



Paradise for Land Snails

Efforts to protect land snails in the Ogasawara Islands

WHAT ARE LAND SNAILS?

Land snails are generally recognized as land-dwelling molluscs which, unlike slugs, have shells. About 800 land snail species have been identified in Japan. They take various shapes and sizes: they range in size from as small as 1 mm to as large as the palm of your hand, and their shells can be very colorful or hairy.



Achatina fulica



Leptopoma nitidum



Ovachlamys fulgens



Aegista elegantissima

They move slowly and can only crawl on the ground.
It is difficult for them to move across mountains or rivers.

LAND SNAILS IN THE OGASAWARA ISLANDS

Mandarina are called **Kata maimai** (hard land snails) in Japan because of their hard shells !



Mandarina suenoae



Mandarina sp.



Mandarina mandarina



Mandarina hahajimana



Mandarina hirasei

The Ogasawara Islands are home to many species of land snails, almost all of them are endemic species. Genus *Mandarina* are raised in Tokyo Sea Life Park. They are relatively large land snails with the shell diameter of about 2 to 3 cm, and 22 species of them are found on the islands. This genus consists of the largest number of species on the islands and is one of the most representatives of the Ogasawara Islands.

THE OGASAWARA ISLANDS AND LAND SNAILS

THE OGASAWARA ISLANDS ARE OCEANIC ISLANDS

The Ogasawara Islands was formed by the eruptions of underwater volcanoes and have never been connected to the continent; thus, there were no living creatures on the islands right after they were formed. Moreover, the islands are about 1,000 km south of central Tokyo, so the limited number of creatures can reach the islands.

HOW DID THEY COME ACROSS THE OCEAN?

About 100 species of land snails have been identified in the Ogasawara Islands, which is one-eighth of the total number of land snail species in Japan. Since they cannot fly or swim, how did they come to the islands? It is possible that they were carried on driftwood or by birds.

IN SEARCH OF BETTER ENVIRONMENT

Because the Ogasawara Islands are oceanic islands with few predators and competitors, the land snails were able to expand their habitats. They have evolved to live in different environments, such as on the ground, in the soil, and on trees, to fit into each environment and increased the number of species. More than 90% of the land snails in the Ogasawara Islands are endemic species.

H. operculina

The shell is thin and easily sticks to the underside of leaves!



H. diplomphalus diplomphalus

The whole shell is round and easily burrows into the gaps between soil grains!



Genus *Hirasea*:

The shell shapes differ greatly depending on where they live.

arboreal
M. suenoae



semi-arboreal
M. tomiyamai



sheltered ground
M. mandarina



exposed ground
M. anijimana



Each species of genus *Mandarina* lives in different habitats.

THANKS TO THE LAND SNAILS !?

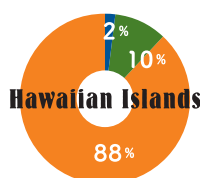
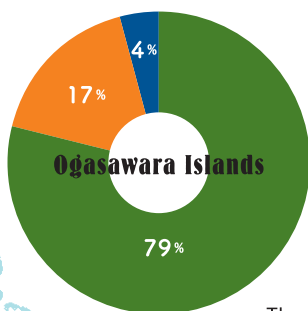
THE ISLANDS ARE REGISTERED AS A WORLD NATURAL HERITAGE SITE



Logo of the
Ogasawara Islands
World Natural
Heritage Site

The Ogasawara Islands were registered as a World Natural Heritage Site in 2011. One of the reasons was the high evolutionary diversity and low extinction rate of the land snails. While nearly 90% of the land snails are extinct in the Hawaiian Islands, the extinction rate in the Ogasawara Islands is about 17%. Valuable populations remain in good conditions.

Chichijima



- endemic species (extant species)
- endemic species (extinct species)
- Other native species

Compared to the Hawaiian Islands...

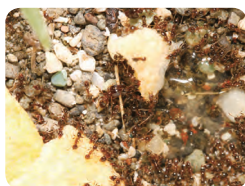
Ogasawara Islands 113 species / 63km²
Hawaiian Islands 768 species / 16,504km²

The percentages of extant and extinct species in the Ogasawara Islands and the Hawaiian Islands

RISK OF EXTINCTION

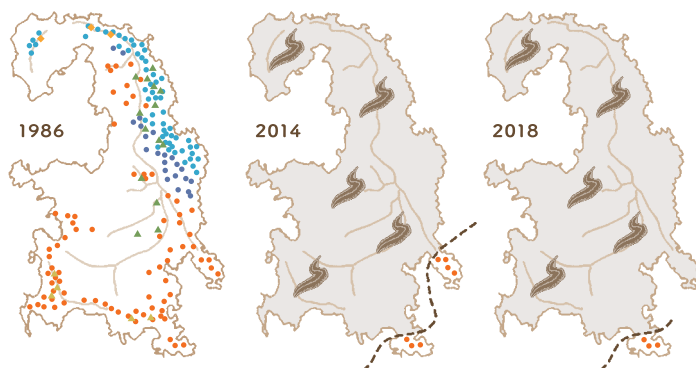
The land snails in the Ogasawara Islands are currently under great threat.

The main reason for this is predation by alien species. How did the alien species come to the Ogasawara Islands? They are easily transported by attaching themselves to shiploads of trees for planting, construction materials, etc. It is not clear exactly how they got here, but regrettably, it is very likely that they migrated with humans.



The main alien species that prey on and have a significant impact on the land snails.

left: The New Guinea flatworm (belongs to the planarian group)
center: The African big-headed ant
right: The black rat



Distributions of five species and one hybrid of the genus *Mandarina*
The dotted line is the distribution line of the New Guinea flatworm.

On Chichijima in particular, the New Guinea flatworm was first identified in 1995, and since then, they have quickly expanded their distribution and have had a major impact on the land snails.

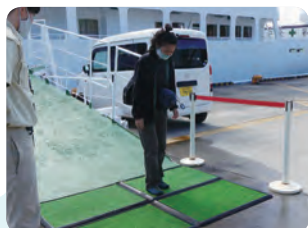
- *M. chichijimana* • *M. mandarina*
- *mandarina* × *chichijimana* hybrids
- ▲ *M. suenoae* ▲ *M. hirasei*
- *M. tomiyamai*

TO PROTECT THE SNAILS

A wide variety of activities is carried out to protect the land snails at risk of extinction.

POPULATION SURVEY

The population and species of land snails are regularly monitored. By doing so, we are able to identify species that need to be taken care of on a priority basis and how to take care of them.



up: Hot bath processing of seedlings
center: brushes for cleaning shoes
under: helicopters to spray pesticides

MEASURES AGAINST ALIEN SPECIES

It is also necessary to take measures against alien species, which are the main cause of the decrease in the number of the land snails.

The New Guinea flatworm

Since we have not found an effective way to exterminate the flatworms that have come to the island, we are taking measures to prevent them from spreading any further. For example, seedlings in cargo should be soaked in hot water to remove them, and everyone, including tourists, should clean the soles of their shoes when boarding and leaving the ship, etc.

The African big headed ant / The black rat

The distribution and density of these animals have been reduced mainly by the use of pesticides. Although black rats have been eradicated in some islands and areas, it is important to monitor and control them as they may swim from nearby islands.

These alien species have lives too. However, they are having a great impact on the ecosystem of the islands, and if this goes on, not only the land snails but also many other creatures will disappear from the islands. In order to preserve the unique creatures of the Ogasawara Islands, various measures must be taken.

BREEDING IN CAPTIVITY

The endangered land snails are raised at a breeding facility on the island. They are the insurance policy in case the wild populations become extinct. As of December 2020, six species of 5327 animals divided into 14 population groups are being grown.



A staff from the islands, such as students, participate in the breeding.

THE EFFORTS OF TOKYO METROPOLITAN GOVERNMENT'S ZOOS AND AQUARIUM

The Tokyo metropolitan Government's zoos and aquarium (Ueno Zoological Gardens, Tama Zoological Park, Tokyo Sea Life Park, and Inokashira Park Zoo) began the conservation of the land snails in 2017, and raise four land snail species: *M. mandarina*, *M. hirasei*, *M. chichijimana* and *M. suenoae*.

THE MAIN OBJECTIVE



Raising

Providing insurance in case the number of land snails diminishes in the wild or in other breeding facilities



Research

There are many things we still don't know about them, such as their ecology. Thus, we carry out various experiments to find out new things.

Promotion

We carry out outreach activities to let people know about the current situation of the land snails.



Outreach activities at Inokashira Park Zoo

WE AIM TO BRIGHTEN THE FUTURE OF THE LAND SNAILS AND OTHER CREATURES IN THE OGASAWARA ISLANDS.

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