



# The Contribution of R Nitabuch to The World Obstetric Science

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## Abstract

The adaptive conversion of spiral arteries is the essential part of pregnancy physiology and incomplete conversion is associated with preeclampsia and intrauterine growth restriction. Based on the study of an autopsy of a pregnant uterus, Raissa Nitabuch was the first who gave an accurate description of the uteroplacental circulation in main provisions of her doctoral thesis in 1887. In this thesis, the fibrinous layer in the decidua was identified as site of detachment of the placenta from the uterine wall after delivery of the baby. Although this was only an accidental finding, as “Nitabuch membrane” this fibrinous layer up to this day is associated with her name. It is unclear, why the much more important findings of the uteroplacental circulation never were published in a scientific journal. In view of the ongoing investigations on function and regulation of uteroplacental circulation, there can be no doubt, that an original publication of the findings of Raissa Nitabuch in a scientific journal today would be a Classic deserving to be revisited.

**Keywords:** Raissa Nitabuch; The Uteroplacental circulation; Fibrinoid of Nitabuch; History of medicine

## Introduction

Raisa Nitabuch is known worldwide as a German doctor. So, it is spoken in various literary and Internet sources. In fact, Raisa Semenovna Nitabuch was born and lived in Russia. Her father, Shimon (Simon) Nitabuch – merchant 1-St Guild from Vladikavkaz, oilman. In 1885, he received a lease for 10 years Grozny oil sources. His firm, organized in 1886, was called “Нитабух, Финкельштейн и К”. Shimon Nitabuch was intimately familiar with Emanuel Nobel, nephew of Alfred Nobel, who arrived in Vladikavkaz at the auction. Apparently, E. Nobel was the one, a close to the family Nitabuch, who sponsored the visit and work implementation of Raisa Nitabuch. In the late 19th century Raissa Nitabuch together with a group of female students came from Russia to Switzerland to study medicine. After the graduation from the University of Zurich, she moved to Bern, where at the Institute of Anatomy she worked as an assistant and successfully passed her doctoral exams. And there she did a doctoral thesis entitled “Kenntniss der menschlichen Placenta”, which appeared in print in 1887. The doctoral thesis contains 39 pages and 6 illustrations of histological sections [1]. On the title page of her doctoral thesis written that Raisa Nitabuch “Aus

Wladikawkas” which translates to “from Vladikavkaz”. This means that neither the Austrians nor the Germans thought to “assign” the name of the remarkable researcher Raisa Semenovna Nitabuch, but, on the contrary, strongly emphasized her Russian origin. The mentor of Raissa Nitabuch was Professor Theodor Langhans (1839-1915), an outstanding researcher, head of the Department and Director of the Institute of Pathological anatomy of the University of Bern in 1872-1915.

Under his direction, research activities at the Institute of Anatomy at the University of Bern were focussed on different topics of placentology such as characterisation of the trophoblast as well as the distribution of fibrinous material at different locations inside the placenta and decidua [2]. In her doctoral thesis, Raissa Nitabuch first described a fibrinous layer in the decidua as the region, where after delivery of the baby the placenta detaches from the uterine wall. Up to this day, this layer is known as “Nitabuch membrane”. In the introduction, she describes the anatomical connection of the intervillous space with the maternal vasculature as the main objective of that study. In hindsight, the decidual fibrin layer was

just an accidental finding. This dissertation is the first printed document with a detailed description of spiral arteries as the link between the intervillous space and the uterine vasculature. In view of the enduring scientific dispute about the uteroplacental circulation carried out in the late nineteenth and early twentieth century, it remains unclear, why the significance of this important finding at the time was not recognized [1].

### The Fibrin layers

Part of the thesis, which made the name of Raisa Nitabuch known throughout the world, contains five and a half pages and is entitled "Zur Kenntniss der Serotina" ("knowledge of serotine"). In this Chapter, Nitabuch discussed the sequence of decidua layers. She first described an intensely stained fibrin layer and found tissue in it that was completely similar to Langhans fibrin. It is a homogenous, bright intracellular substance that is stained with hematoxylin or boraxcarmin and is penetrated by numerous channels with variable size which is communicated with each other. The channels remain empty or contain small dark kernels belonging to apparently colorless shaped elements. This fibrin layer divides the serotina in an upper half - the zona compacta next to the intervillous space - and a lower half - the zona spongiosa, which extends towards the muscular layer of the uterine wall. The zona compacta and zona spongiosa are made up of cells with fairly little intercellular matrix. The cells of the zona compacta are quite large and of cubical shape, whereas the cells of the zona spongiosa have a longitudinal form.

Vessels and glandular spaces predominantly are located in the zona spongiosa, which is of regular thickness. The zona compacta is considerably thinner and varies in thickness. Raisa Nitabuch suggested that the fibrin layer is the result of deposition of the intervillous space content and is the upper limit of maternal tissue. In her study she also noticed that villi reach up to only the upper layer of serotine until the fibrin strip and can even penetrate it, but never penetrate deeper [3]. Did any other pathologist see this accumulation of fibrinoid before Nitabuch? In any case, it was not described [4,5].

### Conclusion

Whereas the fibrin layer up to today carries the name of Raissa Nitabuch, it is largely unknown, that she was the first, who correctly described the anatomy and physiology of circulation of maternal blood inside the human placenta. When looking at the reference list of several publications of the German literature, there also is no mention of the findings of Raissa Nitabuch by any of these most prominent placentologists of those days. Only Stieve in his extensive review discussing the different views of the arterial access and the venous drainage of maternal blood in the intervillous space, briefly speaks about the fibrinoid layer of Raissa Nitabuch citing her dissertation. But there is no word on her very convincing findings of the circulation of maternal blood in the intervillous space and its anatomical connection with the vasculature in the deciduas. Henning Schneider noted that the results of the study of this connection are much more important than the fibrin layer of Nitabuch. Extensive attempts to get more information about further study and publications of Raissa Nitabuch, Russian researcher, were unsuccessful.

It is quite likely, that except this dissertation no other publication of these remarkable findings, which she already described in the late of 19<sup>th</sup> century, exists. It is unknown when Raisa Nitabuch left Switzerland. She probably returned to Russia and continued her research here. No publications have been written about the biography of the researcher.

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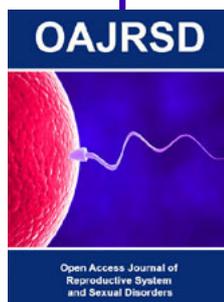
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