THREE SCIENCES, THREE OPTIONS FOR THE KNOWLEDGE TRANSFER IN THE LATE OTTOMAN TURKEY: ZOOLOGY, CHEMISTRY, GEOGRAPHY

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The phenomenon of the knowledge which transferred from Europe to the reforming late Ottoman Turkey cannot be discussed without a detailed look at the history of various disciplines. For a first provisional sketch I have chosen the disciplines of zoology, chemistry and geography. In all these three disciplines the general political conditions have often played a decisive role. The Turkish educational planner had been forced to adapt to new conditions within short intervals. Only in the second half of our century had they been in the position to plan the general conditions themselves. Shortly, I want to explain my choice for these three disciplines:

Regarding zoology, especially the medical zoology, it can be shown, which options for the transfer of science generally existed in Turkey.

Chemistry in my opinion is the discipline with which it can be best shown, how strong the contribution of modern science had been to support traditional trade in a pre-industrial country.

The example of geography as an academic discipline proves, how the early Turkish science had to adapt to different national schools before, during and after the First World War. Geographic scientists have thought more than other experts about the potential of development of Turkey as well as about the reasons for keeping behind.

The first topic: Zoology and the options of the transfer of knowledge.

At the change from the 19th to the 20th century Turkey had in general three options to reform the higher level of the educational system:

Option 1 existed in the sending of young scholarship holders to European universities, at first to France, the francophone "periphery" (Swiss, Belgium) and a constantly growing amount also to Germany. The first option had been temporary supported by the establishment of an Ottoman boarding school, which had been established in Paris - by the way according to an Egyptian model.

The second option was the appointment of a foreign specialist at Turkish university chairs for professorship. This way had been chosen since the military schools of Selim III and had reached its height in the German professor-nisation of the First World War.

The third possibility was the permission of foreign educational institutions on Ottoman territory, as the Robert College in Istanbul or the Syrian Protestant College or the Jesuit University Saint Joseph in Beirut. These as missionary schools denounced institutions often offered free access to all Ottoman students. In fact they had been visited mainly by non-Muslims. In regard to this third way one can not actually say that this has been a choice of the Ottoman politicians of education. It was the result of the foreign cultural mission and the Ottoman tolerance.

In regard to option 1 it must be added, that not all of the young people, who went to Europe in the 19th century, had been equipped with a scholarship of
The year 1915 created with the appointment of 17 (since 1935 around 200 scientists from Germany to Germany! German professors at the Dübendorfer, that is in the year 1900 reorganized University of Istanbul, a deep cut, which resulted in the emancipation of the branch zoology from the medical compulsory sciences to the basic sciences. For the Prussian advisor of the Ottoman minister had been close from the beginning, that the Dübendorfer should develop itself to a place for science and lecturing. The experiments of the German professor mission was, in the eyes of most Turkish observers as well as for the Austrian-Hungarian Ambassador, a daring, complete meaningless effort at a point, when the Ottoman state was for its ongoing existence in front of the doors of Istanbul, in the south of the Caucasus and in the deserts of Mesopotamia and Sinai. Who knows, how endlessly tiring appointment procedures for a "small" professorship at a State University in the current Germany could be, can only be astonished about the quickness with which a Prussian government recruited the staff for several faculties within a few months.

The story of the professor-mission of 1915 can be read detailed elsewhere, here we concentrate on the chosen branches of zoology, chemistry and geography. The first professor for zoology in Istanbul at a natural science faculty had been Boris Zarnik, a privat assis. Professor from Würzburg, as the botanist and zoologist Ferdinand Pax refused his appointment. By the way, the third person on the appointment list was Julius Schaud, later a very important biologist. This I point out, as the printing media in Istanbul showed great distrust for very young scientists. (By the way, it is not known as yet, whether the German or the Turkish side decided about the choice of the short lists (Fesrer)).

Boris Zarnik has studied in the circle round Ernst Haeckel in Jenae, went then to Würzburg in order to take his doctor degree from Theodor Boveri, one of the founders of the cell science. Like his teacher from Würzburg he also worked among other things with the organs of various sea archives. In Istanbul he thought - according to the model of the famous zoological institution in Naples - of the foundation of a marine biological institute. Boris Zarnik, who was born in Lajnack/Slovenia, immediately after his appointment became target for "all-German" hostility. A professor of English from Berlin denounced him to a Prussian minister. Zarnik would be a doubtful candidate, but not because of personal weaknesses or mistakes. His delict was the fact, that he had a brother who - the informer did not have closer details - should have been involved in "paulaner activities". It was very positive of the advisor / malign Franz Schmidt, that he strictly defended his Slovene zoologist and Austrian subject at higher quarters.

In order to summarize the above mentioned information regarding zoology: Within three generations Turkey succeeded in connecting to the European science in a discipline, which in the Islamic world in contrary to other disciplines, stayed more under the reached level of Aristoteles and Plinius than gone beyond of it.

Zarnik had been called to Istanbul at a time, when the positivism and with it the biological materialism became - in an ordinary form - to an ideology of the young Turkish intellects and Ernst Haeckel's materialism had been propagated by the philosopher Ba-he Tevfik. I add that in order to remind that "biology" at the turn of the century had not been a non-controversial discipline, neither in Germany nor in the Autumn state.

With the example of chemistry I would like to show, that the appointed professors at Istanbul had not been only followers of the University of Humboldt. In review to the years in Istanbul Gustav Fest, the later professor lecturing in Frankfurt/Main and one of the three German professors, wrote 1919 in the "Zeitschrift für angewandte Chemie" (Magazine for applied chemistry) that a principle mistake had been made in choosing the singular lesson, namely "that partly representatives of some disciplines had been appointed, who have not been absolutely necessary for some basic general studies". Fest was probably right of the professorships of philosophy-psychology res.
archaeology and philology. For him basic general studies have been the education to "teach, doctor, chemist, pharmacist, lawyer, advocate or administrative official".

More than that, Fester criticized that "the reformers had the ideal of the idealistic character of the German universities", and he added "in order to take the utilitarian tendency of the modern English universities as an example". In the review Fester admits, that this understanding had been missing at the chemists in the year 1916. After a long period of the semi-scientist and the return to Germany he could talk uninhibited widespread about English examples and "special schools - of course with scientific spirit".

That should not give the impression, that they did not make it to their business to educate young people for practical work and teachers for higher grade. To the contrary: In the 5th and 6th semester a technological college in combination with an organic and chemical-technical practical training had been offered. Oil industry (vegetable oil!) and tannery had been taught in detail, whereas the so important sugar- and porcelain industry for Germany had been less considered. (One should not forget, that the sugar industry in Turkey is a republican achievement). The special German contribution had certainly been the focal point of the chemical practical training.

At least after 2 years approximately 100 working places for students had been available. That is not a bad result if one respects that the Turkish industrial statistic of 1915 showed only 4 chemical enterprises with totally 131 employees. Besides the education of teachers they showed efforts in annexed special schools in order to improve the technology of coloring and tanning.

By the way it was duty for all German professors, whose contract of employment contained the carrying of the Fes, that with the beginning of the second employment year they had to teach in Turkish. Ernst Arndt (Kinyarw Arndt), professor for disorganische chemistry rendered great services by developing a Turkish terminology for chemistry. We can suppose, that most of the chemists did not believe, that their field would lead to a development of the economical situation in Turkey within a short period of time. Also the economist Friedrich Hoffmann, one of the German professors under the Fes, showed great skepticism in his article he wrote in 1918 in Istanbul - Arnavutköy.

The third and last discipline of our examples, geography, leads us to the German-French competition and the topic of development, which only can indirectly be sensed in the first two disciplines. The geologists from Germany are more confident than their colleagues, they base on the identity of interests of the allied and believe in the contribution of their disciplines to build up Anatolia after the war.

Namely the representatives of the disciplines medicine and chemistry had been deeply convinced of the superiority of the German science and doctrine over the French one. Close to practice versus "Büzgölpedarım" had been the short but most important agreement of the German side. The French side wanted to expose the "Intuition" as previous stage of the "Invention" at French speciality (Descartes, Les Allemands et la science, 1916). Robert Rieder Pascha, "General inspector of the Royal Ottoman Medical Schools and director of the Gülhane Hospital" insisted on the obligatory introduction of the German language at medical schools. For him it was out of question to teach in Turkish, "as for a medical lecture the detailed knowledge of the Arabic and Persian language is a conditio sine qua non sei" (S. 220). For Prof. Rieder also a French lecturing had been out of question, because at his time on the Prussian gymnasiurns it had not been taught the art to speak French. During the world War the chauvinistic tones on both sides were getting louder and louder.

In the field of geo-science as well as in zoology and chemistry the German professors were "condemned" to cooperation with Turkish colleagues. Two especially distinguished personalities participated before. During the World War at an geo-science education. One of them was the part-time professor Mehmed Celal, one of the few madaris with German education. Mehmed Celal had studied agricultural science in Germany and had written a small book about his stay there. In Istanbul he taught general geography. Halil Edhem wrote his chemical doctoral thesis in Bern 1885. As the Daruifinide he built geology and mineralogy.

The most important figure had been Faik Sabri Duran, at the time of the reorganisation of the Daruifinide the only full-time geographer. He has studied in the Soviet as one of the best scholarship holders of the state between 1910 and 1913 and received after his return to Istanbul a professorship for Islamic-Turkish geography. Faik Sabri Duran actually should have been sent to one of the provinces as a French teacher after his return. Saffet Bey (Geylingili), the last geographer of Istanbul without studies in a foreign country, rescued him from this fate by giving his place to the young brilliant Faik Sabri. Faik Sabri, who wrote in Paris a thesis about the geo-morphology of the English southcoast, wrote 1915 the first Geography of Economy of the Ottoman Empire in Turkish language. In this book he described Anatolia as "the actual and most important part of the Ottoman state" and describes the contrary between the advantageous natural conditions and the existing poverty. He accused the foreign competitors with the example of natural colours (kik boyan) , opium (ayvon) and the hair of the angora goat (tezlik). The book of Faik Sabri reverses in an nationalist sense the statements of the geography of colony which has been taught in France and he likes to make the geography to a weapon for development for the own country.

1915 Walther Penck and Erich Obst had been appointed in Istanbul as the first German geo-scientists. Erich Obst, characterized by the chemist Ernst Arnold energetically and busy. Very quick started as a busy conflict with the Ottoman Minister Süleyman Bey: "The lessons can't be prepared conforming to western European standards ... due to the lack of the library. We have to distance ourselves from practical geographical works out of startet lack of necessary equipment." Because of missing instruments - they lied at the customs - also the monthly excursion had been cancelled. That actually geography is an out-door discipline had not been accepted. Obst planned besides the establishment of a 3-years curriculum the foundation of a "royal ottoman head institution for weather science", as "scientific basis and to increase enterprises of agricultural and technical nature". After the war all nations reunited of the arms-brotherhood should profit from the "missing of the production force" of the Ottoman state.

Analogously to the initiative of Professor Obst the geologist Walther Penck dedicated a memorandum through the German Embassy to the ministry of foreign affairs, in which he suggests the establishment of a geological national institution. This institution only has been realized in the Maden Tefik and Arama Enstituı.ı. A close colleague of Penck, Hämzi Nafis Pamir, who took his doctor degree 1915 in Geneva, should here play an important role.

In spite of the closeness to practical life the "German University professors of Constantinople" confessed themselves in an extensive and a rather sunny memorandum in the year 1915 to "science as an end in itself", even if the Turks until now only know "a basis study". The impression remains that also sciences with "practical important economic aims", as it is mentioned in the memorandum, should better be held in institutions besides the university than under its roof.

When I finally again have to justify the choice of my topics, then I will try to do this with the experience we got from the history of the transfer of knowledge:

We have seen, that the political instrumentalisaton of science is more the rule than the exception. Those scientists who accepted this fact had been better off than those who defended themselves too hard against the leading strings of politicians and bureaucrats. The result of the World War led to a big gap between the German-Turkish scientific relationships. On the other hand it protected Turkey of a too overacted adjustment to the German speaking world. The Kemalistic Turkey a quite pluralistic science business started. The different academic rooms of the Turkish scientists have been the best condition to avoid inestimable relationships ...
By insisting on keeping Turkish as the language for teaching, plenty of scripts of the foreign guest had been used as textbook.

The French-German war of 1870 created also a splitting on scientific level. In the case of the western nations the basic research and applied research played a growing role. In it the institutes far from universities as the Kaiser Wilhelm Institute had by no way been a German invention. Meanwhile we know about the influence of the American models since 1905, first of all the Carnegie-Institution, beside other institutions far from university.

The indecision of the Ottoman education system for the choice of models lead of course to frictional loss and spoiled human potentials. On the other hand Turkey kept itself out of the trouble of not always fruitful bindings to one country resp. cultural regions. The change from Italian to German over French had never been completely realized. Soon Turkish became the only teaching language at all important institutions, let alone mention Galatasaryi and Donmiye. The extension of the Ottoman literature language to a modern science language could succeed, because in the Tanzimat decades a secular elite believed in Turkish as science language.

The same distance to the victorious powers and the former allied stayed the characteristics of the foreign politics of Austria, which means until the years of Initial the condition for free scientific and artistic movement. With the example of the young Ismail Hakki Balyozlolu, the later rector of the University of Istanbul, could have been shown, how strong the need for "Africanus" for the formulation of a new pedagogic has been already in the early-Turkish years.

The aim for my historical few was to show, which conditions existed at the eve of the Republic, in order to understand the outstanding cultural revolution of Mustafa Kemal Ataturk better.

### THE METRIC SYSTEM IN TURKEY

Starting from the 14th century, the Ottoman Empire (1299-1923) ruled over a large territory for more than six centuries. Its long reign may be divided into two main periods: the classical age and the modernisation period. From the viewpoint of the history of science and culture, we can say that the classical age, highly influenced by Turkish and Islamic traditions, continued until the last decades of the 18th century. The modernisation period, which followed, witnessed the co-existence of both the old tradition and European novelties, the latter being introduced and adopted with great enthusiasm during the 19th century.

However, from the 15th century onwards, the Ottomans began to pursue the technical innovations developed in Europe, especially in such fields as war technology, mining, and cartography. Contacts with Europe accelerated in the 17th century and the Ottomans learned more about Europe, as well as its science and technology, through travel notes of Ottoman ambassadors, books translated from European languages, and other means. Towards the end of the 18th century, Ottoman officials started to recruit engineers and officers from France to help to reorganize the Ottoman military corps and train engineers for the army. The goal was to reverse the relative decline of the Ottoman army by importing clever men with western science and technology. These reforms constituted the beginning of the modernisation period, which would last until the end of the Ottoman Empire. Thus, by the 19th century, especially after the 1839 Reform Movement called the Tanzimat, Ottoman administrators took Europe as "the model", and a multidimensional transformation occurred in almost every field, from the state organisation to architecture, from education to social life.

The attempts to transfer and adopt European science and technology unavoidable brought along the need to compare the Ottoman and European measuring systems at the end of the eighteenth century. The first comparisons were made in the Muhendishan (Engineering School), a leader in the introduction of European techniques into the Ottoman Empire. Political conditions of the late eighteenth century led to the recruitment of French and English experts in the Muhendishane where texts translated from these languages were used for teaching. Collaboration between the Ottoman and foreign technicians, and the teaching of new engineering techniques to Ottoman students, resulted in the establishment of the Ottoman equivalents of French and English measures. The results of the comparisons were published by Hüseyin Refik Taşmacı, the chief instructor of the school, in the textbooks on engineering (filtration techniques, the driving of mine galleries etc.) he had compiled from European sources (1 adet-i konansı, 1.166 adet-i fonş, 1,242 adet-i tef Extracts). Starting from the first half of the nineteenth century, metric weights and measures became included in the European books of science and technology. Ottoman engineers mentioned same in the books they translated or compiled from European sources and calculated the metric equivalents of Ottoman weights and measures (1 metre = 1,319 zira or 1 lira = 0.738 metre). An early example is Ishak Efendi's book on fortification (Umut-i istihbar, Istanbul 1834). In the calculations, they used the results of the comparisons made by H. Refik between the Ottoman measures and the pre-metric French measures.
The Great
Ottoman-Turkish
Civilisation
The Great
Ottoman - Turkish Civilisation

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PHILOSOPHY, SCIENCE AND INSTITUTIONS

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YENİ TÜRKİYE
The incredible fact that the Ottoman frontier beylik became an Empire over such a short period of time has attracted many Western researchers and scholars to delve into the history of the Ottoman State. It could be argued that there are miscellaneous determinants and dimensions that actually created the possibility for such an incredible feat to be accomplished. This volume has been edited with the aim of focussing on the main factors that gave rise to such a great civilisation. In the first place, the institutional character of the Ottoman State is of utmost importance. In order to understand the basis of Ottoman civilisation, the different patterns of its institutions should be studied, as the comprehensive analysis of the institutional structure of the Ottoman Empire might enable us to conceive how a small beylik was able to turn into one of the greatest Empires in the world. In this volume, the administrative, judiciary and military institutions of the Empire are set out as the main subject titles. In addition, there are various subjects which have been analysed, under such subrubles as bureaucracy, religion and law, shedding light on the main characteristics of Ottoman institutions.

In appreciation of the highly developed institutional structure of the Ottoman Empire, the ideational and philosophical sources cannot be underrated. Unless these sources are taken into consideration, it is impossible to grasp the various dynamics of Ottoman institutions. Therefore, this volume is entitled “Philosophy, Science and Institutions”, due to the close correlation and importance of these subjects to one another.

Contrary to conventional Euro-centric and Orientalist assumptions, which hold “science” as the peculiar praxis of the Renaissance and Enlightenment in
the West, in this volume it is generally argued that the Ottomans had a number of successes in scientific activities (İhbar ve fen). The Ottoman State not only promoted the development of science within the borders of the Empire, but also facilitated several interactions with scientific activities outside of its territories. During this interaction, it both benefited from and contributed to the scientific improvements made in Europe.

Additionally, this volume dedicates an important place to the development of philosophy and thought in the Ottoman Empire; although in the Ottoman Empire such major philosophical concepts as developed in Europe were not formed, rather the Ottomans focused mainly on Islamic philosophy. Yet this situation does not arise from the fact that the Ottomans lagged behind in speculative matters. On the contrary, they were not interested in philosophical issues that were outside the realm of Islamic tradition. From their point of view, Islam encompassed all ontological and epistemological matters, making any other philosophical concern dysfunctional.

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