Acta Ophthalmologica

History of Ophthalmology

Forgotten achievements of Polish retinal research in international ophthalmology

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ABSTRACT.

The development of ophthalmology was greatly restricted in Poland in the 19th century, because it was partitioned and occupied by its three dominant neighbours. Polish medical universities were closed, and in Polish hospitals, only clinical work was possible. Those who wanted to study medicine and become ophthalmologists were forced to live and work in exile. Nevertheless, there were some Polish ophthalmologists at that time who had some international influence on retinal research. They contributed to colour vision physiology and pathology, ophthalmoscopy, retinal detachment and gyrate chorioretinal atrophy and congenital choroidal coloboma. The most prominent were Wiktor Szokalski, Ksawery Gałęzowski, Bolesław Wicherkiewicz, Kaziemierz Noiszewski and Michał Borysiekiewicz.

Acta Ophthalmol. 2012: 90: 193–198

doi: 10.1111/j.1755-3768.2009.01856.x

Introduction

The invention of the ophthalmoscope by Hermann von Helmholtz in 1851 was a breakthrough in ophthalmology. It opened the way to study the anatomy and pathology of the fundus of the eye. However, this development was greatly restricted in Poland, because Poland was partitioned and occupied by its three neighbours: Russia, Prussia and Austria in the 19th century. Although medical studies in Poland had a long tradition and dated back to the establishment of the Academy of Cracow in 1364, they were significantly affected by the politics of the occupiers. The Medical University of Warsaw was shut down many times, and the level of education at the university dramatically deteriorated. A few years later, it was transformed into the Russian University. Also, the Faculty of Medicine of the Vilnus University was closed repeatedly before it was finally shut down, whereas Lviv University did not have a medical faculty at that time.

This difficult situation of education at Polish universities forced many students to study abroad. Those who wanted to specialize and conduct research spent many years living in exile. The author wishes to describe the outstanding work conducted by researchers of Polish nationality, who devoted their research mainly to structure, function and diseases of the retina, regardless of the place of their residence and whether they published in Polish or any other language.

Research achievements of Polish ophthalmologists working in exile

Wiktor Feliks Szokalski (1811–1891), founder of 19th century Polish ophthalmology, entered Warsaw University in 1827, and during the 1831 October Resurrection (war against Russia), he worked as a physician in the Polish Army and received the most distinguished Polish Order of Virtuti Militari. After the war was lost, he had to emigrate. He resumed his medical studies and graduated in Giessen in 1834, where he also presented his doctoral dissertation [Szokalski 1842;]. He later spent 2 years in Heidelberg and Wurzburg. Then, he worked for 12 years from 1836–1848 in France where he had to retake his final medical exam and where he wrote another doctoral thesis titled 'On monocular diplopia or double vision in one eye' (La diplopie unioculaire ou la double vision d'un oeil''). He was a pupil of Sichel, edited the journal 'L'Esculape' and founded in 1844 the Parisian Society of German Physicians. In 1859, Albrecht von Graefe gave a lecture on papilledema with cerebral afflictions. He was offered a professorship of ophthalmology in Krakow; however, the Austrian authorities refused the approbation. [Hirschberg 1991] Finally, he came back to Poland in 1853 and settled in

Warsaw, which was under Russian rule at that time. There, he had to sit his medical examinations for the third time. In 1858, he became the head of the Prince Lubomirski Ophthalmic Institute, the first eye department in Poland, and he became the professor of ophthalmology and otology at the 'principal school' of Warsaw, the position he had previously resigned from after the school was transformed into a Russian university. He was a teacher and tutor of many Polish ophthalmologists, including Ksawery Jasiński (who later worked in Kharkiv, Ukraine), Zenon Cywiński (who later worked in Vilnius, Lithuania), Walenty Kamocki, Maurycy Likiernik, Wiktor Jodko-Narkiewicz, Bolesław Gepner and Emil Wolfring.

Szokalski published more than 200 articles in German, French, Russian and Polish on various ophthalmic subjects. His main contributions included the first Polish two-volume textbook of ophthalmology [Szokalski 1869] (later translated into Russian) and publications on colour vision physiology and pathology [Szokalski 1840, 1842]. The latter was a thorough review of the contemporary knowledge of the subject, but Szokalski introduced also his own original ideas concerning the role of the brain in colour vision and tried to establish new types of colour blindness.

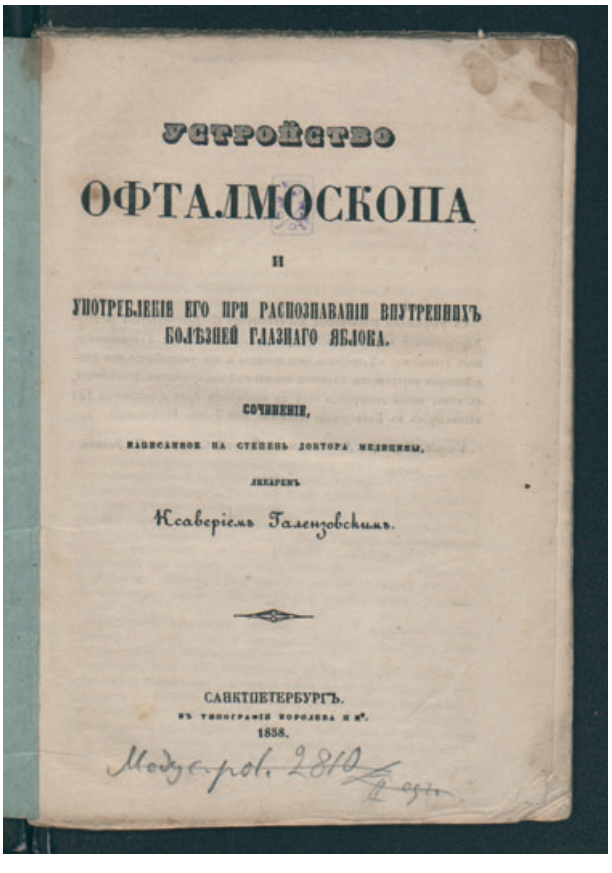
Another ophthalmologist, Gałęzowski (1832–1907) (Fig. 1), presented his doctoral dissertation on ophthalmoscopy in St Petersburg in 1858 [Gałęzowski 1858;] (Fig. 2) and then left for France, where he stayed until the end of his life [Schett 1996]. From 1859–1864, Gałęzowski was an assistant at Desmarre's eye clinic in Paris; in 1865, he was given the title of doctor of medicine with the dissertation entitled 'About the pathologic changes of the optic nerve and the cerebral diseases from which they originate' [Hirschberg 1992]; in 1867, he founded a private clinic, which became one of the best (in addition to the clinic of Wecker) ophthalmic hospitals in Paris. He also worked in other Parisian hospitals, in collaboration among others with Charcot. Hirschberg wrote that he was assumed as one of the best practitioners and surgeons in ophthalmology in those days. He was a teacher of many French, including H. Parinaud, Daguenet, Koenig, Remy, H. Parent, Despagnet, Beauvois and O. Parisotti, and his son Jean as well as Polish ophthalmologists, including B. Ziemiński, K. Bein and J. Szymański [Hirschberg 1992].

He founded the first French monthly ophthalmic journal 'Journal d'ophtalmologie' in 1872, which was continued from 1879 to 1907 as 'Recueil d'ophtalmologie'.

Gałęzowski was one of the most distinguished Polish ophthalmologists. He was the author of hundreds of articles and 12 books, on nearly every aspect of ophthalmology, including his major interests in ophthalmoscopy, retinal chromatoscopy, treatment of glaucoma, cataract and retinal detachment [Amalric 1999; Hirschberg 1992]. He also advocated the use of gelatine discs for the closure of cataract operation wounds. [Heitz 2005] Because of his collaboration with Jean-Martin Charcot (1825–1893) at the Salpetriere, he gained a great deal of experience with neurological diseases, and he became the pioneer of the use of ophthalmoscopy in the diagnosis of central nervous system diseases (cerebroscopy) [Sommer 1866; Gałęzowski 1866].

Other probably less known Polish ophthalmologists were also forced to live in exile. Among them were Józef Talko (1838–1906), Kazimierz

Fig. 1. Ksawery Gałęzowski (1832–1907). (Library of the Department of the History of Medicine, Poznań University of Medical Science, Poland).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ОФТАЛМОСКОПА

и

употребленія его при распознаваніи внутреннихъ болѣзней глазнаго яблока.

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САНКТПЕТЕРБУРГЪ.

1858.

Fig. 2. Frontpage of Gałęzowski's doctoral thesis entitled '*The ophthalmoscope and its application in the diagnosis of internal diseases of the eye*'. St. Petersburg 1858. (Jagiellonian Library in Cracow).

Noiszewski (1859–1930) and Michał Borysiekiewicz (1848–1899). Talko spent his early years in Russia, he studied and specialized in ophthalmology in Kiev and, then, worked in the Caucasus. He returned to Poland in 1872. Noiszewski graduated from the University of Moscow and lived in St.Petersburg for many years. He presented his doctoral and postdoctoral dissertations there. In 1920, 2 years after Poland regained independence, he became the Head of the Ophthalmology Department in Warsaw. Borysiekiewicz (Fig. 4), a student of Ferdinand Arlt (1812–1887), and Karl Stellwag von Carion (1823–1904) in Vienna presented his postdoctoral dissertation in Innsbruck, where in 1887, he was appointed Professor of Ophthalmology. In 1892, he became the head of the Eye Department at the University of Graz.

Bolesław Wicherkiewicz (1847–1915) spent a part of his life abroad (Fig. 3). [Grzybowski 2007] He was persuaded by Bernhard von Langenbeck (1810–1887), a professor in Berlin, to continue his specialty training in Wroclaw in Professor Richard Foerster's (1825–1902) Ophthalmology Department. Next, recommended by Foerster, he spent 2 years in the Ophthalmology Department of Wiesbaden University, headed by Alexander Pagenstecher (1828–1879) who was well known all over Europe. Then, he worked in the best European ophthalmology centres with William Bowman (1816–1892) and George Crichett's (1817–1882) in London and with Louis de Wecker (1832–1906) and Photinos Panas (1832–1903), in Paris. He also worked in Heidelberg, Leipzig and Halle. Finally, he returned to Poznan in 1877 to start his own ophthalmology practice [Orłowski 1974]. Between 1877 and 1895, he founded and developed the largest and internationally best known 19th century ophthalmic hospital in Poland. In 1895, the hospital had a total of 80 beds. Emil von Behring, who later received a Nobel Prize, was an assistant to Wicherkiewicz in Poznań between 1881 and 1888, and co-author of an article [Behringer & Wicherkiewicz 1882]. With his extensive experience gained abroad, Wicherkiewicz was well prepared to become in 1895 the head of the most important ophthalmology centre in Poland – the Department of Ophthalmology at the Jagiellonian University in Cracow. He published about 300 scientific reports in Polish, German and French, including among others original contributions on oculoplastic surgery (operation of epicanthus and lid coloboma), cornea transplant, glaucoma surgery (sclerotomia cruciata posterior superficialis), cataract surgery (cataract irrigation technique), clear lens surgery in myopia and many reports on new ophthalmic medications (pilocarpine, cocaine, novocaine, pyoktanin, dyonin, aspirin, antipirin, etc.), as well as papers on aetiology and the treatment of retinal detachment. [Hirschberg 1991; Orłowski 1969]. In 1899, Wicherkiewicz founded the first Polish ophthalmic journal 'Postęp okulistyczny'.

Fig. 3. Bolesław Wicherkiewicz's (1847–1915). (Library of the Department of the History of Medicine, Poznań University of Medical Science, Poland).

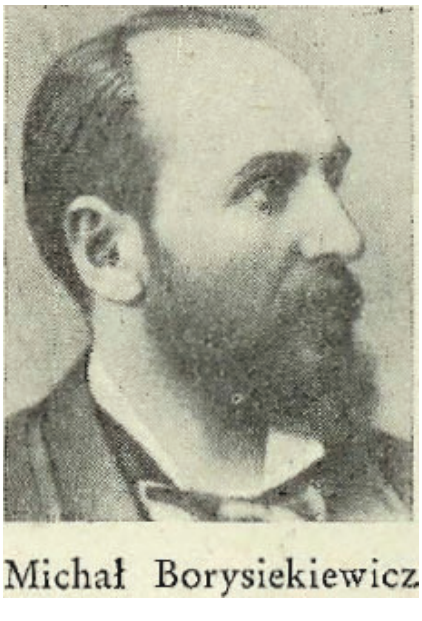

Fig. 4. Michał Borysiekiewicz (1848–1899). (Library of the Department of the History of Medicine, Poznań University of Medical Science, Poland).

The fact that those who wanted to study medicine and carry out research in ophthalmology had to live abroad had some advantages. The necessity to use the languages of the occupying states led to a situation where Poles became fluent in foreign languages, such as Russian, French and German. Many Polish ophthalmologists studied in renowned European centres, such as Vienna and Paris. They completed internships in the best research hospitals all over Europe. They had direct access to the latest international research in retinal physiology and pathology. They established personal contacts with European researchers in the field, published extensively in foreign professional journals and attended international medical conferences.

It should be mentioned that the scientific potential of many Polish ophthalmologists was not fully used abroad. Polish ophthalmologists living in exile were often perceived as foreigners, and they did not fully manage to assimilate with a foreign society. Although in the second half of the 19th century, the development of ophthalmology in many European countries was based on interdisciplinary cooperation among clinicians, pathologists, physiologists and often physicists, Polish ophthalmologists had to work individually. Their achievements were solely based on their own work and their own observations. Clinical publications on retinal pathology by Gałęzowski, Talko and Noiszewski may serve as good examples of this state of affairs [Grzybowski 2008].

Influence of Polish retinal research on international ophthalmology

Ophthalmoscopy was a breakthrough in the diagnostics of ophthalmology in the middle of the 19th century. In spite of the complicated political

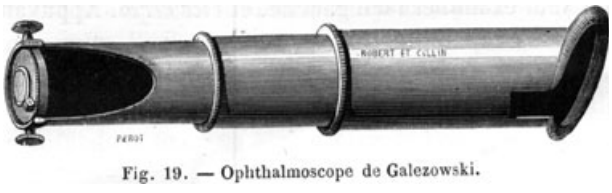

Fig. 19. — Ophthalmoscope de Galezowski.

Fig. 5. Gałęzowski's ophthalmoscope from 1862. From: Gałęzowski K, Traité Iconographique d'Ophtalmoscopie, Paris 1876 (J.P. Wayenborgh, private collection).

situation, numerous Polish publications on the topic indicate that knowledge in this area was very quickly assimilated in Poland [Sławikowski 1853; Szokalski 1855, 1869; Narkiewicz-Jodko & Gepner 1869–1870; Kośmiński 1875; Majer 1857]. However, original contributions were due only to Jodko-Narkiewicz and Gałęzowski. The first, introduced a modification of Girard-Teulon's binocular ophthalmoscope (Fig. 7) [Jodko-Narkiewicz 1864; Orłowski 1979]. The second was the author of numerous publications on this subject, including a textbook on ophthalmoscopy in 1858 [Gałęzowski 1858], papers on *cerebroscopy* [Sommer 1866; Gałęzowski 1866] and presentations of some of his own models of ophthalmoscopes [Gałęzowski 1860, 1862, 1866] (Figs 5 and 6).

In 1899, Adam Bednarski (1869–1941) presented one of the first descriptions of gyrate chorioretinal atrophy. [Bednarski 1899] Bednarski described '*the symptom of night blindness, decrease in central and peripheral visual acuity, colour blindness and decreased light perception'*. These features together with myopia and the relatively young age of the patient (23-years-old) were consistent with the contemporary and the present descriptions of the disease. Bednarski observed in ophthalmoscopy '*the signs of the early optic nerve and retina atrophy, (…) atherosclerosis of the choroid, which near around the optic disc produced the complete atrophy of the choroid, and further created a ring 2–3 discs wide, in which vessels are narrowed by their thickened walls. (…) the picture of retinal epithelium atrophy with the rest of it in the form of islands communicating with each other by threads, thus producing a network between retinal and choroid vessels'*. The characteristic features of the presented description were circular choroidal atrophy, significant narrowing of blood vessels and pigment lesions of the retina.

Fig. 20. — Mode d'emploi de l'ophthalmoscope de Galezowski (*).

Fig. 6. Gałęzowski's ophthalmoscope during an examination. From: Gałęzowski K, Traité Iconographique d'Ophtalmoscopie, Paris 1876 (J.P. Wayenborgh, private collection).

Apart from the clinical aspect, the author also presented some interesting information about the history of the disease, including earlier descriptions by Cutler in 1895, Fuchs in 1896, Jacobson in 1888 and by Hensel in 1899. In 1895 at the Ophthalmology Society session in Heidelberg, he presented the seventh case of gyrate retinitis in the world literature. In 1900, Bednarski described two more cases of the disease [Bednarski 1900a] and published the results abroad [Bednarski 1900b]. These reports were cited up to modern times [Takki & Simell 1974]. For many years, gyrate atrophy was rarely diagnosed, probably because of the similarity with retinitis pigmentosa and choroideremia. In the first reports of Cutler and Fuchs, the disease was considered as a type of retinitis pigmentosa [Cutler 1895; Fuchs 1896]. It was described later, including the report of Bednarski, as a separate disorder.

In 1885 and 1886, Konrad Rumszewicz (1870–1905) published some descriptions of congenital choroidal coloboma [Rumszewicz 1885, 1886]. This was the eighth description of a unilateral coloboma of the macula [Sorsby 1935].

Important papers in retinal anatomy and physiology

Polish 19th century ophthalmologists had some publications on retinal anatomy and experimental physiology. Jan Mile (1789–1839) was the first professor of physiology at the University of Warsaw. It is believed that his major works were lost in manuscripts, including his lectures in physiology and his treatise on perceptions and sensations received by the brain [Ostrowska 1976]. His two most important works, on human optics [Mile 1837] and colour vision [Mile 1839], were widely cited in the 19th and the 20th century. [Helmholtz 1924; Stenström 1945]. For example Hermann von Helmholtz (1821–1894) in his Optics discussed these papers in the following chapters: Chromatic Aberration of the Eye, Dioptrics of the Eye, Refraction of the Eye, Optical System of the Eye, the Compound of Colours and the Perception of Vision [Helmholtz 1924]. In his work on colour vision [Mile 1839], he analysed the rules of the creation of secondary colours and the conditions needed for the perception of complimentary colours. He performed an experiment, in which different colours were presented to corresponding areas of the retinas of both eyes, and he observed no secondary colour perception. Although the reference to Goethe [Goethe 1810] did not appear in the paper, Mile presented a very similar concept of colour vision.

Borysiekiewicz conducted histological studies of the human retina and the retinas of animals. [Borysiekiewicz 1887] In his 1887 work, he presented detailed descriptions of the human retina as well as of the retinas of an elephant (Fig. 8), a tiger, a leopard and a cat [Borysiekiewicz 1887]. The descriptions were richly illustrated. He drew attention to differences in the individual layers of the retina and the structure of individual cellular elements. For example, he observed that the elephant's retinal ganglion cells are usually of a circular shape, whereas nearby the fovea, they become pear shaped. On average, they have a couple of projections, and it is only close to the fovea that they are of a bipolar nature. On the other hand, two large projections

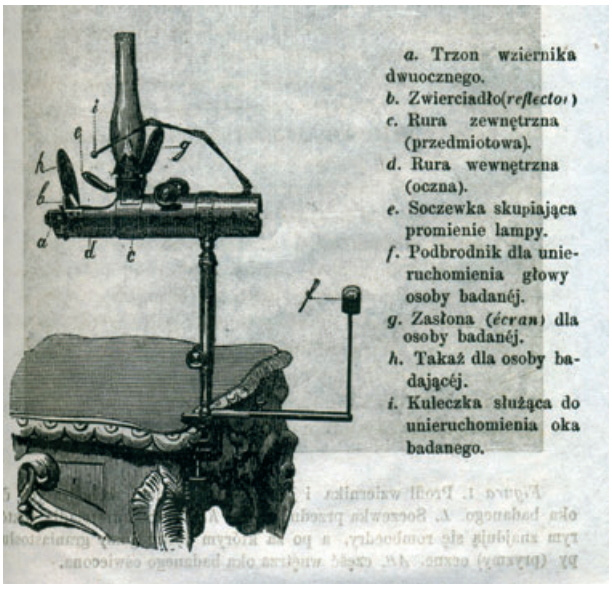

Fig. 7. Jodko-Narkiewicz ophthalmoscope, From: Jodko-Narkiewicz W, *Wziernik dwuoczny p. Girard – Teulon*. Pamiętnik Towarzystwa Lekarskiego Warszawskiego [Memoirs of the Warsaw Medical Society] 1864; 52 (Library of the Department of the History of Medicine, Poznań University of Medical Science, Poland).

running across the retina are typical of the tiger's and the leopard's retinal ganglion cells. [Borysiekiewicz 1887] Borysiekiewicz also analysed grain-like structures in the granular layers in different animal species and in humans. [Borysiekiewicz 1887] In his later work, Borysiekiewicz discussed, among others, the issue of light-sensitive structures and their location in the retina. [Borysiekiewicz 1894] Borysiekiewicz doubted that rods and cones were those structures. He considered them to be the ends of Müller cells, to which he ascribed a very important function (the only role that Müller cells were considered to have at that time was related to the supportive structures of the retina). [Borysiekiewicz 1894] Borysiekiewicz noticed that the impact of light on the retina may cause some changes, e.g. the translocation of some elements, and that it was not possible to detect this by means of histological studies alone. [Borysiekiewicz 1894] In both of his papers Borysiekiewicz widely discussed earlier contributions to the histology of the retina, including among others, those of Ernst Brücke, Heinrich Müller, Johannes Müller, Albert von Kölliker, Gottfried Treviranus, Max Schultze, Wilhelm Krause, Gustav Schwalbe, Friedrich Merkel, Jan Dogiel, Jakob Henle, Franz Boll, Wilhelm Kühne, Julius von Michel and Alfonso Corti.

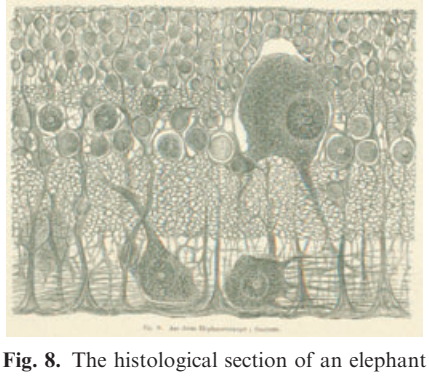

Fig. 8. The histological section of an elephant retina with a presentation of ganglion cells. From: Borysiekiewicz M, *Untersuchungen über den feineren Bau der Netzhaut*, Leipzig und Wien, 1887. (the Jagiellonian Library in Cracow).

Studies on retinal detachment

The issue of retinal detachment was scientifically and clinically challenging both for Polish and international ophthalmology. Studies by Rydel (1863-1864, 1864, 1884), Wicherkiewicz (1889) and Szulisławski (1891) were as good as those dealing with the same issue published abroad. Moreover, Gałęzowski's research in the pathogenesis and treatment of retinal detachment was prolific. He experimented with a number of new methods of retinal detachment treatment, including the injection of iodine solution, [Vogt 1936], retinal herniation in the scleral wound [Gałęzowski 1876], iridectomy [Gałęzowski 1872a,b], catgut suture [Gałęzowski 1902a] and the incision of the posterior eyeball (posterior sclerotomy) [Gałęzowski 1895].

Although these procedures appeared finally to be ineffective, they played their role in the process of searching for new methods of treatment in this disease.

The real progress came when he introduced the cauterization of retinal holes in 1902 [Gałęzowski 1902] and so became the first ophthalmologist to perform ignipuncture of the retinal tear once the subretinal fluid had been released. [Vogt 1936] As he was considered in the same study that Lebers hypothesizes that the retinal tear was the cause of the detachment as erroneous, Gałęzowski probably did not understand the mechanism of retinal detachment. For him, it resulted from a fistule in the zonule through which the aqueous passes beneath the choroid. The aim of his treatment was 'to obliterate the fistulating communication between the bag of the detachment and the anterior chamber' [Gałęzowski 1902]. It needed the painstaking work of Gonin with carefully checking and rechecking the hypothesis that the retinal hole is the cause, and 20-year-long accumulation of evidence to slowly convince the ophthalmic community that closure of the retinal hole was the prerequisite to healing rhegmatogenous retinal detachment [Gonin 1933, 1934].

Conclusions

To be able to study medicine and carry out research in ophthalmology, many Polish ophthalmologists had to live in exile. Despite this, some Polish ophthalmologists had a considerable impact on international retinal science at that time, e.g., Szokalski's studies in colour vision physiology and pathology [Szokalski 1840], Galęzowski's research in the area of ophthalmoscopy [Gałęzowski 1858] and retinal detachment [Gałęzowski 1872a, 1872b, 1890, 1895, 1902a], Bednarski's works on gyrate chorioretinal atrophy [Bednarski 1899] and Rumszewicz's studies on congenital choroidal coloboma. [Rumszewicz 1885, 1886].

Acknowledgement

The author thank Dr Monika Połczyńska, The AMU School of English, Poznań, Poland for her help with

the proofreading of the English text and Mr. Jean-Paul Wayenborgh, J.P. Wayenborgh Publishing, for his consultations and for supplying the pictures of Gałęzowski ophthalmoscopes. The author has no financial support or relationships that may pose a conflict of interest.

References

Amalric PM (1999): The Gałezowski tradition in Paris. Doc Ophthalmol **98**: 105–113.

Bednarski A (1899): O przypadku zaniku okrężnego naczyniówki i siatkówki (atrophia gyrata chorioideae et retinae) z miażdżycą (sclerosis) naczyniówki [On a case of gyrate choroidal and retinal atrophy (atrophia gyrata chorioideae and retinae) along with choroidal sclerosis]. Przegląd Lekarski [Med Rev] **47**: 637–639.

Bednarski A (1900a): Dalsze dwa przypadki zaniku okrężnego naczyniówki i siatkówki (atrophia gyrate chorioideae et retinae) [Two further cases of gyrate chorioretinal atrophy (atrophia gyrata chorioideae and retinae)]. Postęp Okulistyczny **10**: 389–393; 11: 425-429.

Bednarski A (1900b): Über einen Fall von Atrophia gyrata chorioideae et retinae mit Sklerose der Aderhaut. Archiv f. Augenheilk **40**: 420.

Behringer E & Wicherkiewicz B (1882): Ein Fall von metastasirendem Chlorosarkom. Berliner Klinische Wochenschrift **19**: 509–513.

Borysiekiewicz M (1887): Untersuchungen über den feineren Bau der Netzhaut. Toeplitz & Deuticke: Leipzig und Wien.

Borysiekiewicz M (1894): Weitere Untersuchungen über den feineren Bau der Netzhaut. Leipzig und Wien: F. Deuticke.

Cutler CW (1895): Drei ungewöhnliche Fälle von Retino-Chorioideal-Degeneration. Arch f. Augenheilkd **30**: 117–122.

Fuchs E (1896): Ueber zwei der Retinitis pigmentosa verwandte krankheiten (Retinitis punctata albescens and Atrophia gyrata choriodea et retina). Arch Augenheilkd **32**: 11–116.

Gałęzowski K (1858): Ustrojstwo oftalmoskopa i upotreblenije jego pri raspoznavanii vnutrennich boleznej glaznago jabloka [The ophthalmoscope and its use in the diagnosis of internal diseases of the eye]. St. Petersburg.

Gałęzowski K (1860): Nowa modyfikacja oftalmoskopu przez doktora Ksawerego Gałęzowskiego [Dr Ksawery Gałęzowski's ophthalmoscope: new modification]. Rocznik Towarzystwa Paryskich Lekarzy Polskich [Annual of The Society of Polish Parisian Doctors] **1**: 268–271.

Gałęzowski K (1862): Nouveau modéle d'ophthalmoscope présente par l'auteur à l'Académie impériale de médecine de Paris. In: Gałęzowski K (ed.). Observations cliniques sur les maladies des yeux. Paris: Typographie de Henri Plon, 43–46.

Gałęzowski K (1866): Etude ophthalmoscopique sur les altérations du nerf optique et sur les maladies cérébrales dont elles dépendent. Paris: Leclerc.

Gałęzowski K (1872a): Du décollement de la rétine et de son traitement par l'iridectomie. Journal d'Ophthalmologie **1**: 594–602.

Gałęzowski K (1872b): Sur le traitement du décollement de la rétine par une opération d'enclavement de cette membrane dans une plaie scléroticale. Journal d'ophthalmologie **1**: 27–31.

Gałęzowski K (1876): Sur la curabilité du décollement de la rétine. Recueil d'ophthamologie **3**: 54–67.

Gałęzowski K (1890): Du décollement de la rétine et de son traitement. Recueil d'Ophthalmologie **12**: 1–3.

Gałęzowski K (1895): Du décollement de la rétine et de son traitement par ophtalmotomie postérieure. Bull Mém Soc Fr Ophthamol **13**: 170–175.

Gałęzowski K (1902a): Nouveau procédé opératoire dans le décollement de la rétine. Paris: Congrès français de chirurgie 417–420.

Gałęzowski K (1902b): Traitement du décollement de la rétine. In: Gałęzowski K (Ed.). Leçons Cliniques d'Ophthalmologie. Paris: Felix Alcan Editeur 87–92.

Goethe JW (1810): Farbenlehre. Leipzig: Insalwerlang.

Gonin J (1933): Quelques remarques sur le traitement du decollementretinien. Schw Med Wschr **63**: 1287–1289.

Gonin J (1934): Le Décollement de la Rétine. Librairie Payot: Lausanne 1–279.

Grzybowski A (2007): Bolesław Wicherkiewicz i jego słynny szpital okulistyczny [Bolesław Wicherkiewicz and his famous ophthalmology hospital]. In: Kronika Miasta Poznania: Szpitale [Poznań City Chronicles: Hospitals] **4**: 255–261.

Grzybowski A (2008): Polski dorobek naukowy w zakresie badań nad anatomią, fizjologią oraz patologią siatkówki z uwzględnieniem struktur otaczających w wieku XIX na tle nauki światowej [Polish 19th Century Studies in the Areas of Retinal Anatomy, Physiology and Pathology with a Consideration of the Surrounding Structures]. Poznań University School of Medical Sciences Press, Poznań, pp. 53–237.

Heitz R (2005): History of contact lenses, vol. 2. Bonn: J.P. Wayenborgh Publishing.

Helmholtz H (1924): Treatise on physiological optics, vol. I-III. In: Southall JPC & James PC (ed.). The Optical Society of America, Menasha, Wisconsin. Electronic edition (2001): University of Pennsylvania URL: http://psych.upenn.edu/backuslab/Helmholtza.

Hirschberg J (1991): The History of Ophthalmology. The first and second half of the nineteenth century, vol.10. transl by Blodi FC. Bonn, Wayenbourg Verlag.

Hirschberg J (1992): The History of Ophthalmology. Vol. 11. The reform of ophthalmology. transl by Blodi FC. Bonn, Wayenbourg Verlag.

Jodko-Narkiewicz W (1864): Wziernik dwuoczny p. Girard-Teulon ujęty w przyrząd nowego pomysłu [Girard-Teulon's a new idea and a newly designed binocular ophthalmoscope device]. Przegląd Lekarski [Med Rev] **51**: 406–407.

Kośmiński S (1875): Prof. Dr Meyera wykład chorób oczu [Professor Meyer's lecture on eye diseases]. Warsaw: Gazeta Lekarska.

Majer J (1857): Fizjologia zmysłów [A physiology of the senses]. Krakow-Warsaw, Kraków, 217–227.

Mile J (1837): Ueber Richtungslinien des Sehens. Anat. u. Physiol **42**: 37–71.

Mile J (1839): Ueber die Empfindung, welche entsteht, wenn verschiedenfarbige Lichstralen auf dieselben Stellen d. Retina eines einzigen Auges fallen. Archiv f. Anat u. Phys **1**: 64–69.

Narkiewicz-Jodko W & Gepner B (1869–1870): Oftalmologia podług Weckera [Ophthalmology according to Wecker]. vol. I-II, Warsaw: Drukarnia Gazety Polskiej.

Orłowski W (1969): Z dziejów polskich periodyków okulistycznych [A history of Polish ophthalmic journals]. Klinika Oczna [Acta Palaeontol Pol] **39**: 773–777.

Orłowski W (1974): Bolesław Wicherkiewicz w życiu społecznym i naukowym Wielkopolski [Bolesław Wicherkiewicz in the social and scientific life of Wielkopolska]. Klinika Oczna [Acta Palaeontol Pol] **44**: 723–734.

Orłowski W (1979): Słowo wprowadzające do IX sympozjonu retinologicznego [An introduction to the 9th retinal conference]. Klinika Oczna [Acta Palaeontol Pol] **81**: 645–648.

Ostrowska T (1976): Mile Jan Szczepan Bernard (1789–1839). In: Rostworowski E (ed.). Polski Słownik Biograficzny [Polish Biographical Dictionary], vol. XXI. Warszawa, Kraków Zakład: Narodowy im. Ossolińskich Wydawnictwo Polskiej Akademii Nauk 199–201.

Rumszewicz K (1885): Un cas de colobome maculaire. Revue generale d'ophthalmologie **4**: 152–155.

Rumszewicz K (1886): O szparze środkowej oka [On the central coloboma]. Przegląd Lekarski [Med Rev] **9**: 125–127; 10: 143-145; 11: 158-160; 13: 185-187.

Rydel L (1863-1864): Drei Fälle von Netzhautablösung. Vienna: Bericht über die Augenklinik der Wiener Univ. 81–86.

Rydel L (1864): Uwagi nad przypadkiem opisanym przez dra Blumenstoka [Some remarks on a case reported by dr Blumenstok] (in nr 43 i 44 Przeglądu Lekarskiego [Medical Review] z br. [this year]. Przegląd Lekarski [Med Rev] **47**: 369–370; 48: 377-379; 49: 385-388.

Rydel L (1884): O leczeniu oderwania siatkówki i jego wynikach w klinice okulistycznej Uniwersytetu Jagiellońskiego [On retinal treatment and its results at the ophthalmology department of Jagiellonian University]. Przegląd Lekarski [Med Rev] **2**: 17–19; 4: 57-58; 6: 81-83; 9: 123-125.

Schett A (1996): The ophthalmoscope, part I. Ostende: J.P. Wayenborgh, p. 153.

Sławikowski A (1853): Uwagi nad najnowszemi do ophthalmoskopii zaleceniami [Some remarks on the newest recommendations for ophthalmoscopy]. Pamiętnik Towarzystwa Lekarskiego Warszawskiego [Diary of the Warsaw Medical Society] **29**: 178–197.

Sommer F (1866): Korespondencya [Correspondence]. Gazeta Lekarska [Med Newspaper] **20**: 314–316; 21: 332-335;

Sorsby A (1935): Congenital coloboma of the macula: together with an account of the familial occurrence of bilateral coloboma in association with the apical dystrophy of hands and feet. Br J Ophthalmol **19**: 65–90.

Stenström S (1945): Untersuchungen ueber das Optische Drehzentrum des Menschlichen Auges. Acta Ophthalmol **23** (3): 195–244.

Szokalski W (1840): Essai sur les sensations des couleurs dans l'état physiologique et pathologique de l'oeil. Paris: Chez H. Cousin.

Szokalski W (1842): Ueber die Empfindungen der Farben in physiologischer und pathologischer Hinsicht. Giessen: J. Ricker'sche Behandlung.

Szokalski W (1855): Rzut oka na czynności lekarskie w Instytucie Oftalmicznym Warszawskim w ciągu siedmiu ostatnich miesięcy zeszłego roku [A glimpse at the medical procedures in the Warsaw Ophthalmology Institute within the last seven months of the previous year]. Tygodnik Lekarski [Med Weekly] **4**: 25–27; 6: 41-44, 50-53.

Szokalski W (1869): Wykład chorób przyrządu wzrokowego u człowieka [A lecture on diseases of the human eye]. vol. 1-2, Warsaw: Drukarnia Józefa Ungra.

Szulisławski A (1891): Przypadek kilkakrotnie powracającego urazowego odczepienia siatkówki [A case of repeatedly recurring retinal detachment]. Nowiny Lekarskie [Med News] **3**: 16–20.

Takki K & Simell O (1974): Genetic aspects in gyrate atrophy of the choroid and retina with hyperornithinaemia. Brit J Ophthal **58**: 907–916.

Vogt A (1936): Die operative Therapie und die Pathogenese de Netzhautablösung. Stuttgart: Ferdinand Enke Verlag 6–16.

Wicherkiewicz B (1889): O wartości leczenia samoistnie odczepionej siatkówki sposobem Schoelera [On the value of detached retina treatment by means of the Schoeler method]. Nowiny Lekarskie [Med News] **1**: 10–15.

Received on December 17th, 2008.
Accepted on December 20th, 2009.

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