

## Editorial

**Foreword to the special issue arising from the international conference “Tourmaline 2017”****Jan CEMPÍREK, Milan NOVÁK***Department of Geological Sciences, Faculty of Science, Masaryk University, Kotlářská 2, 611 37 Brno, Czech Republic*

Twenty years ago (June 1997), the first Tourmaline Conference was organized by Milan Novák (Moravian Museum, Brno, Czech Republic) and Frank Hawthorne (University of Manitoba, Winnipeg, Canada). This meeting brought together an international group of scientists to discuss tourmaline research and to advance tourmaline science, and this led to a host of fruitful collaborations. Results of this conference were published in special issues of the *European Journal of Mineralogy* and *Journal of the Czech Geological Society*. Over the years, this meeting attained mythical status among tourmaline researchers, and a second edition was long overdue.

In June 2017, at the 20<sup>th</sup> anniversary of the first conference, Jan Cempírek and Milan Novák (Masaryk University) reconvened 61 scientists from 17 countries at the same location near Nové Město na Moravě (Czech Republic) to assess progress in tourmaline research, to discuss new challenges, and to catalyze community efforts for advancing tourmaline science.

A series of eight keynote lectures over the three-day conference highlighted the state-of-affairs, challenges, and future directions for tourmaline research in mineralogy, petrology, and geochemistry. These were interspersed with numerous contributed presentations and posters. With the experience of having attended both meetings, Darrell Henry (Louisiana State University, USA) began with a historical perspective on the issues leading to the 1997 conference and a broad overview of progress since that time. Ferdinando Bosi (Sapienza University of Rome, Italy) reviewed the complexities of the tourmaline structure and chemistry, as well as the advances in structure determination that have highlighted the importance of short-range order. Andreas Ertl (University of Vienna, Austria) focused on tourmalines with tetrahedral boron, a finding first reported at the 1997 meeting. Federico Pezzotta (Natural History Museum of Milan, Italy) presented tourmaline in gem pegmatites. Eleanor Berryman (GFZ German Research Centre for Geosciences, Germany) discussed experimental work on tourmaline that has allowed quantitative correlations to be made between select major elements in tourmaline and fluid chemistry. Barbara Dutrow (Louisiana State University, USA) highlighted the utility of tourmaline as an indicator of the fluid phase,

relating, for example, some tourmaline species (e.g. oxy-dravite/povondraite) to salinity trends. Horst Marschall (Goethe University, Germany) provided an overview of tourmaline isotopic systematics where “no element is left behind” and discussed the need for more studies on isotopic systems. Vincent van Hinsberg (McGill University, Canada) presented new work on trace elements in tourmaline, demonstrated the challenges in obtaining and interpreting such data, and showed the potential for carefully collected data. Robert Trumbull (GFZ German Research Centre for Geosciences, Germany) showed that tourmaline has many applications when it comes to interpreting the genesis of ore systems, and he focused on B isotopic studies. One of the key outcomes of the meeting was the recognition that tourmaline’s unique structure has a complex control on its composition: both short- and long-range element order determine what major and trace elements can be accommodated. Understanding and quantifying this control holds great promise to expand tourmaline’s use as an indicator mineral.

A field trip to eight classic tourmaline localities in the eastern part of the Bohemian Massif followed the conference, led by Milan Novák and Jan Cempírek with Petr Gadas, Radek Škoda, and Renata Čopjaková. Outcrops permitted all of the attendees to collect tourmalines of variable origins: from abyssal pegmatites, through orthogneisses, metacarbonates and granitic pegmatites (LCT as well as NYF family) to nodular granites. A field guide (Buriánek et al. 2017) supplemented overviews given by tourmaline researchers at each locality.

One of the aims of the Tourmaline 2017 conference was promoting experience transfer to students; the 23 students from 10 countries who joined the conference presented results from a large variety of interesting studies, pushing the boundaries of tourmaline research further into unknown areas. This special issue, which presents ten papers on various topics, also includes several remarkable student papers.

The first article by *Darrell Henry and Barbara Dutrow* brings a review of tourmaline research history. The increase in number of publications, especially in last 20 years, is remarkable and shows how important group of minerals tourmaline became.

The second contribution by *Barbara Dutrow and Darrell Henry* reviews the behavior of tourmaline as a monitor of hydrothermal fluid composition. Tourmaline clearly became very useful in exploration and petrogenetic research of multiple (e.g., porphyry, VMS, orogenic gold or U, Cu, Mo) types of ore deposits and hydrothermal environment in general.

The third and fourth papers by *Zbyněk Buřival and Milan Novák*, and *Emily Scribner et al.* deal with metasomatic processes and tourmaline formed by replacement of garnet and amphiboles. In the latter case, unusually Ca,Ti-rich tourmalines formed, possibly with high  $\text{Fe}^{3+}$  contents, in calc-alkaline lamprophyre dikes.

The fifth article by *Peter Bačík* uses site-occupancy unconstrained approach to assess the structural response of tourmaline octahedral sites to compositional changes in simple Fe–Mg–Al–Li tourmalines. Besides the bond-valence relations, the study emphasized effects of Jahn-Teller distortion that can be the decisive factor in cation occupancy in tourmaline.

Two subsequent papers focus on spectroscopic properties of tourmaline – the team led by *Simone F. da Silva*

discusses optical (NIR-vis-UV) spectra of several types of colored tourmalines from Brazil, whereas *Elizabeth Lévy et al.* used XANES for determination of the  $\text{Fe}^{3+}/\text{Fe}^{2+}$  ratio in schorlitic tourmalines.

*Tamás Spráňitz* and colleagues present the first comprehensive petrological study of tourmaline-rich rocks from Sopron area in north-western Hungary. Using tourmaline, they successfully traced a large part of the magmatic and metamorphic history of the area.

The two final contributions by *Shoshauna Farnsworth-Pinkerton et al.* and *Oleg Vereshchagin et al.* deal with tourmaline applications in provenance of sedimentary rocks using Laser-Induced Breakdown Spectroscopy (LIBS) and multi-mineral approach. Clearly, tourmaline can provide useful information on provenance of sedimentary rocks; however, *Vereshchagin et al.* conclusively showed that multi-mineral approach combined with detrital zircon dating should be ideally employed, as many rock types lack tourmaline.

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