Laudatio for the 70th Birthday of Rudolf Fritsch

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`(richtig: Johannisburg)`

Rudolf Fritsch was born in Johanesburg (East Prussia). He earned his doctorate in 1968 at the University of Saarbruecken and his habilitation in 1973 at the University of Konstanz. Since 1981 he is Professor at the Department of Teaching of Mathematics at the Ludvig-Maximilians University Munich.

Prof. Fritsch deals with topology, geometry and mathematics education. He is also interested in history of mathematics and has written several biographies of prominent mathematicians for the new German biography.

For the first half of the 20th century and a little beyond that time frame, researchers in mathematics was approaching the subject of their research with a marked difference from today's standard practice. Back then, one was pursuing one's own interest and curiosity, with little care for whether the subject was fashionable, whether it was held in high esteem by important people or whether there was a large enough group of practitioners to form a group powerful enough to influence the power politics of the mathematical village.

The attitude of that vanished generation can be best read from the widespread interests of Max Dehn, Kurt Reidemeister, Emil Artin, Reinhold Baer, Emanuel Sperner, Alfred Tarski. Work in the foundations of geometry had, to put it mildly, never been held in very high esteem in the Russian, French, or American school of mathematics, and it was only the prestige achieved outside of this field by Hilbert that gave it some measure of recognition in German-speaking countries. This fact never discouraged those named earlier to pursue their own interest and further our understanding of the foundations of geometry; although they were experts in several other fields as well.

Rudolf Fritsch is a late representative of that school who viewed mathematics not as a competition between rival groups, but a pursuit of personal interests and curiosities. By the time he approached mathematics with this view of the freedom of the spirit, mathematics was already in the process of undergoing the changes that are apparent today, so that he has been almost the sole person to do research in the foundations of geometry while at the same time doing research in a subject held in incomparably much higher esteem by the mathematical community of the day, namely algebraic topology (the only other case of that time being Wilhelm Klingenberg, whose career in the foundations of geometry is, however, separated in time from that in differential geometry). It is very interesting that for Professor Fritsch, the two careers, that of researcher in the foundations of geometry and that of algebraic topologist happened concomitantly, that he never left one for the other, nor felt that there was a tension

between the two. To these two, he added in time a third area of interest: the history of mathematics, mostly of the 19th and 20th century.

In the foundations of geometry, Professor Fritsch has been interested in particular in what Hilbert called the purity of the method, i. e. in finding not new theorems, but rather the axioms that are needed to prove known theorems. This approach goes back to the ancient Greeks. He has found a more transparent proof of the theorem of Adolf Schleiermacher, that if any projectivity with five fixed points is the identity, then Pappus's theorem must hold, has found new ways to show that Desarguesian Planes can be embedded in three-dimensional space, a proof of Bodenmiller's theorem in a very general setting, as well as proofs in a very weak axiom system for Miquel's 1838 cyclic configuration theorems, for an 1822 Poncelet cyclic configuration theorem, and for the Wallace-Simson line theorem.

In algebraic topology, where Professor Fritsch started his research, under the direction of Dieter Puppe, he has written some twenty papers, as well as, in 1992 with Renzo Piccinini, a textbook, that has also become a much-cited reference: Cellular structures in topology. A paper in pure algebra of 1972 takes a similar look as his later axiomatic analyses in geometry at the Jordan-Holder and Schreier theorems: What is needed for their truth?

His historical interest has led him to take a closer look at the history of the Four-color-theorem, resulting in a lovely and very readable monograph on the subject.

According to his teachers' exams and a practical experience as gymnasium teacher as well in view of corresponding papers Rudolf Fritsch was elected for the chair of Mathematical Education at the Ludwig-Maximilians-University of Munich in 1981. He filled this position for almost 25 years with subject oriented themes on mathematical education: What of mathematics and how should it be taught in schools in particular in gymnasia? One main point his activities were propaganda for spatial geometry in school which caused the nickname "Tetraeder-Rudi"given him from students. This reflected his aim to encourage students to think how triangle geometry can be transferred in the space. The main problem is that it is not clear what the three-dimensional analogues of plane lines and curves are. In the plane objects of dimension 1 have also codimension 1, but this coincidence fails in the space. With respect to teachers' education at the university he tried to show the students the connection between higher and elementary mathematics. As an example he explained that the rationalizing of fractions in grade 9 relies on the algebraic theorem that the factor ring modulo a maximal ideal is a field. Since several years he also makes efforts to introduce dynamical geometry software in the schools. According to his long experience he is still requested as examinator from many students. So in this year 2011 he has to perform about 200 oral exams.

We can say that professor Fritsch is a good friend of many Bulgarian mathematicians.

Professor Fritsch holds honorary doctorates from the Universities of Sofia and Kaliningrad. He is president of the Sudeten German Academy of Sciences and Arts. He is associate editor of Electronic Journal Forum and a founding member of the Friends Geometricorum mathematics in industry, university and school at the Ludwig-Maximilians University.

We wish him continued success in his discipline-transcending approach, and wish that his example will serve as a source of courage and inspiration for young mathematicians.