

TADEUSZ STEFAN KURKIEWICZ (1885-1962) – HIS IMPORTANT CONTRIBUTION TO CONTEMPORARY CARDIOLOGY

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Abstract

Tadeusz Stefan Kurkiewicz (1885-1962) belongs to the well-known Polish histologists and embryologists. His scientific activity started in the Department of Biology and Embryology of the Jagiellonian University in Cracow, which was chaired by professor Emil Godlewski (1875-1944), famous Polish embryologist. Between years 1908-1911, under supervision of the pioneer of the Polish histology, professor Stanisław Maziarski (1873-1959) T. Kurkiewicz continued researches in the Department of Histology of the Jagiellonian University. In 1909 he published results of studies on the development of cardiac muscle in the chick and on the basis of this publication on July 21, 1911 Tadeusz Kurkiewicz received Ph.D. from the Jagiellonian University. Between 1922 and 1959 (with the exception of the period of German occupation) Tadeusz Kurkiewicz was the head of the Department of Histology and Embryology of the Faculty of Medicine of the Poznań University and Academy of Medicine in Poznań (at present: Poznań University of Medical Sciences). His Ph.D. thesis demonstrated that the epicardium originates from pericardial villi, it means from extracardiac source. This great scientific achievement has been confirmed by recent studies. In this article we present curriculum of Tadeusz Kurkiewicz and impact of his discovery on contemporary cardiology.

Keywords: heart, embryonic development, epicardium development, Tadeusz Kurkiewicz

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Professor Tadeusz Stefan Kurkiewicz (1885-1962) was the well-known Polish histologist and embryologist, and head of the Department of Histology and Embryology of the present Poznań University of Medical Sciences (Fig. 1). In a tribute to his memory we present an outline of his curriculum. Moreover, we overview the impact of T. Kurkiewicz's studies on developing heart on contemporary cardiology, especially in the field of searches for cardiac stem cells.



Figure 1 Tadeusz Stefan Kurkiewicz (photo taken ca 1955, from the archives of the Department of Histology and Embryology, Poznań University of Medical Sciences)

Tadeusz Stefan Kurkiewicz was born on February 23, 1885, in the village of Strzegowo near Mława (the Russian zone following partition of Poland) to Franciszek, a teacher and Zofia, maiden name Krusiewicz.

In 1902 he received the general certificate of education from the classic school at Płock and started to study natural sciences at the Faculty of Physics and Mathematics of the Imperial University of Warsaw (present Warsaw University). From 1906 he continued studies at the Faculty of Philosophy, Jagiellonian University at Cracow. During studies he worked in the Department of Biology and Embryology which was chaired by professor Emil Godlewski (1875-1944), famous Polish embryologist. Between years 1908-1911, under supervision of the pioneer of the Polish histology, professor Stanisław Maziarski (1873-1959) T. Kurkiewicz continued researches in the Department of Histology of the Jagiellonian University. In 1909 he published results of studies on the development of cardiac muscle in the chick [1] and on the basis of this publication on July 21, 1911 Tadeusz Kurkiewicz received Ph.D. from the Jagiellonian University (Figs. 2, 3). Of importance is that the title of dissertation is in Polish and German while the entire text only in German.

In the same year he returned to Warsaw and worked in the Laboratory of Histology of the Imperial University of Warsaw, which was chaired by professor A. Kołosow. In 1914 Kurkiewicz published observations on Paneth cells in mammals [2].

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9. DIE FRENKEL. Die Kleinhirnbahnen der Taube.		
10. T. KURKIEWICZ. Zur Kenntnis der Histogenese des Herzmuskels der Wirbeltiere. — Mémoire de M. T. KURKIEWICZ, présenté par M. K. Kostanecki m. t.		
11. BR. BYDZIEWSKI. Sur la faune crétacée de Mialy près Grodno.		

Figure 2 Program of the meeting of the Academy of Science of Cracow, No 6, June 1909

10. *O histogenezie mięśnia sercowego zwierząt kręgowych. — Zur Kenntnis der Histogenese des Herzmuskels der Wirbeltiere.* — Mémoire de M. T. KURKIEWICZ, présenté par M. K. Kostanecki m. t.

(Planches VIII, IX et X).

A. Einleitung.

Während bei den Untersuchungen über die Entwicklung der Skelettmuskeln der ganze Entstehungsmechanismus derselben in detaillierter Weise in der bisherigen Literatur berücksichtigt worden ist und man hier die Genese des Bildungsmaterials und die lange Reihe von Umbildungen, welche dieses Material durchmachen muß, um sich zu einer ausgebildeten Faser mit ihrer komplizierten Struktur zu gestalten, bis in die kleinsten Einzelheiten behandelt hat — sind die Beobachtungen über die Entwicklung des Herz-

Figure 3 Title and the beginning of the T. Kurkiewicz's publication

Following outbreak of the World War I, T. Kurkiewicz was evacuated to Tomsk (Russia), where he worked as a prosector in the Department of Histology of the Imperial Tomsk University (chairman: professor S.G. Tchasownikow / С.Г. Часовников). There, in 1921, on the basis of studies on passage of striated muscles into tendon T. Kurkiewicz obtained Doctor of Sciences degree (habilitation). In 1922 he returned to independent Poland and settled in Poznań. In the same year he accepted duties of the chairman of the Department of Normal Histology and Embryology of the Poznań University. In 1922 T. Kurkiewicz accomplished a Polish habilitation (with the same thesis) and was appointed a chairman of the above mentioned Department. He remained at post there till his retirement in 1959 (with break during the World War II).

During the interwar years Tadeusz Kurkiewicz worked for a few months (1927) in Zoological Station in Naples (Italy) where he collected a rich research material on the earliest stages of development of Echinoidea and Tunicata, with special emphasis on cleavage and blastomere formation. On basis of this material, between years 1929-1931 T. Kurkiewicz published few articles concerning mechanisms of the cleavage [3]. He also performed important studies on mechanism of adrenaline release from chromaffin cells of the adrenal medulla [4]. In Polish literature his method of adrenaline cell visualization is named the reaction of Henle-Kurkiewicz.

In these times professor T. Kurkiewicz served as a vice-dean and in years 1935-1937 the dean of the Faculty of Medicine of the Poznań University.

During the World War II he moved to Warsaw. Officially Tadeusz Kurkiewicz was employed in hospital division of the city council and in the Red Cross Hospital. In conspiracy he served as a lecturing professor of histology and embryology at the underground University of the Western Lands (Polish: Uniwersytet Ziemi Zachodnich) and also underground Warsaw University.

Professor Tadeusz Kurkiewicz returned to Poznań in March 1945 and resumed the chairmanship of the Department of Histology and Embryology. In the postwar period he focused activity on teaching and administrative works. He also organized modern laboratories, in which numerous prominent Polish scientists completed their Ph.D. and habilitation theses. Among them were Tadeusz Pawlikowski, Jan Kanty Słotwiński, Kazimierz Miętkiewski and Kazimierz Dux. In 1947 he published the excellent textbook „Outline of human histology. Part 1 (Cell and tissues)” [5].

In years 1945-46 and 1947-1948 professor Kurkiewicz again served as a dean of the Faculty of Medicine. With foundation of the Medical Academy (present Poznań University of Medical Sciences) Tadeusz Kurkiewicz received nomination for rector (president), and served at this post till 1952.

Professor Tadeusz Kurkiewicz died in Poznań on March 11, 1962.

An extensive curriculum of Tadeusz Kurkiewicz has been published in Polish [6, 7].

The greatest scientific achievement of Tadeusz Kurkiewicz was connected with his studies in Cracow, where he naturally came under the influence of professor Emil Godlewski, and this influence fostered in Kurkiewicz a passion for embryology. His original observations were performed on the development of heart in chicken and revealed new facts about origin of epicardial cells [1]. At days 2 and 3 of egg incubation a material for histologic studies was collected every 3 h, while between days 4-7 every 6 h. Moreover, developmental stages of studied embryos were also checked by myomere counts. Technical skills and detailed, systematic and time-consuming studies allowed T. Kurkiewicz to trace the origin of the epicardial cells in the developing heart. In contrast to the earlier hypotheses claiming that both myocardium and epicardium originate from the same source of the primitive heart tube – myoepicardium or epimyocardium, Kurkiewicz demonstrated that the epicardium originates from pericardial villi, it means from extracardiac source. As known, mesoderm-derived pericardial villi cover the ventral wall of the sinus venosus. An excellent review of this work and its impact on contemporary cardiology was published by Männer et al. in 2001 [8].

Although in publications of “Carnegie Institution of Washington” (1918) the paper of T. Kurkiewicz is mentioned and its cytological aspects extracted [9], it seems that for over 50 years his observations on developing heart remained unknown to other embryologists. Männer et al. [8] supposed that “The discovery of Kurkiewicz’s [1909] paper in the late 1960s seems to be the merit of Romanoff’s [1960] profound knowledge of the literature on embryonic development of the chick”. Indeed, Romanoff’s book contains numerous details on heart development which were described by Kurkiewicz [10]. However, it seems that it was Manasek [11, 12] who attracted embryologists to the original paper born in Cracow. His light and electron microscopic studies revealed cardiac stem

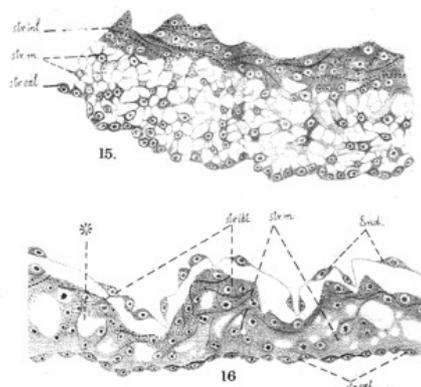


Figure 4 Original drawings illustrating chicken heart at day 3 of development demonstrated by T. Kurkiewicz (in his publication figs 15 and 16)

that by stage 12 (15 somites) of chick development the heart wall was composed only of cells that contained myofibrils, and no epicardial cells were present. Manasek accentuated that his findings supported original Kurkiewicz’s [1] observations. Of interest is that some microphotographs taken by Manasek are very similar to drawings performed by T. Kurkiewicz (Fig. 4). In subsequent years the idea of extracardiac origin of epicardial cells became commonly accepted.

Why the discovery of Kurkiewicz’s paper is so important for modern cardiology? Growing body of evidence from recent publications suggests that epicardium derived cells differentiate into components of coronary vessels (coronary endothelial and smooth muscle cells) as well as components of the fibrous skeleton of the heart and cushion mesenchyme. As demonstrated by modern molecular biology techniques, these cells play regulatory role in cardiac development (signaling centers governing the development) as well as in Purkinje cell differentiation. They also regulate adult cardiomyocyte phenotype and function. It is believed that as a multipotential cells, epicardium derived cells are

cells. And in fact, promising results of experiments with epicardium derived cells grafting into ischemic or infarcted myocardium have been reported [13, 14, 15].

In attached references we included papers which, to our knowledge, contain citation of T. Kurkiewicz's doctoral dissertation [8, 53]. Original observations of professor Kurkiewicz are also cited in various textbooks and handbooks [for example 9-10, 21, 54-61] or dissertations non listed in SCI [62-67]. Furthermore, name of T. Kurkiewicz appears in numerous original publications, although his fundamental publication is not included into the references (for example "theory challenged as early as 1909 by Kurkiewicz" [68], "in 1909 Kurkiewicz identified the pro-epicardium as the source of the epicardium" [69].

Competing interests

The authors declare they have no conflict of interest

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