

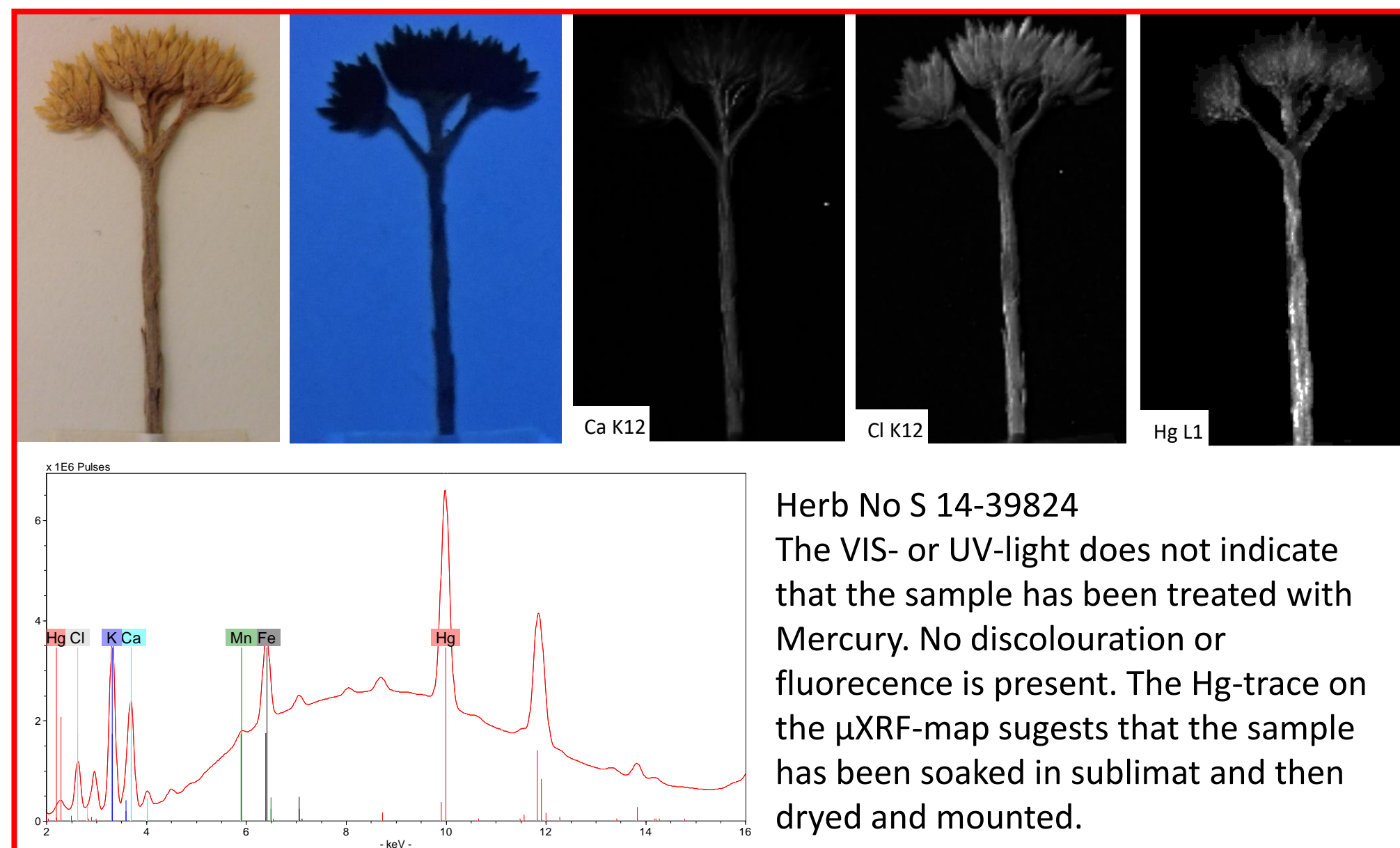
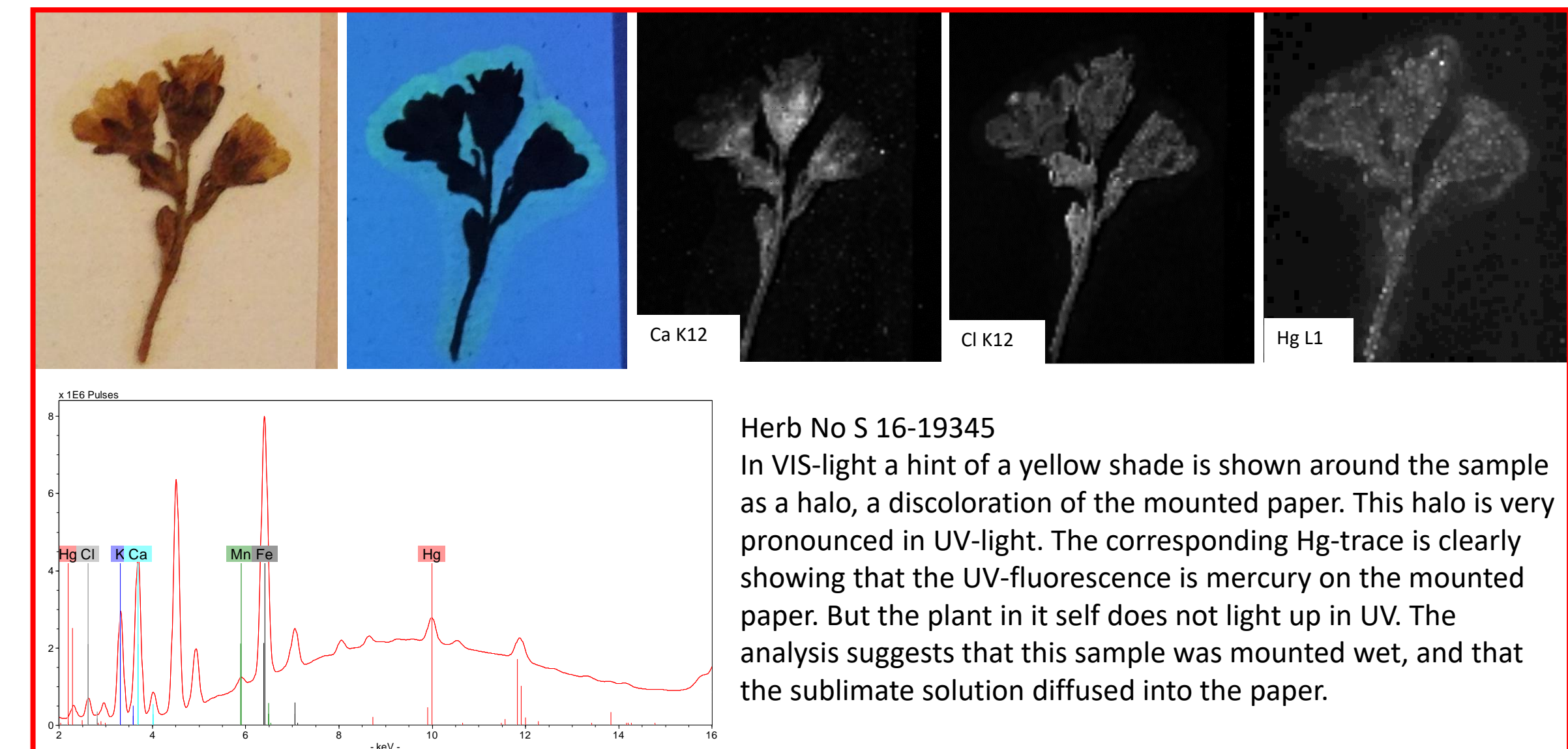
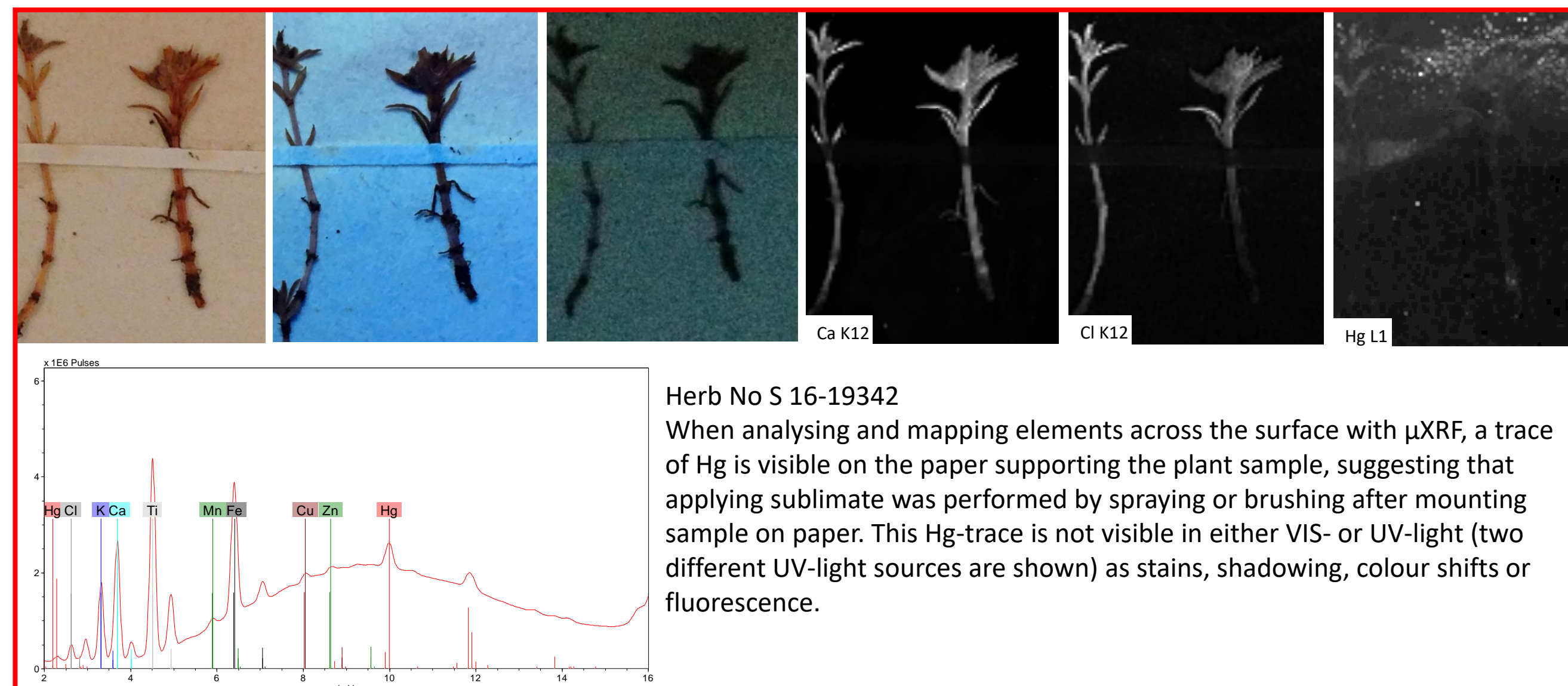
Mercury in museum herbarium collections

Introduction

Mercury (Hg) and all mercury containing compounds are poisonous. Mercury has had a broad variety of use in history and can be found in many different types of objects in museum collections(1). In herbarium collections, mercury was used in pest management and conservation(2). Plants and mounted paper was treated with Mercury(II)chloride (HgCl_2), often called corrosive sublimate. The crystalline Mercury(II)chloride is poisonous if digested, so contaminated objects should be treated with care and proper safety equipment, e.g. gloves. Over time HgCl_2 will decompose and it may cause mercury emission and subsequently Hg vapour in indoor air, a serious occupational health hazard(3). Not only for the workers at the collection, and cleaning personnel at the museum, but also for researchers who need to work with and handle the collection materials. It is therefore important to identify if a collection is contaminated with mercury. It has been suggested that scanning with a UV-lamp can provide a positive response to mercury treated samples(4,5). The UV-light fluorescence induced is supposed to be distinctly coloured, ranging from cream, yellow, peach through to orange. Many museums today have used UV-lamps to scan mounted paper and plant samples in their herbarium in order to detect mercury. But is this a valid working method of investigation?

Method

Samples were acquired from a herbarium collection (the Swedish Museum of Natural History). Several types of plant samples were investigated, samples known to contain Hg, samples marked with a S for sublimate treated, and reference samples not treated with sublimate. Samples were analysed with μXRF (ARTAX 800, Bruker). Mapping of element distribution was performed and the Hg-trace compared to VIS- and UV-light. In figures showing Hg L1-trace, contrast has been enhanced in order to compare with other figures. UV-lamps applied were: 1) Universal-UV-Lampe, Camag 29200, Muttentz, Schweiz 2) Original Hanau typ 5261, Quarzlampen, GMBH.



References

- 1) Riksantikvarieämbetet. Vårda väl. Kvicksilver i samlingar: <http://samla.raa.se/xmlui/handle/raa/10709>
- 2) Riksantikvarieämbetet. Vårda väl. Bekämpningsmedel i samlingar: <http://samla.raa.se/xmlui/handle/raa/10710>
- 3) Havermans, J., Dekker, R. & Sportel, R. The effect of mercuric chloride treatment as biocide for herbaria on the indoor air quality *Herit Sci* 3, 39 (2015) doi:10.1186/s40494-015-0068-8
- 4) Purewal V., Colston B., Novel detection and removal of hazardous biocide residues historically applied to herbaria https://amgueddfa.cymru/media/32289/SPNHC_Posters_1.pdf
- 5) Purewal V., <https://museum.wales/articles/2013-11-05/Madness-not-to-stay-safe-around-Mercury/>

Results and discussion

The handling of mercury treated samples and the emission of mercury from herbarium collection forms a serious occupational health hazard. This short study shows that it is not possible to identify all different types of mercury treated mounted paper or plant samples by scanning with a UV-lamp. The discolouration of mounted paper may or may not indicate mercury. This study also shows indications of different ways of applying the sublimate to the sample, for example by soaking or brushing materials using a solution of HgCl_2 with ethanol.

In order to work safe with a herbarium collection, you will have to treat all samples as if they are contaminated, e.g. use proper safety equipment, and have good ventilation –Even if UV-light gives no indication of mercury. Only a chemical analysis will tell if the sample is contaminated with mercury. Reference samples did not contain Hg, as expected.

