Mitochondria DNA sequences of Finlayson’s squirrel found in Hamamatsu, Shizuoka Prefecture, Japan

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Alien *Callosciurus* squirrels cause severe damage to trees in forests, gardens, and commercial plantations (Jouanin 1986; Setoguchi 1990; Torii 1993; Aprile and Chicco 1999; Gurnell and Wauters 1999). Pallas’s squirrel (*Callosciurus erythraeus*) originally occurs in eastern India, Bhutan, southeast China, Taiwan, Indochina, and Malaya (Corbet and Hill 1992; Wilson and Reeder 2005). This squirrel was introduced into other countries as an exotic pet. At present, *C. erythraeus* populations are found in Argentina (e.g., Aprile and Chicco 1999), France (Jouanin 1986; Gurnell and Wauters 1999), and Japan (Ishii 2005; Tamura 2002, 2009; Ikeda et al. 2011). Under law number 78 of the Invasive Alien Species Act (Ministry of the Environment, Government of Japan, 2004: http://www.env.go.jp/nature/intro/index.html), import of *C. erythraeus* to Japan is strictly prohibited. This species is treated as ‘invasive alien species’ in Japan.

Finlayson’s squirrel (*Callosciurus finlaysonii*), which originally occurs in the Indochina Peninsula (Corbet and Hill 1992; Wilson and Reeder 2005), was also introduced to Italy (Bertolino et al. 1999; Currado et al. 1999). Similar to *C. erythraeus*, *C. finlaysonii* is thought to cause damage to environments (Bertolino et al. 2004). It is difficult to distinguish this species from *C. erythraeus* based on external characteristics such as pelage patterns (e.g., Lekagul and McNeely 1988). Based on mitochondrial (mt) DNA control region sequences, Oshida et al. (2007) reported that *C. finlaysonii* was probably introduced to Hamamatsu, Shizuoka Prefecture, Japan (Fig. 1). They captured eight *Callosciurus* individuals in Hamamatsu. Of them, seven individuals had haplotypes closely related to that of *C. finlaysonii* from Laos (two *C. finlaysonii* haplotypes were detected), and one individual had a *C. erythraeus* haplotype. Therefore, we expect these two *Callosciurus* species exist sympatrically in Hamamatsu. *Callosciurus finlaysonii*, however, is not treated as an invasive alien species in Japan (law number 78 of the Invasive Alien Species Act, Ministry of the Environment, Government of Japan, 2004). Currently this species is treated as unidentified alien species. If the population of *C. finlaysonii* increases, this species should be added to the list of invasive alien species.

To estimate whether *C. finlaysonii* is increasing, we investigated ratios of *C. finlaysonii* haplotype and *C. erythraeus* haplotype in the Hamamatsu population by using mtDNA control region sequences. We discuss the present situation of introduced *C. finlaysonii* in Hamamatsu. In addition, we compare control region sequences of specimens from Hamamatsu, Laos and Thailand, to identify the origin of introduced *C. finlaysonii*. The exact origin would be difficult to determine because we do not have sequence data from all *C. finlaysonii* populations occurring in the Indochina Peninsula. We, however, obtained successfully *C. finlaysonii* sequences from Thailand and Laos. Identifying whether the Hamamatsu population is more closely related to specimens from Thailand or Laos may help to prevent subsequent introductions of this squirrel into Japan with international legal and political action.

**Materials and methods**

*Specimens, DNA extraction, amplification, and sequencing*

From 2004 to 2006, 83 *Callosciurus* squirrels were collected from 19 sites in Hamamatsu, Shizuoka Prefec-