

Excellent Enteric Explorers

Matthijs P Somford, Geertruid MH Marres, George P van der Schelling

Amphia Hospital, Breda, The Netherlands

Abstract

As if following the natural course of an ingested particle, several structures in the gastrointestinal tract which were named after their discoverers are presented including concise backgrounds of these pioneers of the human intestines.

Keywords

Eponyms – gastro-intestinal tract.

Introduction

For centuries, scientists have studied the anatomy of the human gastrointestinal tract. This has resulted in a number of eponyms in this part of the human body, which honour the discoveries of these early pioneers.

Knowing more about the historical background of these individuals and their work makes medical science more dynamic.

By analogy with Isaac Asimov's *Fantastic Voyage*, we would like to take you on a journey through the human body. In Asimov's story, a team of people is miniaturized to microscopic size and injected into a scientist's bloodstream so they can dissolve a blood clot in the man's brain. Our journey, however, has no other mission than to marvel at the background of the anatomical eponyms. Additionally, our exit will not be quite the same as in Asimov's story, in which the team leaves the body in a teardrop: instead we shall travel the route of an ingested particle.

Embarking on our voyage, we must first pass through Waldeyer's ring. This ring consists of the lingual, pharyngeal and the palatine tonsils.

Heinrich Wilhelm Gottfried von Waldeyer-Hartz (1837–1921) was born in Hehlen, Braunschweig, Germany. He was a pupil of Friedrich Gustav Joseph Henle. He became Professor of Anatomy at the University of Strasbourg, which at that time also employed great teachers such as Friedrich Daniel von Recklinghausen and Adolph Kussmaul. It was here that Von Waldeyer described and named the plasma cell in 1875. From 1867 until 1872, Waldeyer studied the development of cancer. In 1883, he went to Berlin as a Professor of Anatomy. In 1884, Von Waldeyer described the lymphatic ring in the oropharynx and in 1888 he named the chromosome. Johannes Sobotta, whose atlases are still widely used, was one of Von Waldeyer's students. Von Waldeyer is considered to be the founder of the neuron theory of the nervous system. He coined the term 'neuron' to describe the basic structural unit of the nervous system in 1891.

Passing from the mouth to the stomach, we travel down the esophagus. 'Oesophagus' is not an eponym, but is derived from the Greek word 'οισοφάγος' [oi-so-pha-goss], meaning 'what carries and eats'. At the end of this gullet, we reach the stomach. In the lower half of this reservoir, we encounter the pylorus. The word 'pylorus' is not an eponym either, but is derived from the Greek word 'πυλωρος' [puu-low-ross], which means 'gate guard'. We enter the duodenum after being permitted by this "guard". 'Duodenum' is an abbreviation of the Latin 'duodenum digitorum' – meaning 'twelve fingers' – which is the approximate length of this part of the small intestine. The duodenal wall contains Brunner's glands, which excrete mucus to protect and lubricate the duodenum and activate enzymes.

Johann Conrad Brunner (1653–1727) was a Swiss anatomist. His father-in-law, J.J. Wepfer, was the actual discoverer of the duodenal glands. Brunner was a pioneer of experimental physiology. He discovered that excising the pancreas in dogs caused polydipsia and polyuria. His findings became the basis of further research into the etiology of diabetes. Brunner's glands are located mainly before the ampulla of Vater, through which bile salts and pancreatic fluids enter the intestine.

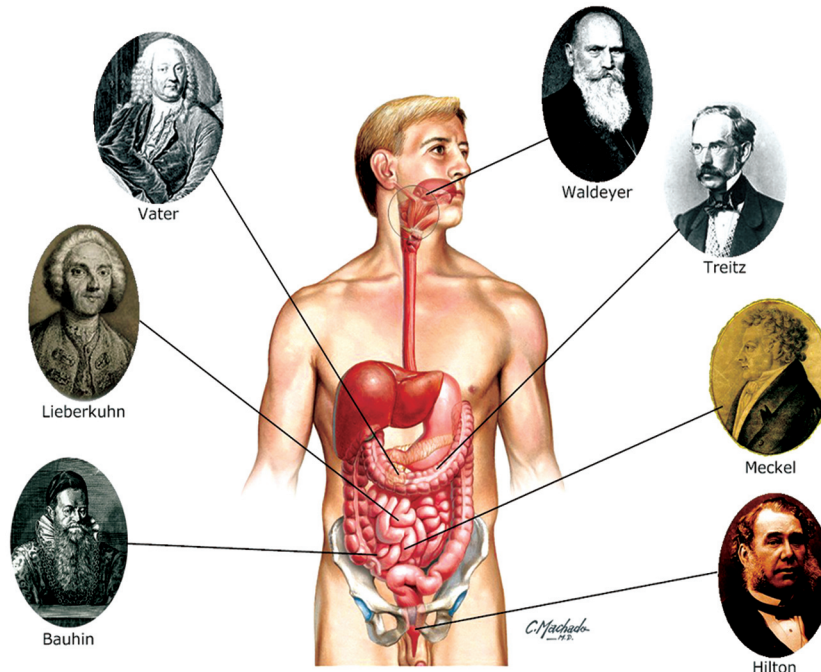
Received: 30.08.2009 Accepted: 17.09.2009

J Gastrointestin Liver Dis

December 2009 Vol.18 No 4, 469–472

Address for correspondence:

Matthijs Somford
Amphia Hospital Breda
Amsterdam, The Netherlands
Email: mp_somford@hotmail.com



Abraham Vater (1684–1751) was born in Wittenberg, Germany. At the University of Wittenberg he studied both philosophy and medicine. Vater became a Doctor of Philosophy in 1706 and received his medical degree in 1710.

In 1719, Vater became Professor Extraordinaire of Botany and Anatomy. Following his appointment, he founded an anatomical museum. Vater is thought to be the first professor to teach anatomy to women. Most of his published work deals with anatomy, but he also wrote about botany, surgery, gynaecology, pathology, pharmacology and chemistry.

Surrounding the ampulla of Vater and regulating the secretion of bile salts and pancreatic fluids is the sphincter of Oddi.

Ruggero Ferdinando Antonio Giuseppe Vincenzo Oddi (1864–1913) was born in Perugia, Italy. While studying medicine at the universities of Perugia, Bologna and Florence, he discovered the sphincter and described its physiological properties. As an assistant at the Physiological Institute of Florence, Oddi reintroduced bedside teaching. In January 1894, Oddi was named Head of the Physiology Institute of Genoa. He was relieved of his duties in 1900 however, due to flirtations with drugs and fiscal improprieties. Oddi then sought employment in the Belgian colonial medical service. He spent some time in Congo, but his continued use of narcotics eventually caused him to become mentally unstable. He died in Tunis, Tunisia.

After this smooth journey downward, we have to make a short climb because the duodenum is suspended by the ligament of Treitz, bending it slightly upward.

Václav Treitz or Wenzel Treitz (1819–1872) was born in Hovernic, Bohemia (then part of Habsburg Austria). He studied medicine in Prague. In 1852, he was made Professor

of Anatomy and Pathology in Kraków. He returned to Prague in 1855 to become Professor and Director of the Pathological Anatomy Institute. Other discoveries which are attributed to Treitz include the angle of Treitz (the sharp curve at the duodenal–jejunal junction) and Treitz’s fossa (a depression in the peritoneum extending posterior to the caecum). He died in 1872 after ingesting potassium cyanide.

After the ligament of Treitz, the jejunum starts. The term ‘jejunum’ is derived from the Latin adjective *jejunus*, which means “fasting” or “barren”, referring to the fact that this part of the intestine is found empty after death.

Approximately five centimeters behind the pylorus, we find the plicae circulares, or circular folds of Kerckring. These mucosal folds are most pronounced in the jejunum and disappear in the first half of the ileum. Their function is to enlarge the surface of the intestine and to slow down the progress of food.

Theodor Kerckring or Dirk Kerckring (1638–1693) was born in Amsterdam, The Netherlands. After studying Latin, he went on to study medicine at Leiden University. He spent most of his career in Amsterdam, but started travelling Europe in 1675. He eventually settled in Hamburg. Kerckring is best known for his *Spicilegium Anatomicum*, in which he describes medical curiosities, autopsy discoveries, and clinical observations, and provides general anatomical information. To investigate the folds in the small intestine, Kerckring used a microscope made by Baruch Spinoza.

The folds in the small intestine are covered with villi. At the root of the villi are little trap holes that excrete enzymes. These glands or crypts of Lieberkühn can be found throughout the small and large intestine.

Johann Nathanael Lieberkühn (1711–1756) was born in Berlin. Although his father wanted him to study

theology, his talent for science was recognized by Johann Gustav Reinbeck, a Protestant theologian. He introduced Lieberkühn to the Prussian king Friedrich Wilhelm I, who made it possible for Lieberkühn to devote himself to science and medicine.

In 1739, Lieberkühn received his doctorate from the University of Leiden, where he had studied under Gerard van Swieten and Herman Boerhaave.

In 1745, Lieberkühn published *Dissertatio anatomico-physiologica de fabrica et actione villorum intestinorum tenuium hominis*, in which he describes the structure and function of the intestinal villi and glands which were to bear his name.

Lieberkühn spent a lot of time exposing, exhibiting and preserving the vascular tissues of various animals. After his death, his collection of anatomical preparations was dissolved and sold to several museums.

The jejunum changes into the ileum about halfway through the small intestine. The term 'ileum' is most likely derived from the Latin word for 'flank'.

Approximately 60 to 100 centimeters before the ileocecal valve, we may encounter a small 'alley' that is present in only 2% of all people. This true congenital diverticulum, a vestigial remnant of the omphalomesenteric duct, is called Meckel's diverticulum.

Johann Friedrich Meckel the Younger (1781–1833) was born into a family of prominent physicians in Halle, Prussia. He had an outspoken aversion to medicine in general and anatomy in particular when he was younger, possibly as a result of having to help his father perform dissections. This did not prevent him from becoming a doctor in later years however; as an adult, Meckel went on to become one of the greatest anatomists of his time.

Meckel received his medical doctorate in Halle in 1802. After travelling Europe, he settled in Paris in 1803. Together with Baron Georges Cuvier, he analyzed the immense collection of anatomical and zoological specimens that Napoleon's armies had collected and sent to the Jardin des Plantes. He also translated Cuvier's *Leçons d'anatomie comparée* into German.

When Meckel returned to Halle in 1806 to become an Associate Professor, the city was occupied by Napoleon's troops and his home had been turned into a temporary military headquarters. Under his appointment, Halle became the centre of comparative anatomy in Germany.

As editor of *Reil's Journal*, Meckel campaigned against unscientific speculation and mindless experimentation. He stressed that only articles based on objective observation and empirical experimentation should and would be printed.

Meckel became paranoid in his forties. He retired at the age of fifty and spent his last days as a recluse. He died childless, thereby ending the academic tradition of the Meckel family.

Along the entire small intestine, but mainly near the end of the ileum, we find diffuse patches of lymphoid tissue. These are called Peyer's patches. For us 'intruders' from

outside, Peyer's patches are best avoided, as they perform the immune surveillance of the intestinal lumen and facilitate the immune response in the mucosa.

Johann Conrad Peyer (1653–1712) was born in Schaffhausen, Switzerland. After studying medicine in Paris and Montpellier, he received his doctorate in Basel, in 1681. When working in Schaffhausen, Peyer did a lot of research with Johann Jakob Wepfer and his son-in-law Johann Conrad Brunner. In 1677, Peyer published *Exercitatio anatomico-medica de glandulis intestinorum earumque usu et affectionibus*, which describes the patches that have been named after him.

At the terminal ileum, a final obstacle on our way to the colon is Bauhin's valve.

Gaspard Bauhin (1560–1624) was born in Basel, Switzerland. He was the son of Jean Bauhin, a French physician who had been forced to flee the country after converting to protestantism. Bauhin studied medicine in Padua, Montpellier and Tübingen. He received his doctor's degree when he returned to Basel in 1580. Besides anatomy, he also excelled in the subject of botany. Over the course of his career, Bauhin was named city physician, Dean of his faculty and Rector of the university. He published his principal work on anatomy, *Theatrum Anatomicum infinitis locis auctum*, in 1592. Bauhin's valve is not the only entity named in his honor. Carolus Linneaus named the genus *Bauhinia* after him. One species of this orchid family – *Bauhinia blakeana* – is the floral emblem of Hong Kong.

After passing Bauhin's valve we enter the colon. The word 'colon' has its roots in the Greek κολον [co-lone], meaning 'sausage'. We assume that no further explanation is necessary. The first part of the colon is the caecum or caecum. This term is derived from the Latin 'caecus', meaning 'blind'.

Nearing the end of our journey, we have to pass through a couple of curves in the sigmoid. 'Sigmoid' is derived from the Greek σιγμοειδής [sig-mow-I-deez], which means 'sigma-' or 's-shaped'.

The sigmoid is followed by a short straight part, the rectum ('rectus' is the Latin word for 'straight'). At the end of the tunnel, a white line marks our final descent. It represents the transition zone from the non-keratinized squamous epithelium of the anal canal to the keratinized squamous epithelium of the peri-anal skin. Some theories say it also marks the tissue between the two sphincters when they are both contracted. This definite anatomical landmark is called the white line of Hilton.

John Hilton (1804–1878) was born in Essex, Great Britain. He began his medical training in Guy's hospital in London, where he soon became an anatomical demonstrator. He was made surgeon in 1849. Hilton left an extraordinary collection of anatomical models to the hospital. He was the first to operate on a patient with internal strangulation of the small intestine. Unfortunately, the patient died nine hours after surgery.

As Professor of Human Anatomy and Surgery at the Royal College of Surgeons, Hilton gave a series of lectures on “rest and pain” that have become classics. They were still being published – in sixth edition – in 1950, nearly a hundred years later. Hilton was surgeon extraordinaire to Queen Victoria and held leading positions at numerous medical societies. He remained active in the Royal College of Surgeons (of which he was named President in 1867) until his death. He was known as a skilful observer and valued consultant, as well as an excellent but sarcastic lecturer.

Nicknamed “Anatomical John”, Hilton is considered to be one of the greatest anatomists of his time.

And so we leave the body in a slightly less romantic way than the team of scientists in Asimov’s story did: through the anus, which is Latin for ‘ring’. Here we end our fantastic journey through the gastrointestinal tract.

Literature and further reading

1. Firkin BG, Whitworth WA. Dictionary of Medical Eponyms. 1st edn, The Parthenon Publishing Group Ltd, Carnforth 1987.
2. Gray, H. *Gray’s Anatomy: The Anatomical Basis of Medicine and Surgery (The digestive apparatus)*. 40th edn., Churchill-Livingstone, Elsevier 2008.
3. Macea MM, Macea JR, Fregnani, TJHG. Quantitative study of Brunner’s glands in the human duodenal submucosa. *Int J Morphol* 2006; 24: 7–12.
4. Nicholls AG. Theodore Kerckring and his ‘Spicilegium Anatomicum’. *Can Med Assoc J* 1940; 42: 480–483.
5. Encyclopædia Britannica, 2008. Encyclopædia Britannica Online. Available at <http://www.britannica.com/> Accessed 21 Dec 2008.
6. Isaac Asimov. *Fantastic Voyage*. Houghton Mifflin, New York 1966.
7. Novelization of the movie “Fantastic Voyage” by Harry Kleiner from the original story by Otto Klement and Jay Lewis Bixby. 20th Century Fox, 1966.
8. Hiller RI. Anal anatomy with reference to the white line of Hilton and the pecten of Stroud. *Ann Surg* 1935; 102: 81–85.
9. Shenker N, Ellis H. John Hilton (1805–78): anatomist and surgeon. *J Med Biogr* 2007; 15: 219–226.
10. Wikipedia. Online encyclopedia. Available at: <http://en.wikipedia.org>. Accessed 20 dec 2008.