

# From the Editor



**AS** I write this column, memories linger of a very successful and enjoyable BCA Spring Meeting in York. I thought that the high number of joint sessions, where relevant insights from one branch of crystallography informed practitioners of another branch, clearly demonstrated the benefits of getting the entire BCA together for a meeting. Next year's meeting

will take place in Nottingham from 4-7 April.

Of course, we won't have to wait that long for more good meetings. First up, our own Industrial Group will hold its XRF meeting on 17 June at the University of Leicester. An impressive set of presentations has already been arranged, with more to come. Details are available on the IG website. If you want an additional application of XRF, read on...

Next comes the meeting of the American Crystallographic Association from 25-29 July in Philadelphia. Conveniently for participants from the UK, the eastern location means a time difference of only 5 hours. Therefore we should still be able to enjoy social events in the evening but wake up bright and early for the next day's first lecture (at 8 AM!). Take a look at the conference logo, which cleverly integrates crystallographic notation with Philadelphia's most iconic artefact, the Liberty Bell. Philadelphia has a distinguished association with crystallography: although **Arthur Lindo Patterson** was peripatetic in his early years, including the time when he developed his famous function, for most of his scientific career he worked in the Philadelphia area.

As for the Liberty Bell, it was ordered from the renowned Whitechapel Bell Foundry in England by the Pennsylvania Provincial Assembly in 1751. As an inscription it carried the Biblical text "Proclaim LIBERTY throughout all the Land unto all the Inhabitants thereof". Tested in Philadelphia after a rough sea crossing, it cracked with the first stroke of the clapper. Astonishingly, two local craftsmen, the iron founder **John Pass** and the brass founder **John Stow**, were entrusted with recasting the precious 945 kg bell. After carefully taking a mould of the bell and its inscription, Pass and Stow broke it up with sledgehammers and remelted the pieces. The standard recipe of the time called for a bronze with about 77% copper and 23 % tin. A higher concentration of copper made the metal too soft, while more tin made it too brittle. Guessing that the original bell cracked because it had too much tin, Pass and Stow added copper. Their recast bell was stable enough and had an imposing appearance, but an observer recounted that "it sounded like two coal scuttles banged together". Embarrassed, Pass and Stow cast the bell once again after raising the tin content. Lacking pure tin, they did this by adding scrap pewter which also contained lead. The new version of the bell sounded better and gave good service for a few decades, but then it developed the crack that in some ways has made it even more famous. There are several legends about the occasion when it cracked, but all that is known for certain is that it happened sometime between 1817 and 1846. Since a set of church bells in Ipswich dating

from as early as the 1450s can still be safely rung, the failure of the Liberty Bell after less than a century of use suggests metallurgical problems. Chemical analysis of a small sample of shavings drilled from near the crack showed 73.1% Cu, 24.0% Sn, 1.3% Pb, 0.28% Ni, 0.25% Ag, 0.25% Zn and 0.05% Fe. Thus there was a bit too much tin. However, removing samples from different parts of such a hallowed object to check its uniformity was out of the question. A non-destructive alternative was provided by energy-dispersive X-ray fluorescence carried out *in situ* with radioactive  $\text{Cd}^{109}$  and  $\text{Am}^{241}$  as the sources of primary radiation. Reported by Victor F. Hanson, Janice H. Carlson, Karen M. Papouchado and Norman A. Nielsen in *American Scientist*, **64**, 614-619 (1976), such analyses at 10 points around the bell yielded a range of Cu from 64.95 to 69.12%, Sn from 25.20 to 30.16%, Pb from 2.20 to 5.47%, and smaller amounts of 6 other elements. Such non-uniformity is understandable, given that Pass and Stow probably lacked a crucible large enough to hold the full mass of their alloy and had to divide it among several smaller ones. Surprisingly, the lowest concentration of tin was found adjacent to the crack; but perhaps, if the area of impact was the least brittle, this could explain why the bell lasted as long as it did. In 1976, members of the Procrastinators' Club of America picketed the Whitechapel Bell Foundry with signs "We got a lemon" and "What about the warranty?" The foundry replied that they would be glad to supply a replacement bell, provided that the defective one was returned in its original packaging!

In August we can look forward to ECM29, the European Crystallographic Meeting in Croatia. Croatia is well known for beautiful scenery and historic towns, but Croatians also are very crystallography-minded people. The Hrvatska Udruga Kristalografa (Croatian Association of Crystallographers) has approximately 100 members. Proportional to population, that figure means the BCA should have 1500. Let that be an inspiration to us! In 1966 the Yugoslav Centre of Crystallography was established in Zagreb under the auspices of the Yugoslav Academy of Sciences and Arts (notice the order!). After independence Croatia inherited this pre-eminence. Not resting on their laurels, the Croatians have done their utmost to work with distinguished crystallographers from all over Europe to create a really interesting programme.

A satellite meeting for ECM29 looks interesting. Between 20-22 August 2015, ECACOMSIG is organising a two day Computing Workshop on Advanced Software Development for Crystallographers, in Duga Uvala, about 40 km from Rovinj, Croatia. The Workshop will provide an opportunity for younger developers to meet and engage with senior developers and also with their peers in Crystallographic Methods development. Further satellite meetings are listed in this issue.

In conclusion, I wish all our readers an enjoyable and relaxing summer. I hope that you will get some time in the garden or on a beach where you can think about crystallography with no worries about marking exams or writing reports.

**Carl Schwalbe**