Study of natural history specimens using X-ray fluorescence spectrometry

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There may be hidden risks in handling natural history specimens as they are usually treated with preservatives such as arsenic or mercury compounds, as they may lead to occupational health concerns to museum personnel. A non-destructive method using x-ray fluorescence spectrometry (XRF) was used to investigate whether the natural history collections pertaining to the Hong Kong History Museum and the Hong Kong Science Museum contained any hazardous materials as preservatives. Over 83% of the specimens were found to contain higher concentrations of arsenic in the main body of the specimen, while only a small number were found to hold mercury. The collections in questions were known to have been produced in China but the production method was not clear. Literature reviews indicated that arsenic trioxide was commonly used to preserve natural history specimens. Mammals and reptiles are frequently treated with arsenic trioxide, alum and camphor, while birds were treated with arsenic trioxide mixed with soap and camphor in a paste form.

XRF is a useful tool in detecting inorganic preservatives. Precautionary guidelines on handling and storage were implemented. The use of boric acid as a less hazardous substitute should further be investigated.