Middle Articles

MEDICAL HISTORY

J. Evangelista Purkyně (1787–1869)

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J. E. Purkyně died on 28 July 1869. He was born to Czech parents, but as the result of a faulty entry of his name by a German priest into the register of births he is generally known as "Purkinje." He used this spelling until he returned to Prague from Breslau in 1850 (John, 1959a).

Jan Evangelista Purkyně.

Purkyně and Mendel (1822–84), the two great biologists of the nineteenth century, were born in what is now Czechoslovakia. Both came from humble peasant stock and both fought against strained material circumstances during their formative years. Here the resemblance ends. Mendel sought and found refuge in a religious order "to enter a station of life which would free him from the bitter struggle for material existence" (Mendel, 1965). Purkyně became a priest for similar motives, but after three years left the order in protest "against a continuous slavery to the superiors whose lives and dignity did not always come up to my expectations" (John, 1959b). Mendel's posthumous fame rests on one single paper (Mendel, 1866), his scientific interests were limited, his political activities parochial. Purkyně became an acknowledged master of histology and of physiology early in life; his scientific interests were catholic, he was a great reformer of medical education, he translated the German classic poets into Czech, was a pleasing poet in his own right, and finally became a leading figure in the cultural renaissance of his people.

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Purkyně qualified in Prague in 1818 and became an assistant at the surgical clinic and prosector of anatomy. Five years later King Friedrich IV of Prussia made him—against the strong opposition of the medical faculty—professor of physiology in Breslau. It must have been one of the most surprising university appointments of the time, for the young Czech had not even the title "Dozent" to his name and only a few little-noticed publications. His basic experiments on vertigo had been performed on the swings and roundabouts of a Prague amusement park (Purkinje, 1820). Nevertheless, his doctor's thesis, "Contribution Towards our Knowledge of Vision from the Subjective Point of View" (Purkinje, 1819), had come to the knowledge of Johann Wolfgang Goethe (1749–1832), who believed—wrongly as it turned out—that he had found in Purkyně a powerful ally against the mathematicians and Newtonians, "the scarecrows who prevail like witches and devils in the darkest centuries" (Goethe, 1826). Now after reading of Purkyně's entoptic subjective sensations Goethe rejoiced: "after years my adversaries are ensnared" (Goethe, 1830).

Whether the great and influential Old Man of German letters was directly responsible for Purkyně's appointment in Breslau is an open question. But Purkyně was given an audience in Weimar and found to be "an unusually excellent man; an autodidactic and heautomorumentic spiritual and brilliant pianist" (Goethe, 1823). These are perhaps not the qualifications sought in a prospective professor of physiology, but those were still the days of German *Naturphilosophie*, and in Berlin Purkyně found other powerful protectors and canvassers. J. H. K. Schultz (1772–1852), the adviser on university appointments, had worked on the subjective phenomena of vision, Johann Nepomuk Rust (1775–1840), also of Bohemian origin, had been Bluecher's surgeon-general at Waterloo. The anatomist K. A. Rudolphi (1771–1832) was soon to become Purkyně's father-in-law. Purkyně also joined a masonic lodge, which counted many influential physicians and civil servants among its members.

Inaugural Oration

Purkyně delivered his inaugural oration in Breslau in December 1823 (Purkinje, 1823). Its first part dealt with the physiology of vision, the second with a "Commentatio de examine physiologico systematis cutanei." Francis Galton (1822–1911), who is usually credited with introducing scientific dactylography, translated it 70 years later into English and remarked: "The Commentatio of Purkene [sic] has the great merit of having first drawn attention to the patterns of skin ridges and attempted to clarify them" (Galton, 1892).

In the opening sentences of his oration Purkyně declared his scientific *Weltanschauung* in surprisingly modern terms: "The most important problem of a physician appears to me not his effort to renew a life already shattered, or to sustain a life a little longer, but efforts towards the support of evolving life; to protect it from harm; to bring it to the peak of perfection and beauty. . . . The physician who assumes this task may be

called an artist. Otherwise he merely performs the task of a repairman. . . ."

Title-page of Purkyně's dissertation on the subjective aspects of vision.

Soon the avalanche of original observations and publications from the Breslau Institute of Physiology—the first of its kind in Europe—started to move. Purkyně surrounded himself with a circle of gifted assistants—among them G. G. Valentin (1810–83), who with Purkyně first described the ciliary movement (Purkinje and Valentin, 1835), and A. Oschatz (1812–57), who constructed the forerunner of modern microtomes (Oschatz, 1841). Purkyně introduced sublimate for fixing histological specimens and indigo for staining cell nuclei. He introduced the digestion of tissues by gastric juice in vitro (Purkinje and Pappenheim, 1838), a method which some years later Fritz Miescher (1844–93) used with great success for the extraction of cellular nuclei and nucleic acids (Miescher, 1871). Purkyně may well have been the first man to say: "Next slide please." According to his successor in Breslau, R. Heidenhain (1834–97), he first produced microscopical photographs and demonstrated them with a powerful "laterna magica" (Heidenhain, 1888).

Varied Activities

His annus mirabilis came in 1832, when after a seven-years war with the authorities he was allowed to buy a Ploessel microscope. From then onwards he and his assistants investigated a large variety of animal and plant tissues, "with the hunger of wolves."

Today Purkyně's name is mostly associated with cerebral cells (Purkinje, 1827) and with a number of visual phenomena, such as the "Purkinje shift," the Purkinje-Sanson catoptric images on the eye surfaces, and his "after images" (Purkinje, 1823; Sanson, 1838). Purkyně's subendocardial fibres were first

described by the master himself (Purkinje, 1845), and not, as has been repeatedly stated, by his assistant B. Palicki (1813–63) (Palicki, 1839). Their function was not appreciated until 60 years later, when Tawara (1873–1952) suggested that "they serve the same purpose as the atrio-ventricular bundle" (Tawara, 1906).

It is less well known that as early as 1837 Purkyně read a little-noticed paper in which he showed and beautifully illustrated the cellular (granular) composition of the gastric mucosa, suggested that the "granules"—by which he meant cells—were the same as the cells in plants, and prophesied that "further investigation of these granular enchyms will throw light on the development of the embryo and the pathogenesis of inflammations" (Purkinje, 1837). Thus he anticipated T. Schwann's (1810–82) main cellular hypothesis by just one year (Schwann, 1839).

With only a strong magnifying-glass at his disposal he described the germinal vesicle in the chick (Purkinje, 1830), and when Baer (1792–1876) reported the discovery of the mammalian egg in the Graafian follicles, he wrote in the introduction to his famous book, ". . . if I present here so few discoveries of my own, Purkyně is to blame who left me so little to say" (Baer, 1828). Purkyně also coined in 1839 the term "protoplasma"—according to his biographer, Studnička (1937), from the words in a sixth-century liturgic song "De parentis protoplasti fraude factor condolans"—and provided Jacob Henle (1809–85) with the term *Grundsubstanz* (ground substance) (Meckauer, 1836).

In the field of pharmacology Purkyně was one of the most enthusiastic self-experimenters of all times (Purkinje, 1825). He believed that the experiment "in corpore nobili"—in one's own body—gave more practical results than those "in corpore vili"—the animal experiment—or in fatally ill patients. Consequently he poisoned himself with ipecacuanha and belladonna, and after taking 7.5 g. of a concentrated potion of *Digitalis purpurea* he recorded his visual sensations graphically. The alarming symptoms after taking large quantities of camphor started the unfounded rumour that he was an epileptic. Finally, after swilling down three whole grated nutmegs with a glass of wine, he gave a classic description of symptoms which many years later Sir Henry Dale (1875–1968) ascribed to the action of myristic acid (Dale, 1909).

Purkyně—in contrast to practically all Continental physiologists of his time—never settled down to compiling a comprehensive textbook; some of his most important discoveries first appeared in little-known provincial journals or in the transactions of medical congresses. He left the writing of monographs to his assistants, but he often contributed to medical encyclopaedias, occasionally on somewhat diverse items, such as "vomiting, rutting, hatching, calor animalis, and circulatio sanguinis" (Purkinje, 1831).

None of his original papers were first published in Anglo-Saxon journals, but he translated two papers by Martin Barry (1802–55), who had been his pupil at Breslau and later became a pioneer of the cellular hypothesis in England and president of the Royal Medical Society in Edinburgh. The astonishingly productive years in Breslau were also marked by personal tragedy. In 1832 his two young daughters died of cholera, and only three years later his beloved wife fell victim to a typhoid epidemic. He never remarried, but his hospitable house was always open to political exiles and impecunious scholars, such as the famous plant physiologist Julius Sachs (1832–97).

Prague Chair of Physiology

At the age of 63 years came the long-hoped-for call to fill the chair of physiology in Prague. It was the Prague of 1850—two years after many of the Czech national aspirations had been temporarily squashed by the abortive 1848 uprising. It was also the year of birth of T. G. Masaryk (1850–1937), who almost 70 years later achieved what Purkyně with a vigour

amazing for a man of his age fought for—the national and, alas, only temporary independence of the Czech people.

In politics as in his private life Purkyně's actions were governed by "fortiter in re, suaviter in modo." His friendship with many influential Austrian aristocrats stood him in good stead and the Austrian police authorities were never quite certain whether he was a dangerous "subversive element" or, according to a later assessment in his secret dossier, "an eccentric humanist who does not constitute a danger to State interests."

However this may have been, Purkyně founded the first Czech medical journal in 1861 against strong opposition by the local authorities and by most of his German colleagues in Prague. One year later "His apostolic majesty most graciously granted consent for the Society of Czech Physicians to be established by Jan Purkyně and other physicians." Purkyně was elected to the Czech Parliament, coedited the leading Czech daily newspaper, and popularized science and medicine in a large number of articles. Once again he founded a new physiological institute and opened it with the memorable words: "Life entered into the world of inorganic things in order to follow Nature's laws not to disturb them" (Purkinje, 1851).

After returning to Prague administrative duties and politics took up all his time, and at the age of 70 his health began to fail. Yet on his 80th birthday he was able to step out on his balcony and tell a large crowd (John, 1959c): "I can proudly say that I am one of those who support our nation. Like Moses who, after many years of wandering finally reached his promised land, I was to see again our beautiful fatherland . . . and to work for it."

The centenary year of Purkyně's death is not a happy one for his nation, and one may perhaps conclude a necessarily incomplete appreciation of one of its greatest sons with a few lines he wrote in 1821 (Purkinje, 1821): "It is not right that one nation should rule another nation. Slavic nations, the Russians, the Poles, the Serbs, the Czechs have the fortune that their languages are closely related, and if proper arrangements can be made, there would be the most active interrelation in their literary and spiritual efforts. When the Slavic country which is the largest amongst them will have reached the desired height of moral and scientific culture, no forcible effect would be needed but merely moral effort would be adequate to find the point of gravitation in their midst."

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Twenty-third World Medical Assembly, Paris, 22–28 June 1969

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In addition to a great deal of unavoidable humdrum business, each World Medical Assembly produces at least one item of high interest. This year the spotlight was turned upon the rising cost of medical care, in a two-day conference at which for the first time representatives of national medical associations met to discuss medical supply and demand in all its aspects.* This international conference had been arranged by the appropriate committee of the World Medical Association, and the sessions in Paris on 25 and 26

June were sandwiched between two sets of business sessions of the usual Assembly.

Demand for Medical Care

In the first of five sessions, the outstanding presentation was undoubtedly that of Professor H. P. PÉQUIGNOT, of Paris, who analysed the causes of the increased demand for medical care which has been recorded all over the world. His analysis was constantly referred to by later speakers, since it was so obviously a sound one. He divided the factors responsible for increased demand into: (1) demographic factors, including the population

explosion and the change in population structure with a proportionate increase in the numbers of elderly and of children, two groups requiring more than average medical care; (2) technical progress in medicine; (3) cultural factors, which are both individual and collective, and include improved education of the public and improved access to medical care; (4) the advance of medicine into new areas. Thus, medicine has entered such fields as family planning, the education of the handicapped and maladjusted, and treatment of various forms of antisocial behaviour. During the session Dr. RONALD GIBSON, from Britain, suggested that the

* A fuller report of this conference will be appearing in an early issue of the *World Medical Journal*.