The famous microbiologists associated with Wrocław (Breslau).

Anna Przondo – Mordarska.

The University of Wrocław, (formerly Breslau), was the place where famous microbiologists worked. Professor Anna Przondo-Mordarska, also Professor of Microbiology at this University, reports here the achievements and some personal traits of these famous scientists who paved the way for current progress in Medicine.

Richard Friedrich Johannes Pfeiffer (1858-1945)

Richard Pfeiffer was born in March 1958 in Zduny, in the Posen province of Poland.
He studied medicine at the Royal Friedrich-Wilhelm Institute of Medicine and Surgery in Berlin.

Shortly after graduation, Pfeiffer had to fight the epidemics of typhus as an army medical officer and learned the laboratory techniques of bacteriological research. As an outstanding scientist, he was sent to Berlin to the famous Robert Koch laboratory where he worked in a team with Ehrlich, Behring, Loeffler and others. Owing to his professional abilities and personality, he was quickly promoted to the position of director of the scientific division of the Institute of Infectious Diseases.

Pfeiffer's ties with Wrocław date back to 1909 when he became a University professor and Director of the Institute of Hygiene and Bacteriology in Breslau (Wrocław). The pioneering research conducted by Pfeiffer concerned influenza, cholera, typhus, coccidiosis and malaria. Pfeiffer discovered *Haemophilus influenzae,* previously called *Bacillus pfeifferi*. During his work on *Vibrio cholerae* and on its differentiation, he demonstrated the cross-resistance and the possibility of using specific sera in the differentiation of related strains. Pfeiffer's name is associated with the phenomenon of bacterial lysis mediated by complement in the presence of specific antibodies, as well as with endotoxins.

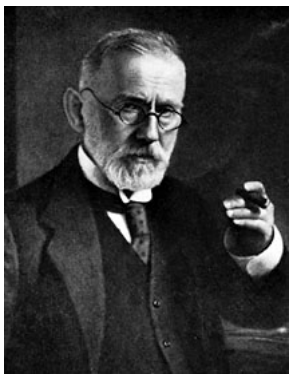
His interest in coccidiosis in rabbits led him to discover the life cycle of the parasites causing the disease. Pfeiffer was the first researcher to suggest that the life cycle of *Plasmodium malariae* might occur outside the human body.

Some of the important character traits of Pfeiffer were his diligence at work, precision and his excellent laboratory skills. In 1889, together with Carl Fraenkel, he wrote the famous *Mikrophotographischer Atlas der Bakterienkunde*.

As a microbiologist and researcher, Pfeiffer gained worldwide recognition and was awarded numerous medals and prestigious positions in scientific organisations.

In 1926, after 17 years of managing the Institute of Hygiene and Bacteriology in Breslau (Wrocław), he retired. He spent the last years of his life in his house in the mountains in Lądek Zdrój. Pfeiffer died in 1945.

The wall of the building which in the old days housed the Institute and Chair of Microbiology bears a plaque which serves as a lasting tribute to our remembrance of Richard Pfeiffer.




<u>Paul Ehrlich</u> (1854-1915)

Paul Ehrlich was born in a small town not far from Breslau (Wrocław). He studied natural science and medicine at the University of Breslau (Wrocław).

During and following his studies, Ehrlich became more and more fascinated with staining of cells and its medical uses. It was that fascination that brought him into contact with Ferdinand Cohn and Julius Conheim, and he met Robert Koch for the first time in Cohn's laboratory.

Ehrlich's new methods of staining cells and tissues and the discovery of mast cells gained him international recognition. He made fundamental contributions to haematology. The next line of Ehrlich's research concerned his investigations of plant poisons and their ability to cause antibody production in mice. He defined the concepts of active and passive immunization. This research naturally led to a collaboration with Emil Behring on a serum therapy against diptheriae. At that particular time Ehrlich published his famous side-chain theory. Beginning in 1904 Ehrlich worked as the director of the Institute of Chemotherapy, the so-called Georg Speyer-Hause. He took up the idea of examining the chemist's arsenal of different compounds in order to find suitable drugs that would have an effect only on the parasites which attacked the human body.

At the same time, Schaudin reported that *Spirocheta pallida* caused syphilis. Ready-made Ehrlich's "compound 606", which was later renamed *Salvarsan* (*i.e.*, arsenic that cures), was tested for relapsing fevers in rats and mice as well as syphilis in rabbits. Sixty-five thousand doses were manufactured for clinical testing. The results were very good both for relapsing fever and new cases of syphilis. Ehrlich received a number of honours and the Nobel Prize in Physiology or Medicine in 1908.

Ferdinand Julius Cohn (1828-1898)

Cohn was a German botanist whose microscopic studies of plant life put him in the same rank as Louis Pasteur and Robert Koch and like them he became a pioneer of Bacteriology. He was born in Breslau (Wrocław) into a Jewish family.

He was a student at the University of Breslau (Wrocław) but he graduated from the University of Berlin. Julius Cohn returned to his home town and in 1850 he began lecturing on the relationship between the world of plants and the history of human culture. At the University of Breslau, F. J. Cohn was Head of the Institute of Plant Physiology.

His main interests focused on the algae, Cyanophyta, as well as on bacteria and fungi. The most important contributions of Ferdinand Cohn to microbiology included a classification system for microorganisms, the discovery of bacterial spores and the correlation between the spores and spontaneous generation. He developed the principles of modern bacterial taxonomy based on the hypothesis that bacteria can be classified and distinguished by specific inheritable features that have been selected during evolution. He studied several properties of bacteria in growth experiments on synthetic media.

This exceptional man was an outstanding academic teacher and speaker and was a highly recognised member of the European scientific community. It is interesting that it was Cohn who appointed Robert Koch to the Imperial Health Office in Berlin where Koch continued his research thereafter.

Apart from the new building of the Institute of Plant Physiology, Wrocław is grateful to Cohn for the creation of the Botanical Museum and the beautiful South Park.

Cohn died in 1898, his renovated tomb can be found in the Jewish cemetery in Wrocław.

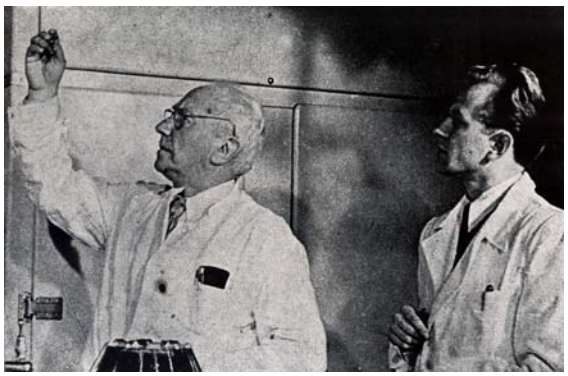
<u>Albert Ludwig Sigesmund Neisser</u> (1855-1916)

When speaking about the famous microbiologists and the history of microbiology in the old Wrocław, one cannot omit Albert Neisser, the great researcher who brought notoriety to Wrocław in the field of dermatology.

He studied medicine in Breslau (Wrocław). In 1882, this extraordinary professor became Head of the Department of Skin and Venereal Diseases. Ten years later, thanks to Neisser's huge involvement, a beautiful new building was erected and the famous research and teaching centre of dermatology opened its doors.

Albert Neisser was as much a theoretician and experimenter as a clinician and therapist. His involvement and research on the aetiology of gonorrhoea, leprosy and tuberculosis as well as on serology in syphilis established his reputation as an excellent scientist. At the same time, research by Koch, Weigert and Ehrlich paved the way for the smear technique and cell staining which was the basis on which Neisser discovered gonococci. The second major discovery by Neisser was the first staining of *Mycobacterium leprae*.

Although it was Fritz Schaudin who discovered the aetiological agent of syphilis, Neisser carried out experiments on animals leading to new knowledge on the duration of incubation and distribution of the pathogen in the body. Another contribution which is associated with Neisser's name is the introduction of the Wasserman reaction to diagnosis in 1906. The link between Albert Neisser and other microbiologists involved not only common work and discoveries but also personal and social relations, particularly with Richard Pfeiffer living and working in Wrocław at that time. Both Pfeiffer and Neisser were outstanding researchers; they had organisational talent and rare intellectual values. They were also musically gifted – Pfeiffer played the piano and Neisser played the violin and they performed concerts together in Neisser's house.



<u>Ludwik Hirszfeld</u> (1884-1954)

The famous Polish serologist, microbiologist and immunologist, Ludwik Hirszfeld began his scientific career in Berlin where in 1907 he completed his doctoral dissertation “Uber Blutagglutination”. In the same year he moved to Heidelberg where he worked at the Institute for Experimental Cancer Research until 1911. During the First World War, Hirszfeld worked as a serological and bacteriological adviser in Serbia where epidemics of typhus and bacillary dysentery broke out. At that time, he discovered the bacillus *Salmonella paratyphi* C, also called *Salmonella hirszfeldi*.

After the war, he returned to Warsaw where he soon became deputy director and scientific head of the National Institute of Hygiene in Warsaw.
In 1941, during the Second World War Hirszfeld was forced to move to the Warsaw ghetto with his wife and daughter. There, he organised anti-epidemic programmes and taught secret medical courses. After two years he and his family fled the ghetto. At that time his daughter died.

After the war in 1945 he took part in the organisation of the Wrocław University and became the director of the Institute for Medical Microbiology of the University of Wrocław and Dean of the Medical Faculty. In Wrocław he founded the Institute of Immunology and Experimental Therapy, affiliated with the Polish Academy of Sciences which was named after him and remains to this day.

He received honorary doctorates from the Universities of Prague and Zurich.

Hirszfeld’s achievements and discoveries were so significant and their scope so wide that the trace which he left cannot be erased.

Hirszfeld, together with Emil von Dungern, established ABO nomenclature and the inheritance of blood groups.

He recognized possible serological conflicts between mother and child which was confirmed by the discovery of the Rh factor. He established the importance of determining the Rh factor and developed a method of saving newborns born with a serological conflict.
Ludwik Hirszfeld died in 1954 in Wrocław.

Hirszfeld was a rare type of scientist, a great humanist who radiated his authority and was an exceptionally gifted teacher. The unique personality of this great scientist and humanist was clearly expressed in his published memoirs:
“A scientist must accept the fact that the buildings he constructs will be inhabited by others.”
“He who wishes to set people on fire must be burning himself.”