Early clinical pathologists 4: Rudolf Virchow (1821-1902)

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It is easy to think of Rudolf Virchow, whose name is memorised by medical students in undergraduate pathology as a rather staid but eminent establishment figure. But this belies his political passions and social conscience which at one time lost him his salary. It is worth following his advice and studying history—"a research tool equal to all other methods of investigative medicine."¹

Born 13 October 1821 at Scheivelbein in Pomerania, son of the town treasurer, Rudolph Ludwig Karl Virchow excelled at school: he learnt Hebrew simply because he loved languages. His examination report was described as monotonous, there being only three terms in it—excellent, very good, and most satisfactory. In the Easter to autumn break before starting medical school he taught himself Italian. He went to the army medical school in Berlin in 1839 where, in addition to medical studies, he attended lectures on logic, psychology, history and Arabic poetry. Just before he arrived, his teacher, Müller, had announced the discovery of the animal cell by Schwann. This was to open many possibilities in the scientific study of disease, and to lead to the refutation by Virchow of the old "humoral" theories of illness.

After he took his degree in 1843 Virchow worked as an assistant, then as prosecutor at the *charité*. He was able to show that cells were not formed from a primitive blastema, as Schwann had thought, but only from other cells: "*Omnis cellula e cellula*." "The begetting of a new cell from a previous cell supplements the reproduction of the individual from another, of the child from the mother. The law of continuity of animal development is therefore identical with the law of heredity." At the age of 25 he ruthlessly demolished Rokitsky's theory of crasis which had developed from the previous humoral principles. "Rokitsky who reaches out beyond the borders of pathologic anatomy without carrying out investigations beyond these borders; who pushes pathologic anatomy out of the firm realm of facts into the insecure world of hypothesis."¹ Rokitsky subsequently withdrew the pathology section from his handbook.

A year later, with his friend Benno Reinhardt, Virchow founded the journal *Archiv Für pathologische Anatomie und für klinische Medizin* (still published), which he later used for argumentative debate with Wunderlich, and which he edited until his death, reading the proofs of every article himself. His introduction to the first issue said "The role of pathological anatomy as a dogmatic science is at an end; for each individual law we must have a

proof, clearly recognised, and carrying personal conviction. But where are the proofs to come from when the entire argument begins with a hypothesis?"—a clear reference to the humoral theory. In these early days Virchow began a study of phlebitis which was to lead to the well known "Virchow's triad." He also formulated the concept of leukaemia—previously unthought of, and usually confused with septicaemia. Around that time he married and had one son and one daughter. He was described as a lover of his family and his household pets, though he cannot have spent much time with them.

Still under 30 years of age Virchow was sent with a commission to investigate an epidemic of famine fever that had begun in 1847 in upper Silesia. The local authorities had done nothing, and in response to press agitation central government had sent the commission. Virchow did not concentrate on the medical aspects when it was clear to him that social factors were the major cause, and his report called for "complete and unrestricted democracy. . . . At least capital and labour power must have equal rights, and living energies must no longer be subordinated to dead capital."²

During the 1848 revolution in Germany, Virchow returned to Berlin and spoke out, demanding reform for the medical profession—professorial appointments made by competitive examination; students to be trained at the State's expense; legal restriction of the working day for manual workers; establishment of a ministry of health; and impecunious workers to be cared for at the State's expense. These outrageous views led to his salary being stopped and the loss of his office, although he was not technically dismissed. He was elected to the National Assembly, but could not take his seat as he was too young.

In 1849 he was appointed to a chair in the university of Würzburg, and with his social aims seemingly at a dead end, he threw his energies into pathology. A journal he had established to campaign for the change of the medical system was closed. He worked to promote the idea of disease not as individual maladies gripping the patient but as physiology contending with obstacles. A disease gives rise to an abnormal stimulus on the cell which responds in one of various ways. These ideas have been the basis on which contemporary pathology has been built and it was his work that compelled pathologists to use microscopes, previously not a tool of the trade. These years in Würzburg were well used, gathering material, developing his theories, and publish-

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ing. During this time he researched tuberculosis, adipocere, the anatomy of the epidermis, congenital hydronephrosis, echinococcus of the liver, and much more. One underlying principle of Virchow's has not continued to flourish: he thought of the body as multiple separate systems living unconnected in community. "The organism is not a unified but a social apparatus." He could not realise the importance of intercellular substances.³

In 1856, at the age of 35, Virchow was appointed professor of pathological anatomy and director of the Pathological Institute in Berlin. He lectured extensively, not only on pathology but on wide ranging problems of science, medicine, and life. He published the *cellularpathologie* in 1858, based on his previous work, a treatise laying the foundations of scientific pathology. He then became known as the father of cellular pathology.

He continued to publish a great deal of work on pathology and taught and examined extensively. His lectures were held in a room in which there was a spiral table 20 inches wide and possibly 150 feet long. Attached to this were tramway bearing trucks on which simple microscopes with specimens were appended. On the blackboard he drew the appearances which the students should be looking for. His exactitude was a challenge in the examination room—the exact tint of a colour, the tilt of a specimen allowing fixative to touch the seal—nervous fumbling while looking for equipment was not treated gently.⁴ In the matter of time, however, he was not exact, and was habitually late, sometimes by two hours for an examination, or missing a lecture altogether.

As indicated above, Virchow's triad was formulated in 1856, and Virchow's "node" (a supraclavicular node containing tumour) was described in 1860. In 1877 he described the first bone cyst and discussed rickets as a nutritional disease, although this issue had already been raised by Broca. He performed extensive obstetrical pathology studies. He entered into a dispute with Koch, stating the potential danger of inoculation treatment and challenging Koch's exclusion of all links between human and bovine tuberculosis. In 1898 he gave the Huxley lecture with the leading idea that, whatever the bacteriological agencies producing disease, the activities of the cells would explain the morbid process.

His researches at this time also involved anthropology and archaeology: he published two books, *Contributions to the Topography of*

Troy (1879) and *Old Trojan Graves and Skulls* (1882), resulting from his involvement in Sehliemann's excavations of Troy and Mycenae. He was able to discuss with expertise horses, literature, history, art and many other subjects. Socially, he was also described as "exact", and "rarely allowed an inexact or random statement inadvertently made in his presence to pass uncorrected."⁴

His eminence (he was now widely recognised as a vital force in medicine's progress) did not afford him a position in the political establishment. He became a left-wing, opposition municipal councillor, and particularly served educational reform and public hygiene. The water and sewage system of Berlin are part of his legacy. In 1865 he was challenged to a duel by Bismarck after he had led the opposition to defeat the government on a motion to create a German navy. He declined.

On his eightieth birthday international homage was paid with a major celebration attended by scientists from Europe, America, and Japan.⁵ His importance was recognised by himself and others, and the man who had the intellectual vigour to change so much in science maintained his independent thinking in all matters. A bibliography of his work was published—46 pages of medical and pathological titles and 65 more of anthropology and ethnology. He himself had previously announced that his primary object was accomplished, that the science of medicine had been placed on a secure foundation, though he declared that it would inevitably have occurred without him. To think that because we learned his name at medical school he must have been immersed only in his research would be to ignore his commitment to social ideals.

On 3 January 1902, aged 81, he impetuously jumped off a moving tramcar and broke his hip. After making an initial recovery he died, probably of a pulmonary embolism, on 5 September, elements of his own triad coming into fruition in his death.

Nature and Nature's laws lay hid in night:
God said, let Virchow be, and all was light.
Sir Samuel Wilks' adaptation of Pope's epitaph on Newton.

- 1 Anonymous. Obituary. *Br Med J* 1902;September 13: 795–803.
- 2 Sigerist HE. *Great doctors, a biographical history of medicine*. London: George Allen & Unwin Ltd, 1935.
- 3 Wilson W. Virchow's contribution to the cell theory. *J Hist Med* 1947;2:163–78.
- 4 Klempner. The pathology of Morgagni and Virchow. *Bull Hist Med* 1958;32:24–38.
- 5 Rudolph Virchow's 80th birthday. *Br Med J* 1901;October 19:1180–3.