

## Kajika Frogs (*Buergeria buergeri*) as Premium Pets During the Japanese Modern Monarchical Period

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**Abstract** This study reviews articles about the prices of Kajika frogs (*Buergeria buergeri*) in eight Japanese newspapers published between 1884 and 1938. Frog prices have been converted to present-day United States dollars (US\$). The frogs had a wide range of prices. Premium individuals, in particular, were often sold for US\$1,000–2,000. In this paper, I discuss the reasons why exceptional individuals were traded at a high price in the market, although Kajika frogs were a common native species. Other topics, such as the presentation of frogs as gifts to royal families, are also discussed.

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### Introduction

In Japan, there are 48 known frog species (Amphibia: Anura), including invasive species (Matsui and Maeda 2018). Most frogs inhabit ponds, wetlands, and rice paddies. However, a small number of frog species are found in streams. These include the Kajika frog (*Buergeria buergeri*) (Figure 1), which lives in mountain streams, an uncommon habitat for Japanese frogs. Male and female *B. buergeri* are about 4 and 5–7 cm long, respectively. *B. buergeri* are well known for their cry (*fi fi fi fi fi fi*), which can be heard mainly in the summer and sounds like a song. Their songs can be heard on the website of the Museum of Nature and Human Activities (Hyogo 1997). The Japanese name of the frog is *kajika-gaeru*, two words that mean “deer in a river” and “frog”, respectively, because the frogs’ cry is thought to resemble that of a deer. This frog’s nickname is “songstress in a clean stream,” although only males can sing.

During the Japanese modern monarchical period (1868–1945), almost all frog fanciers reared *B. buergeri* exclusively in order to listen to their songs (Hoshina 2018c). In previous studies, I examined prices for pet insects, such as Japanese fireflies and crickets, as they appeared in newspaper articles from the modern monarchical period (Hoshina 2017b, 2018a). Currently, people in Japan cannot buy fireflies and

singing Orthoptera—except for *Meloimorpha japonica* (de Haan 1844)—at normal pet shops and summer festivals. Moreover, present-day Japanese newspapers seldom report the prices of pet insects. In contrast, in the modern monarchical period, fireflies and various singing Orthoptera were usually sold at summer festivals (Hoshina 2017b, 2018a), and newspapers often mentioned the prices of these coveted pets. In addition, those newspaper articles included *B. buergeri* prices (Hoshina 2018c). Therefore, I examined the prices of *B. buergeri* that were kept as pets during the modern monarchical period and have recorded some cultural insights relevant to this frog. The aim of the present study is to show how the value of *B. buergeri* as a pet animal in Japanese culture changed from the modern monarchical period to the present.

### Methods

In Japanese history, the period between 1868 and 1945 (following the Edo Period) is known as the modern monarchical period. During this period, many newspaper publishing companies were established, and newspapers became popular among ordinary Japanese people. In this study, I look at the prices of *B. buergeri*, which were kept as pets, as they appeared in newspaper articles from the modern monarchical period.



**Figure 1** *Buergeria buergeri*. Photo credit: Kazunori Kawachi, May 2009.

I mainly conducted research in two newspapers: *Yomiuri Shinbun* (still in circulation) and *Tokyo Asabi Shinbun* (now called *The Asabi Shinbun*) from Japan's modern monarchical period. The Japanese word *shinbun* means newspaper. In addition, I referred to the *Tokyo Yokohama Mainichi Shinbun*, *Mainichi Shinbun*, *Yorozu Chōbō*, *Miyako Shinbun* (the present-day *Tokyo Shinbun*), *Un-yu Nippō*, and *Chūō Shinbun*. Except for the *Miyako Shinbun*, the other newspapers are defunct.

Many newspaper articles contained information on the prices of *B. buergeri*, which were kept as pets, in Tokyo's market, methods for rearing them, and other matters. The main currency types used during Japan's modern monarchical period were *yen* and *sen*. One *yen* was equivalent to 100 *sen*. Eventually, the *sen* was taken out of circulation, and the only official Japanese currency at present is the *yen*. Prices varied depending on the period; therefore it is very difficult to have a real sense of the original prices when indicated in *sen*.

Consequently, I converted modern monarchical prices into present-day United States dollars, an international standard currency. The price of a *Tokyo Asabi Shinbun* copy in the modern monarchical period ranged from 1–4 *sen*. In contrast, the average price of a newspaper copy in contemporary Japan ranges from 100–160 *yen*. The current *yen*/US dollar exchange rate (December 2019) is about 110 *yen* per dollar. Therefore, I very roughly estimated that the *Tokyo Asabi Shinbun* cost US\$1 per copy. For example, the *Tokyo Asabi Shinbun* (1 *sen* per copy at the time) reported in 1890 that the price of a *B. buergeri* was 1–1.5 *yen* (100–150 *sen*). Based on this information, I very roughly estimated the price of the frog to be US\$100–150 in 1890.

In Table 1, the nine newspapers *Yomiuri Shinbun*, *Tokyo Asabi Shinbun*, *Tokyo Yokohama Mainichi Shinbun*, *Mainichi Shinbun*, *Yorozu Chōbō*, *Miyako Shinbun*, *Un-yu Nippō*, and *Chūō Shinbun* have been abbreviated as YM, TA, TYM, MA, YR, MI, UN, and CH, respectively. For instance, when I cite a newspaper article from December 8, 1941 in *Yomiuri Shinbun*, I describe the authentic article as YM. 12. 8. in the table. In the main text, I cite the newspaper article as (*Yomiuri Shinbun* 1941), and the date, title, and page number of each article is noted in the references. All articles used in this study were examined by reading reprinted editions or microfilms, not the original papers. Page numbers of some articles are unclear.

## Results and Discussion

### *B. buergeri* Sold at a Wide Range of Prices

I found many articles on the prices of *B. buergeri* sold in Tokyo's market in the eight newspapers that were published between 1884 and 1938 (Table 1). Table 1 shows that the prices of *B. buergeri* ranged from cheap to very expensive. All commercial *B. buergeri* were living frogs. A prime individual was often sold for US\$1,000–2,000. For contrast, in 1886, the daily pay of a carpenter was about 0.4 *yen* (US\$40) (Morinaga 2008). It follows that commoners could not buy such expensive frogs.

In contemporary Japan, these frogs cost about US\$10–20 in pet shops that specialize in reptiles and amphibians. Now, *B. buergeri* are commonly found in mountain streams in suburban areas, and in the countryside, where people can hear them sing; the Japanese Ministry of the Environment has not classified this species as endangered. During the modern monarchical period, this frog must have been more common than it is now. For example, *B. buergeri* were even found in some numbers at the Tama River in Tokyo in those days (*Tokyo Yokohama Mainichi Shinbun* 1885; *Yomiuri Shinbun* 1927b), although now the frog has been designated a prefectural endangered species (Bureau of Environment, Tokyo Metropolitan Government 2013). So, why was this frog often very expensive during late monarchical times despite being relatively common?

Frogs collected from particular localities were treasured among fanciers in Tokyo. In those days, the frogs collected from Kamogawa River, Kyoto were the most valuable, followed by those collected from Shizuoka and Yamanashi (*Yomiuri Shinbun* 1902, 1903b). In contrast, the frogs collected from Saitama and Chiba were considered to be inferior singers

**Table 1** The annual prices of *B. buergeri*.

Year	Frog price (yen)	Relative value in USD	Authority <sup>1,2</sup>
1884	0.24–10	24–1000	YM. 6. 14.
1885	0.15–3	15–300	TYM. 6. 19.
1886	0.1–20	10–2000	MA. 7. 2.
1887	0.13–0.5	13–50	YM. 7. 28.
1890	1–1.5	100–150	TA. 6. 26.
1892	0.3–0.5	20–33	YM. 4. 24.
1892	0.15–5	10–333	YM. 8. 14.
1895	0.5–1	33–67	YR. 6. 20.
1897	0.2–0.5	20–50	TA. 6. 22.
1900	0.25–1	17–67	YR. 6. 11.
1902	0.05–0.28	3–19	TA. 6. 8.
1902	0.2–1	13–67	YM. 6. 8.
1903	0.25–10	17–667	TA. 5. 31.
1903	0.1–30	7–2000	YM. 6. 27.
1904	0.15	10	YM. 7. 11.
1905	0.2–30	13–2000	YM. 6. 23.
1907	0.15–0.3	8–15	MI. 5. 28.
1909	0.5	25	MI. 8. 26.
1910	0.03–0.25	2–13	TA. 7. 6.
1912	0.05–0.1	3–5	TA. 4. 8.
1917	0.5–8	25–400	UN. 6. 19.
1919	0.1–7	5–350	CH. 6. 27.
1920	0.4–5	13–167	YM. 6. 5.
1921	0.4–5	10–125	YM. 5. 7.
1922	0.4–5	10–125	YM. 6. 3.
1924	0.5	17	YM. 7. 11.
1926	0.5–15	17–500	TA. 7. 1.
1938	0.15	4	YM. 6. 22.

<sup>1</sup>YM, TYM, MA, TA, YR, MI, UN, and CH are abbreviations of newspapers. See text in methods.

<sup>2</sup> The two numbers of newspaper articles in authority are month and day. The years published have been omitted. See year in the first column.

(*Miyako Shinbun* 1907; *Tokyo Asabi Shinbun* 1910; *Yomiuri Shinbun* 1903b). In short, frogs collected in western Japan were more popular among fanciers than those collected in eastern Japan (Figure 2). These frog evaluation differences were directly reflected in the prices. Rich fanciers looked frantically for frogs from Kyoto in the market, and these sold at much higher prices (*Yomiuri Shinbun* 1903a). Kyoto frogs were particularly highly esteemed by fanciers because these frogs were the subject matter of poems by great poets at Kyoto in the Heian Period (794–1192) and considered the best singers of all the *B. buergeri* (Usui 1989). Of course, there is no zoological basis for these

evaluations. Rather, these high evaluations of Kyoto frogs reflected Tokyo citizens' longing for the ancient capital of Kyoto.

Old and fat frogs were valued and traded at high prices in the market (*Tokyo Asabi Shinbun* 1921a; *Yomiuri Shinbun* 1903b), as large frogs could sing better than small ones. Individuals kept in captivity for a long time had a higher value than those recently collected from rivers. When wild frogs were captured from fields and put in rearing containers, they did not sing immediately. However, frogs that had adapted to living in rearing containers over the course of several years sang very well. In 1903, an old individual worth



**Figure 2** Map of Japan, with locations mentioned in the text.

US\$667 had been kept for seven or eight years (*Tokyo Asabi Shimibun* 1903). In addition, during Japan's modern monarchical period, it was very difficult for fanciers to breed frogs from eggs or tadpoles. Therefore, keepers bought young and small frogs and nurtured them until they grew to a large size.

To summarize, frogs that were collected from Kyoto, kept for a long time, and attained a large size were traded at a very high price. In contrast, small and young frogs that were captured in eastern Japan and sold in the market as soon as they had been collected from the rivers were cheap pets.

#### *Rearing Methods of B. buergeri by Fanciers*

There were almost no pet shops that specialized in reptiles and amphibians during the modern monarchical period. *B. buergeri* were sold in pet shops that also offered singing Orthoptera, birds, and goldfish, and sometimes they were even sold in candy stores (*Yomiuri Shimibun* 1892; *Yorozu Chôbô* 1900). In contemporary Japan, frog keepers usually feed the frogs with cheap crickets and mealworms that are bred as food for tropical fish, reptiles, amphibians, and birds. During the modern monarchical period,

fanciers collected wild spiders and earwigs to feed their frogs, as insects for frogs were not commercially bred in those days. According to fanciers' rearing manuals, they gave their frogs 5–10 small insects per day (Hoshina 2018c).

One of the difficulties in keeping temperate frogs is overwintering. As winter approached, the fanciers prepared clay bottles and put fallen leaves, stones, and a small amount of water into them. Then, they put the frogs into the bottles and buried them in the ground under the floor (*Tokyo Asabi Shimibun* 1937b; *Yomiuri Shimibun* 1903c). In addition, during the 1920s, some keepers reared frogs in greenhouses during the winter and succeeded in having them sing throughout the year (*Tokyo Asabi Shimibun* 1921b).

Rich fanciers were very particular about rearing containers. They prepared containers made from black stones or put charcoal into them because they preferred black-ish to white-ish frogs (*Tokyo Asabi Shimibun* 1937c; *Yomiuri Shimibun* 1927b). Of course, fanciers knew well that frogs could change their dorsal colors, to a certain extent, to blend in with the background. In 1878, specialized frog rearing containers were sold out in Osaka (Figure 2). Some eager keepers reluctantly went to Tokyo just to get containers (*Yomiuri Shimibun* 1878). Fanciers were affectionate towards their frogs. Some fanciers mourned the loss of their pet frogs and held funerals for them (*Tokyo Asabi Shimibun* 1917).

#### *A Limited Market for B. buergeri*

In the modern monarchical period, newspapers often reported on a shortage of *B. buergeri* for sale (*Tokyo Asabi Shimibun* 1902; *Yomiuri Shimibun* 1884). The reason was that the number of *B. buergeri* circulating in the market was too small. For example, in 1887, the number of *B. buergeri* shipped from Yamanashi (Figure 2) to Tokyo's market was only three hundred (*Yomiuri Shimibun* 1887). Breeding *B. buergeri* was a hobby for rich people because the price was high, and the rearing of frogs took a great deal of time and money. Therefore, the *B. buergeri* market was relatively small in comparison to the market in pet animals and insects as a whole, even though the unit price of *B. buergeri* was high. In this respect, the *B. buergeri* trade contrasts with the trade in singing Orthoptera, which were pet insects for common people. For example, in 1930, one company breeding singing Orthoptera shipped over a hundred thousand insects to Tokyo's market (Hoshina 2017a).



It was fortunate for the conservation of the wild population of *B. buergeri* that the market in these frogs was limited. In the modern monarchical period, a large number of fireflies were overhunted by professional services and delivered to buyers such as festival sponsors, department stores, and railway companies (Hoshina 2018a, 2018b). For example, in 1922, one company collected ten million wild fireflies and shipped them to Tokyo's market (Hoshina 2018b). At that time, fireflies were very cheap; therefore, one department store could stock a few million fireflies for free gifts to customers (Hoshina 2018b). Naturally, in the modern monarchical period, the population of Japanese fireflies was rapidly reduced by overhunting (Hoshina 2018b). In contrast, *B. buergeri* could escape overhunting because a relatively small number of them were collected from rivers and sold in the market. For this reason, *B. buergeri* is still a common species in Japanese mountain streams.

Moreover, the fact that the unit price of *B. buergeri* was high was also fortunate for the conservation of their regional genetic variation. In the modern monarchical period, sponsors often bought hundreds of thousands of fireflies for a festival. They would be brought them from the country to the city and released there for mass appreciation. It is possible that the artificial transportation of many fireflies from a distant area caused problems of genetic disturbance (Hoshina 2018b). However, it would have been challenging to prepare over 10,000 *B. buergeri* for festivals in the city, even if the sponsors were large department stores and railway companies, because *B. buergeri* were expensive. Consequently, it is believed that the genetic disturbance of *B. buergeri* did not arise in the modern monarchical period. At present, geographical differentiation in *B. buergeri* is confirmed by morphological and molecular biological studies (Matsui and Maeda 2018; Ueda et al. 1998), and generic disturbance of this frog has not been reported. Moreover, the National Institute for Environmental Studies recorded Japanese native thirteen species of frogs introduced to other area where they did not originally inhabit in Japan, but *B. buergeri* is not listed among them (Sarashina and Yoshida 2015).

#### *B. buergeri* Presented to the Emperor

During the modern monarchical period, royal families were sometimes presented with river frogs from ordinary people. For example, in 1885 one merchant

offered an expensive frog to the Ministry of the Imperial Household (*Tokyo Yokohama Mainichi Shinbun* 1885).

Emperor Taishō (1879–1926; reigned from 1912–1926) loved river frogs. He visited Mie Prefecture in 1900 when he was crown prince and found many frogs in Isuzu River. He was delighted and ordered his retainers to catch two frogs (*Tokyo Asahi Shinbun* 1900). Crown prince Taishō was worried that frogs presented to him by a loyal subject would not sing at all in a pond of the Imperial Palace. However, they began singing in 1909 and he was satisfied with their beautiful songs (*Yomiuri Shinbun* 1909).

Emperor Shōwa (1901–1989; reigned from 1926–1989), who succeeded Taishō, was a renowned biologist and interested in various life forms. In 1913, when Emperor Shōwa was crown prince, he went on an excursion to Tama River with 140 schoolmates and enjoyed listening to the songs of river frogs. Furthermore, he was presented with about 100 frogs from local elementary school students (*Tokyo Asahi Shinbun* 1913). He donated them to Emperor Taishō after going back to the Imperial Palace (Imperial Household Agency 2015).

In 1927, people in Mita village around Tokyo collected several thousand river frogs, selected 110 top class individuals, and presented them to the Ministry of the Imperial Household. These frogs were released at a pond at the Imperial Palace (*Yomiuri Shinbun* 1927a).

#### *B. buergeri* Songs Broadcast Live by a Radio Station

Japanese radio broadcasting began on March 22, 1925 (Takeyama 2002). In the 1930s, radio stations often broadcast songs of wild river frogs recorded live on the spot (*Miyako Shinbun* 1936, 1937; *Tokyo Asahi Shinbun* 1937a, 1938, 1939; *Yomiuri Shinbun* 1939). If it happened to rain during a recording, the stations broadcast singing by human singers as opposed to frogs.

#### *Change in Japanese People's Favorite Pets Before and After World War II*

According to research on New York State pet shops in 1998–1999, the average price of eight native frog species was US\$5 and the most expensive frog, *Scaphiopus holbrookii*, cost US\$20 (Horn 2003). In contrast, in a certain Japanese pet shop that currently specializes in amphibians, five native frog species, including *B. buergeri*, are sold at an average price of US\$21. The most expensive species, *Bufo gargarizans*

*miyakonis*, costs US\$48, and *B. buergeri* costs US\$11. In this Japanese pet shop, most frog species are foreign and several are sold for US\$300 at most. Considering all of the aforementioned points, it could be concluded that *B. buergeri*, which cost more than US\$1,000 during the modern monarchical period, were at a premium, although they were common native species.

In the Edo Period (1603–1868), living *B. buergeri* were already sold as pets in what were then the three biggest cities, Edo (present Tokyo), Osaka, and Kyoto (Kanô 2011). Wealthy people in the modern monarchical period succeeded in breeding *B. buergeri*. Moreover, investment in railway infrastructure after 1868 enabled the transportation of *B. buergeri* from distant areas, and rearing techniques for the frogs were also improved. Furthermore, the general public began to enjoy *B. buergeri* songs through radio broadcasting, although they could not breed the frogs themselves. A culture of familiarity with *B. buergeri* was certainly developed in the modern monarchical period. However, Japanese people's favorite pets were clearly different during the modern monarchical period and after World War II. Japanese fanciers formerly reared singing Orthoptera, fireflies, and river frogs out of love (Hoshina 2017a, 2018b, 2018c), therefore they did not mind if their pets had a somber appearance. On the contrary, in contemporary Japan, many frog fanciers focus on pretty and colorful foreign species, such as the Argentine horned frog (*Ceratophrys ornata*), rather than native species. Moreover, contemporary insect fanciers do not breed singing Orthoptera of modest appearance, but attractive foreign stag and rhinoceros beetles (Hoshina 2019). Contemporary Japanese frog and insect fanciers select their pets for their appearance rather than emotional reasons.

### Declarations

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