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Course notes

Exploring eponyms in a corpus of medical articles. Origins and meanings

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Introduction

Eponyms are common in many scientific fields; however, the language of health sciences is probably the one which has the highest occurrence of eponyms for various reasons. Eponyms are terms that honour the contribution of the person who discovered or invented something. Concepts become associated with eponyms when enough popular attention is drawn to that particular device, disease, condition, procedure, etc. There are multiple reasons for which the use of medical eponyms should be employed across languages. For one thing, eponyms are frequently translated from one language into another by calque, that is, word-for-word translation, with the aid of which one can avoid a wrong use of a particular term or mistranslate it. Moreover, eponyms also reflect a certain degree of language and historical culture by honouring the remarkable contributions of specialists and scientists. This study investigates a corpus of randomly chosen articles form a Romanian medical journal published in English and included in the Core Collection of Clarivate Analytics. As far as methodology is concerned, manual processing was employed for eponym extraction. The purpose was to identify the occurrences of eponyms and, consequently, to trace their origin and explain their meaning.

Background

While there are different definitions for the term *eponym* (see various dictionaries: Oxford, Merriam-Webster, etc.), according to the most widely accepted one, an eponym is "one for whom or which something is or is believed to be named". Eponyms are the simplest way of referencing new discoveries in medicine (1). Some eponyms have been lexicalised, that is, they allow derivations as adjectives (e.g. *parkinsonian* from James Parkinson; *skodaic resonance* from the name of Joseph Skoda) or verbs (see for example *to roentgenise* derived from the name of the inventor of the device Wilhelm Conrad Roentgen, or *to pasteurise* which is rooted in the name of Louis Pasteur).

An eponym comes into being when enough popular attention is drawn to an entity, disease, not necessarily for the first time. However, no rules

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define eponym development which may take extended periods of time (2). Moreover, eponyms may be different in different languages and cultures, as such, it is important for a translator or medical writer to know which eponym, or synonym, for that matter, the target language prefers. Nevertheless, there are opposing views on whether to use or avoid eponyms, ranging from avoiding stigma or favouring communication to militating against communication or glorifying vicious people. In terms of their broad use, one study conducted on 16,787 records found eponymous names in 1,747 of them, which accounts for a percentage of 10.4 (3). Another study found that more eponyms were used in the titles of publications in 2014 than ever before, highlighting a peak in eponym usage (3%) in 1991 (4).

While there are various opinions both for and against the use of eponyms, there are also conflicting views on whether the use of eponyms should be abandoned altogether (5), as there may be cases when eponymous terms have synonyms in medical language without resorting on the name of the discoverer (*Clarke ulcer*, namely *uterine neck ulceration*, or *Moszkowicz test* which is synonymous with *hyperaemia test*). Sometimes it is simpler to remember the eponym rather than a scientific pathologic description (2).

Medical eponyms can be categorised in different groups: simple (*Hodgkin lymphoma*), compound, also termed multiple individual eponyms (*Weibel-Palade bodies*), possessive (*Parkinson's disease*), etc. (2). As far as the possessive form of eponyms is concerned, arguments both for and against emerged in the 1970s. While the recommendations of the World Health Organization in 2004 and the American Medical Association in 2007 were to avoid the use of possessive forms, the study by Ayesu et al. (6) conducted on PubMed search queries for medical eponyms found that the use of possessive forms prevailed over the non-possessive ones.

From a historical point of view, eponyms play an important role in medical language because they honour the contribution and discoveries of great scientists. Nevertheless, there are eponyms that have fallen out of use and have been replaced by synonymous phrases. This is mainly the case of eponyms related to Nazi crimes rooted in the names of individuals involved in World War II crimes (*Reiter's syndrome* – reactive arthritis, *Spatz-Stiefler reaction* – paralysis agitans reaction; *Spatz-Lindenberg disease* – cerebral thromboangitis obliterans) (4, 7).

The study

This paper is based on a corpus of randomly selected articles from one single issue of a Romanian medical journal published in English and indexed in the Core Collection of Clarivate Analytics (Web of Science). The corpus comprised 12 articles which were processed manually for eponym extraction. Topics of the articles were various: sacral tumours, osteoarthritis, acute pancreatitis, etc. The titles of the articles of the corpus will not be referenced here for citation reasons.

The purpose of this paper is to trace the origin and explain the meaning of the eponyms retrieved from the 12 investigated articles. The study of the corpus revealed 19 eponymous phrases, and all definitions below are taken from Stedman's Medical Eponyms (8). The identified eponyms will be listed alphabetically and biographic information on the researchers after whom they were named will be provided.

For another practical reason, knowledge of these eponyms may be useful both for translators and medical writers or authors who can acquire them in their correct form, possessive or non-possessive. Moreover, depending on the features of the target text a translator has to produce, he/ she can decide whether to employ the use of an eponym or its synonym. Medical translators should

ideally have some knowledge of medical fields and terminology. Thus, the definitions below are meant to explain the translator the meanings of the eponyms.

From a medical point of view, the identified eponymous phrases could be categorised as follows (listed alphabetically):

A. Conditions/ diseases
- Bowen's disease
- Bowenoid papulosis
- Ewing's sarcoma; Ewing tumour
- non-Hodgkin's lymphoma
- Pinkus tumour
- Sjögren's syndrome
- Tarlov cysts

B. Cellular/ tissular/ microscopic elements
- Antoni A areas/ regions
- Antoni B areas/ regions
- Auerbach plexus
- Golgi-derived vesicles
- Langerhans islets
- Meissner plexus
- Pap smear
- Schwann cells
- Schwannoma
- Verocay bodies
- Weibel-Palade bodies

C. Stains, solutions, and substances
- Dulbecco's Modified Eagle's Medium; Eagle's medium

From the point of view of their type, the identified eponyms could be grouped as follows (listed alphabetically):

A. Simple
- Antoni A areas/ regions
- Antoni B areas/ regions
- Auerbach plexus
- Bowenoid papulosis
- Golgi-derived vesicles
- Langerhans islets
- Meissner plexus
- Pap smear
- Pinkus tumour
- Schwann cells
- Schwannoma
- Tarlov cysts
- Verocay bodies

B. Compound
- Weibel-Palade bodies

C. Possessive
- Bowen's disease
- Dulbecco's Modified Eagle's Medium
- Ewing's sarcoma
- non-Hodgkin's lymphoma
- Sjögren's syndrome

Due to the occurrence of the eponyms *Dulbecco's Modified Eagle's Medium*, and *Weibel-Palade bodies*, all four scientists will be included in the description. Finally, two of the eponyms found in the corpus are related to one researcher, namely Theodor Schwann.

1. *Antoni A areas/ regions*; *Antoni type A neurilemoma* – relatively solid or compact arrangement of neoplastic tissue that consists of Schwann cells arranged in twisting bundles associated with delicate reticulin fibres
2. *Antoni B areas/ regions*; *Antoni type B neurilemoma* – relatively soft or loose arrangement of neoplastic tissue that consists of Schwann cells in a nondescript arrangement among reticulin fibres and tiny cystlike foci
3. *Auerbach plexus* – a plexus of unmyelinated fibres and postganglionic autonomic cell bodies lying in the muscular coat of the oesophagus, stomach, and intestines
4. *Bowen's disease* – a form of intraepidermal carcinoma, synonym: Bandowen precancerous dermatosis
5. *Bowenoid papulosis* – a clinically benign form of intraepithelial neoplasia that microscopically resembles Bowen disease or

carcinoma in situ, occurring in young individuals of both sexes on the genital perianal skin usually as multiple well-demarcated pigmented warty papules
6. *Dulbecco's Modified Eagle's Medium*; *Eagle's medium* – a solution of various salts used as a tissue culture medium
7. *Ewing's sarcoma*; *Ewing tumour* – a malignant neoplasm that involves bones of the extremities, including the shoulder girdle, with a predilection for the metaphysis, synonym: endothelial myeloma
8. *Golgi-derived vesicles*
9. *Langerhans islets* – cellular masses composed of different cell types that comprise the endocrine portion of the pancreas and are the source of insulin and glucagon; syn.: islet tissue, Langerhans islands, pancreatic islands, pancreatic islets
10. *Meissner plexus* – a gangliated plexus of unmyelinated nerve fibres; syn.: submucosal plexus
11. *non-Hodgkin's lymphoma* – a lymphoma other than Hodgkin disease (i.e. malignant neoplasm of lymphoid cells of uncertain origin, associated with inflammatory infiltration of lymphocytes and eosinophilic of leucocytes and fibrosis; syn.: lymphadenoma)
12. *Pap smear* – vaginal or cervical cells obtained for cytological study; syn.: Papanicolau smear
13. *Pinkus tumour*; *Pinkus disease* – benign asymptomatic, flat-topped, skin-coloured papules mainly affecting children and young adults
14. *Schwann cells* – cells of ectodermal (neural crest) origin that compose a continuous envelope around each nerve fibre of peripheral nerves; syn.: neurilemma cells
15. *Schwannoma* – neurilemoma, neuroschwannoma
16. *Sjögren's syndrome* – keratoconjunctivitis sicca, dryness of mucous membranes, telangiectasis or purpuric spots on the face, and bilateral parotid enlargement, seen in menopausal women synonym: Gougerot-Sjögren disease, sicca syndrome, Sjögren disease
17. *Tarlov cysts* – a perineural cyst found in the proximal radicles of the lower spinal cord
18. *Verocay bodies* – hyalinised acellular areas seen microscopically in neurilemomas
19. *Weibel-Palade bodies* – rod-shaped bundles of microtubules seen by electron microscopy in vascular endothelial cells

As previously mentioned, the eponyms identified in the corpus of this study are meant to honour and celebrate the contribution of scientists to the vast medical field. The fame of the various specialists is rooted in the remarkable discoveries they made. Biographical data about each of the scientists whose name was identified in the eponyms will be detailed below, along with their most relevant achievements in the fields of medical science, in order to give the translator the background on which these scientists built their research, and to provide the cultural and historical perspective and basis that any translator or medical writer should have.

Nils Ragnar Eugene Antoni (1887-1968) was a Swedish neurologist and researcher who worked at the Royal Neurologic Clinic of Stockholm (9). In 1920 he described two distinct patterns of cellular architecture in the peripheral nerve sheath tumours, that is, schwannomas. Antoni went on to become professor of neurology at the Karolinska Institute in Stockholm. To honour his discoveries, the two distinctive patterns described by him have come to be known as Antoni A and Antoni B regions (10, 11).

Leopold Auerbach (1828-1897) was born in Breslau and studied medicine in Breslau, Berlin, and Leipzig. He earned his degree in medicine in 1849 and worked as a physician afterwards. He obtained his habilitation in 1863 and went on to become associate professor of neuropathology at the University of Breslau, now Wroclaw. He was a pioneer in diagnosing the nervous system using histological staining methods. His research findings were published in numerous articles on neuropathological problems and muscle-related disorders. The eponym that honours his work, the *plexus myentericus Auerbachi*, denotes a layer of ganglion cells which control the movements of the gastro-intestinal tract (12).

John Templeton Bowen (1857-1941) was born in a prominent Boston family and was an excellent student of the Boston Latin School. He graduated Harvard University in 1879 with a Bachelor of Arts degree followed by a Medical Doctorate in 1884. He completed his training in dermatology in Berlin, Munich, and Vienna, and became assistant physician in the Massachusetts General Hospital. He was appointed assistant professor at Harvard Medical School and later became president of the American Dermatologic Association. His remarkable contribution to dermatology lies in his description of precancerous dermatoses, interestingly enough based on only two cases, published 1912 (13).

Renato Dulbecco (1914-2012) was born in Cantanzaro, Italy. He earned his medical doctorate from the University of Turin in 1936, following which he completed a 2-year military service before training in pathology. Shortly afterwards, he discovered his passion for cell culture techniques and joined Giuseppe Levi in his Turin institute. After the end of World War II, Dulbecco pursued his ambition of studying the genetics of simple organisms and moved to the United States in 1947. Here, his interest was shifted to tumour viruses, and in 1959 he published his first article on polyomaviruses. Together with his fellow workers, Dulbecco won the Nobel Prize in Physiology or Medicine in 1975. Dulbecco's modified Eagle medium, or DMEM as it is known, is the most suitable medium for many adherent cell phenotypes among defined media for cell and tissue culture. His modification of Eagle's medium is an enhanced supplementary formulation that boosts select amino acid and vitamin content by up to fourfold (14, 15).

Harry Eagle (1905-1992) was born in New York City. He obtained a teaching certificate from Baltimore Hebrew College which allowed him to teach Hebrew. He was one of the youngest graduates of Johns Hopkins University, earning his medical doctor degree in 1927. Apart from his interest in the field of chemotherapy and blood coagulation, he excelled in the field of cell biology and studied the basic requirements of the cells. His work led to the discovery of what is now known as Eagle's medium, the components of the cell extract which are essential for cell growth (16, 17).

James Ewing (1866-1943) was born in Pittsburgh Pennsylvania to a Scotch-Irish father and a German mother. Suffering from osteomyelitis of the femur, Ewing was confined to bed for two years and entered various competitions. At one point, he won a microscope, a fact that would play a crucial role in his future career. He graduated the College of Physicians and Surgeons of New York in 1891 and worked in various hospitals as well as in his own private practice. In 1899, at the age of 33, Ewing was appointed the first Professor of Pathology at Cornell University. In 1920 he noted a malignant bone neoplasm, observing that, unlike osteosarcomas, the cancer metastasised to the lymph nodes, a malignant lesion which to date is called Ewing sarcoma (18).

Camillo Golgi (1843-1926) was born in Corteno, Italy, which today bears the name of Corteno Golgi. Following his physician father's footsteps, Golgi trained as a medical doctor and graduated from the university of Pavia in 1865 with a graduation thesis on the aetiology of mental illnesses. He became interested in experimental and histological research, and set up a laboratory in the kitchen of the apartment of the hospital where he was working which allowed him to develop a novel technique of nervous tissue staining, the Golgi stain, the black reaction, a histological silver-staining which allowed neurons and glia to be visualised with all their processes and in great detail. He published eight works with illustrations of his own. After completing his mandate as Rector of the University of Pavia, Golgi returned to his research work on nervous tissue and went on to discover a new structure that he called *internal reticular apparatus*, which was subsequently named the Golgi apparatus, a cytoplasmic organelle. In 1906 he shared the sixth Nobel Prize for Physiology or Medicine with Santiago Ramón y Cajal (19-21).

Thomas Hodgkin (1798-1866), born in Pentonville, England, received an upbringing that focussed on honesty, discipline, and concern for the less fortunate. He earned his medical degree from Edinburgh Medical College in 1823 and was appointed lecturer of anatomy at Guy's Hospital Medical School in London where he spent twelve productive years. During his time there, he performed numerous autopsies which allowed him to make various observations and comparisons regarding the specimens that he catalogued. Having met and worked with René Laënnec in France, Hodgkin brought the first stethoscope, Laënnec's recent invention, to Guy's Hospital and trained the members of the physical society of the hospital. Hodgkin will be remembered in health sciences for his classic description of a disease characterised by the enlargements of groups of lymph nodes and spleen, observations published in his 1832 article *On Some Morbid Appearances of the Absorbent Glands and Spleen* (22, 23).

Paul Langerhans (1847-1888) was born in Berlin. He studied medicine at the universities of Jena and Berlin graduating in 1869. He studied under Rudolf Virchow and Julius Conheim. He was still a student when he made his first discovery in Virchow's laboratory and published his findings in Virchow's Archiv in 1868 on the stellate corpuscles which now bear his name. In this article titled *Ueber die Nerven der Menslischen Haut*, he also described the *stratum granulosum* which is known as the layer of Langerhans. However, his most famous discovery was that of the pancreatic islets, also made while still a student. He travelled to the Middle East in order to study leprosy, and served as a physician in the ambulance service during the French Prussian War. He was employed as prosector in pathology at the University of Freiburg im Breisgau, and was later promoted to the position of chair of pathology, but was forced to quit the academic career due to the diagnosis of pulmonary tuberculosis. Moving to the coast of Madeira, he continued working and studied intervertabrates and produced four papers with drawings of his own (24-28).

Georg Meissner (1829-1905) was born in Hanover, Germany. He studied medicine at the University of Göttingen earning his doctoral degree in 1852. He was appointed professor at the universities of Basel, Freiburg, and Göttingen. While still a student, he developed a particular interest for microscopic anatomy. He went on an expedition to Trieste to study the nerve endings of the torpedo fish. The concept behind the eponym that bears his name was described in his work Über die Nerven der Darmwand in 1857 (29).

George Emil Palade (1912-2008) was born in Iași (Jassy), Romania to a family of teachers, his father was professor of philosophy, his mother was a high school teacher. He graduated Carol Davila School of Medicine in Bucharest and gained his doctoral degree in 1940 with research in the microscopic anatomy of the dolphin nephron. Following World War II, he was employed at the Institute of Anatomy of the Bucharest school of Medicine, but left for the United States in 1946 to do postdoctoral research. Palade joined Albert Claude's electron microscopy research group at the Rockefeller Institute for Medical Research, initially as a volunteer, and later became full professor of cell biology at the Institute in 1956. His work led to the subsequent discovery of a small particulate component of the cytoplasm, which became known as the ribosome. In 1964, after research on rat and human lung cells, Palade and Weibel published the article titled *New Cytoplasmic Components in Arterial Endothelia* in the Journal of Cell Biology. Albert Claude, Christian de Duve, and George Palade shared the Nobel Prize for Physiology or Medicine in 1974 (30-33).

George N. Papanicolau (Georgios Nikolaou Papanikolaou) (1883-1962) was born in Kyme, Greece, and graduated from the University of Athens with a degree in music and humanities. Under the influence of his physician father, Papanicolau completed his medical studies in 1904 and earned his doctoral title in zoology from the University of Munich in 1910. Having worked in the military after his graduation, following the breakout of the Balkan War he returned to military in the medical corps. After emigrating to the United States, due to the language barrier, he was forced to take various jobs such as violin player, clerk at a Greek newspaper. Nevertheless, he was employed at the Pathology Department of New York University and Anatomy Department at Cornell University Medical College where he performed his scientific work for the rest of his life. Based on his observations on vaginal smears of female guinea pigs, he published his article titled *Sex determination and sex control in guinea-pigs* in 1915. Starting 1920, his work was shifted onto the cytopathology of the human reproductive system. He presented his findings on the smear test that he devised under the title *New Cancer Diagnosis*. Initially met with reluctance and scepticism, his discovery, the smear which bears his name, remains a low-cost and effective method in the prevention strategy against cancer in women. Although he was nominated for the Nobel Prize five times, the most renowned prize in the medical field was never awarded to him (34-36).

Felix Pinkus (1868-1947) was born in Berlin. He graduated from the University of Freiburg with a degree in medicine. He trained in dermatology in Breslau where he started publishing papers on different dermatological conditions. He completed his doctoral studies on the cranial nerve of African lungfish and is credited with the discovery of the *nervus terminalis* found in sharks and humans (37, 38).

Theodor Schwann (1810-1882): was born in Neuss, Germany. He gained his medical degree from the University of Berlin and was appointed professor of anatomy at the University of Leuven. Schwann's work is connected to his friend's, Matthias Jakob Schleiden, with whom he was once enjoying coffee while having a discussion about the universality of plant cells. Being more interested in animal cells, Schwann suddenly acknowledged striking similarities to plant cells. The two friends published their findings one year apart (Schleiden 1938, Schwann 1939) without any reference to each other's work. The most important concept of the Cell

theory of Schleiden and Schwann is that the cell is the elementary unit of life (11, 19, 39, 40).

Henrik Sjögren (1899-1986) was born near Stockholm. He gained his medical degree from the Karolinska Institute in Stockholm and qualified as a medical doctor in 1927. He published a doctoral thesis at Karolinska Institute titled *On knowledge of keratoconjunctivitis*. His observations on the dry eye and mouth had been documented before. His work remained unnoticed until he published it in English in 1943, after which he was appointed associate professor at the University of Gotenberg. Although the condition he defined had been described previously by Mikulicz, the eponym *Mikulicz's disease* was replaced by the term *Sjögren's syndrome* (41).

Isadore Max Tarlov (1905-1977) was born in Norwalk, Connecticut, where he spent his childhood. In 1930, he gained his medical degree from the Johns Hopkins Medical School, and completed his training as a resident in neurosurgery. The eponym that bears his name today, Tarlov cyst, stems from his description of the evolution of the perineural cyst with its aetiopathogenesis. He also demonstrated that the location of the cyst was strongly related to the nerve roots (42).

José Juan Verocay (1876-1927) was born in northwest Uruguay to an Austrian father and an Italian mother. He entered the Prague School of Medicine, where he remained from 1897 to 1904 under the guidance of the pathologist Hans Chiari. Verocay earned his doctoral degree in 1904 and published his works at the age of 29. After having been offered an appointment in Montevideo which however did not occur, Verocay returned to Prague and published his most cited article, *Zur Kenntnis der Neurofibrome* in 1910. He described the histogenesis of Schwann cell neuromas analysing the microscopic polymorphism and describing the structures that today bear his name: *Verocay bodies* (11, 43).

Ewald Rudolf Weibel (1929-2019) was a Swiss anatomist and electron microscopist. He completed his medical education at the University of Zurich, and went on to study at Yale and Columbia Universities. He was appointed assistant professor at University of Zurich and three years later in 1966 full professor at Bern University. His scientific work focused on different areas such as the morphometry of the human lung as the structural basis of the gas exchange function, as well as the use of these methods in cell biology to measure the membrane system of the liver cell and the mitochondria in the musculature. He discovered the specific organelle of blood vessel endothelial cells in 1962 with George Emil Palade, which today bears the name of *Weibel-Palade body* (44).

Conclusion

If eponyms are frequent in medical language it is for two reasons: eponyms exist for the human desire of being acknowledged and honoured, and because sometimes there is no better way to define a concept without resorting to an unmemorable description. They also reflect the supremacy of scientific cultures and languages (2). Medicine is based on human passion and dedication, thus celebrating the contribution of remarkable personalities in the field remains of paramount importance. Although there have been trends and advocates in favour of abandoning eponyms, eponyms are part of the medical language legacy and should not be replaced as they also play an essential role in bridging generations of physicians. Even if many of the above-described eponyms refer to negative aspects of life such as diseases, conditions, they have entered the world heritage of human knowledge and are part of the *lingua franca* of health sciences.

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