RUDOLF ZIEGELBECKER: STRENGTH FROM SCIENCE 1924–2009

Rudolf Ziegelbecker. Born August 26, 1924 in Veitsch, Austria. Died January 12, 2009 in Graz, Austria.

The first author (CN) of this tribute had the honor and privilege of meeting the late Rudolf Ziegelbecker (RZ), then in his early eighties, at his home in Graz, Austria, shortly after the XXVIth Conference of the International Society for Fluoride Research held in Wiesbaden, Germany, September 26-29, 2005. Although his health was beginning to fail, RZ was still very active in campaigning against unnecessary and harmful exposure to fluoride. Beginning in 1969, he had been tireless, and often successful, in his efforts to convince European health authorities of the ineffectiveness of water fluoridation, mandatory fluoride supplements, and salt fluoridation for the prevention of dental caries and that the procedures deserved to be abandoned.

It was from his first-hand experience with industrial fluoride pollution that RZ became interested in fluoride research. In 1966, a new brickworks manufacturing plant had opened half a kilometre from his home in Graz. He soon noticed the trees and vegetables in his garden were showing signs of serious damage. Moreover, his own children and many children living nearby began complaining of tiredness, queasiness, stomach ache, joint pain, and pain in the limbs from what he suspected to be airborne pollutants. Measurements conducted by the Hygiene Department under the direction of Prof RJ Möse at the University of Graz[1,2] of various gases in the air along with chemical analyses of the plants, and urinalyses of workers in the brickworks and persons living in the neighborhood, revealed very high concentrations of fluoride in the air and vegetation, including fruits and vegetables from the home garden that were a main source of food for the Ziegelbecker family. This meant that the children were getting fluoride exposure not only from the mandatory school F tablet program and from fluoridated toothpaste but also from the brickworks. When the local public health officials

could not offer any convincing documentation for the safety and effectiveness of the school F program, RZ insisted, despite considerable resistance, that the school stop giving fluoride tablets to his children. He also discontinued the use of fluoride toothpaste at home as well as the consumption of fluoride-contaminated fruits and vegetables from his garden. A few weeks later the health complaints of his children ceased.

Following careful study, over the next few years, of the scientific literature on the dental, medical, and toxicological aspects of fluoride and through media appearances, private campaigning, and presentations at public hearings, RZ was able, in 1973, to convince school and city officials of Graz, the capital of the Province of Styria, to discontinue issuing F supplements and to shut down the brick factory. The rest of the Province then followed the lead of Graz and discontinued the supplements. Despite warnings from dentists and public health officials, no increase in caries occurred.[3]

As a result of his early experience in scientific work at the Research Center for Electron Microscopy at the Technical University of Graz, which included work on highly toxic fluorine compounds and studies on crystal formation, RZ was strongly motivated to undertake an intensive review of the literature pertaining to the recommendation and introduction of water fluoridation. With primary training in engineering, mathematics, and especially in physics, he used various approaches from the natural sciences, especially the detailed examination of the data gathering process, to assess, criticize, and ultimately refute the foundations of fluoridation. From the beginning he was struck by weaknesses in the studies purporting to show that fluoridation was safe and effective. His re-analyses of the data published by the US Public Health Service revealed serious problems in the seminal studies by Dean and others,[4,5] upon which the entire fluoridation program edifice was based.

Thus, in his re-examination[5-9] of Dean's famous "21-cities study" of caries in permanent teeth of 4,425 children, aged 12–14 years, published in 1942, RZ noted that Dean had not included caries data from his earlier surveys that would not have fitted into his proposed inverse relationship between natural F water levels and dental caries. RZ noted that the caries prevalence in more than 650 counties and cities was known to Dean at that time,[5] covering a range of 1.5 to 9.5 DMFT/child in 1933–34, mainly at low F in water, and that some of the 21 cities had undergone very different, very large changes until 1941/1942. RZ therefore examined the caries prevalence data available in 1981 for the permanent teeth of 48,000 12–14 year-old children in 136 communities in the USA, Canada, Great Britain, and Europe with 0.15 to 5.8 ppm natural F in the drinking water. When he plotted all these caries data, including those of Dean's 21 cities, against F in water (heightened by an estimated basic intake from other sources) in a log-normal coordinate frame, he found only a flat line—not Dean's inverse relationship of caries with F in the drinking water.[6] On the other hand, when he plotted, in the same manner, the incidence of dental fluorosis of 12,000 children, 9–14 years of age, in 67 communities of the USA and 6 in Denmark against the F content of their

drinking water, ranging from 0.4 to 6.6 ppm natural F, he found a highly correlated direct relation.[6] Further analysis of 10 of Dean's 21 cities, in the same coordinate frame, showed a close direct relationship of caries scores with higher Lactobacillus acidophilus levels in the saliva—even at low F water levels.[5,7,8]

Likewise, in the USPHS "demonstration trial" in Grand Rapids, Michigan, a similar pattern of data selection undermined the claimed validity of the study. After just one year, practically the entire caries reduction for the next five years was reported to have occurred. This situation resulted from the fact that the initial dental survey in 1944/45 included all children in the 79 schools in Grand Rapids, but after fluoridation began, caries data were collected for the children in only 25 schools—clearly reflecting a biased selection of data.[5,10] Moreover, caries rates in the control nonfluoridated city of Muskegon, Michigan were found to be declining after 1945 just as in fluoridated Grand Rapids.[5]

Throughout his research, RZ constantly endeavored to maintain his objectivity and scientific integrity and to secure independent confirmations (in one case 19!) of any important new results. He obtained opinions from university faculty and various professionals including physicists, mathematicians, statisticians, biologists, and later his own son (second author RCZ), who undertook postdoctoral studies in physics at the Institute for Experimental Physics of the Technical University of Graz. In this connection, he often argued that if fluoride could not be proved to be effective in preventing tooth decay, then there was no need to argue about its possible harmful side effects. His analyses convinced him that ingested fluoride had no true dental benefit, i.e., no significant ability to reduce the susceptibility of teeth to caries. Nonetheless, he did contribute to the scientific study and debate of several adverse side effects of fluoride, including cancer.[11,12]

Following his success in Graz and the Province of Styria, he made presentations in various parts of Europe at government hearings, published in scientific and popular publications, spoke on the radio and appeared on TV, and wrote letters to the relevant decision-makers, thereby contributing significantly to the abandonment of water fluoridation throughout Continental Europe. Nowhere a real increase in dental caries occurred afterwards.[10] Although many countries in Western and Eastern Europe have experimented with water fluoridation, today only Spain on the continent still has any water fluoridation.

In part owing to his effectiveness in opposing fluoridation, F proponents tried to censor and undermine RZ's work, the largest part of which he conducted as a member of the Institute for Environmental Research which he co-founded and which was owned by the Province of Styria, one of the nine provinces which make up Austria. He was also an invited speaker at scientific conferences and was well appreciated by the scientific community in and outside of Europe. In the 1970s, because his evidence and arguments against fluoridation had become so effective, several dental journals refused to publish his papers. He was treated with hostility by some dental officials and fluoride promoters, who even tried to influence the administration of his research institution via the Austrian Federal Chancellor to

stop his work which appeared after and undermined the World Health Organization's and other recommendations on fluoridation.

Nevertheless, evidence for the soundness of his criticisms plus the continuing reports cases of intoxication by F and the death of a child in Austria from a small number of "safe" fluoride tablets[13] convinced many local, federal, and international dental health decision-makers including former fluoride-promoting dentists as well as many members of the public, to reject fluoridation.

On April 19, 2007, he was officially honored as "Citizen of the Provincial Capital Graz" for his continuous and courageous engagement for a better environment for all citizens.[14]

For all who knew him, RZ will be deeply missed. Scientists involved in fluoride research, campaigners against compulsory fluoride exposure, and all Europeans who have benefited from his efforts on their behalf, are indebted to his decades of tireless, intelligent, and effective work. Because he applied his background in mathematics and physics to problems in data collecting and analysis that dental researchers often had not performed properly, his published papers are well worth revisiting. In them he showed how many dental researchers made fundamental errors in their eagerness to promote fluoride as a panacea against dental caries.

Over the years open-minded officials and friends honored him with their appreciation, e.g.:

> "Your results have been accepted everywhere in Germany with the greatest interest and have increased the grave doubts against drinking water fluoridation by dentists, hygienists, toxicologists, water experts, etc. It is regrettable that the existing data on water fluoridation had not been examined earlier using mathematical-statistical methods [such as yours]. Otherwise the myth of drinking water fluoridation would have already dissolved into air long ago. Some statisticians with whom I talked about your results declared them as unrefutable. … In your papers we see a decisive contribution to the objective scientific critique of drinking water fluoridation which will guide the problem out of the fog of bias and prestige."
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> Prof Dr Erich Naumann, Director of the German Federal Health Office, Head of the Institute for Water, Soil, and Air Hygiene in Berlin.[15]
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> "…. your publications were decisive for our decision to discontinue fluoridation."
>
> Otto Wolfskehl, a commissioner of the Kassel Germany Public Utility.[16]
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> (Kassel was the only West German city to ever be fluoridated.)
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> "… Rudi Ziegelbecker is the originator of the longest inquiry ever brought before the Austrian Parliament, of course on the topic of fluoride. We have often worked closely [on health issues]. At that time I still had a very naive trust in all institutions, positions, and companies on health issues, but Rudi opened my eyes and my critical consciousness, for which I will be forever grateful to him. Rudi Ziegelbecker strove against the stream whenever necessary without ever losing his amiable and deeply human compassion, a combination which is very rare, almost unique. … Rudi was always consistent, courageous, and brilliant."
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> Dr Madeleine Petrovic, former Austrian Green Party leader.[17]

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