

Terminologia anatomica in the past and the future from perspective of 110th anniversary of Polish Anatomical Terminology

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Professional terminology is commonplace, particularly in the fields of mathematics, medicine, veterinary and natural sciences. The use of the terminology can be international, as it is with Anatomical Terminology (AT). In the early age of modern education, anatomists adopted Latin as the international language for AT. However, at the end of the 20th century, the English language became more predominant around the world.

It can be said that the AT is a specific collection of scientific terms. One of the major flaws in early AT was that body structures were described by varying names, while some of the terms was irrational in nature, and confusing. At this time, different international committees were working on preparing a unified final version of the AT, which in the end consisted of 5,640 terms (4,286 originally from the Basle Nomina Anatomica, BNA). Also, each country wanted to have its own nomenclature. In order to accomplish this, each country based their nomenclature on the international AT, and then translated it into their own language.

The history of the Polish Anatomical Terminology (PAT) is unique, and follows the events of history. It was first published in 1898, at a time when its neighbours partitioned the territory of Poland. During 150 years, the Polish culture and language was under the Russification and Germanization policy. It is important to note, that even with such difficult circumstances, the PAT was the first national AT in the world. The PAT was a union of the accepted first BNA in Latin and the original Polish anatomical equivalents. This union formed the basis for theoretical and clinical medicine in Poland. (Folia Morphol 2008; 67: 87–97)

Key words: anatomy, anatomical terminology, history of medicine, nomenclature, Polish Anatomical Terminology

INTRODUCTION

The concept of anatomical linguistics is not officially recognized as an independent scientific discipline, however, as anatomical research and scientific interest intensifies, it may soon be given the reco-

gnition it so rightly deserves. Understanding the origins of various international languages is something that has increasingly become a challenge for both historians and linguistic researchers. Previous research on the historical development of Anatomical

Terminology (AT) has focused on the initial developments rather than on more modern events, which shaped the formation and use of AT.

Similarly, a country's development of any particular group of terminologies is fascinating, due to the cultural, societal, political, educational, and even religious significances that play a role in its evolution. The authors present an overview of the historical development of the Polish anatomical language, which is used by physicians and researchers as a means of communication with each other. It is very important to understand the flow of concepts, and words from one vernacular to another.

THE FIRST INTERNATIONAL ANATOMICAL TERMINOLOGY

The Polish Anatomical Terminology (PAT) can be considered as a linguistic phenomenon. The history of the evolution of the PAT has been an intricate journey, which began due to the principal desire of developing an internationally unified process in science at the end of 19th century. Unification in theoretical medicine is necessary for international communication and the proper exchange of results of scientific experiments and the subsequent discoveries in morphological sciences.

In the 18th and 19th century, ambiguous and arbitrary terminology persisted in the Anatomical Vocabulary (AV), which ultimately, became a strong obstruction, particularly in the development of surgical procedures and the proper exchange of scientific information. The ambiguity and confusion was particularly prevalent in the independent naming of structures of the human body, and the use of discordant directional terminology. This fact has long been recognized, and individual attempts to remove the inconsistencies have been numerous. At the age of the surgical revolution, the most famous surgeons were closely interested in anatomy [6]. At this moment in anatomical history there existed an AV, which was one of the oldest scientific and medical languages. The AV was a collection of approximately over 50,000 archaic terms, till the year 1895, when the first international official AT was established as Basle Nomina Anatomica (BNA). It was the results of deliberations between the German Nomenclature Commission and some international anatomists. It was in this year that the Latin became the international language of anatomy, mainly due to the fact it was understandable through out the whole world. Also, it can be viewed as a type of international communication,

similarly to that of the medical, veterinary and natural sciences [7, 14, 15, 28, 32].

At the beginning on its conception, AV had its origins mainly in mythology and religion or in some instances was also derived from botanical terms such as *oliva*, and *pisiforme bone* as well as zoology, for example the *hippocampus*, and *cauda equina* [4, 14, 25, 31]. In 4th century B.C., Hippocrates introduced the first anatomical terms such as *bronchus*, *peritoneum*, and *acromion*. After him, throughout several centuries scientists studied and identified anatomical structures and subsequently named them. Some items were named several times with different names (synonyms), which caused confusion in understanding anatomical structures. For example, the *vagus nerve* was also named the *pneumogastric nerve*; the *trapezius muscle* was also referred to as the *cucullaris* or *cowl muscle* or even according to its attachments place the *occipito-dorso-clavi-sus-acromien*. In addition, anatomists of that time used over 50 synonyms of the pineal gland [11, 14, 17, 20, 23, 24]. Due to the confusion this caused among the whole of the medical community, anatomists such as Krause, Henle, Owen, Parker, Schultze, and Wilder and those after him tried to organize the chaotic, incoherent, and at times contradictive AT. Finally, in the year 1895 during the congress in Basel, the number of anatomical terms had been reduced to approximately 5,528. The AT was ratified as BNA, which was soon adopted in America and Italy. A commission of English and French anatomists failed to report back in the time required to have their opinions included, while the recommendations of the American committees were for the most part ignored. During this time many countries had been striving to create their own anatomical nomenclature, containing the historical, modern and clinically used terminology. Most countries since have based their anatomical nomenclature system on the international AT, or Latin terms are translated into their native language [7, 9, 14, 23, 24].

Sometimes, the national AT was published prior to a country even receiving its independence. An example of this unique circumstance is Poland, where nationalistic roots were very strong. The PAT was published at a time when the country was partitioned by the Russian, German and the Austro-Hungarian Empire (1772–1918).

The PAT was closely associated with the development of the European and world anatomical nomenclature. Following are four different time periods,

Table 1. Polish herbal and medical terminology — 1st period of Polish Anatomical Terminology development — time 13th–16th century

Year and place of edition	Name and affiliation	Title
13 th century	W. Ciołek	<i>Structures of the eye</i>
1528, Cracow	F. Mymerus, Academy in Cracow	1. <i>Dictionarium trium linguarum Latine, Teutonice et Polonice potiora vocabula continens</i> 2. <i>Dobrego zdrowia rządzenie, przez wszystkie miesiące roczne, jako się każdy człowiek w yadle y w picciu y w puszczeniu krwi ma rządzić</i> (in Polish)
1534, Cracow	S. Falimierz	<i>O ziołach y mocy ich...</i> (in Polish)
1537, Cracow	Szymon from Łowicz	<i>Enchiridion medicinae...</i>
1542, Cracow	H. Spyczyński	<i>O ziołach tutecznych y zamorskich y o mocy ich...</i> (in Polish)
1564, Königsberg	J. Miączyński	<i>Lexicon Latino-Polonicum: ex optimis Latinae linguae scriptoribus concinnatum</i>
1. 1590, Cracow 2. 1610, Cracow	S. Syreński	1. <i>Quaestio [...] Medicae [...]</i> 2. <i>Herbarium</i>

which are distinct and the beginning periods of each of the categories emphasizes a milestone.

HERBAL AND MEDICAL TERMINOLOGY

The first period can be defined as that from the beginning of Polish writing till the 16th century, and was characterized by the AV being a part of natural and medical nomenclature (Table 1). The first work in Polish described the eye structures and was conducted by Witelion Ciołek in the 13th century [14]. At that time anatomy had not been developed as a separate discipline from medicine. This could be mainly attributed to the lack of scientific and autopsy studies in Poland. Most of the scientists and medical doctors were educated abroad and they were the only ones to perform autopsies, the most legendary being the autopsy of the Polish king Stefan Batory. During this time, the Polish AV was moderately included in the dictionary of herbal and medical terminology. Perhaps, the most valuable was the work of Franciszek Mymerus the medical doctor and the famous linguist of the Academy in Cracow. His book titled *Dictionarium trium linguarum Latine, Teutonice et Polonice...* was published in three languages (Polish, Latin and German) in 1528. Dr. Mymerus also published the guide for medical doctors regarding good health care which should be taught each month, and depends on how people eat; drink and making people bleed out (Table 1). The work also included many anatomical structures. Another work of that time period was that of the

herbalist Stefan Falimierz (1534) that was dedicated to herbs and their effectiveness (Table 1) [12]. Also the work of Szymon from Łowicz, a professor at the Jagiellonian University entitled *Enchiridion medicinae...* should be emphasized (Table 1). In his book as well as his therapeutic recipes, a small Latin–Polish dictionary with the names of the herbs, illnesses, and some body parts and organs was included. Another herbalist text regarding local and overseas herbs and its effectiveness was published by Hieronim Spyczyński and Szymon Syreński. They wrote the most famous herbal book in Europe at that time, *Herbarium* (Table 1). Szymon Syreński was the author of a dissertation about the importance of experimentation in medicine *Quaestio [...] Medicae [...]*. Jan Miączyński also used Polish medical terminology in his work. He wrote the book titled *Lexicon Latino-Polonicum ex optimis Latinae linguae scriptoribus concinnatum* (Table 1) [14, 27]. Authors of herbal terminology lists were motivated to create Polish anatomical equivalents because of the lack of a direct anatomical dictionary. In essence, they were a valuable and important source of the language roots of the next periods.

TEXTBOOKS WITH POLISH ANATOMICAL TERMINOLOGY

The second milestone of the PAT began in the year 1610, when the first Polish anatomical textbook was published. It pertained to the human anatomy of bones and joints and consisted of three parts, titled *De ossibus humanis tractatus tres* by Jan

Table 2. Polish anatomical Books — 2nd period of Polish Anatomical Terminology development — time 1610–1838

Year and place of edition	Name and affiliation	Title
1610, Lwow	J. Niedźwiedzki, Zamoyski's Academy	<i>De ossibus humanis tractatus tres</i>
1722, Warsaw	C.H. Kircheim, doctor of king August II	<i>Facies anatomica corporis humani</i>
1774–1777, Lwow	J. Krupiński, Collegium Medicum in Lwow	1. <i>Osteologia lub nauka o kościach ciała człowieka krótko dla pożytku cyrulików y powszechney potrzeby zebrana</i> (in Polish) 2. <i>Splanchnologia lub nauka o trzewach w ciele człowieka się znajdujących, z przydatkiem wykładów fizyologicznych</i> (in Polish) 3. <i>Nauka o naczyniach i nerwach w ciele człowieka się znajdujących</i> (in Polish) 4. <i>Nauka o myszkach y ścięgnach</i> (in Polish)
1786, Cracow	T.T. Weichardt, doctor of king Stanisław August Poniatowski	<i>Anatomia, to jest nauka poznania części ciała ludzkiego... ku pożytkowi felczerów i cyrulików</i> (in Polish)
1786, Cracow	F. Ryszkowski	<i>Stan człowieka zdrowego naturalny</i> (in Polish)
1790, Kalisz	L. Perzyna	<i>Anatomia krótko zebrana, chcącym się uczyć lekarskiej y cyrulickiej nauki</i> (in Polish)
1795, Warsaw	M. Cambon, Jagiellonian University, School for Surgeons in Warsaw	<i>Krótka myologia, w której muskuły są opisane podług części ciała ludzkiego na których się one znajdują</i> (in Polish)
1811, Cracow	S. Girtler, Jagiellonian University	<i>Nauka anatomii</i> (in Polish)
1810–1816, Warsaw	F.A. Brandt, obstetrician, Medical Warsaw Society	<i>Anatomia człowieka, vol. 1–4: osteology, angiology, splanchnology and myology</i> (in Polish)
1816–1817, Cracow	R.I. Czerwiakowski, Jagiellonian University	<i>Narządu powszechnego opatrzenia chirurgicznego, vol. 1–6</i> (in Polish)
1823, Vilno	W. Pelikan, Vilnius University	<i>Myologia czyli nauka o muskułach ciała ludzkiego dla pożytku uczących się...</i> (in Polish)
1828, Cracow	B. Gutkowski, Jagiellonian University	<i>Anatomia teoretyczna czyli nauka o budowie części składających organizm człowieka</i> (in Polish)
1829, Vilno	K.J. Muyschel, Vilnius University	<i>De synonymia myologica equini generis</i>

Niedźwiedzki known as Ioannes Ursinus Leopoldinus (Table 2). He was the head of the department of natural sciences in Zamoyski's Academy, earlier, he had earned his PhD in Italy under the very famous anatomists Fabricius ab Aquapendente Hieronymus. Niedźwiedzki's book was written in Polish. The first part of the book was about the names of bones. The author singled out the 248 bones of the human body, which included 49 bones of the skull. Nowadays, it is known that there are 214 human bones in total. The second part of the text was dedicated to the bony structures specifically to the processes. However, while Niedźwiedzki described the processes of the temporal bone (zygomatic, styloid and mastoid process) his description of the zygomatic process was completely different from what

is known presently. He named it as the "winding linked process". Additionally he included many of the Latin and Greek synonyms (*processus grasiformis, acufornis, jugularis, zygomatus*). One of the terms did identify the zygomatic process, which is currently still used today. In the last part Niedźwiedzki described the joints of the bones, which he named "commissions" [9, 13, 27].

At the same time many anatomical textbooks in Poland had been published. However, Niedźwiedzki's work was more focused on the AT, then those of his contemporaries. In 1722 Chrystian Henryk Kircheim, the doctor of king August II, published *Facies anatomica corporis humanis* in which he described all parts of the human body (Table 2). He published it in Polish from his German edition in

1706 titled *Vade mecum anatomicum* [20]. During the period of 1774–1777, the five-volume textbook by Jędrzej Krupiński had been printed. He was a Professor at *Collegium Medicum* in Lwow, the first four volumes consisted of anatomy and the last one was a surgery textbook. The four volumes are as follows: the first was about the bones, which was directed at medical healers, the second was regarding the science of the human body organs, followed by the science of the vessels and the nerves present in the human body, and lastly, the science of the muscles and tendons.

In 1786 Teodor Tomasz Weichardt (doctor of king Stanislaw August Poniatowski) published his work about how to get to know the human body parts, especially for people who are medical healers (Table 2). At the same time in Cracow, a well-known medical doctor Franciszek Ryszkowski, published work about the natural condition of healthy person with a small anatomy course and a dictionary of the AT [20].

Ludwik's Perzyna shortly collected anatomy book for all who want to study the medical and healing sciences with 22 pages of Polish–Latin and Latin–Polish vocabulary, which was published in 1790. It was kind of the short manual for surgeons. In 1795, Marc Cambon who taught anatomy at the Jagiellonian University and then at the School for Surgeons in Warsaw published a short text regarding the muscles of the human body (Table 2). The next scientist who contributed to development of anatomical knowledge and the increase in the PAT was Sebastian Girtler, a surgeon and obstetrician. He was the lecturer of forensic medicine and the history of medicine at the Jagiellonian University and he translated the book of Joachim Consbuch from German to Polish (Table 2) [17, 20].

Franciszek Antoni Brandt's was an obstetrician and founding member of the Medical Society of Warsaw. His work on human anatomy was published in 1816 (Table 2). It was a type of translation and compilation of the German textbooks [20].

During the years 1816–1817 the six volumes of the textbooks on surgery (Table 2) by Rafał Ignacy Czerwiakowski was published. He was a lecturer at the department of the anatomy, surgery and obstetrics at the *Collegium Medicum* of Jagiellonian University. The last part of Czerwiakowski's book has a dictionary of the human organs included. In 1823, Wacław Pelikan, the anatomy lecturer and the chair of the surgery department at the Vilnius University published a student's textbook on human muscles

(Table 2). In 1828 Błażej Gutkowski, a dissector at the anatomy department of the Jagiellonian University published his work which focused on the morphology of the human body organs (Table 2). The first volume was about the bones and the tendons (Table 2). The majority of books published in the Polish language have not served to significantly progress the PAT. Most of them had only partial benefit to Polish anatomical vernacular [9, 17].

The works of Karol Justus Muyschel completed the second period in the evolution and development of the PAT. He was the lecturer of surgery and human and animal anatomy in Vilno. In 1829 he published a book about the synonyms of the muscles in horses (Table 2).

DICTIONARIES WITH POLISH ANATOMICAL TERMINOLOGY

Józef Mayer (anthropologist) and Fryderyk Skobel (physiologist), both professors at the Jagiellonian University in 1838 published an anatomical and physiological dictionary (Table 3). This was the first work to be dedicated only to AT. It was a huge milestone, which started the third period of the evolution of the PAT. This dictionary characterized many cooperative efforts between the scientists who wanted to simplify, standardize and unify the anatomical and medical terms. It was the result of laborious and hard work, as well as a great deal of analysis of the previous works of both authors. They were also focused on the criteria of ensuring grammatical accuracy of the PAT [9, 14].

Mayer and Skobel were the first in Poland and also one of the first in the world to compare the earlier terms, and they ultimately chose the most substantial, semantically and grammatically correct anatomical terms. Mayer and Skobel summarized all previous Polish anatomical names and formed the criteria for the new terms currently used to this day. The rules were as follow:

1. Each term should be created based on the same matter and according to their meanings. There could be the exceptions made in cases pertaining to Latin names where there would be no betrayal of the earlier principles and changes made to the well-known and obvious names related to tradition. A good example is the "bronchus", the term originated from Greek (*broncho*) meaning moisten or dampen. The ancient scientists believed that solid food came to the stomach, and that the liquids ran to the lungs through the bronchi, automatically there

Table 3. Polish medical dictionaries — 3rd period of Polish Anatomical Terminology development — time 1838–1898

Year and place of edition	Name and affiliation	Title
1838, Cracow	J. Mayer, F. Skobel, Jagiellonian University	<i>Słownik anatomiczno-fizjologiczny</i> (in Polish)
1842, Cracow	J. Mayer, F. Skobel, Jagiellonian University	<i>Słownik niemiecko-polski wyrazów lekarskich</i> (in Polish)
1849, Cracow	J. Mayer	<i>Uwagi w przedmiocie zasad słownictwa lekarskiego</i> (in Polish)
1850, Cracow	L. Bierkowski, Jagiellonian University	<i>Wstęp do anatomii ciała ludzkiego</i> (in Polish)
1867, Warsaw	L.M. Hirschfeld	<i>Anatomia opisowa ciała ludzkiego</i> (in Polish)
1861, Vol. 4		<i>Vol. 4. Neurologia i aesthesiologia czyli opis układu nerwowego i przyrządów zmysłowych człowieka wraz z uwagami fizjologicznymi</i>
1863, Vol. 3		<i>Vol. 3. Układu naczyniowego człowieka (Angiologia) wraz z uwagami fizjologicznymi</i>
1867, Vol. 1		<i>Vol. 1. Opis układu kostnego i stawowego (Osteologia i arthrologia) wraz z uwagami fizjologicznymi</i>
1869, Vol. 2		<i>Vol. 2, Part 1. Opis układu mięśniowego i powięziowego (Myologia et aponeurologia) wraz z uwagami fizjologicznymi</i> <i>Vol. 2, Part 2. Opis układu trzewowego czyli nauka o wnętrznościach (Splanchnologia) wraz z uwagami fizjologicznymi</i>
1881, Cracow	S. Janikowski, J. Oettinger, A. Kremer	<i>Słownik terminologii lekarskiej polskiej</i> (in Polish)

the food would be moisturized. However the Polish term should be closely connected with describing the structure. Moreover each term should be short, and it would be best if it consisted of only one word.

- Names should be originally Polish, they shouldn't be newly created but found among already existing Polish terms. Polonisation (borrowing) of foreign terms is not allowed. If the substantial anatomical term was not commonly known and used then it should have the strict translations of the names generally recognized.

Mayer and Skobel's dictionary contains a historical outline of PAT with the references listed that were used during their preparation. The authors completed all anatomical, physiological and clinical terms in 260 printed pages. A few years after the dictionary had been published, in 1842, Mayer and Skobel published the German–Polish dictionary of medical terms (Table 3). They separated the anatomical terms from purely clinical names and they emphasized their individual features. In 1849, Mayer formed the rules for the term-formation of medical nomenclature once again. He published his findings in a book which examined the rules of medical terminology (Table 3).

In the middle of the 19th century, it became evident that professionals from various scientific disciplines were striving to standardize the terminology of their respective disciplines, particularly in the fields of medicine, biology, and the natural sciences. The increase in the numbers of scientific journals allowed individuals latitude in the sharing of skills and the publishing of individual thoughts. In 1850, in Cracow a book regarding the introduction to the anatomy of the human body had been published by Ludwik Bierkowski, a professor of the department of surgery at the Jagiellonian University (Table 3). The author warned against Polonisation of foreign-languages into professional Polish terms [20].

Between 1861–1869, four volumes of the book regarding the descriptive anatomy of the human body (Table 3) by Ludwik Maurycy Hirschfeld were published. What is strikingly significant is that these texts emphasized the practical use of the PAT. Hirschfeld was a Polish doctor and Professor of Anatomy who earned his degree in France. He spoke Polish with great difficulty, but continued to lecture in Warsaw on anatomy until 1875. Also, previously he was an anatomy lecturer in Paris at the École Pratique de Médecine for many years. He had a great

influence on the PAT. He was one of the anatomists who connected anatomical theory with clinical medicine and formed new terminology in clinical anatomy [20].

During this period the leading centre in the study of AT and related fields was Warsaw. The scientists were concentrated at the Medico-Surgical Academy and around it was set up a committee for preparing medical and natural terminology. As a result of the work of a large group of scientists a book regarding the principals of chemical terminology had been published (in Polish: *Zasady słownictwa chemicznego*). It is of great historical interest to note that all of the efforts put into developing the Polish AV was completed but never published, due to the fact the student who made a final copy of the manuscript was arrested, and the death penalty was imposed on him by the Russian Tsar's regime as a result of his political activity, before he could submit it for publication. After that misfortune all the hand-written manuscripts of this hard work in Warsaw went missing. In those types of situations, the Cracow centre had priority over the Warsaw centre to improve and develop the anatomical and medical terminology [9].

In 1847, the committee of AT at the Cracow Medical Society had been established once again. After a few years of hard work, in 1881, the dictionary of Polish medical terminology by Janikowski, Oettinger and Kremer had been printed (Table 3). The dictionary consists of 538 pages and additionally it included the anatomical and medical terms and in its equivalents five languages (Polish, Latin, German, French and English). Furthermore it was full of anthropological, veterinary and pharmacological terminology. After the dictionary had been edited, the Medical Warsaw Society appointed a special terminology commission to verify all terms included in this dictionary published under the auspicious Cracow Medical Society [13].

It brought about a number of debates and a great deal of editorial publishing in "Przegląd Lekarski" (in Cracow) and also in "Krytyka Lekarska" (in Warsaw). The school of Cracow was in favor of the literal translation of foreign-language terms; however the Warsaw school was more in favor of free translations. The disputes regarding the Polish medical terminology were eliminated once the textbook of AV had been published in Warsaw (Table 3) [9, 13].

THE FIRST STANDARD ANATOMICAL TERMINOLOGY WITH POLISH EQUIVALENTS

The completion of the AV manuscript in 1896, by Stanisław Krysiński started the last and fourth period in the evolution of the PAT [13]. It was the time of international collaboration of scientists. Three years before publishing the first PAT, the international AT committee had been set up and their rules had been generally accepted. Mainly German anatomists had supported the cooperation of works. The financial support was derived from the German scientific organizations as well. The international committee with Wilhelm His as the President had been active since 1889. All terminology created during the committee session were officially published during the 9th Meeting of Anatomical Society in Basle in 1895. The terminology they elaborated on and adopted, received the name BNA and the authors followed the similar general rules as the Polish scientists Majer and Skobel proposed previously. Finally, doctor His had published the BNA in 1895 as *Die Anatomische Nomenclatur Nomina Anatomica*. The Basle committee followed the subsequent rules:

- each part of the body (organ or structure) should have only one Latin name. Names should be grammatically and orthographically correct;
- the names should be short and simple. The exception is the sternocleidomastoid muscle, which was too common in use so there was no sense in changing it and giving the muscle another name. Each name should be chosen from the list of terms already existing. There were only a few new terms accepted;
- structures that have the same topography should have the same adjectives, i.e. femoral artery, vein and nerve. Adjectives should have their oppositions: right-left, major-minor. Terms lateral and medial proposed by Henle were carefully restricted;
- terms containing personal names should be eliminated if possible, specially if they are not historically correct;
- openings and structures passing through them like veins, arteries, and nerves should have the same name;
- names of the ligaments should contain structures to which they are attached.

The committee also took into consideration the progression of medical sciences and coined new medical terms, as well as new clinical terminology.

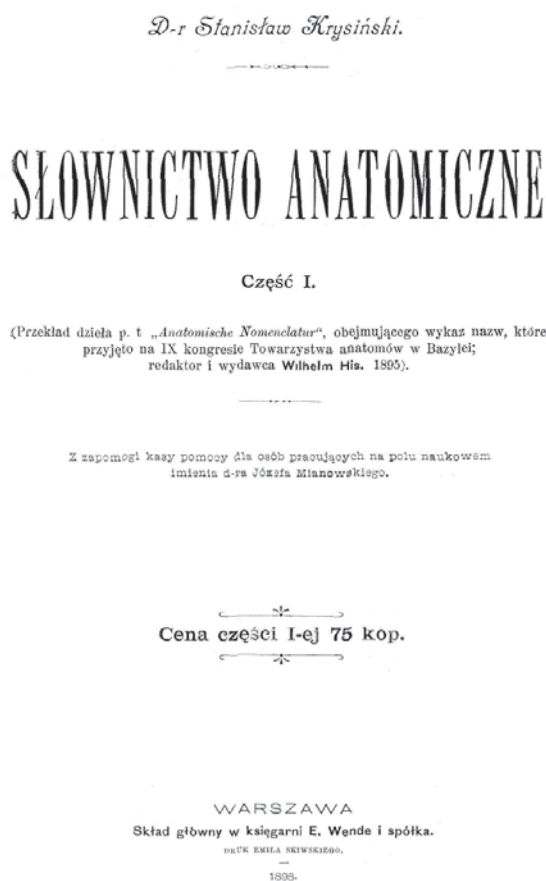


Figure 1. The title page of the first part of *Słownictwo anatomiczne* by St. Krysiński in the year 1898, the first Polish Anatomical Terminology book.

The more minute terms used in the many medical specialties were omitted. The eponyms of the terms originally taken from the names of scientists were treated as being optional, but were not considered to be the main term [2, 9, 13, 14, 23].

Three years after the BNA had been published (Fig. 1); the AV by Krysiński had been edited under the Russian partition of Poland (Table 4). Stanisław Dominik Krysiński first earned his diploma with a Masters in Mathematical and Natural Science, in 1868 from the Main School of Warsaw. Krysiński began an interest in medicine after he broke his leg and subsequently had complications. He decided to start studying medicine in Wien (Austro-Hungarian Empire), and afterward in Jena (Germany). In 1884, in Jena he wrote the manuscript about pseudomembranous enteritis and earned his M.D. During the scientific meetings in Jena, Krysiński delivered many

lectures in medicine, physics and chemistry. He was known as a thorough scientist, good lecturer and brilliant conversationalist. He did his work with a great deal of professionalism. However he could not do his habilitation due to the fact he was Polish and academic careers were reserved only for German scientists. Later on, Krysiński moved to Dorpat (now Tartu in Estonia) where he started to study for the purposes of gaining a medical license from the Congress of Poland (an integral part of the Russian Empire). He wrote his PhD thesis on toxicity and silver poisoning, which was at that time an ingredient of many drugs. In 1888 Krysiński started his medical practice in Warsaw and soon he became a well-known gynecologist and obstetrician. In 1889, he was elected as a member of the Warsaw Medical Society. However, Krysiński published eight different dissertations, but his book about AV was the work of his life. As a result of his sudden death he was unable to finish his work. His friends' and colleagues Dr. Markiewicz (general practitioner), Dr. Puławski (public health expert), Dr. Sawicki and Dr. Śmiechowski (both surgeons) collected and corrected his work (none of them were anatomist). Dr. Markiewicz printed the book, in the Wende press after Krysiński had passed away [9, 13, 14]. It was ultimately issued in three parts. The first part was a direct translation into Polish from Latin standards of the first international anatomical nomenclature (BNA). The second part was a Polish–Latin and Latin–Polish dictionary of anatomical terms organized in alphabetical order. The third part was the etymological dictionary of anatomical terms, which nowadays seems to be quite unique. The author did the work mainly by himself, and therefore many mistakes have been found in the book. The publication of the AV brought about many discussions and different opinions. The paediatric surgeon and history of medicine teacher, Józef Peszke was unforgiving in his criticism of Krysiński's work. He accused the author of using AV of many different meanings and grammatical mistakes as well as a great deal of neologisms. He also noted direct translations of some Latin terms into Polish, such as promontory. The Latin *promontorium* was translated into Polish as a mount, but *promontorium* directly means the foothills. All the criticism had been published in 1902, by Peszke in the book about the new AV (Table 4). Even though some errors have been present and the author must have known that this book wasn't perfect, it was however the first attempt of systematization of the PAT on such a big scale. It was one of the most

Table 4. Standard anatomical nomenclature with Polish equivalents — 4th period of Polish Anatomical Terminology development — time 1898–2004

Year and place of edition	Name and affiliation	Title
1898, Warsaw	S. Krysiński, St. Markiewicz, A. Puławski, B. Sawicki, A. Śmiechowski	<i>Słownictwo anatomiczne</i> (in Polish)
1889–1899, St. Petersburg	K. Noiszewski	<i>Anatomia opisowa ciała ludzkiego</i> (in Polish) <i>Anatomia czaszkojamu, vol. 1</i> (in Polish)
1902, Warsaw	J. Peszke	<i>O najnowszym słownictwie anatomicznem naszym</i> (in Polish)
1905, Cracow	T. Browicz, St. Ciechanowski, St. Domański, L. Kryński	<i>Słownik Lekarski Polski</i> (in Polish)
1958, Warsaw	M. Stelmasiak	<i>Mianownictwo anatomiczne (Latin–Polish)</i> (in Polish)
1976, Warsaw	M. Stelmasiak	<i>Mianownictwo anatomiczne (Latin–Polish)</i> (in Polish)
1979, Warsaw	M. Stelmasiak	<i>Mianownictwo anatomiczne (Latin–Polish)</i> (in Polish)
1983, Warsaw	W. Łasiński	<i>Mianownictwo anatomiczne (Latin–Polish)</i> (in Polish)
1989, Warsaw	R. Aleksandrowicz	<i>Mianownictwo anatomiczne (Latin–Polish)</i> (in Polish)
1997, Warsaw	R. Aleksandrowicz, J. Gielecki, W. Gacek	<i>Dictionary of anatomical terms (Latin–Polish–English)</i>
1999, Warsaw	J. Gielecki, W. Gacek, T. Wilczak	<i>Multimedia anatomical dictionary (Polish–English–Latin)</i>
2002, Lublin	Z. Urbanowicz	<i>Współczesne mianownictwo anatomiczne</i> (in Polish)
2004, Lublin	Z. Urbanowicz	<i>Podręczny słownik mianownictwa anatomicznego</i> (in Polish)

important works in the PAT and etymological studies. Krysiński not only translated the BNA into Polish but also formed rules for the creation of the first national anatomical language in the morphological sciences [13, 14]. He established and was guided by the following rules for the construction of the PAT:

- terms should be originally Polish;
- terms shouldn't be created but found among already existing Polish vocabulary;
- substantial terms if they weren't commonly known and used, should be strict translations of terminology generally known;
- each part of the body should have only one Latin name and each body structure should be assigned one Polish term;
- adjective names should be created based on the same pattern and according to their meanings.

Krysiński's AV had been used as a basic source of Polish and Latin AT by Bochenek and co-authors of the first edition of human anatomy [14]. In 1889–1899, a text about the descriptive anatomy of the human body by Kazimierz Noiszewski had been published in St. Petersburg. In Noiszewski's time only the first volume about the anatomy of the skull cavity (Table 4) was edited, which was greatly criticized

by Peszke, more so than Krysiński's work was. Noiszewski was the first who used the word "terminology" (in Polish: *mianownictwo*) not vocabulary (in Polish: *słownictwo*) [20].

Another important step in PAT was the printing of the first edition of the Polish medical dictionary in 1905 [14] (Table 4). It halted the discussions between different medical scientific centres in partitioned Poland (Warsaw, Cracow, Poznan, Lwow, Vilno). It was the last published work joining anatomical and medical terminology before the Polish Anatomical Society (PAS) had been accessed [1]. From then on, authors of anatomy handbooks didn't care any more for the correctness of the used PAT. They left those decisions up to the commissions set up especially for that purpose. One of those commissions established by the PAS was set up in 1956 with Mieczysław Stelmasiak, Józef Kołaczkowski and Wiesław Łasiński. In 1958 a new terminology had been published, which was based upon the *Nomina Anatomica Parisiensia* (NAP) in 1955 and the anatomical, histological and clinical disciplines and linguistic consultant's collaboration [2, 26]. After NAP many national as well as international works and papers under the AT

were published. The differences in the names of the structures were emphasized and the anatomical terms started to abide by clinical medicine [10, 11, 16, 18, 26]. Professor Stelmasiak released the second edition of the nomenclature with corrections made according to the congress in New York, Lenin-grad and Tokyo in 1976 (Table 4). The third edition was released in 1979 [26]. The fourth one was published in 1983 by Łasiński after the congress in Mexico (Table 4). In 1984, after Professor Stelmasiak and Kołaczkowski passed away, and after Professor Łasiński retired, a new commission was set up. In 1984 the new committee had been appointed by the PAS. In 1989 the members, including Professor Aleksandrowicz as the president, with Professor Gołąb and Narkiewicz, ratified and finally issued the 5th PAT, which is obligatory up to this date [2]. In 1997, *Dictionary of anatomical terms Latin–Polish–English* was published by Aleksandrowicz et al. [3]. The last published books with AT was regarding the contemporary use of AT in 2002 a dictionary and handbook of the AT was published by Zygmunt Urbanowicz [29, 30] (Table 4).

The establishment of guidelines for AT is of great importance. Often it is difficult to navigate through obscure and numerous terms. For instance, 50,000 words that existed described the various structures of the human body, but after the BNA, only 5,528 terms remained, which made it much more unified and practical for all physicians and scientists. The immensity of this work is very difficult to deny. Development of science requires the continuous adjustment of terminology and that is the reason why it was so important to find a common international language for anatomists.

In 1998, new members of the Federative Committee on Anatomical Terminology (FCAT) published the final version of the international AT, called *Terminologia Anatomica*. It is worth mentioning that the FCAT confirmed Latin as the basic language of AT, but the first edition English equivalents were also published [8]. This brings back an old debate of which language to use that can be universally designated, for AT. The debate shifts between Latin and English. Ian Whitmore points out that Latin is viewed as a dead language, with no further linguistic developments. This makes it ideal, because it does not belong to one country or nation. He characterized it as global design for the whole morphological world. This means that, out of the number of advantages that this classical language offers, its constancy, international character, and neutrality

(unlike national languages) should be accentuated. There are those who would disagree, international committees are under great pressure from the editors of international journals to omit Latin altogether. In 1991 the editor of the British Medical Journal declared that Latin quotations would no longer be acceptable in this periodic [8, 32].

While the debate rages, it can be noted that the use of English in contemporary AT may in fact replace Latin, after all English is more commonly spoken, and for the most part is still Latinated. This presents a unique advantage for the PAT, since a greater number of professional individuals in Poland speak English, and may find using English more advantages to Latin.

During the past decade, the computer revolution necessitated the creation of an interactive dictionary with word alignments. In 1999, one year after the publishing of the hard copy of *Terminologia Anatomica* [8], the CD-ROM version was available. This can be viewed as a great progress, due to the fact it makes anatomical terms more readily available to a more computer savvy audience. Currently, the new multilingual dictionaries are continually being edited. PAT also has three interactive dictionaries as the first trilingual Polish–Latin–English anatomical dictionary [3, 9]. Similarly, the English–Swedish interactive medical dictionary has been prepared on the basis of new computer algorithms, especially created for the translation of medical professional terms [19, 21, 22].

A greater question for the future may be directed at computer software that translates anatomical terms. Which terms will be wildly accepted and in which language may be a source of great debate. Using a technological approach may have its benefits, primarily because it is devoid of emotion or culture. However, insuring that the right information, and universally accepted terminology is presented may prove to be an even greater obstacle. Such points of confusion can even be seen when one reviews *Terminologia Anatomica*, while most individuals did not have issue with the terminology presented, there were individuals who questioned the presentation of the material, particularly the first column involving numbers and letters [5, 8, 21, 22].

The co-operation, determination, and debates, which persisted in the development of the PAT, are a symbol of how a nation can come together to create professional unity, even when the country itself has been geographically divided. The debates regarding AT will surely continue, but a foundation

has been established, with the assistance of great Polish physicians, scientists and anatomists, which will allow for sound conclusions to be found.

REFERENCES

- Aleksandrowicz R (1980) From the history of the Polish Anatomical Society and the International Federation of Anatomical Societies. *Folia Morphol*, 39: 393–395.
- Aleksandrowicz R (1989) *Mianownictwo anatomiczne*. PZWL, Warsaw.
- Aleksandrowicz R, Gielecki J, Gacek W (1997) *Słownik mian anatomicznych łacińsko-polsko-angielski*. PZWL, Warsaw.
- Banay GL (1948) An Introduction to Medical Terminology I. Greek and Latin Derivations. *Bull Med Libr Assoc*, 36: 1–27.
- Bishop MG (1992) What's in a name? *J R Soc Med*, 85: 249–252.
- Debakey ME (1991) A surgical perspective. *Ann Surg*, 213: 499–531.
- Donath T (1969) *Anatomical Dictionary*. Akademiai Kiado. Budapest.
- FCAT (1998) *Terminologia Anatomica*. International Anatomical Terminology. Thieme, Stuttgart. New York.
- Gielecki J, Wysocki J (1997) Historia polskiego mianownictwa anatomicznego. In: Gielecki J, Gacek W, Wilczak T ed. *Multimedialny Słownik Anatomiczny*. CD-ROM. PZWL, Warsaw.
- Grignon B, Roland J, Braun M (1995) Employment of the anatomical terminology of the nomina anatomica in the radiologic literature. *Surg Radiol Anat*, 17: 289–291.
- Hauser J, Usajewicz R (1964) Apropos of the anatomical nomenclature in otorhinolaryngology. *Otolaryngol Pol*, 18: 429–432.
- Jankowiak LA (2006) *Słownictwo medyczne Stefana Falimirza. Początki polskiej renesansowej terminologii medycznej*. Vol. 2. SOW, Warsaw.
- Krysiński S (1898) *Słownictwo anatomiczne*. Wende i Spółka, Warsaw.
- Łasiński W (1959) Modern anatomical terminology. *Pol Przegl Chir*, 31: 321–331.
- Mareckova E, Simon F, Cerveny L (2002) Latin as the language of medical terminology: some remarks on its role and prospects. *Swiss Med Wkly*, 132: 581–587.
- Message MA, Anderson RH (1996) Towards a new terminology for clinical anatomy, with special reference to the heart. *Clin Anat*, 9: 317–329.
- Michejda K (1953) Dictionary of historical development of Polish medical terminology with special reference to anatomical and surgical terminology. *Pol Przegl Chir*, 25 (suppl.): 1–16.
- Moseley EG (1961) Medical dictionaries and studies of terminology. *Bull Med Libr Assoc*, 49: 374–395.
- Nyström M, Merkel M, Ahrenberg L, Zweigenbaum P, Petersson H, Ahlfeldt H (2006) Creating a medical English-Swedish dictionary using interactive word alignment. *BMC Med Inform Decis Mak*, 12: 6–35.
- Reymond J (2006) *Twórcy polskich podręczników anatomii człowieka i ich dzieła (XVIII–XIX wiek)*. Biga-Druk, Radom.
- Rosse C, Mejino JL (2003) A reference ontology for biomedical informatics: the Foundational Model of Anatomy. *J Biomed Inform*, 36: 478–500.
- Rosse C (2004) Terminologia Anatomica; Considered from the perspective of next-generation knowledge sources. *J Biomed Inform*, 36: 478–500.
- Samkowicz-Jelisiejew T (1958) New anatomical nomenclature. *Pol Tyg Lek*, 13: 686–688.
- Sierociński W, Sierocińska K (1984) Inaccuracies of anatomical terms in monographs, textbooks and clinical periodicals. *Pol Tyg Lek*, 39: 309–311.
- Singer C (1959) The strange histories of some anatomical terms. *Med Hist*. 3: 1–7.
- Stelmasiak M (1976) *Mianownictwo anatomiczne*. PZWL, Warsaw.
- Szpilczyński S (1979) Jan Ursinus from Lwow, author of the 1st anatomical dissertation *De Ossibus Humanis* with Polish nomenclature published in Zamość in 1610. *Arch Hist Med*, 42: 441–449.
- Ślusarczyk K, Misiolek M, Namysłowski G, Ślusarczyk R (2004) The review of anatomical and clinical terminology concerning vocal folds. *Otolaryngol Pol*, 58: 1023–1026.
- Urbanowicz Z (2002) *Współczesne mianownictwo anatomiczne*. Czelej, Lublin.
- Urbanowicz Z (2004) *Podręczny słownik mianownictwa anatomicznego*. Czelej, Lublin.
- Warwick R (1978) The future of Nomina Anatomica: a personal view. *J Anat*, 126: 221–223.
- Whitmore I (1999) Terminologia anatomica: new terminology for the new anatomist. *Anat Rec*, 257: 50–53.