



## Iriomote island: ecology of a subtropical island in Japan

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This article aims to introduce the reader to the charm of Iriomote island. Iriomote island is in the subtropical region of Japan. I have been visiting the island since 2015, for four consecutive years. I have also been taking graduate students with me to provide them with field experience with mountains, rivers, and the sea, all together in one place. The students belong to the Kyoto University Leading Graduate Program in Primatology and Wildlife Science (PWS), a 5-year PhD program (<http://www.wildlife-science.org/index-en.html>).

Iriomote island is located 4°17'33" N and 123°51'43" E. Its area covers 289.61 km<sup>2</sup>. The highest point is Mt. Komi, at 469.5 m. About 90% of the island is covered by subtropical rainforest. As of March 2018, the population was only 2376 residents. Therefore, population density is only 8.2 persons per square kilometer. Thus the island is a sort of semiclosed ecosystem with little human disturbance. We have been exploring the island using the facility of the University of the Ryukyus as our home base (Fig. 1).

Iriomote is at the southern end of the Ryukyu islands, only 200 km from Taiwan (Fig. 2). The Ryukyu islands stretch across about 1000 km in the area between Kyushu and Taiwan, and consist of 198 islands (defined as land larger than 0.01 km<sup>2</sup>). Among them, Yakushima island (504.88 km<sup>2</sup>, 1.7 times the size of Iriomote island) is home to the so-called Yakushima monkey (*Macaca fuscata yakui*), a subspecies of the Japanese monkey. Besides Yakushima, there are no monkeys in any of the other Ryukyu islands. Incidentally, there is another macaque species, called the Taiwanese monkey (*Macaca cyclopis*), in Taiwan. Thus, the Ryukyu islands in a way represent a gap in macaque distribution.

Primatologists have been carrying out research on Yakushima since the 1950s because of its monkeys (Maruhashi 1980). Many publications have resulted from this work, which continues to the present day (e.g., Pelé et al. 2017). In contrast, they paid very little attention to the other Ryukyu islands. Nonetheless, it might be interesting

**Fig. 1** Research facility of the University of the Ryukyus on Iriomote island (photo taken by Tetsuro Matsuzawa on 8 November 2018)

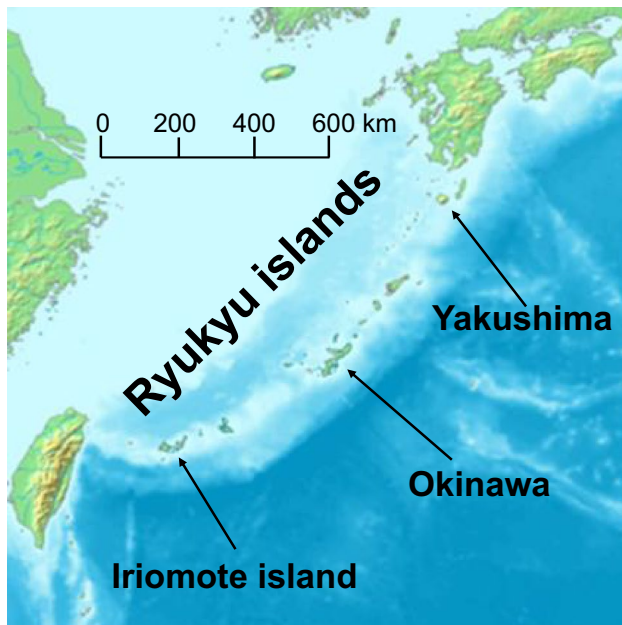


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**Fig. 2** Iriomote and other islands in the Ryukyu islands

to explore various aspects of other large islands, such as Iriomote, that, unlike Yakushima, have no monkeys in their ecosystem.

Not only are monkeys absent from Iriomote island but it has no rats or mice either, except for the human-introduced black rats (*Rattus rattus*). There is only one carnivore on the island—the Iriomote cat. This cat was first discovered in 1965. At that time it was reported as a new species (*Felis iriomotensis*). However, recent progress in DNA analysis revealed that the cat is in fact a subspecies of the Bengalese cat; consequently, its scientific name was changed to *Prionailurus bengalensis iriomotensis*.

The first part of the PWS field course is trekking in the mountains. We have never seen the rare Iriomote cat but we have often spotted crested serpent eagles (*Spilornis cheela*). The cats and the eagles occupy the top of the food chain in Iriomote island's ecosystem. They feed on snakes, lizards, turtles, frogs, crabs, insects, and so forth. We have also seen other endemic animals such as a species of bat called the Yaeyama flying fox (*Pteropus dasymallus yayeyamae*), the largest bat in Japan. We have also encountered the endemic turtle *Cuora flavomarginata evelynae* (Fig. 3) during our treks.

The second part of the field course is canoeing in the Nishida river. The river flows through mangrove forests. This is the largest mangrove forest in Japan. We used drones to explore the canoeing route of the upper stream, and paddled up the river from the sea in two-man canoes (Fig. 4). The river is in so-called brackish water that consists of double layers. The upper layer is fresh water that has flowed down from the upper stream of the mountains. The lower layer is



**Fig. 3** This yellow-margined box turtle (*Cuora flavomarginata evelynae*) was found near the research facility (photo taken by Tetsuro Matsuzawa)

from the sea, brought in by the tides. We learned how to use an apparatus to measure salt levels in the water. Around the middle of the river, we stopped canoeing and started trekking to a waterfall. This year, we saw a large snake about 2 m long crossing the stream near the waterfall. It was identified as *Elaphe taeniura schmackeri*, the largest snake of the Ryukyu islands. It was beautiful to see the snake from such close distance, gliding from one rock to the next over the stream.

The third part of the field course was snorkeling. When I was young I was a mountaineer, and had only limited experience of the sea. I had only snorkeled twice in my life before this Iriomote practice course, once in Baja California in Mexico and once in Hawaii, both times utilizing the opportunity while visiting these places thanks to international



**Fig. 4** Canoeing in the Nishida river (photo taken by Tetsuro Matsuzawa)



**Fig. 5** Snorkeling in Iriomote island. Two professors, Matsuzawa in front and Kohshima at the back (photo selfie taken by Tetsuro Matsuzawa)

conferences. The sea surrounding Iriomote island was as beautiful as those that I had experienced elsewhere. We enjoyed exploring the coral reef that harbored various kinds of tropical fishes and sea snakes.

The practice course in the sea has advanced year on year. In the first year, we just wore our snorkeling masks and looked at the coral reef while standing in shallow water. This year, we hired a boat to take us far offshore. We wore wet suits and fins (Fig. 5) and dived into the deep sea. This was a little daunting, but also a lot of fun. After acclimatizing to the experience, I dared to keep going, further and further from the boat. The sea turned from blue to dark blue. I could not see the bottom of the sea and there happened to be no fishes there. I saw nothing except blue.

Just then, I was reminded of an experience in the Himalayas. I was climbing a mountain named Muztagh Ata (7509 m) at the northern edge of the Tibetan Plateau. I was exploring the climbing route with my partner. Suddenly, I fell into a huge crevasse. It was a so-called hidden crevasse that was covered by snow at the top—I had not noticed it. I stepped on it and broke the snow surface. I fell vertically, almost 15 m, and was stopped by the rope tying me to my partner. He successfully stopped my fall but he was not able to do anything else. I hung there, at the end of the rope. I had to climb up the rope by myself. The crevasse was huge. When I looked down, I could see only black space and no bottom. When I looked sideways, I recognized that the crevasse was about 2 m in width. Both sides were ice walls that continued far into the distance. I was alone, hanging in space, surrounded by blue ice. That scene now came back to me, as I floated in the Iriomote sea. By the way, it took me almost 2 h to climb out of the crevasse, up the vertical rope to reach the surface.

The Iriomote field course provided a night safari too. I have experienced night safaris in tropical rain forests in Borneo: Danum valley, Maliau Basin, and Imbak Canyon. There, I saw sambar deer, flying squirrels, tarsier, civets, chevrotains, and so forth. On Iriomote island, night safaris let you observe the subtle way of life of many tiny creatures, such as bats, lizards, crabs, coconut crabs, frogs, etc.

I was particularly impressed by the fireflies (*Lychnuris atripennis*) this year. It was already November. On the four main islands of Japan, we see fireflies in the summer but not in November. There are about 2000 species of fireflies in the world; about 50 of these occur in Japan. Japanese people love to see fireflies flashing in the bushes along stream banks. The fireflies in Iriomote this season were flashing on the road. We were mystified—why the road? We carefully examined the light sources and realized that it was firefly larvae, not the adult form, that were flashing. Their underbellies were lighting up! This was my first time seeing firefly larvae flashing.

There are four World Natural Heritage (WNH) sites designated by UNESCO in Japan: Shiretoko peninsula, Shirakami mountains, Ogasawara islands, and Yakushima island. Iriomote island is now a candidate to become the fifth. The Japanese government has nominated Iriomote, Amami, Tokunoshima, and a part of Okinawa as WNH sites. Those islands and Yakushima are included in the 1000-km span of the Ryukyu islands. My aim is to continue my visits to Iriomote and the neighboring islands across different seasons to learn more about the unique features of their ecosystems.

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