



# Article

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## A new frog species of the genus *Rugosa* from Sado Island, Japan (Anura, Ranidae)

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### Abstract

We describe a new frog species in the genus *Rugosa* from Sado Island, Japan. This new species, *Rugosa susurra*, is genetically close to *R. rugosa* Temminck and Schlegel, but is morphologically distinguishable and postzygotically isolated from the latter species. The skin over the entire body is much smoother, and the abdomen and ventral surface of hindlimb are deep yellow whereas these are pale yellow or grayish yellow in *R. rugosa*. In addition, duration of the advertisement call of *Rugosa susurra* is definitely longer than that of *R. rugosa*. *Rugosa susurra* is the first endemic amphibian species to Sado Island in Japan.

**Key words:** *Rugosa susurra* sp. nov., advertisement call, postzygotic isolation, smooth skin

### Introduction

The wrinkled frog, *Rugosa rugosa* is a species of a convoluted taxonomic history. Fei *et al.* (1991 “1990”) proposed a new genus name of *Rugosa* to the three frog species of *Rana rugosa* Temminck and Schlegel, *R. emeljanovi* Nikolsky and *R. tientaiensis* Chang, and the name of *Glandirana* to the species *Rana minima* Ting and Ts’ai. Dubois (1992) relegated *Rugosa* and *Glandirana* as subgenera of *Rana* and set them into the different sections (*Rugosa* into the section *Pelophylax* and *Glandirana* into the section *Hylarana*). However, the two sections were considered polyphyletic by Che *et al.* (2007). More recently, Frost *et al.* (2006) combined the two genera, *Rugosa* and *Glandirana*, into one genus *Glandirana* based on the molecular phylogenetic data. However, *Glandirana* (sensu Frost *et al.* 2006) was sometimes considered as non-monophyletic (Wiens *et al.* 2009). In addition, several morphological characters, particularly toe webbing, of *Rana minima* were largely different from the remaining three species (Frost *et al.* 2006). Thus, we consider that it is premature to recognize *Glandirana* (sensu Frost *et al.* 2006) as a good genus for the four species. Also, we consider the Dubois’s classification invalid, because the two subgenera *Rana* (*Glandirana*) and *Rana* (*Rugosa*) were placed into polyphyletic sections as mentioned above. In contrast, monophyletic relationship of the three species *Rana rugosa*, *R. emeljanovi* and *R. tientaiensis* seems stable although the name of *R. rugosa* was not used in several studies (Frost *et al.* 2006; Che *et al.* 2007; Wiens *et al.* 2009). Therefore, in this study, we follow Fei’s classification.

The wrinkled frog, *Rugosa rugosa* was thought to be distributed in the northeastern parts of Asia, including Japan archipelago (Maeda & Matsui 1999). However, the Chinese populations of *R. rugosa* was given a distinct species name, *Rugosa emeljanovi* (Fei *et al.* 1991 “1990”). Recently, the populations in Korean peninsula were also treated as *R. emeljanovi* (Kuzumin *et al.* 2004). Following these treatments, we use the species name *Rugosa rugosa* for only the Japanese populations in this study. The type locality of the species was restricted to Nagasaki of Kyusyu district in the Western part of Japan (Stejneger 1907). The unique biological characteristic of *R. rugosa* is the diversity in sex determining mechanisms. A total of five geographic races are currently recognized on the basis