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Perspective

The tooth relic of the Buddha: The viewpoint from paleodontology and modern dentistry

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The tooth relic of the Buddha is venerated in Sri Lanka as a sacred cetiya relic of the Siddhartha Gautama - Buddha, who is the founder of Buddhism, one of the three major religions in the world. According to Sri Lankan legend, when the Buddha passed away in 543 BC, his body was cremated in a sandalwood pyre in Kushinagar, and his disciple Khema removed his left canine from the funeral pyre. Khema then gave it to King Brahmadatte for worship. A belief that whoever possessed the tooth relic had a divine right grew in India and subsequently caused the war, and then the tooth relic was brought to Sri Lanka after the conflict.¹ However, according to historical records from Theravada Buddhism,

the Buddha left four teeth after his nirvana. This legend provides a basis for the fact that there was more than one tooth relic left in the world after the Buddha passed away. Furthermore, Mahayana Buddhism spread to China was most in line with the values of the Chinese people. Since ancient times, Chinese emperors who believed in Buddhism always loved to welcome the Buddha tooth relic, resulting in the widely spread of the Buddha tooth relics in later generations and the use of animal teeth in their places.² In this article, we collected relevant information about religious facilities or groups claiming to have the Buddha tooth relics in the world today, and try to put forward the viewpoint from dentistry.

In this article, the internet search by the keyword "Buddha tooth relic" was used to filter the reports related to religious facilities or groups claiming to have the Buddha tooth relics. In the reports, if these religious facilities or groups had specific names and their countries and places were known, we would record them. It should be noted that

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we only observed the phenomenon and recorded those reports that met the requirements, and did not try to verify the reported content. The results of our search for the Buddha tooth relic are shown in Table 1. Based on the

collected reports, we filtered out 32 temples or museums that enshrined the Buddha tooth relics. There were 20 places that enshrined the Buddha tooth relics in China, 2 in Sri Lanka, and 2 in Myanmar, while one each in Taiwan,

Table 1 Several tooth relics from different locations purported to be the Buddha tooth relics.

	Country	Place	Temple, pagoda or museum	Yingu ^a
A. Unanimously recognized Buddha tooth relics				
1	Sri Lanka	Kandy	Temple of the Tooth	
2	China	Beijing	Lingguang Temple	
B. Claimed Buddha tooth relics				
3	Taiwan	Kaohsiung	Buddha Memorial Center of the Fo Guang Shan Monastery	
4	Japan	Kamakura	Engaku Temple	
5	Sri Lanka	Polonnaruwa	Somawathiya Chaitya	
6	Singapore	Chinatown	Buddha Tooth Relic Temple and Museum	
7	USA	Rosemead, California	Lu Mountain Temple	
8	India	Nagarjunakonda	Museum on the island situated in the Nagarjunasagar Lake	
9	South Korea	Goseong County, Gangwon-do	Geonbongsa Temple	
10	Myanmar	Mingun	Mingun stupa in the custody of Master VenKondanna	
11	Myanmar	Mingun	Mingun Pahtodawgyi (an enormous unfinished pagoda)	
12	Malaysia	Kelantan	Lotus Temple	
13	Cambodia	Siem Reap Province	Angkor Wat Wishing Hall	
14	China	Wenshang County, Jining City, Shandong Province	Baoxiang Temple	
15	China	Wutai County, Xinzhou City, Shanxi Province	Buddha relic tower of Mount Wutai	Lower third molar of cow
16	China	Dangyang City, Hubei Province	Yuquan Temple	
17	China	Ying County, Shanxi Province	Wooden Buddha Pagoda of Fogong Temple	Wood carving and horse tooth fossil
18	China	Fuzhou City, Fujian Province	Yongquan Temple of Kushan	
19	China	Songyang County, Lishui City, Zhejiang Province	Yanqing Temple	
20	China	Gu'an County, Hebei Province	Baoyan Temple	
21	China	Dengzhou City, Henan Province	Buddha Pagoda of Fusheng Temple	
22	China	Zhengzhou City, Henan Province	Fawang Temple of Mount Song	
23	China	Songjiang District, Shanghai	Buddha Pagoda of Fangta Park	Fossilized ivory
24	China	Luliang City, Shanxi Province	Anguo Temple	
25	China	Zhengding County, Hebei Province	Lingxiao Wooden Buddha Pagoda of Tianning Temple	
26	China	Ji County, Tianjin	Dingguang Buddhist Pagoda	
27	China	Shenyang City, Liaoning Province	Liaobin Buddha Pagoda	
28	China	Lianshui Town, Huai'an City, Jiangsu Province	Miaotong Buddha Pagoda of Nengren Temple	
29	China	Jiujiang City, Jiangxi Province	Tianchi Buddha Pagoda of Mount Lu	
C. Claimed tooth relics of the Saint other than the Buddha				
30	China	Emeishan City, Leshan City, Sichuan Province	Wannian Temple of Mount Emei (Ancient tooth relic)	Maxilla of stegodon
31	China	Tongzhou District, Beijing	Dipankara Buddha Pagoda of Youshengjiao Temple	
32	China	Lianyungang, Jiangsu Province	Ashoka Pagoda of Haiqing Temple	Third maxillary tooth fossil of horse

^a The so-called shadow bones are relative to the real bones of the Buddha. Shadow means innuendo and imitation, and shadow bone is the bone of imitation.

Japan, Singapore, USA, India, South Korea, Malaysia, and Cambodia. Most of these Buddha tooth relics were enshrined in temples or pagodas of temples, and a few were in the museums. We divided the Buddha tooth relics into three types: unanimously recognized Buddha tooth relics, claimed Buddha tooth relics, and claimed tooth relics of the Saint other than the Buddha. There were 2 recognized Buddha tooth relics, one in Sri Lanka and the other in China, respectively, because they complied with three principles of scriptures, historical inheritance, and factual proof. However, in the vast majority of cases, temples claimed that they had the genuine Buddha tooth relics, which also included the tooth relics of the Saint other than the Buddha. Furthermore, in the later translated classics of ancient China, it was claimed that even if there is no real Buddha bone relic, other substitutes, so-called Yingu (known as shadow bone), can be used. Holy objects are also allowed to be manufactured, which not only shows that Buddhism is developing rapidly, but also demonstrates that Buddhism contains symbolic culture and there is no need to be demanding about authenticity. In this article, we also found cases of using animal jawbones, teeth or tooth fossils as substitutes for the Buddha tooth relics.

In this article, we found 32 temples or museums that enshrined the Buddha tooth relics, and some of them even had more than 2 tooth relics. From a logical viewpoint, the fact that the Buddha tooth relics held by them are not real is relatively possible. However, there are quite different views on this issue within Buddhism, mainly due to different opinions on the authenticity and religious nature of the Buddha tooth relics. In addition, there are also difficulties in scientific inspection of the material aspect of the Buddha tooth relics. To the best of our knowledge, there is currently no scientific research on the Buddha tooth relics which are unanimously recognized by the scientific community. Most published antiquarian studies on relics are based solely on morphological and macroscopic analyses of eucharistic remnants. The reason for this practice was that the relics could not be removed from the sealed reliquaries. Only one work discusses the dental remnants of the Saint Apollonia preserved in the cathedral treasury in Rab, Croatia from a biomedical perspective. Here, the tooth was macroscopically examined in situ and on enlarged high-resolution photos.³ The results demonstrated the presence of cervical caries, enamel fractures, and two enamel pearls on the distal root surface. However, neither further analysis of the tooth nor scientific dating of the relic was subsequently carried out.⁴ Teeth are a common type of the Saint's relics because they are durable and easy to obtain. They may be preserved as the isolated specimens in adequate reliquaries, or as part of the jaws of a Saint's skull. In addition to Buddhism, interestingly, tooth relics have significance in different world religions, such as Christianity and Islam. Teeth are also important in world symbolism, where they are seen as carriers of life force, reproduction, and strength.⁵ Furthermore, another problem with the analysis of the relics is that they often defy simple macroscopic examination because they are often presented to devotees from great distances or only on special occasions. This is what happened with the Buddha tooth relics. There are a limited number of descriptions of these teeth, and there is a possibility that the tooth is a

replica.⁴ However, the religious significance of the Buddha tooth relics is far greater than their authenticity (whether the teeth really came from the Buddha). We consider that those entities called the Buddha tooth relics are symbolic in religious significance where they are regarded as carriers of Gautama Buddha himself. Therefore, it is unhelpful to overly restrict the debate about the authenticity of the entities called the Buddha tooth relics.

In conclusion, this short review on such an interesting topic as dental remnants of the Buddha has shown that there is still lack of broad biomedical and interdisciplinary studies on the Buddha tooth relics, indicating a limited number of descriptions of these tooth relics. From the viewpoint of paleodontology and modern dentistry, however, it is significant to increase their research in order to form an expert and detailed database of relics and their characteristics. Through the analysis of dental morphology for the entities called the Buddha tooth relics, their true identity can be traced (such as whether they are human teeth). The limited information shows why there is still much to say about the pathological and anthropological conditions of the Buddha tooth relics. The scientific research on the remnants of the Buddha, which still limited to occasions requiring the identification of the remnants, will be bound to increase knowledge about the lives, circumstances, and deaths of the entities called the Buddha remains. The results from paleodontology, paleopathology, osteology, and anthropology will be able to corroborate and enrich known biographical data. All of these must be done in an interdisciplinary and non-invasive manner to protect the role of these bodily remnants that retain in the mind of religious people. Among the studies of different relics, the study of tooth relics and the use of teeth to reconstruct the biological profile of the remnants of skull and jaws are undoubtedly two of the most important researches.⁴

Declaration of competing interest

The authors have no conflicts of interest relevant to this article.

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