

# On Togai Ito's Codex of Maps and a Manuscript Originally Prepared by the Tokugawa-Shogunate Expeditors to the Bonin Islands

Takeshi Sugimoto

Kanagawa University, Kanagawa Ward, Yokohama 221-8686, Japan  
E-mail address: sugimt01@kanagawa-u.ac.jp

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For the first time in 333 years Togai Ito's codex, two maps and a manuscript, is put on a scholar's test bench from Tenri Central Library. This codex derives from the original prepared by the Tokugawa-Shogunate expeditors to the Bonin Islands in 1675. Two maps are the nautical chart between Japan proper and the Bonin Islands as well as the coastal chart of the Bonin Islands. The manuscript consists of the log of the ongoing journey, descriptions of island geography and natural history, the list of natural resources brought back to Edo, and the diary of the return journey. Results of the 1675 expedition are revisited at two aspects. One is discoveries of four islands on route (the first historic records). Another is presentation of living birds and bats at Shogun Ietsuna. All discoveries of the endemic are the first historic records. Astonishing is discovery of Purple Swampphen (now extinct).

**Key words:** Japanese Cartography, Scientific Expedition, Era of Discovery

## 1. Introduction

In the summer of 1686 Togai Ito (1670–1736), a Confucian scholar, copied maps and a manuscript about the Tokugawa-Shogunate expedition to the Bonin Islands in the summer of 1675.

The main purpose of the present letter is declaration of discovering the above-mentioned Togai codex (hereinafter referred to so).

For centuries the Togai codex had been in the private library of the Ito family (Togai's offspring). All the belongings to this library were purchased by Tenri University in 1941. Librarians, mainly Yukihiro Nakamura (1911–1998, later Professor of Letters), had organised the specimens and compiled them in the catalogue for fifteen years (Tenri Central Library, 1956). But this catalogue did not attract attention from any scholars in cartography and Ogasawara history; no one but me.

The importance of the Togai codex lies in its structure. It is the unique specimen having both two maps and a manuscript as a set. Nearly ten manuscripts are extant (Akioka, 1971). One has a nautical chart, but the rest are manuscripts only. Due to Akioka (1971) two nautical charts and four coastal charts are extant, but there is no example of both a nautical chart and a coastal chart as a set. Therefore, the Togai codex is a rare case.

The Togai codex, in particular two maps, sees the light of day in 333 years.

We shall also revisit the results of the Tokugawa-Shogunate expedition with respect to island discoveries (the first historic records) on route and fauna discoveries (the first historic records) in the Bonin Islands.

It is noted here that navigation and mapping are well

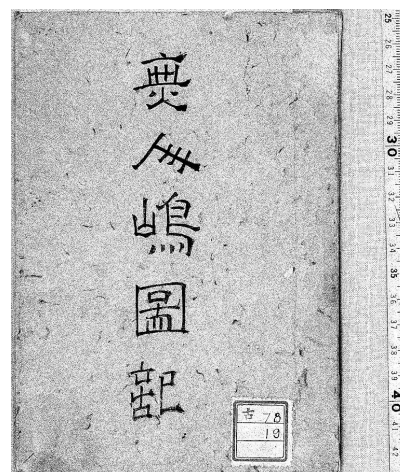


Fig. 1. Front Cover of the Togai Codex (Courtesy of Tenri Central Library).

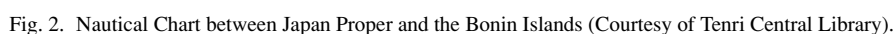
within 'Science on Form', because they are concerned to pattern recognition and pattern formation. Therefore, the Tokugawa-Shogunate expeditors are practitioners of 'Science on Form'.

The Bonin Islands are properly known as the Ogasawara Islands that now constitute a UNESCO natural World Heritage site.

All the dates are provided in New Style except specified as Old Style.

## 2. Structure of the Togai Codex

The codex is entitled 'Maps and Report about Munin Shima' as shown in Fig. 1. The Tokugawa Shogunate determined to call the Bonin Islands 'Munin Shima' in 1675. Bonin derives from Munin, and hence both words mean uninhabited. Shima denotes island.



The table of the contents is as follows:

(2) exploitation of the Bonin Islands (examining Chichijima, building up a small sail ship, examining Hahajima,

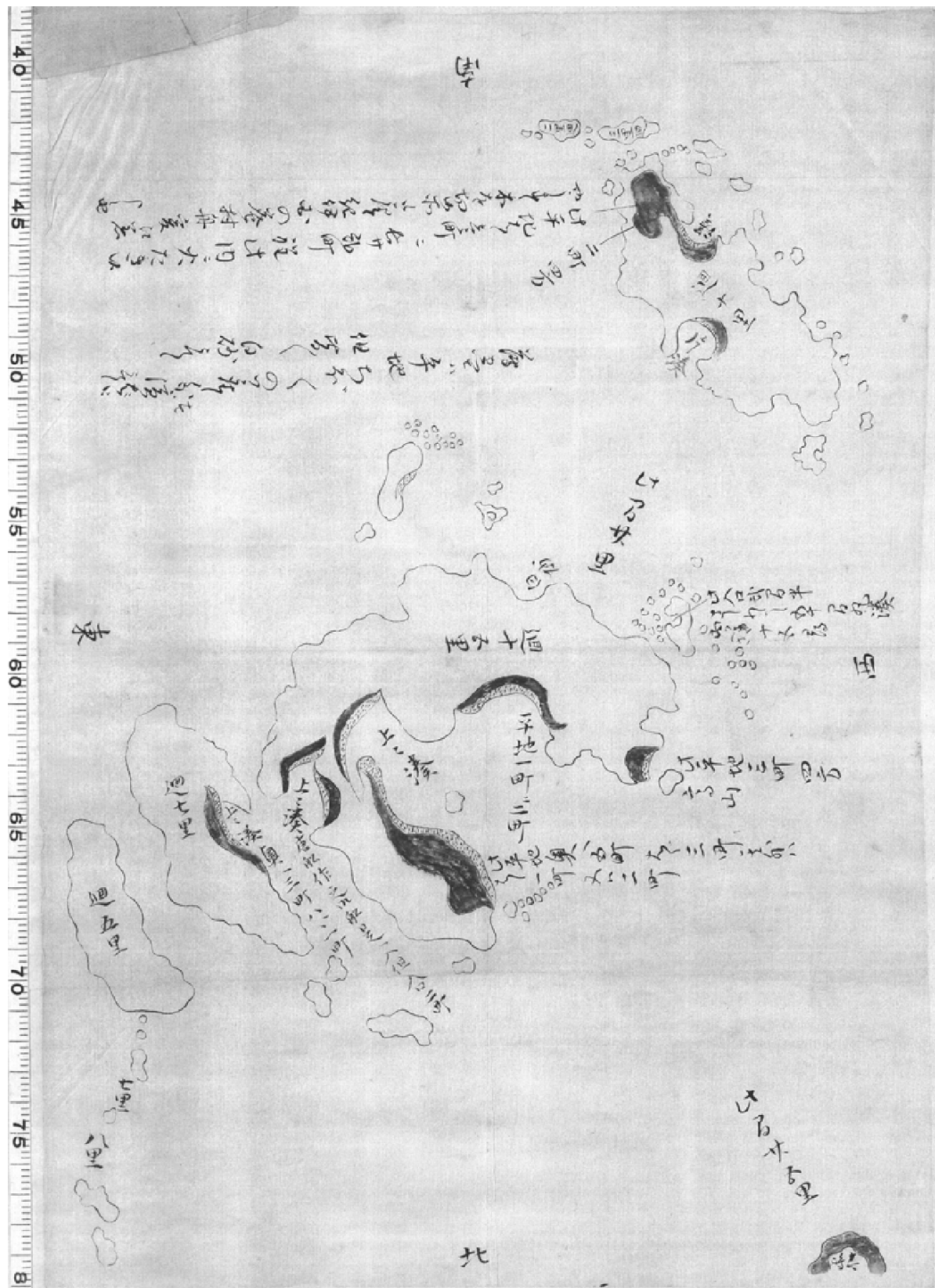


Fig. 3. Coastal Chart of the Bonin Islands (Courtesy of Tenri Central Library).

finding remnants of the castaways in 1670, examining Minami-jima, examining channels, examining Ani-jima, examining Ototo-jima & describing exotic trees;

(3) the list of natural resources to be presented to the

Shogunate in Edo (incomplete);

(4) the diary of the return trip (reaching Shimoda, Japan proper, then to Shinagawa beside Edo by way of Uruga);

(5) closure (date [20 June, Old Style], names of two



commanders [Ichizaemon Shimaya, the captain and pilot & Shozaemon Nakao, the chief purser, in this order];

(6) the list of natural resources (repeated, incomplete);

(7) another closure (date [19 June, Old Style], names of two commanders [in the reversed order of (5) above]);

(8) Togai's closure (date, Togai's signature, seals).

In comparison with the most comprehensive manuscript (Akioka, 1971), the Togai codex suffers information shortage as well as duplication, but this is not Togai's fault. The 'mother' manuscript was already derivative. Detailed annotation of the manuscript will be done in Japanese.

Two maps are reproduced in Figs. 2 and 3; Dimension of the map (Fig. 2): 385 [mm] by 527 [mm]; North (bottom) - East (left) - West (right) - South (top); Dimension of the map (Fig. 3): 289 [mm] by 418 [mm]; North (bottom) - East (left) - West (right) - South (top).

Figure 2 shows the nautical chart between Japan proper (bottom) and the Bonin Islands (top) in the portolan-chart style. The horizontal line on top is the Tropic of Cancer. Latitude is graduated by the words along the vertical line to the left: from 23 degrees (top) to 36 degrees (bottom) by a degree. Note that a Japanese text line is vertical. Three compass roses are located at Chichi-jima (top), Hachijo-jima (right) and Edo (bottom).

Let us take a look at newly discovered islands other than the Bonin Islands. The compass roses at Chichi-jima and Hachijo-jima have one compass line in common. Along this line near Hachijo-jima, four shapes are depicted: the oblong shape next to Hachijo-jima is the plan view of known and inhabited Aoga-shima; the forked shape above is the side view of Smith Island; the round shape further above is the plan view of Tori-shima or Ponafidin Island; the top rectangle is the side view of Sofu-gan or Lot's Wife. There is a round shape between the compass lines of three and four o'clock of the compass rose at Chichi-jima. This is the plan view of Nishino-shima or Rosario Island.

This portolan chart (Fig. 2) is heavily written over with literal information complementary to the manuscript. This is not Togai's addition. The 'mother' map was already decorated by overwritten information. The table of contents in literal information is as follows: orientation towards the Ryukyu Islands and the Ladrones (now Mariana) Islands; description of tame fishes, turtles and birds; description of sizes in unknown trees; sawing experiment; description of timbers; latitude = 27 [deg] N, and so forth. Detailed annotation will be done in Japanese.

Figure 3 shows the coastal chart of the Bonin Islands. The Landolt-ring like shape at the centre is Chichi-jima; Ani-jima to the left as well as Ooto-jima further to the left; surrounding are small islets in the Chichi-jima archipelago.

Haha-jima is located on top and to the right. The distance between Chichi-jima and Haha-jima is not on scale and labelled as '20 leagues in between.'

Kaya-shima is located at the bottom-right corner. Kaya means low vegetation. The distance is not on scale and labelled as '25 leagues in between.' This island is Nishino-shima, but information about its location contains an error as mentioned below.

Literal information relates candidates of ports as well as flat places for farming or remains of the castaways in 1670.

Detailed annotation will be done in Japanese.

The 'mother' map is also derivative, for some known maps are more informative (Akioka, 1971).

### 3. Revisit to Discoveries by the Expeditors

The attempt by the Shogunate is one of the first scientific expeditions to the unknown worlds. We shall highlight two aspects: discoveries of islands and discoveries in natural history of the Bonin Islands.

In 1639 the Dutch observed, but did not land on, Chichi-jima and Haha-jima, which they called respectively 'Grachts Eylandt' and 'Engels Eylandt' after the names of their ships (Kublin, 1953). Therefore, major two of the Bonin Islands were discovered before 1675.

However, as shown in the nautical chart (Fig. 2), the Shogunate expeditors found Smith Island on 3 June, Tori-shima on 4 June, Sofu-gan on 4/5 June, and Nishino-shima 23 June in 1675. These discoveries are all the first historic records. The Shogunate expeditors missed Bayonnaise Rocks next to Aoga-shima, because their journey near these low rocks was taken late at night.

We summarise the results in Table 1: temporary names are designated in the Togai codex, whilst proper names are those used today. About temporary names, Iwa means crag, whilst Maru-shima means a round island. Japanese scholars unanimously recognise that upper three islands in Table 1 were found on the occasion of the expedition in 1675 (Akioka, 1971). I shall add Nishino-shima, the bottom of Table 1, to findings. The proof is made by text-reading and bearings by use of spherical trigonometry.

According to the log of the ongoing journey, on the morning of 23 June the expeditors had sailed to West for 30 leagues until noon. During this morning session, around eight o'clock they saw a round islet, which must be Nishino-shima, the isolated island nearby. At noon they turned starboard by 30 degrees, i.e., West by South-West. Then they had sailed for another 25 leagues and found Chichi-jima at last.

Let S, T and G be the starting point of this day's journey, the turning point and the goal (Chichi-jima), respectively. To convert league to kilometre, we shall use the distance between Chichi-jima and Haha-jima. The Shogunate expeditors relate that the distance is 20 leagues, whilst the distance today is 50 [km]. That is, their one league is equal to 2.5 [km]. Therefore, 30 leagues from S to T become equal to 75 [km], whilst 25 leagues from T to G become equal to 62.5 [km]. We shall use  $40000/2\pi$  [km] as a radius of the earth. We assume that the earth is a sphere.

Applying the cosine law to the spherical triangle STG with the known angle STG ( $5\pi/6$  [rad]), we obtain the distance SG = 133 [km] as well as its bearing = 284 [deg] at G. On the other hand, Chichi-jima is located at ( $27^{\circ}4'44''N$ ,  $142^{\circ}13'00''E$ ), and Nishino-shima is located at ( $27^{\circ}14'429''N$ ,  $140^{\circ}52'28''E$ ). Let us use the north pole as another point to make a triangle with these two islands. Applying the cosine law to this north-pole-and-two-islands spherical triangle, we obtain the distance between two islands = 134 [km] as well as its bearing = 278 [deg] at G. This situation is depicted in Fig. 4. The result shown is too good to be true, but it is true.

Table 1. Discoveries of Islands in 1675.

Temporary Names [Proper Names]	Foreign Names	Foreign Discoveries
Iwa [Smith Island]	Smith Island	1851 by the British
Maru-shima [Tori-shima]	Ponafidin Island	1821 by the Russian
Iwa [Sofu-gan]	Lot's Wife	1788 by the British
Kaya-shima [Nishino-shima]	Rosario Island	1702 by the Spanish

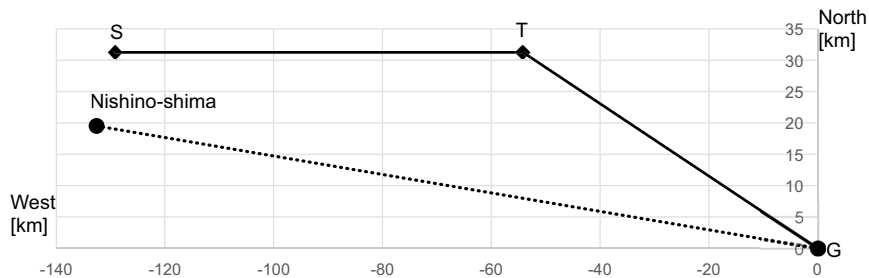


Fig. 4. Orientation towards Nishino-shima and the Expeditors' Route (S-T-G) from Chichi-jima (G).

The distance between Nishino-shima and the starting point S is about 12 [km]. At the elevation of 8 [m] over the sea level, the radius of the skyline exceeds 10 [km]. If the lookout is 20 [m] high, then the radius of the skyline is about 16 [km]. On the other hand, the elevation of Nishino-shima is 25 [m]. Therefore, sailors can observe Nishino-shima at the distance of 20–30 [km].

In conclusion, Nishino-shima is the round islet that the expeditors saw on the morning of 23 June. It is, however, the shame that they misplaced Nishino-shima upon the turning point T in their maps.

Positions are projected upon the tangent plane at G.

The last topic is the natural history. One purpose of the Shogunate expedition is the survey of natural resources in the Bonin Islands. The expeditors brought back the following samples to Edo: minerals, corals, woods, timbers as well as the living specimens of the flora and the fauna. In particular, Japanese scholars unanimously recognise birds and a bat species, as follows, presented at Shogun Ietsuna in Edo Castle on 12 August 1675 (Akioka, 1971): Brown Booby (rare in Japan proper), Rufous Night Heron (endemic subspecies, now extinct), Purple Swampen (now extinct), Ogasawara Island Honeyeater (endemic, the contemporary colour sketch of *these specimens* extant), Ogasawara Island Grosbeak (endemic, now extinct) and Bonin Flying Fox (endemic). This list reveals the fact that commanders are keen naturalists.

The most astonishing discovery is Purple Swampen as shown in Fig. 5, because this species cannot be found today in any parts of Japan. Purple Swampen is a cosmopolitan species found in Europe, Africa, Madagascar, Asia and Australasia. The nearest population exists in Palau (subspecies *Porphyrio porphyrio pelewensis* Hartlaub & Finsch, 1872). Description in the Togai's and other manuscripts is summarised as follows:

Looks like Moorhen with red beaks, black plumage as a whole, purple breast and flank, red legs.



*Porphyrio porphyrio pelewensis*

Fig. 5. Purple Swampen.

Overall information pinpoints the species that is Purple Swampen. European naturalists, visited the Bonin Islands in early 19C, never reported any sign of this species, and hence this species must have disappeared during 18C.

#### 4. Concluding Remarks

From Tenri Central Library I dug up the Togai codex that is the report of the Tokugawa-Shogunate expedition to the Bonin Islands in 1675.

This codex is the unique specimen having both two maps and a manuscript as a set.

Two maps are displayed for the first time in 333 years.

It is revealed to the world that the Shogunate expeditors discovered four islands on their way to the Bonin Islands. All the discoveries are the first historic records. Four islands are Smith Island, Tori-shima, Sofu-gan and Nishino-shima (rigorous proof provided).

It is also revealed to the world that the Shogunate expeditions brought back five species of birds and one pair of flying foxes. Discoveries of the endemic are the first historic records.

Purple Swamphen is the first-and-last living specimen that the Shogun and his samurai saw running in Edo Castle in Japan on 12 August 1675.

The subsequent scrutiny will be done in Japanese.

**Acknowledgments.** Thanks are due to Tenri Central Library for providing me photo-copies of the Togai codex and giving me a permission to reproduce some portions of the Togai codex.

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