Moji učitelé geometrie

Summary

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SUMMARY

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I.

1. I remember my teachers of geometry, not all of them that I got to know or that I met at first hand. As I used to study from textbooks since the fourth year of the realschule,[1] so I remember the textbooks of geometry for grammar schools by Jan Vojtěch (1879–1953), later professor of mathematics at the Czech Technical University, the grammar-school textbooks of descriptive geometry, the authors of which were Josef Pithardt (1874–1955), a grammar school headmaster, and Ladislav Seifert (1883–1956), later professor of geometry at the Masaryk University in Brno. I am only mentioning those of my professors under whom I passed the more important exams in geometry: L. Seifert in Brno and Bohumil Bydžovský (1880–1969), Eduard Čech (1893–1960) and František Vyčichlo (1905–1958) in Prague.

[1] Realschule was a technical secondary grammar school with 7 classes and a leaving examination, which entitled the graduate to study at technical and science universities. In 1943 the realschules were changed to grammar schools by adding an 8^{th} class; they were discontinued in the 1950s.

2. The Union of the Czech Mathematicians and Physicists was founded in 1862. This Union was most successful in the first half of the 20^{th} century. Since 1910 it published textbooks of mathematics that were used till the end of the 1940s; I learned from these textbooks. Soon after assuming power the communists deprived the Union of all property – a large library, large building, special printing works and publishing house. It took 5 years for the Union to renew its activity in 1956 under much more modest circumstances. Without its economic base it depended on state subsidies and thus was unable to regain its previous significance. I became member of the Union already as a student of the realschule in 1943. The discounts offered to members of the Union on books it published enabled me to start up my own mathematics library.

3. Czech universities were subject to heavy shocks during the last 75 years. The greatest in November 1939, when the Germans closed all Czech universities, deported about 1 200 students to the concentration camp in Sachsenhausen and executed 9 student functionaries. A similar fate be fell many academics. In February 1948 the communists come to power and quickly organized purges of students and academics at universities. On page 20 there is a facsimile of the summons I received from Purges Commission in January 1949 which threatened expulsion, should I fail to appear without relevant excuse. During 40 years of the communist regime, political screenings – progressively milder – became a part of the entrance examinations of intending undergraduates.

4. When teachers' faculties were created in 1946 they were welcomed as a promise of the good standard of the Czech school system in future. Communist despotism during the 40 years of its reign left deep vestiges in the system. But it is a sorry reality that even after "the Velvet Revolution" in 1989 the decline in school system continues.

II.

I compare the grammar-school textbooks of planimetry, stereometry, trigonometry, analytical geometry and descriptive geometry published by the Union since 1910, with those which – only with the professional patronage of the Union – have been published since the 1990s. The results of this comparison show that the curricula of the present textbooks is a fraction of that of the textbooks published 100 years ago. An understandable change is a substantial reduction of trigonometry, a positive change is including – but only the most elementary first steps – of spatial analytical geometry. The reducing of the matter is represented by the complete omission of the proof of Heron's formula for the area of a triangle from its sides. The general fault of the present textbooks is an unkind relation to applications and to relations between geometry and visual arts, especially architecture. I was surprised with the interest in this relation when I occassionally spoke about it with my students of geodesy at the Czech Technical University.

III.

Since 1920 Ladislav Seifert was professor of geometry at the Masaryk University founded in those days in Brno. He was appointed dean of the Faculty of Sciences and became rector in 1947–48.

I paid most attention to his seminar in the academic year 1945–47 (see A.), of which I preserved my notes. I am commentarying on the problems which L. Seifert discussed, in some cases in detail. Of Seifert's three books Imaginary Elements in Geometry 1941, Cyclography 1949 and Cubic and Biquadratic Problems 1951 (see C-D-E) I studied especially the third and attempted at least a partial recapitulation of the literature concerning the following problem: From a point in the plane of an ellipse to draw normals to it. In 1887 Karel Pelc, after long synthetic consideration, found that the straight lines passing through the centre of the ellipse orthogonal to the diagonals of the rectangle, the centres of whose sides are the vertices of the ellipse, have the following property: For a point on these straight lines, the biquadratic problem on the normals reduces to two quadratic problems. Pelc's finding can very simply be proved analytically. I then passed to an analogous problem, which is already of the 6^{th} degree, and thus not considered in Seifert's booklet: To draw normals to an ellipsoid from a point. This problem, as has been known for a long time, is connected with the central surfaces of the ellipsoid (these surfaces are generated by two centres of curvature of each point of the ellipsoid). In the Czech literature, only Jan Sobotka deals with central surfaces in his lectures on differential geometry. It turned out that there are open tasks in these problems (see 4). Two Lauermann's and Mertens' circles have the same property as Pelc's straight lines. Schouten's proof that the biquadratic problem on normals reduces to 2 quadratic problems, uses the existence of 27 straight lines on a general cubic surface. I have not come across any elementary proof in the literature. The same holds as regards the question, if and what sort of spatial analogy have Pelc's straight lines and Lauermann's – Mertens' circles. In other words: When does the problem of the 6^{th} degree to draw normals from a point to an ellipsoid reduce to problems of lower degrees? Neither is more literature available on central surfaces of quadrics. I added something about their behaviour at points which are centres of curvature of the 4 real umbical points of the ellipsoid.

IV.

František Vyčichlo (1905–1958) was an relentless organizer of mathematical events. I remember him as a hardly attainable model of help to young people, whom he found to be seriously interested in science. His profound interest in applied mathematics was connected with his activities mostly at the Czech Technical University. The beginnings of Vyčichlo's organizational efforts date back to the end of 1920s, when he prepared problems for the mathematical

journal for students of grammar schools. The first such problem read: Construct a set of points, from which the tangents drawn to two given circles, have a constant sum of lengths. The problem is evidently the generalized gardener's construction of an ellipse. I have analysed it in detail. In the same way I have analysed Vyčichlo's last paper of 1955 on pairs of surfaces with simultaneous differential invariants. I added the eulogy delivered by Vladimír Kořínek, professor at the Charles University, a close Vyčichlo's friend, at the occassion of the first anniversary of Vyčichlo's decease. He referred to F. Vyčichlo as the second most significant member of the Union in the first half of the 20^{th} century.

V.

As regards Bohumil Bydžovský (rector on 600^{th} jubilee of university) I delivered a commemorative speech at the celebration of the 650^{th} anniversary of the founding of the Charles University in April 1998. The speech has been published and, therefore, I shall speak of him only briefly. I recall Bydžovský's explications on the general cubic surface, and I wish to add to them two remarks about the application of their 27 straight lines: Peter Schoute (1846–1913) based on them the investigation of all the points in the plane of an ellipse, for which the biquadratic problem to draw to it normals from them, reduces to two quadratic problems (see III E 2). Richard Blum applied these 27 straight lines to the proof of existence of the cyclides with 6 systems of circles (I remind the reader of the long known Yvon Villarceau's circles on the torus). In my opinion B. Bydžovský's lecture were the best of all my academics. He was famous for his exclusive teaching abilities; nevertheless, number of his students was not large.

VI.

The scientific activity of Eduard Čech (l893–l960) had three periods: the 1920s were devoted to projective differential geometry and the 1930s to topology, both in Brno; after 1945 he returned in Prague again to the geometry of the 1920s, this time to the theory of correspondences. At the celebration of Čech's 60^{th} birthday in 1953, I spoke on Čech's first scientific period; in 1993 at the commemoration ceremony of the centenary of Čech's birthday, I spoke of the same theme, but after 40 years I was much more knowledgable.

E. Čech assigned to me – to a scholarship-holder of the Research Institute of Mathematics, of which he was director – the theme for my doctor's dissertation. He gave me his computations in which he examined the analogy in four dimensions of the known Bertrand's double-curves, and asked me to examine this analogy in five dimensions. As the subject of my Candidate-of-Sciences dissertation E. Čech asked me to find pairs of surfaces analogous to Bertrand's curves. (A trivial case are the surfacess parallel with Darboux's trihedrons).

VII.

In the last part I write on the civic attitudes of my university teachers. I know nothing of the political opinions of L. Seifert. I remember him as being most contented in the serenity of his study. He was rector of the university in Brno in the politically critical year 1948. There, with the start of communist reign, the February crisis did not lead to such shocks as in Prague.

In 1947 B. Bydžovský – a social democrat – was rector of the Charles University. In the year 1948, which commemorated the 600th anniversary of the founding of the Prague university, jurist Karel Engliš (l880–196l) was elected rector. The zealous leader of communist students, Jiří Pelikán (l923–1999), who stayed in Italy after the critical year 1968 and became member of the European parliament) achieved Engliš's abdication. I still question Bydžovský's decision to accept the rector's office after the February 1948 events. He had a good excuse on hand – his health due to which he was forced to abdicate after 3 months.

E. Čech is a special case. At the time of the Protectorate, when the Germans closed all Czech universities in November 1939 and then deported 1 200 students to the concentration camp of Sachsenhausen and similarly persecuted numbers of academics, E. Čech quite ignored this German brutality and applied – of course in vain – for a position at the university in Vratislav (at that time Breslau, nowadays Wrocław). Immediately after the war he became a member of the Communist Party. He was unable to avoid disciplinary proceedings, but it procrastinated and the February 1948 events stopped it altogether.

F. Vyčichlo was also a member of the Communist Party, but I know certainly that it had nothing to do with his career. He came from a very poor family and he disliked social injustice. I was close to F. Vyčichlo several years and I knew that without membership in the Communist Party he would not have been able to do as much for the organisation of the mathematics society. I did not succeed in publishing Kořínek's eulogy of 1959 mentioned above at the time of the centenary of Vyčichlo's birthday in 2005 in the member's journal of our Union. Also my political analysis of the eulogy was not cogent enough for publication, and so I reprint it in full.