

## **JOSEON MUMMIES BEFORE MUMMY STUDIES BEGAN IN KOREA**

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### **ABSTRACT**

Mummy studies in Korea are instrumental in reconstructing the health and disease status of pre-modern Joseon peoples using firm scientific evidence. However, this scientific approach to such investigations in Korea is a relatively new discipline which began only within the last decade. Previous studies on Joseon tombs and their contents were performed exclusively by dress historians because most of the artefacts recoverable from Joseon tombs were textiles. In this report, we examine some of the excavation records left by dress historians in order to elucidate the approximate number and preservation status of Korean mummies discovered prior to the advent of their scientific investigation.

*Keywords:* Korea, mummy, mummy studies, Joseon Dynasty, clothing, history

### **INTRODUCTION**

Joseon Dynasty (1392–1910 CE) mummies are an essential resource for the scientific study of the health and disease statuses of pre-modern Korean people. Although the exact mechanisms of mummification is still not completely understood, it occurred over the course of several hundred years of burial in a specific type of tomb encapsulated by a lime-soil mixture barrier (the LSMB tomb). Considering the lack of any formalized embalming techniques practiced during the Joseon period, the relatively high state of preservation of most of the mummies is surprising (17).

Over the past 10 years, using various techniques of anatomical, radiological, parasitological and molecular analyses, mummy studies in Korea have obtained invaluable information on how pre-modern Joseon peoples lived, suffered (especially from diseases), and died (1–16, 18–28). However, despite their acknowledged historical and cultural value, the scientific study of Korean mummies only began in 2001.

Prior to 2001, mummies received relatively little attention from scientists and researchers. Instead, Joseon tomb investigations had been conducted predominantly by dress historians. Textiles proved very useful to researchers seeking to trace changes occurring in Joseon clothing fashions (10). The accumulated articles of Joseon clothing have grown into one of the greatest historical collections in Korea, and are an invaluable resource for scholarly reconstructions of broad aspects of Joseon culture that otherwise might never have been accessible to modern observers.

The Joseon textile investigations are of particular interest to us, since they indicate that many Korean mummies were discovered in Joseon tombs, although no scientific reports on the mummies were issued. In fact, based on several years of mummy research, we believe that it is highly likely that both clothing and mummies were discovered simultaneously in well-preserved Joseon tombs (10). This means that the discovery of mummies in Joseon tombs might well have been recorded, and the mummies themselves described, in the reports written by dress historians pre-2001.

In this regard, finding information on Korean mummies in dress historian's pre-2001 reports would enable us to obtain information on cases not previously recognized as being connected to mummification practices. In the present study, we examined 107 archaeological reports published by dress historians prior to 2001, the year that scientific studies on mummies began in Korea. Our objective was to gain a sense of the number of other high-preservation mummy cases still potentially awaiting discovery.

## **MATERIALS AND METHODS**

A hundred and seven archaeological reports compiled by dress historians and published prior to 2001 were examined to find descriptions about the discovery of Korean mummies.

## RESULTS

Of the 107 reports studied, 38 included notations and/or descriptions, even if only very brief, pertaining to mummies located during the investigation of Joseon tombs. These mummy-related cases are summarized in Table 1. Here we present three specific cases with relatively detailed information: Lady Yeohung Min, Hwak Kim, and Su Ryun Shim.

**Table 1.** Korean mummies discovered before 2001

Name	Birth/Death	Discovery	Location	Archaeological Information
Gye Ryun Lee	1431–1489	1989	Gwangju, Gyeonggi	Well-preserved mummy found. Some clothing recovered during archaeological investigation.
Lady of Jinju Ryu	1471–1501	1998	Eumsung, Chungbuk	5 pieces of clothing discovered. Female mummified individual.
Soo Byeon	1447–1524	1997	Yangpyung, Gyeonggi	Fair amount of clothing recovered. Shrouded individual. A memorial stone was also recovered from the tombs. Clothing was donated to the National Folk Museum of Korea; however, the mummy was not subjected to scientific investigation.
Woon Koh	1479–1530	1986	Gwangju Metropolitan	Many pieces of clothing discovered. Well-preserved mummy discovered.
On Jeong	1481–1538	1995	Paju, Gyeonggi	This case attracted much media attention due to the discovery of a very well-preserved mummy. Archaeologists collected numerous kinds of clothing and documents. As in other cases, On Jeong's body was reburied in a new tomb.
Lady of Ilsun Mun	Died in 1550–1560 (?)	1998	Andong, Gyeongbuk	Many pieces of clothing and well-preserved mummy found. See the article about this case by Lee et al. (9).
Eung Du Jeong	1508–1572	1988	Koyang, Gyeonggi	News agencies reported that a mummified person, Eung Du Jeong, was discovered from the tomb. When the research team joined the excavation, the mummy had already been re-buried in a new grave.
Lady of Yeonan Kim	Mid-16 <sup>th</sup> century ca.	2000	Yangpyung, Gyeonggi	A clan cemetery was moved to a new grave. Of the 4 tombs that were opened by descendants, only one tomb yielded well-preserved remains. The tomb belonged to a lady of the clan. Like the Eung Du Jeong case, when the investigation team went to the excavation field, this case was already closed. The clothing from the tomb was collected by researchers while the mummy could not be examined at all using scientific techniques. Interestingly, the coffin in which the mummy was found had been immersed in water.

Name	Birth/Death	Discovery	Location	Archaeological Information
Soo Kwon	1531–1580	1999	Euijeongbu, Gyeonggi	Few pieces of clothing were discovered. The mummy had been a tall individual.
Soo Ryun Shim	1534–1589	2001	Yongin, Gyeonggi	The preservation status of the body was good. The clothing wrapped around the mummy was collected on site by dress historians.
Eon Shik Shin	1519–1582	1998	Yangju, Gyeonggi	10 pieces of clothing were discovered alongside a well-preserved mummy.
Eon Chung Lee	1524–1582	2000	Junggye-dong, Seoul	23 pieces of clothing were discovered alongside a well-preserved mummy.
Daughter of Chum Kim	Late 16 <sup>th</sup> century	1985	Gwangju, Gyeonggi	Mummified remains of a teenaged female. Only 3 pieces of clothing recovered.
Byeokjin Lee Clan	?–1585	1991	Chilgok, Gyeongbuk	High-ranking official-general of the Joseon Kingdom. Many pieces of clothing were found with a mummified body.
Eung Tae Lee	1556–1586	1998	Andong, Gyeongbuk	Total of 75 cultural artefacts. Partially mummified body discovered.
Yeo Gwan Shin	1530–1580 ca.	1998	Yangju, Gyeonggi	Many pieces of clothing and other cultural artefacts. The mummy was very tall.
Wi Kim	Early 17 <sup>th</sup> century	1980	Goesan, Chungbuk	20 pieces of clothing and a well-preserved mummy.
Lady of Suncheon Kim	Before 1592 CE	1977	Cheongwon, Chungbuk	Wife of Muui Chai (1537–1594 CE). Multiple pieces of clothing discovered. Documents were well-preserved in the tomb. Female mummy discovered.
Lady of Andong Kim	Mid-16 <sup>th</sup> century	1965	Gwangju, Gyeonggi	3 pieces of clothing and a mummy discovered.
Eon Woong Lee	Late 16 <sup>th</sup> century	1979	Gwacheon, Gyeonggi	Father-in-law of Lady of Cheongju Han.
Lady of Cheongju Han	Late 16 <sup>th</sup> century	1979	Gwacheon, Gyeonggi	Granddaughter of a princess of the Joseon Dynasty. All of the cultural artefacts were exquisitely beautiful, providing a vivid glimpse of Joseon high society. 38 items of clothing discovered.
Lady of Hansan Lee	Late 16 <sup>th</sup> century	1998	Daedeok, Daejeon	Many pieces of clothing and a well-preserved mummy found.
Lady of Yangcheon Heo	16 <sup>th</sup> century	1982	Cheongyang, Chungnam	10 pieces of clothing found. The female mummy measured around 160 centimetres in height.
Lady of Janggi Jeong	1565–1614	1999	Pohang, Gyeongbuk	Known to be the wife of the prime minister of King Gwanghae ( <i>incumbent</i> : 1608–1623 CE). Since she belonged to one of the leading families of the Joseon Dynasty, the cultural artefacts contained in the tomb were of superb quality.
Lady of Yangcheon Heo	1566–1602	1998	Ilyeong, Gyeonggi	Many pieces of clothing and a mummy discovered.

Name	Birth/Death	Discovery	Location	Archaeological Information
Hwak Kim	1572–1633	2001	Pocheon, Gyeonggi	Wife and husband buried together. The coffin of the male was completely preserved, along with a mummified body.
Lady of Dongrae Jeong	1567–1631	2001	Pocheon, Gyeonggi	Hwak Kim's wife. Photographs confirmed that she had been mummified.
Lady of Gurye Sohn	Early 17 <sup>th</sup> century	1979	Cheongwon, Chungbuk	Wife of Yu-in Byun (1566–1641 CE). Many pieces of clothing were discovered, along with a mummy.
Lady of Jinju Ha	1580–1645	1989	Dalsung, Daegu Metropolitan	The female was daughter-in-law of a famous militia general of the Joseon Dynasty. While the descendants tried to move the tomb to a new graveyard, they discovered that the buried female was mummified. Like the other mummy cases, she was heavily wrapped in textiles. Interesting letters were also contained in the coffin.
Yang Woo Jeong	1574–1647	1987	Yeoju, Gyeonggi	Yang Woo Jeong, Tae Jae Jeong and Lady of Namyang Hong were found mummified in the same cemetery. They belong to the same family. Many pieces of clothing were discovered in the tombs.
Tae Jae Jeong	1612–1669	1987	Yeoju, Gyeonggi	Son of Yang Woo Jeong.
Lady of Namyang Hong	1584–1654	1987	Yeoju, Gyeonggi	Wife of Yang Woo Jeong.
Lady of Jeonju Lee	Early or mid-17 <sup>th</sup> century	1987	Cheongwon, Choongbuk	Few pieces of clothing were discovered alongside a mummified body.
Lady of Yeoheung Min	1586–1656	1989	Seoul	Individual belonged to a prosperous clan of the Joseon period. Her tomb was discovered in the clan cemetery, amongst the tombs of other clan members. The body was perfectly mummified.
Woo Hyup Hong	1655–1691	1983	Siheung, Gyeonggi	A high-ranking military officer discovered mummified alongside 60 pieces of clothing.
Lady of Yangcheon Heo	1630–1660 ca.	1992	Goyang, Gyeonggi	Her elder brother was a prime minister of the Joseon Kingdom. Her husband was Sun Seok Han (1637–1704 CE). 18 pieces of clothing were discovered.
Jik Lee	1677–1746	1999	Mapo, Seoul	Discovered at the construction site of the World Cup Stadium. 47 pieces of clothing and other artefacts found.
Tae Gon Lee	1672–1763	1985	Jincheon, Chungbuk	4 pieces of clothing. An almost-skeletonised mummy was discovered.

### ***The tomb of Lady Yeoheung Min***

The tomb of Lady Yeoheung Min (1586–1656) was discovered in Seoul’s Dongrae-Jeong clan cemetery. She had been buried in the tomb in which her husband was also laid to rest (Figs. 1A and 1B). She belonged to one of the most distinguished and prosperous families of the Joseon period. The ancestors of her husband, Gwanggyeong Jeong (1586–1644), had been prime ministers of the Joseon Kingdom, and, as a member of this noble family, he became inspector-general (Daesaheon, 1631), censor-general (Daesagan, 1639), and vice minister (Champan, 1640, for the Ministry of Rites and for the Board of Personnel). Lady Yeoheung Min had also been born into a noble family. Their epitaph tells of many years of happy marriage.

The preservation status of the textiles from this tomb was superb. Dress historians collected 31 articles of clothing and other textiles (18 pieces) that had been used for the funeral ceremony. The clothing included the following: *jangot* (woman’s everyday coat), *jogori* (jacket), *chima* (skirt), *jeoksam* (under-shirt), *baji* (trousers), and *neoul* (noble woman’s veil). Interestingly, as many as 12 *jangot* were obtained, an unusually high number for one tomb. Most were made of silk, and were extremely intricate and beautiful (Figs. 1C to 1F).

Amazingly, Lady Yeoheung Min’s body was discovered mummified. She had been heavily wrapped in the various types of clothing (Fig. 1G). Unlike the textiles, her body was subsequently reburied in a newly constructed family tomb, before any scientific investigations could be undertaken (Fig. 1H)



**Figure 1.** Lady Yeohung Min's tomb. (A) The lime-soil mixture barrier of the tomb was removed. (B) Coffin lid was removed. Preservation status of coffin was superb. (C) to (F) Different types of *Jangot* (women's coat) collected from the coffin. (G) Mummified Lady Yeohung Min. (H) The lady's mummified body was reburied in the new family cemetery.

### ***The tomb of Hwak Kim***

According to the historical record, Hwak Kim (1572–1633) was a member of a prominent family of the Joseon Kingdom. He became chief of the *Bureau of Royal Attire* in 1629. His wife, Lady Dongrae Jeong, the daughter of a prime minister, died in 1631. In 17th century Joseon society, Hwak Kim and his wife were members of the nobility. They were buried together in the same tomb (Fig. 2A).

In 2001, in the course of his descendants' *Ijang* (the process of moving a tomb to a new cemetery), his coffin was opened, and various artefacts were found within (Figs. 2B to 2F). These included the following 52 items of textiles and clothing: *simeui* (Confucian scholar's robe), *danryung* (official's robe with round collar), *jikryung* (man's coat with straight collar), *cheolryk* (man's coat with pleats), *dopo* (man's coat with half sleeves), *changeui* (man's long coat with slit), *jungchimak* (man's coat with wide sleeves and side slits), *jogori* (jacket), *hansam* (undershirt), *baeja* (vest), *baji* (trousers), *bokgun* (man's headdress), *boson* (socks), *shin* (shoes), and *myeongmok* (burial facecloth). All of the articles were exquisitely beautiful, and provided a vivid glimpse into the world of Joseon high society (Figs. 2G to 2L).

From the dress historian's report, we know that Hwak Kim and his wife were mummified (Fig. 2M). As in the case of Lady Yeoheung Min's remains, their bodies were reburied before any scientific investigation could be conducted.





**Figure 2.** Hwak Kim's tomb. (A) Hwak Kim and his wife were buried altogether in the same tomb. (B) Lime-soil mixture barrier formed around the exposed coffin. (C) The barrier was removed. A part of coffin started to be exposed. (D) Coffins exposed. (E) *Jiseok* (epitaph) was discovered from the tomb. (F) Clothing was collected from the coffin. (G) *Jiseok* maintained in museum. (H) Coffin. (I) *Simeui* (Confucian scholar's robe) (J) *Danryung* (official's robe with a round collar) (K) *Cheolyuk* (man's coat with pleats) (L) *Shin* (shoes) (M) Hwak Kim's body was found mummified.

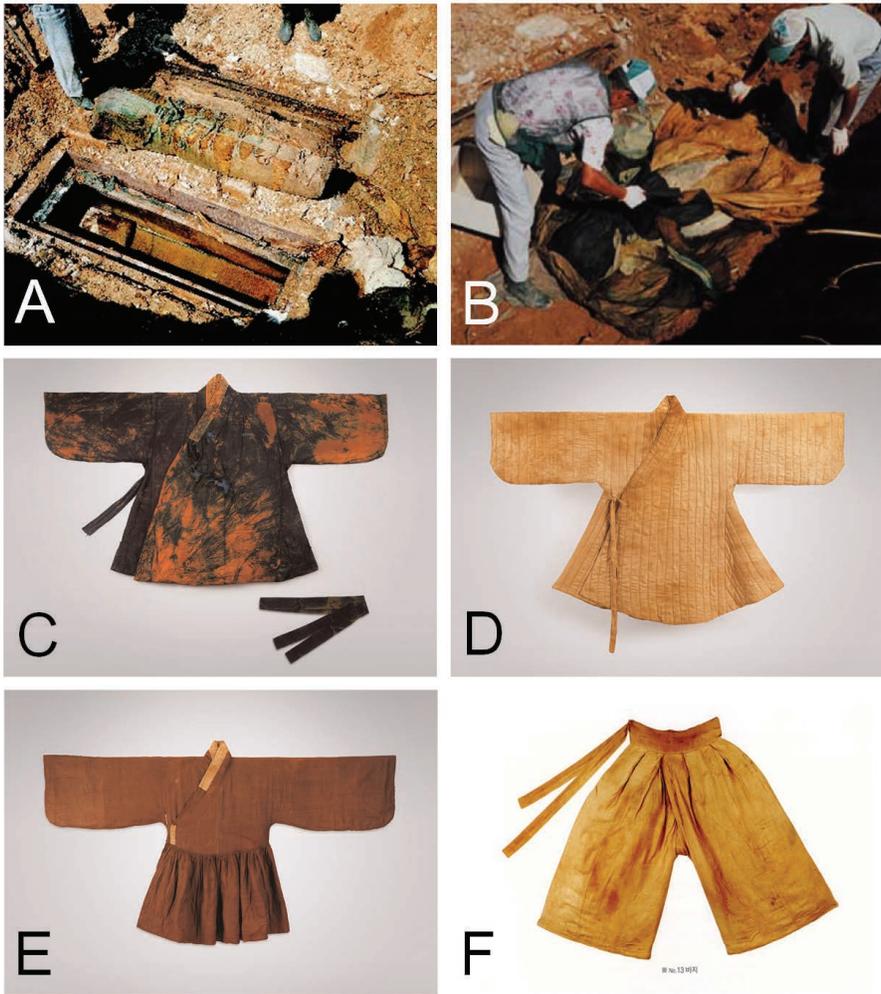
### ***The tomb of Su Ryun Shim***

In 2001, the Yongin City Joseon tomb of a member of the gentry named Su Ryun Shim (1534–1589) and his wife Andong Kwon (who had been buried together), was moved to a new burial site. Upon opening the coffin, researchers found the preservation status of the cultural artefacts and human remains to be relatively good.

Researchers representing Gyeonggi Provincial Museum travelled to the site in order to examine the coffin and its contents. Although some of the clothing had already been removed by workers, they were able to collect many textiles (Figs. 3A and 3B), which they moved to their institution's textile science lab.

A total of 46 cultural artefacts were collected, the most numerous of which were clothing. These articles included the following: *jeoksam* (undershirt), *hansam* (undershirt), *gwadu* (man's long jacket worn during the early Joseon period), *aekjurum* (man's coat with side pleats worn during early and mid-Joseon period), *cheollik* (man's coat with pleats), *jikryeong* (man's coat with straight collar), *dapho* (man's coat with half sleeves), *danryeong* (official's robe with round collar), *baeja* (vest), *baji* (trousers), *dae* (belt), *bokgun* (man's head-dress), *somoja* (skull cap), *haengjeon* (gaiters), *boson* (socks), *supsin* (burial shoes), *myeokmok* (burial facecloth), *aksu* (burial covering for hands), *myeongjeong* (funeral banner), *soryeomgeum* (bedclothes for shrouding the body), *soryeomgyo* (fabric used to wrap and bind the body), *daeryeomgeum* (bedclothes for the body in the coffin), and *daeryeomgyo* (fabric for wrapping and binding the body in the coffin) (Figs. 3C to 3F).

As in the first two cases highlighted in this report, Su Ryun Shim's body was found mummified. Unfortunately for mummy researchers, this mummy could not be examined using scientific techniques, as it was reburied in a grave newly constructed by the family.



**Figure 3.** Su Ryun Shim's tomb. (A) The coffin was opened. (B) Starting to collect the clothing. (C) and (D) *Gwadu* (man's long jacket worn during the early Joseon period), (E) *Cheolryuk* (man's coat with pleats) (F) *Baji* (trousers).

## DISCUSSION

Mummy studies is still an emerging academic field in Korea. Using interdisciplinary approaches post-2011, the health and disease status of pre-modern Korean peoples became better understood (10). However, before 2001, little scientific analysis was performed on Korean mummies. In fact, researchers still do not know exactly how many Korean mummies were found prior to that year.

Prior to 2001, Joseon tombs were the almost-exclusive preserve of dress historians. During the Joseon period, many articles of clothing and other textiles had been buried with bodies in coffins, according to the funeral customs of the time. Thus, it was not rare for Joseon tombs to yield well-preserved textiles, which, naturally enough, attracted the interest of historians. In some cases, as many as 200 items of textiles and clothing have been collected from a single tomb (10).

Yet the field of Joseon dress studies did not develop wholly without difficulty. Most of the perfectly preserved Joseon tombs were discovered only accidentally, in the course of the ritual process of *Ijang* (that is, the process of moving a tomb to a new cemetery). *Ijang*-performing descendants could severely curtail, or even outright deny, the undertaking of academic studies involving the tombs and/or coffins of their ancestors.

Even where permission to study was granted, at least in the earlier phase of research on Joseon tombs, clothing collection was performed by historians *post-factum*: they could begin the process only after the *Ijang* was completed. However, as time passed and attitudes changed, dress historians could collect their materials much more easily. In the archaeological field, they are now permitted to examine clothing prior to the end of the *Ijang* process.

Once scientific studies on mummies finally began, clothing removal was performed in strictly maintained and sterilized laboratory environments. Every step in the clothing-removal procedure was recorded in detail. In this way, scientists obtained excellent-quality samples that were indispensable for authentic bioanthropological research, while dress historians gained access to more authentic and reliable information about how bodies were prepared for funerals under prevailing Joseon Dynasty rites (10).

By virtue of such efforts, improved general information on Joseon tombs was successfully obtained. Indeed, these findings proved broadly applicable, not only to the context of the history of clothing but also to scientific mummy studies. Surprisingly, about 35% of those pre-2001 dress reports (38/107) clearly indicated the presence of Korean mummies in Joseon tombs. On this basis,

we can estimate that there must have been a considerable number of Korean mummy cases before 2001.

The present report suggests the extent to which many invaluable cases might have been lost without due scientific studies being carried out on them, especially given the relatively late start of Korean mummy studies. In fact, considering that only a small portion of the existing Joseon tombs could have been investigated by dress historians, we still do not know how many Korean mummies actually were available for discovery and scientific investigation before 2001.

## CONCLUSION

The scientific approach to mummy studies in Korea is still in its infancy. Previously, studies on Joseon tombs and their contents were performed exclusively by dress historians. In the present investigation, we examined the excavation records of dress historians in order to determine the approximate number of Korean mummies discovered during that “pre-scientific” (pre-2001) period. In this study, we established that only a small portion of the existing Joseon mummies have been investigated by scientists prior to 2001. As a result, many invaluable Korean mummy cases have been lost to decomposition without having been subjected to due scientific scrutiny.

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## REFERENCES

1. Arguelles P., Reinhard K., Shin D.H. (In press). Forensic Palynological Analysis of Intestinal Contents of a Korean Mummy. *Anatom Record*.
2. Chang B. S., Uhm C. S., Park C. H., Kim H. K., Lee G. Y., Cho H. H., Chung Y. H., Shin D. H. (2006a). Ultramicroscopic study on the hair of newly found 15th century mummy in Daejeon, Korea. *Ann Anat*, 188(5), 439–445.
3. Chang B. S., Uhm C. S., Park C. H., Kim H. K., Lee G. Y., Cho H. H., Kim M. J., Chung Y. H., Song K. W., Lim do S, Shin D. H. (2006b). Preserved skin structure of a recently found fifteenth-century mummy in Daejeon, Korea. *J Anat*, 209(5), 671–680.

4. Chang B. S., Uhm C. S., Park C. H., Kim H. K., Jung H. S., Ham J. H., Lee G. Y., Kim D. H., Lee K. J., Bang I. S., Oh C. S., Shin D. H. (2008). Ultramicroscopic investigation of the preservation status of hair collected from a full-term, intrauterine baby mummy of the Joseon Dynasty, Korea. *Int J Osteoarchaeol*, 18(6), 624–631.
5. Kahila Bar-Gal G., Kim M. J., Klein A., Shin D. H., Oh C. S., Kim J. W., Kim T. H., Kim S. B., Grant P. R., Pappo O., Spigelman M., Shouval D. (2012). Tracing hepatitis B virus to the 16th century in a Korean mummy. *Hepatology*, 56(5), 1671–1680.
6. Kim M. J., Park S. S., Bok G. D., Choi Y. H., Lee I. S., Shin K. J., Han G. R., Youn M., Han S. H., Kang I. W., Chang B. S., Cho Y. J., Chung Y. H., Shin D. H. (2006). Medieval mummy from Yangju. *Archaeology, Ethnology and Anthropology of Eurasia*, 28(1), 122–129.
7. Kim M. J., Oh C. S., Lee I. S., Lee B. H., Choi J. H., Lim D-S., Yi Y. S., Han W-J., Kim Y-S., Bok G. D., Lee S. D., Shin D. H. (2008). Human mummified brain from a medieval tomb with lime-soil mixture barrier of the Joseon Dynasty, Korea. *Int J Osteoarchaeol*, 18(6), 614–623.
8. Kim S. B., Shin J. E., Park S. S., Bok G. D., Chang Y. P., Kim J., Chung Y. H., Yi Y. S., Shin M. H., Chang B. S., Shin D. H., Kim M. J. (2006). Endoscopic investigation of the internal organs of a 15th-century child mummy from Yangju, Korea. *J Anat*, 209(5), 681–688.
9. Lee E-J, Shin DH, Yang HY, Spigelman M, Yim SG. (2009). Eung Tae's tomb: a Joseon ancestor and the letters of those that loved him. *Antiquity*, 83(319), 145–156.
10. Lee E-J, Oh C. S., Yim S. G., Park J. B., Kim Y-S., Shin M. H., Lee S. D., Shin D. H. (2013). Collaboration of archaeologists, historians and bioarchaeologists during removal of clothing from Korean mummy of Joseon dynasty. *Int J Hist Archaeol*, 17(1), 94–118.
11. Lee I. S., Kim M. J., Yoo D. S., Lee Y. S., Park S. S., Bok G. D., Han S. H., Chung Y. H., Chang B. S., Yi Y. S., Oh C. S., Shin D. H. (2007). Three-dimensional reconstruction of medieval child mummy in Yangju, Korea, using multi-detector computed tomography. *Ann Anat*, 189(6), 558–568.
12. Lee I. S., Lee E. J., Park J. B., Baek S. H., Oh C. S., Lee S. D., Kim Y. S., Bok G. D., Hong J. W., Lim D. S., Shin M. H., Seo M., Shin D. H. (2009). Acute traumatic death of a 17th century general based on examination of mummified remains found in Korea. *Ann Anat*, 191(3), 309–320.
13. Lim D. S., Lee I. S., Choi K. J., Lee S. D., Oh C. S., Kim Y. S., Bok G. D., Kim M. J., Yi Y. S., Lee E. J., Shin D. H. (2008). The potetial for non-invasive study of mummies: validation of the use of computerized tomography by post factum dissection and histological examination of a 17th century female Korean mummy. *J Anat*, 213(4), 482–495.

14. Lim D-S., Oh C. S., Lee S. J., Shin D. H. (2010). Auto-fluorescence emitted from the cell residues preserved in human tissues of medieval Korean mummies. *J Anat*, 217(1), 67–75.
15. Oh C. S., Lee S. Y., Lee I. S., Kim Y-S., Koh K. S. Shin D. H. (2011). Differential findings in post-factum dissections of medieval Korean mummies which exhibited similar preservation patterns on computerized tomography images. *Ann Anat*, 193(6), 544–549.
16. Oh C. S., Koh B-J., Yoo D. S., Park J. B., Min S. R., Kim Y-S., Lee S. S., Ge J., Seo S. B. Shin D. H. (In press). Academic dispute on the funeral rites of Joseon society is settled by ancient DNA analysis of a Korean mummy. *Anatom Record*.
17. Oh C. S., Shin D. H. (In press). Making Animal Model for Korean Mummy Studies. *Anthropol Anz*.
18. Seo M., Guk S. M., Kim J., Chai J. Y., Bok G. D., Park S. S., Oh C. S., Kim M. J., Yil Y. S., Shin M. H., Kang I. U., Shin D. H. (2007). Paleoparasitological report on the stool from a Medieval child mummy in Yangju, Korea. *J Parasitol*, 93(3), 589–592.
19. Seo M., Shin D. H., Guk S. M., Oh C. S., Lee E. J., Shin M. H., Kim M. J., Lee S. D., Kim Y. S., Yi Y. S., Spigelman M., Chai J. Y. (2008). *Gymnophalloides seoi* eggs from the stool of a 17th century female mummy found in Hadong, Republic of Korea. *J Parasitol*, 94(2), 467–472.
20. Seo M., Oh C. S., Chai J-Y., Jeong M. S., Hong S. W., Seo Y-M., Shin D. H. (In press). The Changing Pattern of Parasitic Infection among Korean Populations by Paleoparasitological Study of Joseon Dynasty Mummies. *J Parasitol*.
21. Shin D. H., Youn M., Chang B. S. (2003a). Histological analysis on the medieval mummy in Korea. *Forensic Sci Int*, 137(2–3), 172–182.
22. Shin D. H., Choi Y. H., Shin K. J., Han G. R., Youn M., Kim C. Y., Han S. H., Seo J. C., Park S. S., Cho Y. J., Chang B. S. (2003b). Radiological analysis on a mummy from a medieval tomb in Korea. *Ann Anat*, 185(4), 377–382.
23. Shin D. H., Lim D. S., Choi K. J., Oh C. S., Kim M. J., Lee I. S., Kim S. B., Shin J. E., Bok G. D., Chai J. Y., Seo M. (2009). Scanning electron microscope study of ancient parasite eggs recovered from Korean mummies of the Joseon Dynasty. *J Parasitol*, 95(1), 137–145.
24. Shin D. H., Lee I. S., Kim M. J., Oh C. S., Park J. B., Bok G. D., Yoo D. S. (2010). Magnetic resonance imaging performed on a hydrated mummy of medieval Korea. *J Anat*, 216(3), 329–334.
25. Shin D. H., Oh C. S., Chai J-Y., Lee H-J., Seo M. (2011). *Enterobius vermicularis* Eggs Discovered in Coprolites from a Medieval Korean Mummy. *Korean J Parasitol*, 49(3), 323–326.
26. Shin D. H., Oh C. S., Chai J. Y., Ji M. J., Lee H. J., Seo M. (2012a). Sixteenth Century *Gymnophalodes seoi* Infection on the Coast of the Korean Peninsula. *J Parasitol*, 98(6), 1283–1286.

27. Shin D. H., Oh C. S., Lee S. J., Lee E-J., Yim S. G., Kim M. J., Kim Y-S., Lee S. D., Lee Y. S., Seo M. (2012b). Ectopic paragonimiasis from 400 year old female mummy of Korea. *J Archaeol Sci*, 39(4), 1103–1110.
28. Shin D. H., Oh C. S., Lee H. J., Chai J. Y., Lee S. J., Hong D-W., Lee S. D., Seo M. (2013). Ancient DNA analysis on *Clonorchis sinensis* eggs remained in samples from medieval Korean mummy. *J Archaeol Sci*, 40, 211–216

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