institute Pasteur in Paris. Russian born and trained, Metchnikoff investigated responses to infection and made the momentous discovery of phagocytosis — that white blood cells devour germs. This discovery was made at his home laboratory in Sicily while he was out of work in 1884; he used the transparent larvae of the starfish, which he had fed with inert pigmented material, and observed their ingestion. He shared the Nobel Prize for medicine and physiology in 1908 with Paul Ehrlich.

Waldemar Mordecai Wolff Haffkine (1860 - 1930), a bacteriologist, immunologist and Talmudic scholar, was also on Pasteur's staff in Paris. He developed the first successful inoculation against cholera, which was in use for many years as 'Haffkine's prophylactic'. In 1893 Haffkine investigated a plague outbreak in India at personal risk and reduced the mortality rate by over 80%. The bacteriology laboratory in Bombay was named the Haffkine Institute in recognition of his services. He bequeathed his entire fortune of about 750 thousand dollars to the *yeshivas* of Eastern Europe.

Georges Fernand Isidor Widal (1862 - 1929) was a professor of medicine and pathology in the Paris Faculty at the age of 32 years. He is known for his discovery of bacterial agglutination (1895) and its application to typhoid fever (Widal test, 1896). His other extensive investigations included haemolytic anaemia (Hayem-Widal type).

Switzerland

Tadeus Reichstein (b. 1897), a Polish-born organic chemist, held professorships at Zurich and Basle. In 1933 he synthesised ascorbic acid (vitamin C), the first total synthesis of a vitamin. His isolation of cortisone and cortisol from the adrenal cortex and his study of their structure and biological effects gained him the Nobel prize for medicine and physiology in 1950, together with E. C. Kendall and P. S. Hench.

England

Casimir Funk (1884 - 1967) was a Polish-born biochemist who worked at the Lister Institute in London. He discovered vitamins while investigating beri-beri, which was a problem in Britain's Far East colonies, in 1911. Funk proved that the disease was caused by the lack of a factor, thiamine (vitamin B_1), which was removed with the husks when rice, the staple diet, was refined. Since it was an amine and essential to life, he called it a 'vitamine'; the term was later shortened to 'vitamin'. In his report he postulated that scurvy, rickets and pellagra were also vitamin deficiencies. The proof of the latter came in remarkable circumstances from a co-religionist, Goldberger, who was also an immigrant to his country.

Joseph Goldberger (1874 - 1929)[4] emigrated from Hungary to the USA as a child and later became a research worker in the Public Health Service. Working on yellow and typhus fevers in the southern USA, he contracted both diseases and narrowly escaped death. For two centuries pellagra had been a major cause of death in the southern parts of Europe and the Americas and it was believed to be an infectious disease. In view of Goldberger's success in infectious disease research he was chosen to investigate pellagra. In a series of lengthy investigations in orphanages and prisons he established a dietary factor in dried yeast that prevented pellagra. He named this the P-P (pellagra preventing) factor. In 1929 the factor was designated vitamin G as a tribute to Goldberger, who died

that year, but subsequent work identified it as nicotinamide, part of the vitamin B complex.

Sir Hans Adolf Krebs (b. 1900) was a German-born refugee from Nazism who became Professor of Biochemistry at Oxford University. He shared the Nobel prize for medicine and physiology in 1953 with **Fritz Albert Lipmann** (b. 1899), who had been a research worker at the Kaiser Wilhelm Institute in Berlin and was also a refugee from the Nazis; he held professorships at Harvard and the Rockefeller Institute. Krebs discovered the tricarboxylic acid cycle (Krebs cycle), a process by which foodstuffs are converted in the living cell to carbon dioxide, water and energy. He was knighted in 1958. Lipmann's share in the Nobel prize was for his discovery of co-enzyme A and its role in the Krebs cycle.

Sir Ernst Boris Chain (1906-1979) shared the Nobel prize for medicine in 1945 with Sir Alexander Fleming (1881-1955), a bacteriologist at St Mary's Hospital, London, and Sir Howard Walter Florey (b. 1898), a professor of pathology at Oxford University. They evolved penicillin, the first antibacterial substance and an antibiotic still freely used today. Its evolution took 16 years from Fleming's initial observation in 1928 that a *Penicillium* mould contaminating a culture plate of *Staphylococcus* liquified the colonies. Sensing that an extract of the mould could be used in treatment, Fleming attempted to prepare an effective extract but failed and gave up in 1932. Fortunately in 1929 he had published his findings — as a laboratory curiosity — in the *British Journal of Experimental Pathology*. This article was noticed in 1938 by Chain,[5] who was a Ph.D. graduate in biochemistry from Berlin and a refugee from Nazi Germany then working in Florey's department at Oxford. Chain was given the task of investigating possible antibacterial substances of microbial origin. Obtaining the original *Penicillium* strain from Fleming, the Oxford team were able to prepare a crude extract that protected mice against pneumonia but they could not adequately purify the extract for use in man since the usual methods of extraction inactivated the penicillin. After 3 years of work under difficult war-time conditions, Chain succeeded using a chromatographic process to purify penicillin; this was proved to be effective clinically. Fleming, Florey and Chain received knighthoods.

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