



## NEW POTS FOR OLD

### Thermoluminescence authentication of T'ang and Han Dynasty pottery

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Over the years during which the Wollongong thermoluminescence (TL) dating laboratory has operated it has been called upon to authenticate various pieces of ancient pottery. By far the frequently submitted wares originate from China and the majority of these are either in the T'ang or Han Dynasty style. Over the past two years there has been a marked increase in the demand for such testing. As many of these pieces have been purchased in Hong Kong this possibly reflects the scheduled change-over during 1997.

More than 80 pieces of T'ang Dynasty and 40 Han Dynasty style ceramic wares have been analysed and this paper presents a summary of these results. Approximately 60% of Han ceramics and 45% of the T'ang pottery authenticated have been shown to belong to periods other than that stylistically suggested. Items which have been found not to be of the anticipated antiquity generally fall into distinct age groups. Of the T'ang wares the most commonly copied item is found to be the horse and for the Han pieces, human figures and ewers/pots/vases represent the most frequently reproduced wares.

Despite the attractive appearance of many of the wares analysed by this means all is not necessarily what it seems. Many of the wares tested cannot be clearly identified as being original or a more recent copy. It seems that a proportion of these reproductions may have been made in the original moulds rendering them stylistically quite unidentifiable from the original pottery produced from those moulds. TL can however often assist in this identification. A small sample taken from the underside of the ware is necessary and this usually takes the form of three or four small drill holes around 1.5mm in diameter. This material is removed from a position such that it does not detract from the appearance of the ware. If required these holes may be later filled although the philosophy encouraged by the laboratory is to leave these as they form a part of the art history of the ware tested. Care must be taken to remove this sample from areas which form a part of the original item as many pieces may have undergone restoration. Particularly vulnerable are the extremities such as limbs, tails and the like. The analysis material taken from of a restored area will result in an age more recent than the fabrication of the original ware. Quite frequently it is also possible to authenticate bronze pieces by this means. This requires the removal of a small amount of the remaining casting core assuming that this is accessible. Such material is generally removed using a small probe rather than by drilling.

Authentication does not seek to provide an accurate age of manufacture of the item under test. This form of test is conducted in order to establish whether or not the age of the ware is consistent with the stylistic appearance. Because of the many unknowns regarding the history of the item under test and the small amount of sample removed, more accurate age determinations cannot be made. In order to achieve greater accuracy it is necessary to remove more sample and this is not often possible. The method is also best suited to the age determination of lower fired earthenware items.

The first step in the authentication process is to prepare a number of sample aliquots. This is achieved by settling the grains of a certain size (1-8 micrometres) onto a number of aluminium planchettes. Subsequently these are heated so releasing the TL signal which has accumulated since the last firing of the object. This process is achieved under carefully controlled conditions which allow the TL signal to be measured in the form of the light emitted during heating - TL. TL is stored in the form of trapped electrons within crystalline minerals within the pottery and the energy which produces TL is provided by the trace amounts of long-lived radioactive isotopes which are also present within the pottery. The initial firing of the ware resets the TL signal which then begins to build up once again at a rate dependant upon the radiation flux present. It is therefore necessary to perform two sets of measurements: one to determine the amount of TL accumulated since the initial firing of

the object and the second to measure the level of the radiation flux which has created this. The longer the time elapsed since the item has been heated the higher the TL level emitted by a given sample.

#### TANG DYNASTY POTTERY (618-907AD)

Of the many items submitted to the laboratory for TL authentication since 1972 this style of pottery has proved the most frequently analysed. In total 77 items have been provided for test. Of these 42, or 55%, have proved consistent with their stylistic appearance. A total of 7 pieces (9%) have yielded ages indicating Ming Dynasty origin, 21 (27%) around 100 years of age and 7 (9%) having been produced about 40 years ago. In fairness it must be stated that several of the pieces which proved to be of Ming origin were suspected of being so by the initiators prior to TL analysis. The pulses recorded around 100 and 40 years clearly coincide with periods of change within the country. Pottery fabricated during these periods make up a substantial proportion of the total number of Tang style wares tested in the laboratory. The proportion of Tang pottery proving to be authentic has increased over the last two years with the percentage increasing from 39% between the years 1972 to 1993 to 55% over the entire period from 1972 to 1995.

A breakdown of the type of Tang pottery most frequently reproduced reveals that the most popular items on the list involves horses with and without riders. Of the 33 such wares tested over the period 1972 - 1995 58% proved to be of more recent origin. 35% of the human figures submitted for authentication also yielded ages inconsistent with their stylistic appearance. There were insufficient numbers of the remaining items tested to provide reliable statistical information.

#### HAN DYNASTY POTTERY (206BC - 221AD)

During the past 23 years a total of 39 wares thought to have origin within this Dynastic period have been submitted for TL authentication. Of these 16 (41%) have proved consistent with this time period. The ages of 8 pieces (21%) have fallen within the Tang Dynasty period and are probably due to incorrect identification in the first instance. As is the situation in the case of the study of the frequency of reproductions for Tang style pottery, there were substantial pulses of Han reproductions produced around 100 and also 40 years ago. These numbered 10 (26%) and 5 (13%) respectively. Once again these periods coincide with times of considerable change within China. There appears to have been little change in the proportion of reproduction Han wares presented to the laboratory over the years of its operation. This figure remains high at around 60%.

The number of items presented for test and thought to have their origin within this period is not as high as in the case of the Tang Dynasty study. The resultant data therefore should be regarded as being correspondingly less reliable. It is quite noticeable however that 67% of the 9 pieces constituting human figures yielded ages consistent with more recent fabrication. 56% of the 9 ewers, pots and vases tested also proved to be inconsistent with the anticipated period whilst pieces involving horses etc, produced during this period appear less frequently with a reproduction rate of 38% compared with 58% for similar Tang period pieces. There were no wares of this stylistic period detected within the Ming Dynasty time frame as is the case for the Tang Dynasty study.

It should be remembered that this study is limited to those items presented to the laboratory for authentication. This may well cause a bias in the sampling process resulting in a higher proportion of reproduction items than is normal. The study does however serve to demonstrate the general trends which can be expected and will possibly serve as an indicator to those proposing to purchase items which are purported to have their origin within the dynastic periods covered. There is clearly a need for caution particularly for the unwary and less experienced. If in doubt it may be advisable to arrange some form of testing, or at least, seek a second opinion, prior to making such a purchase.