

Cultural diversity of traditions for the disposal of exfoliated teeth: Implications for researchers

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Abstract

Objectives: For decades, researchers in anthropology and archaeology have used teeth, including exfoliated primary teeth, as fossil records of people's physical life experiences. Recently, researchers in psychiatry, epidemiology, environmental health and other fields have recognized the potential for teeth to serve as biomarkers of other early-life experiences, including trauma exposure and other types of psychosocial stress, which are potent determinants of later mental and physical health problems. Despite the emerging appreciation and value of teeth as biospecimens, little is understood about cultural beliefs and practices surrounding exfoliated teeth. If known, such insights could inform culturally appropriate practices for paediatric dental care and improve protocols for the ethical acquisition of teeth as biospecimens in research studies. To address this gap, a qualitative systematic review was performed to summarize the variety of traditions performed worldwide for disposing of primary exfoliated teeth.

Methods: PubMed, Google Scholar, AnthroSource, Anthropological Literature, EHRAF World Cultures and Anthropology Plus were searched with a systematic search strategy to identify articles published from inception through December 2, 2021. Citations of relevant papers were also forward and backward searched.

Results: There were 3289 articles that met the initial inclusion criteria, of which 37 were included after individual screening and applying exclusion criteria. Thematic analysis was used to identify 74 distinct traditions related to the disposal of exfoliated teeth, which were organized into seven general themes: (1) giving teeth to a tooth fairy, (2) giving teeth to mouse figures, (3) throwing teeth, (4) hiding/keeping teeth, (5) burying teeth, (6) giving teeth to animals and (7) eating the tooth.

Conclusions: The results of this study elucidate the diversity within—yet universality of—exfoliated tooth disposal traditions and underscore the importance of tooth exfoliation as a major milestone during child development. Special attention must be paid to these traditions and related ethical concerns when designing research protocols related to their collection. With a greater understanding of beliefs and practices related to exfoliated teeth, researchers will be better equipped to engage children and families in studies that include analyses of exfoliated teeth, collect teeth as biospecimens, and broaden the use of teeth in research.

KEYWORDS

adversity, biomarker, biospecimens, children, culture, dentition, teeth, tooth, traditions

1 | INTRODUCTION

Primary teeth (also known as baby, shed, exfoliated, deciduous, temporary or milk teeth) have been a major source of information on ontogeny and health used by anthropologists and archaeologists for decades. Teeth are particularly useful resources because they can preserve a permanent record of early-life experiences, including children's exposure to malnutrition, disease and other physiological stressors.^{1,2} Since the 1960s, exfoliated teeth have become increasingly recognized as capable of recording perinatal exposure to environmental toxicants, including radioisotopes and metals³⁻⁶ and possibly exposure to psychosocial stressor events^{7,8} all of which are prominent risk factors for mental and physical disorders. The promise of teeth as biomarkers has recently generated attention in the popular press,⁹⁻¹² largely because teeth may provide more objective information about a child's environment than parental self-reports, and insights gained from teeth have the potential to guide prevention and early intervention efforts.⁸

Teeth, and particularly children's exfoliated teeth, hold a special significance in human cultures,¹³ as evidenced by the variety and popularity of global traditions surrounding their disposal (meaning parting with or doing something specific with the exfoliated tooth). Yet, little attention has been paid in the scientific literature towards documenting these cultural practices, even though they likely impact paediatric dental care and the engagement of children and families in research studies involving exfoliated teeth. For example, of 123 articles identified in a recent PubMed search designed to capture a broad swath of the research literature (e.g. the search comprised hundreds of keywords such as tooth, teeth, natal, deciduous tooth, dental health, neuropsychiatric disorders, biobanking, childhood adversity and more), only 11 articles described how teeth were collected, even in the most general terms. To the best of the authors' knowledge, few empirical studies mention how or whether cultural knowledge, attitudes and beliefs were considered or incorporated into their study protocol as part of the process of collecting teeth. Studies instead only vaguely noted procedures such as 'mothers were asked to provide their child's naturally shed deciduous teeth'.¹⁴ Lack of awareness on the significance of tooth loss and cultural diversity in disposal traditions may impede researchers' ability to effectively and ethically collect teeth, particularly from diverse populations. Because teeth are unique biospecimens, researchers need to be aware of the meaning and traditions attached to them to ensure respect for teeth and the participants who donate them to science. With such insights, researchers can better understand the perspectives and experiences of tooth donating research participants, and tailor recruitment, engagement and general communication strategies to meet them where they are. In particular, understanding the significance people attach to exfoliated teeth can

help ensure research processes reflect and respect the perspectives of diverse populations and cultures.¹⁵

The aim of the present study was to improve researchers' cultural competence when collecting exfoliated teeth by synthesising information on the wide variety of cultural attitudes, perspectives and traditions across the globe that accompany the natural shedding and disposal of primary teeth. A secondary aim was to explore the ethics of collecting exfoliated teeth and provide insight into how researchers' understanding of tooth disposal traditions can further demonstrate respect for participants when collecting exfoliated teeth. In this qualitative systematic review, published historical records and practices related to global tooth disposal traditions were examined. To give readers an appreciation for the diversity of tooth disposal practices, notable characters associated with tooth loss as well as similarities and differences in the prevalence of these characters among countries are highlighted. A typology of tooth disposal traditions is also provided, which scientists can use as a starting point to understand some differences that exist across cultural groups. This paper builds on a recent perspective article¹⁶ exploring the meaning and significance of tooth disposal traditions for children and families as it relates to dental clinicians. To the best of the authors' knowledge, this is the first systematic qualitative review of the literature regarding primary tooth disposal traditions.

2 | METHODS

2.1 | Literature search strategy

The following databases for publications relevant to this review were searched: PubMed, Google Scholar, AnthroSource, Anthropological Literature, EHRAF World Cultures and Anthropology Plus. Each database was searched to identify articles published from inception to December 2, 2021, with the same keywords and Boolean operators: (teeth OR tooth) AND (customs OR rituals OR traditions OR folklore OR disposal) AND (child OR children OR baby OR children's OR primary OR deciduous OR exfoliated).

Search results and included papers are illustrated in [Figure 1](#). Eligible articles were in English, mentioned what a child from a specific culture or country did with an exfoliated tooth once it was lost, examined only exfoliated teeth and were human studies.

This search returned thousands of results. The results were initially narrowed down by excluding papers that only examined tooth loss in adults, described oral health practices or traditions that did not explicitly refer to disposing of an exfoliated tooth, examined only permanent teeth, and did not mention what happens to a tooth after exfoliation. In the process, specific terms common to many of the excluded papers were identified, specifically focused

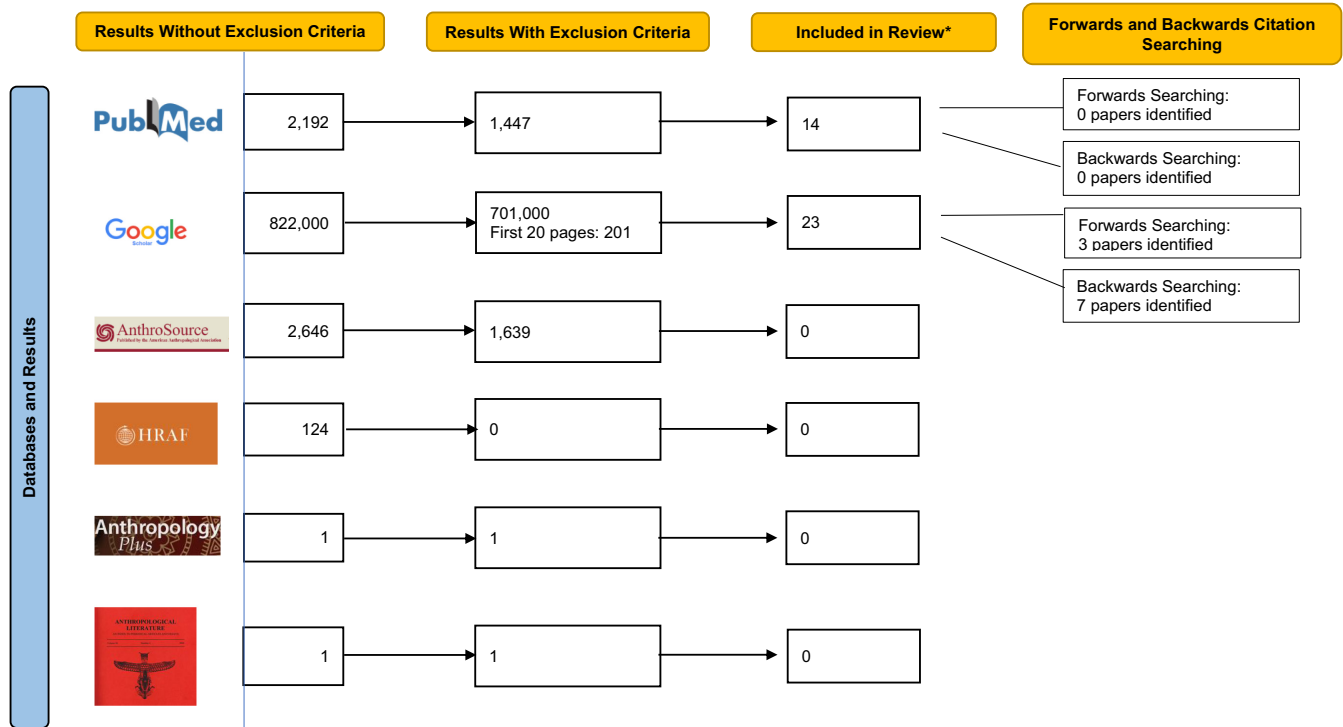


FIGURE 1 Summary of Systematic Qualitative Review Search Results Across Selected Databases. The search strategy without exclusion criteria yielded in each of the selected databases results that were narrowed down once exclusion criteria were incorporated. The included papers were forward and backward searched to identify additional literature. The cell entries in the first column indicate the number of all results identified from that database; thus, these numbers do not reflect unique results. *Excludes duplicate results between databases.

on dentistry and oral health, and therefore these exclusion terms were added to the original search strategy following the operator 'NOT'. Exclusion terms from the title or abstract used to eliminate clinical or orthodontic studies were as follows: 'caries', 'cariou', 'hygiene', 'periodontitis', 'cavity', or 'root canal'. The abstracts of articles meeting the relevant search criteria were reviewed, and those mentioning exfoliated teeth were read in their entirety. The scope of papers included was broad; if the paper described a tradition that a person or country practiced when a tooth was exfoliated, it was included for consideration in the review. However, the focus was exclusively on the disposal of exfoliated teeth.

The citations of included papers were then both forward and backward searched to identify additional papers. Seven more papers were found by backward searching the included results from Google Scholar, and three papers were found through forward searching. Two reviewers (CLBP and RVM) examined the search results and identified papers for inclusion. Of note, not all findings explicitly applied to entire countries. The results are presented using the wording provided by the original paper; thus, conflation may occur between cultural groups, nation states, regions and other specific identities in the results.

There were 3289 articles that met the initial inclusion criteria, while 37 met the final inclusion criteria. This review process was further supplemented by adding 10 sources of historical background information to better understand the cultural context and

circumstances that these traditions exist in and arose from.¹⁷⁻²⁶ Of these included sources, most were published in the 1980s or 1990s; however, some date back to 1942. Sources came from folklore, anthropology, and dental history journals; the literature primarily consisted of interview-based studies (primarily with parents of children of tooth-shedding age in various countries), notes from anthropological observations of communities, editorial-style pieces and book chapters.

A qualitative systematic review of the identified literature was then conducted. As defined by Grant and Booth, 2009, a qualitative systematic review is a method for synthesising findings from qualitative studies and aims to broaden the understanding of a particular phenomenon or concept.²⁷ In a systematic qualitative review, researchers use qualitative, narrative synthesis to identify key themes from the data sources.²⁷ These key themes can be identified through thematic analysis, a method widely applied across a variety of research fields.²⁸ This study specifically used inductive thematic analysis, a process in which researchers read through all source material, generate a list of topics appearing in these sources, and use these topics to develop conceptual themes. These themes are then reviewed, defined, and illustrated with examples.²⁸ This study reviewed qualitative works mentioning how an exfoliated tooth was disposed of, created a list of rituals performed throughout the source material, and grouped these rituals into themes based on the specific action being taken.

TABLE 1 Exfoliated tooth disposal traditions and practices worldwide.

TRADITION	CHARACTER	LOCATION
1. Giving teeth to a tooth fairy	Tooth Fairy ²⁹⁻⁴⁸	Australia, Canada, Denmark, Norway, Serbia, Singapore, South Korea, Switzerland, Turkey (Samsun Region), UK, US (excluding First Nations)
	Place tooth under eggcup, in envelope, on carpet, or in a container for the Tooth Fairy ⁴⁷	UK, US
	Place tooth in glass of water for fairy ^{30,33,34,36,46,48}	Argentina Sweden, US
2. Giving teeth to mouse figures	Raton Perez ^{31,47,48}	Argentina, Colombia, Uruguay, Venezuela
	Ratoncito Pérez ^{31,34,47,48}	Spain
	El Ratón ^{34,35}	Guatemala, Mexico
	El Ratón de los Dientes ^{31,47,48}	Chile, Mexico, and Peru
	El Ratón Miguelito ³⁴	Colombia
	El Ratoncito ³⁴	Argentina
	La Petite Souris ^{30,31,34,35,37,47-49}	France
	Topino ³¹	Italy
	Mouse in general (not a named figure) ^{29,30,33-35,37,46}	Germany, New Guinea, Russia, South Africa, Spain, Ukraine, Venezuela
Rat in general (not a named figure) ³⁴	Uganda	
Place tooth in a rat's burrow ⁴⁹	India	
TRADITION	PRACTICES	LOCATION
3. Throwing teeth	Outdoor Practices:	Benin, Bhutan, Botswana, Brazil, Bulgaria, Cameroon, Cherokee First Nation, Chile, China, Dominican Republic, Georgia, Ghana (Akan), Greece, Haiti, India, Indonesia, Japan, Mauritania, Moldova, Nepal, New Guinea, Nigeria, Pacific Isles, Portugal, South Korea, Sri Lanka, Taiwan, Turkey (Samsun Region & Kars), Ukraine, Vietnam, Yugoslavia
	On the roof ^{29,33,34,36,37,49-53}	
	Outside in any direction ³⁴	Brazil
	Up in the air ^{33,35}	Asia (Iran), Austria
	To the east ^{29,36}	Ojibwe First Nation, Zambia (Bemba),
	Blacken tooth with charcoal, to the west ³⁶	Chippewa First Nation
	In the direction of one's birthplace ^{33,36,52,54}	Australia (Warlpiri Aboriginals), Ethiopia, Namibia
	Towards the sun or sky ^{29,33-35,52,55-57}	Algeria, Egypt, Iraq, Jordan, Lebanon, Libya, Morocco, Oman Palestine, Pueblo First Nation (San Juan, Taos, and Isleta communities), Sudan
	Into the sea or a field ^{34,38}	Lebanon, Patagonia (South America)
	Into a river or garden ^{34,38}	New Zealand (Maori), Pakistan
	Lower tooth up, and the upper tooth low ^{33-35,38}	Japan, Singapore, Taiwan, Thailand, Vietnam
	Lower tooth on the roof ^{34,49}	Korea
	With some stones and run away ^{34,35}	Nigeria
	In the chicken coop/barn ^{34,51}	Mali, Turkey (Samsun region)
	Over the shoulder ³⁶	Shoshoni First Nation
	Over the right shoulder into a forest ³⁷	England
	Onto the roof of a school ⁵¹	Turkey (Samsun region)
	Into a river/pond ⁴⁹	India
	Between the legs ⁵²	Eastern Uganda/ Western Kenya
	Upper teeth into a barrel and lower teeth into a latrine ³⁶	Japan
	Throw tooth with eyes closed without looking where it landed ³³	Iraq
	Over the house ³⁶	First Nations in US
	Towards the moon ³⁶	First Nations in US

TABLE 1 (Continued)

TRADITION	PRACTICES	LOCATION
	Indoor Practices:	Czech Republic
	Over one's head ³⁶	
	Behind the stove ^{33,36}	Austria, Eastern Europe (Siberian Russians), Finland, Germany, Russia
	Under the bed (South Africa: put in a slipper) ^{36,48}	France, South Africa, Thailand, Vietnam
	Under the bathtub ³⁴	Kazakhstan
	Up the chimney ⁵¹	Turkey (Kars)
	Into a corner ^{33,36}	Albania, Bosnia and Herzegovina, Kosovo, Macedonia, Montenegro, Serbia, Spain
	Unspecified: Behind one's back³³	Hungary
	Into a fire ^{29,33,36,38}	Estonia, Sweden, UK, Western Europe
4. Hiding or keeping the tooth	Place tooth in a mouse hole in the ground ^{29,33,34,36,38,58}	Afghanistan, Bangladesh, Mexico, Russia, Turkey
	Place tooth in a gopher hole ³⁶	Nisenan First Nation
	Place tooth in a hole in the wall ²⁹	Taiwan
	Place an upper tooth at foot of the bed ³⁴	China
	Place tooth in a tree ^{29,34}	Benga people (Equatorial Guinea and Gabon), Yellowknife Dene First Nation
	Pass tooth through a cleft in a tree ³⁶	UK
	Place tooth in the shoot of a pandanus plant ³⁴	Aboriginal Australians
	Place tooth on top of cornmeal spread on sand to the East of their home with prayers ⁵⁵	Pueblo First Nation (Acoma community)
	Place tooth under a pregnant cow ⁵¹	Turkey (Samsun region).
	Place tooth in shoes overnight in exchange for sweets ⁵⁹	Swaziland
	Tooth is hidden in a special place; child tries to find it 1 year later ³⁴	Philippines
	Tooth is hidden in the child's hair ³⁶	Arapaho First Nation
	Tooth is kept as a keepsake ^{34,51}	Lithuania, Turkey (Samsun region)
	Teeth are kept until death, when they are buried in the coffin ⁶⁰	UK
	Tooth is made into certain jewellery ^{34,50,51}	Brazil, Costa Rica, Chile, Turkey (Samsun region)
	Place tooth in a tin can and shake to keep the Rolling Calf away ^{34,35}	Jamaica
5. Burying teeth	With an ancestor ^{36,38,52}	New Guinea
	In the ground ^{34,35,61}	Benin, Canada, India, Malaysia, Mongolia, Nepal, Senegal, Tajikistan, Turkey (Samsun region)
	On the east side of a healthy young sagebrush, rabbitbrush, or pinyon tree in a place southeast from the home ³⁴	Navajo First Nation
	In the garden or ground of the child's future place of work ³⁴	Turkey
	Upper teeth beneath the floor ⁴⁹	Korea
	Near a Tulsi plant ⁴⁹	India
	By a tree ^{36,48}	Mongolia
	Under a tree with a few hairs of the child ³⁶	Czech Republic, Slovakia
	Under the entrance to the lodge ^{36,38}	Teton First Nation
	At the edge of the hearth ³⁶	Armenia

(Continues)

TABLE 1 (Continued)

TRADITION	PRACTICES	LOCATION
6. Giving teeth to animals	Feed tooth to a dog, rodent, bird, or other animal ^{33,34,36,38,48,51,62}	Afghanistan, Arikara First Nation, Canary Islands, Cherokee First Nation, Czech Republic, Japan, Kyrgyzstan, Mongolia, Patagonia (South America), Shuswap First Nation, Turkey (Gagauz people), Yupik First Nation
	Place tooth under the pillow for a rabbit to take ³⁴	El Salvador
7. Tooth is eaten	Tooth is ground up, placed in meat, and eaten by the mother ^{35,36}	Australia
	Tooth is swallowed by the mother ^{29,63}	US (in year 1880)

Note: This table lists examples of traditions marking the loss of primary teeth with their associated key figure or practices. The table summarizes: where a particular exfoliated tooth tradition has been noted (location) and; what it consists of (tradition, character, practice).

After reviewing the 37 articles, a list of 74 reported traditions related to the disposal of exfoliated teeth was compiled (second column of Table 1). These traditions were then grouped into 7 major themes (first column of Table 1). Inductive theme generation was used to summarize these variations; for example, the 'tooth mouse' variation is comprised of literature mentioning mouse or mice in relation to tooth disposal, but not other rodents. These variations were organized within the table according to how often they appear in the literature.

3 | RESULTS

The identified literature focusing on exfoliated tooth disposal traditions, particularly outside of the Western Tooth Fairy traditions, is quite sparse (including just 37 scholarly works), dating primarily to the 1990s.^{29,30} The variations within the seven main themes and other observations are summarized below.

3.1 | Giving teeth to a tooth fairy

A common tradition described as occurring in many parts of the world involved giving teeth to a fairy figure, who left children money or another gift in return. Of the 37 papers identified in this systematic review, 20 (56%) mention the Tooth Fairy. This is a very common tradition among Western countries, but, to the best of the authors' knowledge, no study has quantified the prevalence of this or other tooth disposal traditions. Modern-day traditions involving fairies are reported as practiced throughout the US, Canada, Denmark, the United Kingdom, Australia and parts of Asia. However, it is unknown if these traditions arose independently in different parts of the world. Historically, in the early centuries of Europe (exact dates were not reported in the literature reviewed), it was common to bury a child's tooth after exfoliation; parents would celebrate the loss of their child's sixth tooth by leaving a gift or money under the child's pillow.^{31,64} Prior to 1900 in England, young girls who worked as industrious servants were rewarded with coins said to be left by fairies, who placed the money in the girls' shoes while they slept.³⁰ In Gallic traditions recorded from 1887, children placed their exfoliated teeth under a pillow, then the

Virgin Mary left money or a toy as a reward.³⁰ Another Gallic tradition, documented in 1902, consists of a 'good fairy' leaving a piece of candy for the child's exfoliated tooth.³⁰ Different sources also point to an older French story referencing Saint Apollonia (the Catholic patron saint of dentists, dental pain and tooth loss), who is often compared to the modern-day Tooth Fairy.³⁰ Notably, in contemporary France, the figure who takes children's exfoliated teeth is a mouse instead of a fairy. The genealogy of this shift is muddled, but *The Dictionary of Superstitions* specifies fairy figures belong to Anglo-Saxon countries,⁶⁵ which may explain why the French no longer leave teeth to a fairy figure. Today's French-Canadian children offer their tooth to a *fée*, the French translation of fairy.³⁰

During the early twentieth century, the Tooth Fairy figure and accompanying pillow ritual became popularized throughout the United States (US), the United Kingdom (UK) and other Western nations.^{29,30,32,66-68} Exfoliated tooth practices in other countries are poorly documented. The pillow ritual appears to have begun as recently as 1920-1930; children at that time were familiar with the practice, but the Tooth Fairy was not yet a character.³⁰ The Tooth Fairy figure first formally appeared in 1949, when Lee Rogow explored the Tooth Fairy in a short story for *Collier's Weekly*, one of the most popular magazines at the time.¹⁹ Rogow described a child who loosened her tooth on purpose so she could receive a dime from the Tooth Fairy.¹⁹ The Tooth Fairy rose in popularity in the US and UK in the 1950s.³⁰ Because of post-war affluence following World War II, families could afford to give money to their children in exchange for losing a tooth, facilitating the rise of the Tooth Fairy figure.³⁰ Furthermore, childhood had become a distinct, honoured phase of life in which developmental milestones were more commonly celebrated.³⁰

The Tooth Fairy and pillow ritual are by no means universal. However, the practice of exchanging a child's exfoliated tooth for money or other gifts is not uncommon across the globe.⁶⁹ In Sweden, a fairy figure, who is different from the American or British Tooth Fairy, takes the child's exfoliated tooth after it has been placed inside a glass of water, replacing it with a coin.³³

Regarding how teeth are disposed of or kept after the Tooth Fairy tradition takes place, a recent international survey ($n=2905$),⁷⁰ with high participation in Venezuela, Turkey and Brazil, found that most adults believe baby teeth should be kept rather than discarded: 31%

thought teeth should be preserved in the house or with the family, 24% wanted to preserve the teeth for stem cells and 4% elected to hide them. Only 12% of participants would throw teeth away as garbage, 7% would dispose of them according to a cultural practice, and 4% would bury them.

3.2 | Giving teeth to mouse figures

The 'tooth mouse' figure, known as El Ratón Pérez, Ratoncito Pérez, El Ratoncito, El Ratón, El Ratón Miguelito, or El Ratón de los Dientes in Spanish-speaking countries, La Petite Souris in France, or Topino in Italy^{24,30,31} is another well-known character involved in tooth disposal traditions. Of the 37 papers identified, 12 (32%) mention leaving an exfoliated tooth for a mouse character or unnamed mouse/rat to take. El Ratón Pérez dates back to 'ancient times' when mothers fed their children's exfoliated teeth to rodents (for reasons described below).²⁰ Today, the tooth mouse visits children who leave teeth under their pillows and exchanges teeth for coins or gifts.

Because written descriptions and stories of El Ratón are lacking, the history of this mouse has been mostly drawn from the work of Luis Coloma, who wrote a story for young King Alfonso XIII in 1894.²⁴ The lengthy tale tells of El Ratón Pérez accidentally waking up the young king when trying to take the king's exfoliated tooth from under the pillow.²¹ The young king convinces the mouse to accompany him on missions for the night. The story passed among generations, and the name of the mouse varies as it spread among Spanish-speaking countries.

The tooth mouse in France, known as La Petite Souris, likely originated from an 18th century French fairy tale written by Madame d'Aulnoy titled *La Bonne Petite Souris*, or 'The Good Little Mouse' in English.²² The tale follows a fairy who transforms into a mouse and helps the queen defend herself against the king; the mouse does this by hiding under the king's pillow before knocking his teeth out.²² Another belief, described on a popular culture website dedicated to La Petite Souris for French children, was that when a child's exfoliated tooth was eaten by an animal, the new tooth adopted the characteristics of that animal.²³ As rodents have sharp, hard teeth, parents would give their children's tooth to a mouse in the hopes of their child growing a similarly strong tooth.²³

Tooth mouse figures beyond the named El Ratón Pérez, La Petite Souris, and Topino, are common throughout the world, including in Ukraine, South Africa, New Guinea, Germany, Russia, Spain and Venezuela.³⁴ The tooth mouse commonly exchanges children's exfoliated teeth for a monetary reward, similar to the Tooth Fairy.^{30,31} In South Africa, the tooth is put into a slipper which is then placed underneath the bed, in exchange for sweets.²⁶ In some countries, participants place their teeth in a variety of places instead of under their pillows, such as within a mouse hole, behind furniture, or in a hearth or oven.^{30,34} However, not all traditions involve monetary rewards or mythical figures. Countries that do not have figures like a Tooth Fairy or tooth mouse often perform other actions, in which the child or family member interacts with teeth in a variety of ways.

3.3 | Throwing teeth

The practice of throwing teeth is a commonly described tradition. In some parts of Africa and Asia, children throw teeth in a specific direction thought to be significant for promoting the healthy growth of a new tooth, often while reciting a ritualized wish related to the growth of the permanent tooth.^{29-31,33,55,69} For example, Bemba children in Zambia have been reported to throw a piece of charcoal to the west and a tooth to the east while saying 'as the piece of charcoal sinks with the setting sun, a new tooth will rise with the sun of dawn'.²⁹ Similarly, in Japan, lower (mandibular) teeth are thrown upwards, and upper (maxillary) teeth are thrown downwards based on the belief that this will help permanent teeth grow in straight.³⁵ In Namibia, a child bends down and throws their tooth between their legs in the direction of their place of birth.³³ Teeth are also thrown into seas, rivers, gardens, and chicken coops in countries such as Lebanon, Pakistan, New Zealand (Maori) and Mali, respectively.^{34,71} In Kazakhstan, teeth are thrown under the bathtub. In Nigeria, children throw their tooth along with some stones (8 stones for a boy, 6 stones for a girl) and then run away.³⁴

A similar throwing tradition, practiced in Northern Africa and the Middle East, involves children throwing their tooth up in the air towards the sun or sky.^{30,33,56,57} In the US, some indigenous communities such as the San Juan, Taos, and Isleta Pueblo tribes, children throw their exfoliated or extracted tooth towards the sun while asking for a new one.⁵⁵ For the Pueblo of Acoma tribe in the US, children go towards the East for sunrise early in the morning where they place cornmeal on the sand and their exfoliated tooth on top of the cornmeal; the child then places prayer sticks on the sand and prays towards the sun for a new tooth.⁵⁵ There are also reports of teeth being thrown into a fire, such as behind the stove or hearth (in Sweden, Estonia, Siberian Russia, Finland³³). Further variation occurs in Hungary, where children close their eyes and throw their tooth as far behind their back as possible.³³

3.4 | Hiding or keeping the tooth

In certain parts of Africa and Asia (e.g. in Ghana, Japan, Korea, Vietnam, the Pacific Islands, India) and elsewhere (e.g. Greece) children have been reported to toss teeth onto the roof of their houses to hide them from others.^{25,35} This tradition reflects the thinking that special parts of the human body, like teeth, hair and nails, must be hidden so untrustworthy or harmful people cannot take them.³³ Children often recite a saying while throwing teeth onto the roof; these phrases often refer to an animal (e.g. crows, magpies), asking these animals to bring a new tooth.³³ In Jamaica, a similar belief exists—children place their exfoliated tooth in a tin can and shake the can to keep away the rolling calf, a wicked creature in Jamaican folklore.^{34,35} In the Philippines, children hide their tooth in a special place and make a wish, checking to see if it is still there 1 year later.³⁴

Some children and parents have also been reported to keep teeth as keepsakes or mementos. Exfoliated teeth are commonly kept as

part of a family's memories in Western culture, alongside other mementos a child acquires over time. These preserved keepsakes are often protected in jewellery, tooth-shaped pillows, special wooden boxes, or products companies now widely market.⁷² Children have also been reported to keep their exfoliated teeth as keepsakes in Turkey and Lithuania.³⁴ In Brazil, Costa Rica, and Turkey, exfoliated teeth have been used to make different types of jewellery.^{34,50,51} A historical tradition in the UK involves keeping teeth until death in order to bury them in the coffin.⁶⁰

3.5 | Burying teeth

Burying teeth in the ground is another tooth disposal tradition.^{29–31,33,72} In New Guinea, children have been reported to bury teeth with an ancestor.^{69,72} In some countries such as Malaysia, people view the return of parts of the body (like an exfoliated tooth) to the earth as important.^{69,70} Thus, teeth are buried in the ground in Malaysia, Tajikistan, Benin, and Nepal.^{29,33–35,72} Teeth are often buried next to plants, or hidden within them, such as in the Navajo and Yellowknife Dene First Nations, Turkey, and Aboriginal Australians.³⁴ Similarly, in various countries like Taiwan, children place their teeth in a hole in the wall.³³

3.6 | Giving teeth to animals

Across both Europe and Asia, children have been reported to offer teeth to an animal like crows, other birds, dogs, or rodents, wishing the animal will bring them a new tooth.^{30,33} In Turkey, the Czech Republic, El Salvador, Mongolia and Afghanistan, people practice offering teeth to an animal,³⁴ as do children among the Indigenous populations of Alaska and Northern Canada, the Cherokee First Nation and native peoples of Patagonia in South America.^{33,72} There are also traditions involving not just the offering of a tooth, but specifically feeding the tooth to an animal. Often times, as in Mongolia, teeth are wrapped in a piece of meat or other source of protein to feed the animal.³³

3.7 | Eating the tooth

Finally, in Australia, the tooth is sometimes eaten by the mother. Two sources document the practice of mothers in Australia grinding up the tooth, placing it in a bit of meat, and eating the tooth within the meat.^{35,36} Mothers who crush and eat the tooth with food express the wish that their child will have permanent teeth as strong as iron.

4 | DISCUSSION

The main finding of this review was that there is great international diversity in disposal traditions for exfoliated teeth. Seven

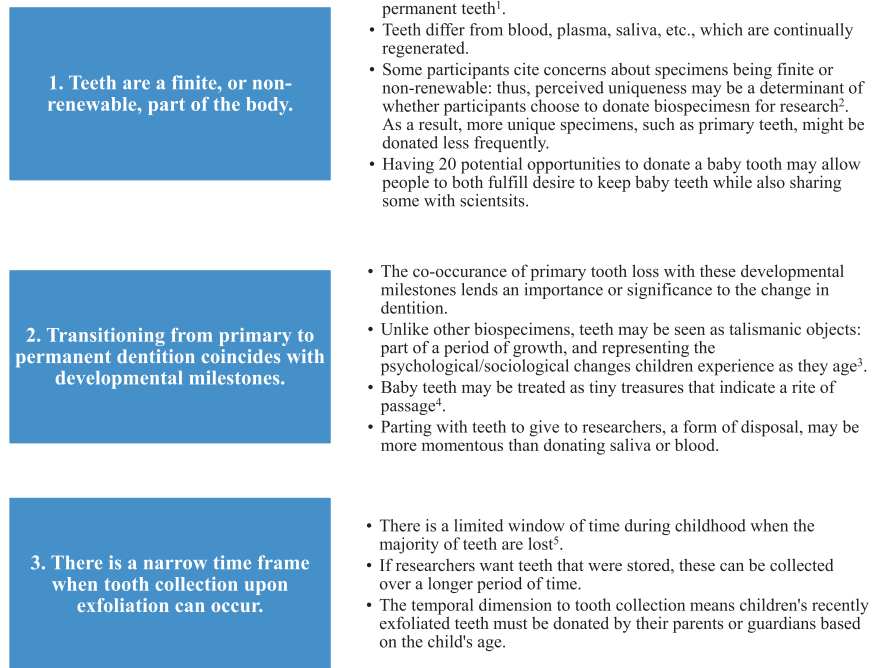
general themes of traditions practiced around the world (both currently and historically) were identified, with 74 specific variations of these customs across cultures. Within Europe, only Germany does not appear to have a disposal tradition documented by this review of the literature.³⁴ Implicit in these findings are the symbolic significance attached to the process of exfoliating primary teeth by many cultures.^{29,73} The near universality of these traditions, which have deep historical roots and may be tied to religious attitudes, suggest they hold meaning for children and parents, including psychological and social functions.¹⁶ The pervasiveness of these practices suggests they imbue the significance of teeth in a child's life, perhaps making children and their families more attached to teeth and increasing the desire to keep them. This paper will hopefully allow researchers to appreciate the variety of traditions practiced, deepen their understanding of the ethics of using teeth for research, and use these insights to help establish responsible research protocols and trusting partnerships with research participants. Researchers can begin to incorporate findings from this study in the following ways and across different stages of the research process.

During the phase of *study conceptualization*, researchers can use this review's results to plan for tooth data collection. Such planning may involve identifying research questions with the intended participants in mind. For example, because of the traditions practiced, some populations may be hesitant to donate more than one tooth to science, hence researchers may focus on collecting just one tooth from each child. Planning may also involve identifying similarities and differences between teeth and other biomaterials planned for collection. Our results suggest teeth may be viewed differently from other biospecimens more routinely analysed by scientists, which may promote or inhibit participants' donation of teeth to science (see [Figure 2](#) for more details). Researchers should keep the ethics of biospecimen donation in mind during their study conceptualization, especially when considering how to recruit and involve participants in their studies. Remembering the ethical considerations typically practiced in biospecimen research and paying special attention to cultural beliefs about teeth and other parts of the body may promote participants' trust in the research team.

These findings can also inform the *development of recruitment and engagement strategies* to involve diverse communities and their tooth disposal rituals. A few study protocols have already incorporated some popular tooth disposal traditions into their work. For example, the National Institutes of Health-initiated *Environmental Influences on Child Health Outcomes (ECHO)* study used the Tooth Fairy as an age-appropriate character to explain and engage children in research.^{74,75} Similarly, a research team in Spain encouraged children to donate their exfoliated teeth in exchange for a souvenir and certificate of assisting El Ratón Pérez.⁷⁶

At the phase of *informed consent*, researchers can incorporate this study's results to develop age-appropriate informed consent materials. Although informed consent is provided by a child's legal guardian, children's *assent* (i.e. their affirmative agreement) should

FIGURE 2 Reasons why teeth may be viewed differently from other biomarkers and how those differences could impact participant's willingness to donate teeth to science.



also be ethically obtained. Indeed, in many cultures, children are key actors in tooth disposal traditions, overseeing and carrying out the practices themselves. For example, children are the ones who throw their tooth on the roof, not their parents. Researchers could incorporate the tooth disposal tradition present in a child's culture to explain the concept of donating a tooth to research. Donating an exfoliated tooth may be challenging for some children: many traditions involve the belief that special parts of the body must be hidden as to not be found by untrustworthy or harmful people, which could include unfamiliar researchers. However, aware of such traditions, researchers can better tailor the assent process to children of diverse backgrounds, educate children (and families) about tooth-focused research, and engage them in a conversation about donating their teeth to science.

At study completion, results from this review can be used to develop culturally appropriate methods for disposing of tooth samples after the research is finished. Through collaborations with parenting groups and community advisory boards, study protocols can be strengthened to utilize methods that recognize and respect the cultural understanding of the body. For example, as has been done with Native American populations, biospecimens can be ceremoniously returned to the community who then collectively destroy them in a ritual, a process which could also be applied to teeth.⁷⁷ Ethical human remains disposal has also been reported in reparation cases.⁷⁸

This study had several strengths. To the best of the authors' knowledge, this is the first systematic review of cultural traditions for disposing of exfoliated teeth. The review process was rigorous and supplemented by additional works to better contextualize these identified traditions. However, this study also had the following limitations. The lack of English literature limited the

number of traditions that could be summarized. Each source identified also varied in the depth of descriptions for each tradition; thus, the more widely recognized traditions, such as the Tooth Fairy, could be described in more detail. Additionally, the quality of the data included in this review was not critically evaluated. There does not appear to be a parallel research tool (to those used in systematic reviews of quantitative studies⁷⁹) to quantify the quality of data included in qualitative works, including risk of bias. Moreover, the majority of sources included in this review did not formally collect or analyse data. As described previously, the bulk of this review's literature came from anthropological notes, chapters from books on folklore or history, and editorial-style pieces, for example, published as early as the 1900s. These disciplines varied in their approaches to describing methodologies, often depending on the publication year and reference type, with some being more narrative in style and others being more of a comprehensive list. By reviewing a variety of references, the breadth of traditions practiced could be better understood, but this did make comparison of studies challenging. The included sources may refer to traditions that are outdated, inaccurate, or overlooked, or incorrectly assigned to specific countries or regional groups. Future studies may use quantitative and qualitative methods to compare findings across disciplines and reference styles. Lastly, the reviewed literature varied in the granularity of practices described for each tradition. Specific cultural and ethnic groups within a particular country were reviewed by some sources, whereas others referred to entire countries. Thus, some traditions could be tied to a specific group within a larger country, and some were attributed to entire countries. Researchers may empirically study the prevalence of tooth disposal traditions across the globe as a means of overcoming these limitations.

5 | CONCLUSION

Researchers and clinician-researchers looking to collect deciduous teeth for study can build their research in an ethically and culturally sensitive context by understanding the diversity and abundance of disposal traditions for exfoliated teeth as they are practiced around the world. In a time when heightened distrust in science is pervasive, hindering the inclusion of diverse groups in research, researchers must establish better connections and improve communication with populations they seek to engage. Diversity is critical for the generalizability of research findings. A deeper appreciation of the cultural beliefs and traditions for disposal of exfoliated teeth among populations will allow researchers to embed ethics into research design. This approach may provide long-lasting benefits for researchers and participants alike, improving understanding between these groups and leading to more productive and collaborative research studies.

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DATA AVAILABILITY STATEMENT

Data sharing is not applicable to this article, as no datasets were generated or analysed during the current study. The literature review results that support the findings of this systematic review are available from the corresponding author, [ECD], upon reasonable request.

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REFERENCES

- Goodman AH, Rose JC. Assessment of systemic physiological perturbations from dental enamel hypoplasias and associated histological structures. *Am J Phys Anthropol*. 1990;33(S11):59-110.
- Armélagos GJ, Goodman AH, Harper KN, Blakey ML. Enamel hypoplasia and early mortality: bioarchaeological support for the barker hypothesis. *Evol Anthropol*. 2009;18:261-271.
- Samuels L. Uptake of radium-226 from drinking water into human deciduous teeth. *Arch Oral Biol*. 1966;11(6):581-586.
- Rosenthal HL, Austin S, O'Neill S, Takeuchi K, Bird JT, Gilster JE. Incorporation of fall-out strontium-90 in deciduous incisors and foetal bone. *Nature*. 1964;203:615-616.
- Petersen N, Samuels L. Deciduous teeth as indicators of 226Ra exposure. *Health Phys*. 1966;12:12-1460.
- Ericson JE. Enamel lead biomarker for prenatal exposure assessment. *Environ Res*. 2001;87(3):136-140.
- Mountain RV, Zhu Y, Pickett OR, et al. Association of maternal stress and social support during pregnancy with growth marks in children's primary tooth enamel. *JAMA Netw Open*. 2021;4(11):e2129129.
- Davis KA, Mountain RV, Pickett OR, Den Besten PK, Bidlack FB, Dunn EC. Teeth as potential new tools to measure early-life adversity and subsequent mental health risk: an interdisciplinary review and conceptual model. *Biol Psychiatry*. 2020;87(6):502-513.
- Klass P. In Baby Teeth, Links Between Chemical Exposure in Pregnancy and Autism. 2018 <https://www.nytimes.com/2018/07/02/well/autism-pregnancy-fetal-development-teeth-chemicals.html>
- Associated Press. Expert: Flint Children's baby Teeth to Be Examined for Lead. 2020. Accessed April 6, 2020. <https://www.usnews.com/news/best-states/michigan/articles/2020-03-16/expert-flint-childrens-baby-teeth-to-be-examined-for-lead>
- Lazar K. Can kids' Teeth Reveal Emotional Trauma? A New Study Suggests Yes. 2019 <https://www.bostonglobe.com/metro/2019/12/17/science-tooth-fairy-proposes-screening-children-teeth-for-hints-future-mental-health-problems/vqt1Oh9345B9R8iGYOBYIO/story.html>
- Rocheleau J. The secret lives of baby teeth. 2022 <https://www.vox.com/the-highlight/22876530/baby-teeth-science-anthropology> Accessed February 14, 2022.
- Goulart MA, De Marchi RJ, Padilha DMP, Brondani MA, MacEntee MI. Beliefs about managing dental problems among older people and dental professionals in southern Brazil. *Community Dent Oral Epidemiol*. 2019;47(2):171-176.
- Arora M, Austin C, Sarrafpour B, et al. Determining prenatal, early childhood and cumulative long-term lead exposure using micro-spatial deciduous dentine levels. *PLoS One*. 2014;9(5):e97805.
- Overall PM. Cultural competence: a conceptual framework for library and information science professionals. *Libr Q*. 2009;79(2):175-204.
- Parsons CLB, Mountain RV, Lau A, Troulis MJ, Bidlack FB, Dunn EC. The meaning and purpose of primary tooth disposal rituals: implications for pediatric dental professionals. *Front Dent Med*. 2021;2:44.
- Tighe T. Here's a creatively Catholic way to handle the Tooth Fairy. 2017 <https://aleteia.org/2017/12/20/heres-a-creatively-catholic-way-to-handle-the-tooth-fairy/> Accessed April 2, 2020.
- Callahan LA. The torture of Saint Apollonia: deconstructing Fouquet's martyrdom stage. *Stud Iconogr*. 1994;16:119-138.
- Fee CR, Webb JB. *American Myths, Legends, and Tall Tales: an Encyclopedia of American Folklore*. Vol 1. Abc-Clío; 2016.
- Álvarez AM, Pintor C, María José Gómez Navarro. *Ratón Pérez*. Instituto Cervantes (Spain). <https://cvc.cervantes.es/actcult/raton/>. 1997. Accessed July 23, 2020.
- Coloma L. *Ratoncito Pérez*. Madrid, Spain: La Real Academia Española. 1911.
- d'Aulnoy MC. *La Bonne Petite Souris. Les contes des Fées*. Claude Barbin; 1697.
- Poulain F-X. Qui est la Petite Souris. In. *La Petite Souris*. Vol 2020. LesDentsDeLait.com; 2010.
- Colato LR. *The Tooth Fairy Meets El Raton Perez*. Tricycle Press; 2010.
- Kaur H, Kaur S, Kaur H. Prehospital emergency management of avulsed permanent teeth: knowledge and attitude of schoolteachers. *Indian J Dent Res*. 2012;23(4):556.
- Bennett HJ. Ever wonder where the tooth fairy comes from? 2012 https://www.washingtonpost.com/lifestyle/kidspost/ever-wonder-where-the-tooth-fairy-comes-from/2012/04/26/g1QAz5urJT_story.html Accessed September 3, 2020.
- Grant MJ, Booth A. A typology of reviews: an analysis of 14 review types and associated methodologies. *Health Inf Libr J*. 2009;26(2):91-108.
- Mihás P. Qualitative research methods: approaches to qualitative data analysis. *International Encyclopedia of Education*. Elsevier; 2023:302-313.

29. Wells R. The making of an icon: the tooth fairy in north American folklore and popular culture. In: Narváez P, ed. *The Good People: New Fairylore Essays*. Garland Publishing; 1991:426-453.
30. Tuleja T. The tooth fairy: perspectives on money and magic. In: Narváez P, ed. *The Good People: New Fairylore Essays*. Garland Publishing; 1991:406-425.
31. Toumba KJ. The legend of the "tooth fairy". *EJPD*. 2013;14:277-278.
32. Yeung CA. Cost of tooth fairy on the rise. *BMJ*. 2013;346:346.
33. Svanberg I. The folklore of teeth among Turkic and adjacent peoples. *CAJ*. 1987;31(1/2):111-137.
34. Beeler SB. *Throw your Tooth on the Roof: Tooth Traditions from around the World*. Houghton Mifflin Harcourt; 1998.
35. Capps D, Carlin N. The tooth fairy: psychological issues related to baby tooth loss and mythological working through. *Pastor Psychol*. 2014;63(3):265-280.
36. Carter B, Butterworth BB, Carter JG. *Ethnodentistry and Dental Folklore*. Dental Folklore Books; 1987.
37. Maroto M. Folklore in children's odontology. *J Hist Dent*. 1998;46(1):17-19.
38. Clark CD. The Tooth Fairy. *Flights of fancy, leaps of faith: Children's myths in contemporary America*. The University of Chicago Press; 1995:5-21.
39. Anderson RS. The loss of magic. *J Miss State Med Assoc*. 2010;51(11):341-342.
40. Wells R. The tooth fairy. Part 1: the tooth fairy and the fairy world. *CAL*. 1979;43(6):2-7.
41. Terry BR. The tooth fairy. *Pa Dent J*. 2010;77(6):5-6.
42. Wells R. The tooth fairy. Part III: the tooth fairy: folk culture and the dental world. *CAL*. 1980;43(9):12-25.
43. Tooth fairy leaving an average of \$3.70 per tooth. *J Calif Dent Assoc*. 2014;42(5):285.
44. Wells R. The tooth fairy. Part II: the tooth fairy and the literary, artistic and commercial words. *CAL*. 1980;43(8):18-24.
45. Wells R. Tooth fairy update. *CAL*. 1982;45(12):6-9.
46. Wells R. Tracking the tooth fairy: blazing the way. *CAL*. 1983;47(1):18-19.
47. Williams VR. *Celebrating Life Customs around the World: From Baby Showers to Funerals [3 volumes]*. ABC-CLIO; 2016.
48. Maniate J. Traditions, Trends and the Tooth Fairy. *Children's Dental World*. 2015.
49. Goud SR, Fernandes S, Potdar S. A survey on myths related to disposal of deciduous teeth after shedding among rural population of central India. *JAMDSR*. 2015;3(1):51.
50. Nations MK, Calvasina PG, Martin MN, Dias HF. Cultural significance of primary teeth for caregivers in Northeast Brazil. *Cad Saude Publica*. 2008;24:800-808.
51. Muglali M, Koyuturk AE, Sari ME. Deciduous tooth extraction & folkloric beliefs in the Samsun region. *J Hist Dent*. 2008;56(1):24-30.
52. Townend B. The non-therapeutic extraction of teeth and its relation to the ritual disposal of shed deciduous teeth. *Br Dent J*. 1963;115:354-357.
53. Thomas N. Birth Customs of the Edo-Speaking peoples. *J R Anthropol Inst G B Irel*. 1922;52:250-258.
54. Barrett MJ. Walbiri customs and beliefs concerning teeth. *Aust J Anthropol*. 1964;6(3):95.
55. Espinosa AM. Miscellaneous materials from the Pueblo Indians of New Mexico. *Philol Q*. 1942;21:121.
56. Muhammad S, Shahid R, Siddiqui MI. Root and canal morphology of human primary molars in a local population of southern Punjab: an in vitro study. *PJMHS*. 2015;9(3):1043-1047.
57. Hamdani MA, Wenzel M. The worm in the tooth. *Folklore*. 1966;77(1):60-64.
58. Nuttall Z. Ancient Mexican Superstitions. *JAH*. 1897;10(39):265-281.
59. Around the world. *Br Dent J*. 2015;219:197. doi:10.1038/sj.bdj.2015.691
60. Venning R. Burial of teeth with body in Cornwall. *Folklore*. 1894;5(4):343.
61. Creighton H. *Bluenose magic*. Nimbus+ ORM; 2014.
62. Hilger MI. Some Customs Related to Arikara Indian Child Life. *Primitive Man*. 1951;24(4):67-71.
63. Loomis CG. Some American Folklore of 1880. *Calif Folk Q*. 1945;4(4):417.
64. Saunders MJ. A small trip through tooth Lore, or where did the tooth fairy come from? *Generations*. 2016;40(3):16-18.
65. Lasne S, Gaultier AP. *Dictionary of Superstitions*. Prentice-Hall; 1984.
66. Prentice NM, Manosevitz M, Hubbs L. Imaginary figures of early childhood: Santa Claus, easter bunny, and the tooth fairy. *Am J Orthopsychiatry*. 1978;48(4):618-628.
67. Hand WD. European fairy lore in the New World. *Folklore*. 1981;92(2):141-148.
68. Patcas R, van Waes HJ, Daum MM, Landolt MA. Tooth fairy guilty of favouritism! *Med J Aust*. 2017;207(11):482-486.
69. Granger BH. Of the teeth. *J Am Folk*. 1961;74(291):47-56.
70. Ivanova P. Milk Teeth: Preserve or Throw Them Away? Dentacoin Foundation. <https://dentavox.dentacoin.com/blog/milk-teeth-preserve-or-throw-them-away-infographic/> Accessed July 17, 2022.
71. Hadaway NL, Young TA, Ward B. Passing on and preserving our stories. *Child Educ*. 2011;87(6):381-386.
72. Clark CD. Flight toward maturity: the tooth fairy. *Flights of Fancy, Leaps of Faith: Children's Myths in Contemporary America*. The University of Chicago Press; 1995:5-21.
73. Tanner J. The teeth in folklore. *West Folk*. 1968;27(2):97-105.
74. Brownlee C. The tooth fairy in the lab. In: *Hopkins Bloomberg Public Health*. Johns Hopkins University; 2017.
75. Gillman MW, Blaisdell CJ. Environmental influences on child health outcomes, a research program of the NIH. *Curr Opin Pediatr*. 2018;30(2):260-262.
76. Centro Nacional de Investigación sobre la Evolución Humana (CENIEH). Nine Spanish Autonomous Regions Participate in the CENIEH Tooth Collection Campaign. Centro Nacional de Investigación sobre la Evolución Humana, CENIEH. 2019 <https://www.cenieh.es/en/press/news/nine-spanish-autonomous-regions-participate-cenieh-tooth-collection-campaign> Accessed July 24, 2020.
77. Mello MM, Wolf LE. The Havasupai Indian tribe case—lessons for research involving stored biologic samples. *N Engl J Med*. 2010;363(3):204-207.
78. National Park Service. Facilitating Respectful Return. U.S. Department of the Interior. Native American Graves Protection and Repatriation Act Web site. 2022 <https://www.nps.gov/subjects/nagpra/index.htm> Accessed July 19, 2022.
79. Schaefer JD, Cheng TW, Dunn EC. Sensitive periods in development and risk for psychiatric disorders and related endpoints: a systematic review of child maltreatment findings. *Lancet Psychiatry*. 2022;9(12):978-991.

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