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Rapid Communication

The globally-invading bryozoan *Watersipora subtorquata* (d'Orbigny, 1852) arrives on remote Rapa Nui (Easter Island)

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Abstract

We report the arrival of the globally invading bryozoan *Watersipora subtorquata* (d'Orbigny, 1852) on remote oceanic Rapa Nui (Easter Island). Several colonies of this bryozoan were found in 2023 on artificial settlement plates in Caleta Hanga Piko, located next to the island's anchorage site for cruise and cargo ships. The species was most likely introduced via hull fouling on internationally travelling vessels, including yachts and sailing boats. It is unknown if or how far it has spread along the island. We present an updated global distribution map for the species and discuss possible vectors of secondary dispersal, such as local boats and floating plastic litter. Moreover, we suggest prevention measures and highlight the need for monitoring and screening for this species, which may have a high potential for spreading and impacting coastal communities along Rapa Nui's shores.

Key words: non-native species, oceanic islands, Bryozoa, hull fouling, Southeast Pacific, marine invasions, settlement plates

Introduction

Rapa Nui (Easter Island) is a very remote oceanic island, situated about 2000 km from the closest inhabited islands (Polynesian Pitcairn Islands) and almost 4000 km off the South American continent. Despite this, vessel-based connectivity between Rapa Nui and other South Pacific islands dates back at least 1200 years to Polynesian voyages and was followed by European vessel traffic starting in the 18th century, as well as cruise ships and international fishing fleets during the current time period (e.g., Ioannidis et al. 2021; Wares et al. 2022). This has caused the introduction of many terrestrial non-indigenous species (NIS), with devastating consequences for the vulnerable island ecosystems (Hunt 2007). However, despite more than 800 years of overseas vessel traffic visiting Rapa Nui (Hunt and Lipo 2006), few marine

NIS have been reported on the island. This is likely due to a lack of detailed studies of the potential invasion history of many marine species there, as is typical of many regions (Carlton 2009; Carlton and Schwindt 2024). Among the few invasions recognized to date are the Northeast Atlantic spirorbid polychaete *Janua heterostropha* (Carlton and Schwindt 2024, Table 4), and a species of teredinid shipworm (JT Carton *personal communication*), both introduced to Rapa Nui by ships, perhaps hundreds of years ago. Another NIS, the pelagic bryozoan *Jellyella eburnea*, is commonly found attached to stranded litter items on Rapa Nui beaches (Moyano 2005; Rech et al. 2018, 2021, 2023).

The marine communities of the Rapa Nui ecoregion (comprising inhabited Rapa Nui and uninhabited Motu Motiro Hiva) were previously described as depauperate in comparison to other South Pacific islands (Fernandez et al. 2014), but this may be associated with low sampling effort, as more and more species have been found in more recent years (e.g., Magalhães et al. 2018; Mecho et al. 2019). As is the case for other remote islands, Rapa Nui holds relatively high levels of endemism, with more than 30% in some invertebrate phyla (Boyko 2003; Fernandez et al. 2014), which may make its natural habitats particularly susceptible to the impact of NIS (e.g., Berglund et al. 2009; Walsh et al. 2012). This is even more worrisome under future climate change scenarios, which are predicted to affect endemic species significantly more than non-endemic species (Manes et al. 2021). As there is no regular monitoring of the island's inter- and subtidal communities, it is likely that not only a high proportion of the native biota may still remain unreported, but that recent and past NIS arrivals have gone unnoticed so far, as has been suggested for other oceanic islands and coastal regions (e.g., Carlton et al. 2019; Carlton and Schwindt 2024). Therefore, in the present study, we aim at detecting marine NIS, using a simple and well-tested experimental approach with floating artificial settlement plates.

Marine invertebrate invasions on remote islands are typically mediated by long-distance vessel traffic (e.g., Carlton et al. 2019). When present, artificial floating structures in local ports and marinas offer ideal conditions for NIS settlement and survival. These structures provide a refuge from benthic predators and are known to harbour much higher numbers of NIS than adjacent natural habitats (e.g., Dumont et al. 2011; Forrest et al. 2013; Giachetti et al. 2020; Rech et al. 2024). Moreover, some NIS larvae attach preferentially to plastic substrata (Pinochet et al. 2020). Once established on such artificial structures, NIS may be further dispersed on local vessels (e.g., Carlton et al. 2019; Leclerc et al. 2020; Castro et al. 2020, 2022; Ashton et al. 2022), or when floating structures are detached and drift with marine currents (e.g., Astudillo et al. 2009).

On the exposed Rapa Nui shores, five small fishing harbours and coves offer protection for local artisanal fishing and leisure boats (Figure 1; Supplementary material Figure S1). International yachts and sailing boats usually anchor

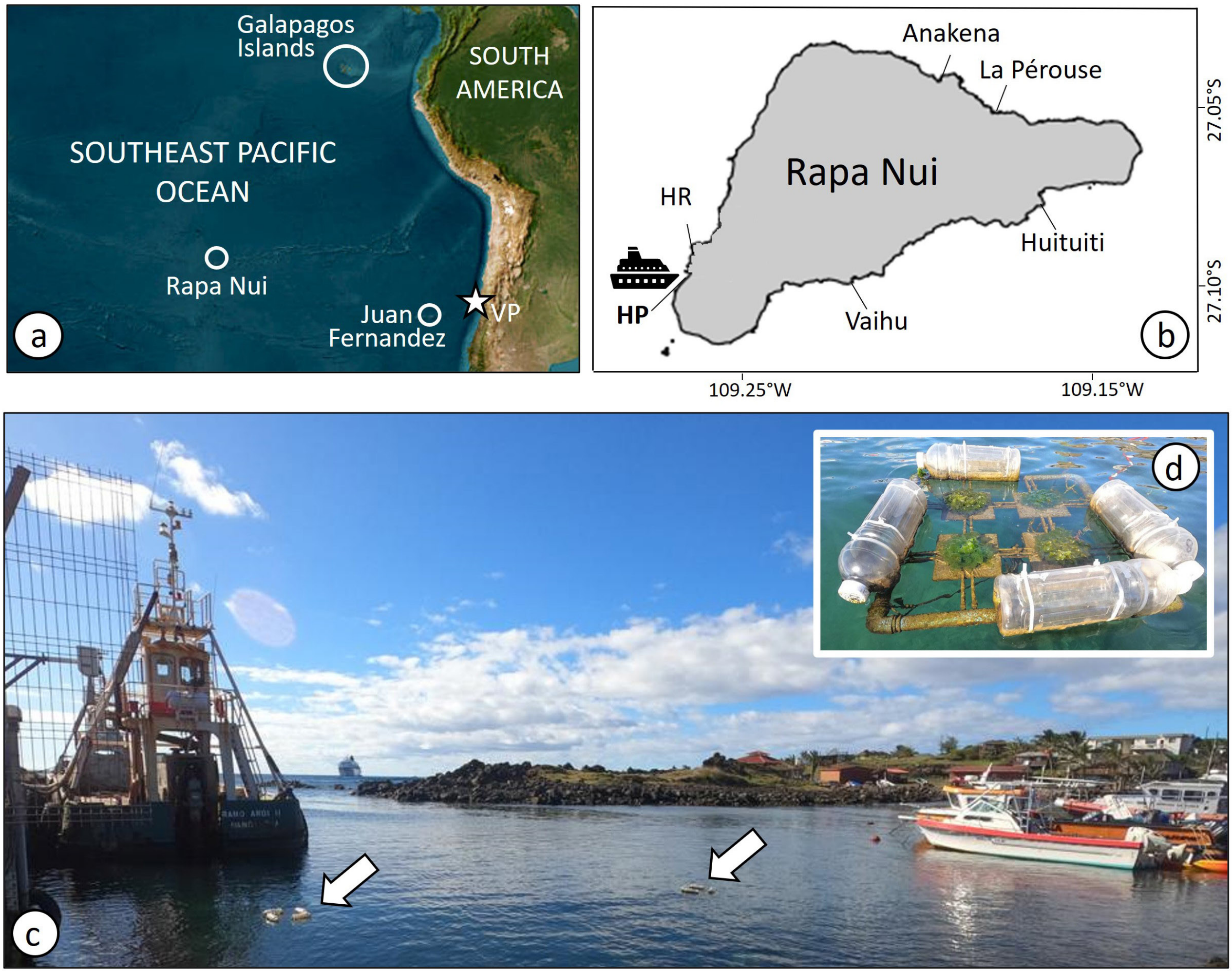

Figure 1. a) Map of the Southeast Pacific Ocean with Rapa Nui and the Galápagos and Juan Fernandez archipelagos. Star symbol indicates the Valparaíso region (VP) holding Chile's two largest ports, San Antonio and Valparaíso port. Basemap: ©2023 Conservation Biology Institute, https://databasin.org. b) Outline of Rapa Nui with bays and harbours. HR = Hanga Roa, HP = Hanga Piko (bold = study site). Cruise ship symbol = offshore anchorage site. c) experimental units (indicated by white arrows) floating close to barge and artisanal fishing boats in Caleta Hanga Piko. In the distance, a cruise ship is visible at the offshore anchorage site. d) Experimental unit with four settlement plates, top view. Photo credit: Pamela Averill.

off the island's shores or in Anakena Bay (Figure 1), as they are too large to enter the small ports (Arturo Olivares, Harbourmaster of Caleta Hanga Piko, *personal communication*, November 2023). The largest fishing port, Hanga Piko, additionally is home to barges that fetch goods from the offshore anchorage site (approximately 500 m from the shore) for cruise and cargo ships. This small harbour may be a likely location for settlement of NIS transported by international vessels and/or dispersed by local fishing boats. Based on this assumption and as a simple and cost-efficient approach, we used artificial settlement plates for the early detection of marine invertebrate invaders in Hanga Piko.

Materials and methods

Two experimental units, each with four 13.5 × 13.5 cm^2 polyvinylchloride (PVC) settlement plates inside of a PVC frame, were installed at a protected site of Caleta Hanga Piko on Rapa Nui Island (27°9′16.7″S; 109°26′21.8″W) on the 20th of November 2022 (Figure 1). Settlement plates were submerged at 2 cm below the sea surface, in a horizontal position. Each experimental unit was moored to the seafloor with a rope tied to a weight and kept floating at the surface by four air-filled plastic bottles.

Plates were retrieved after 4 months of deployment (16th March 2023). To minimise loss or damage of the epifauna, each plate was cut from the floating frame and stored in a separate, labelled plastic bag under water. The bags, each containing a plate and seawater, were then closed, placed in a box in upright position, and transported to a temporary laboratory in Hanga Roa (Rapa Nui). There, each plate was placed in a plastic tray with the seawater from its bag and photographed from both sides. Afterwards, each plate was placed back in its respective bag and submerged in ethanol 95% (in a horizontal position) for 10 minutes. The alcohol from each bag was then filtered separately through a sieve and the retained fauna (mainly mobile organisms) were stored in separate sampling bottles with ethanol 95%. Each bag, containing a plate with its alcohol-soaked epifauna, was closed and put in another (clean) bag for storage. The samples were then kept in a refrigerator at 4 °C for 3 days and brought to the marine biology laboratory at the Marine Science Faculty of Universidad Católica del Norte in Coquimbo (mainland Chile).

After arrival in the marine biology lab, the plates and their attached fauna were immediately frozen and stored at −20 °C for further analysis. For subsequent analyses, plates were thawed and carefully inspected. Colonies of *Watersipora* had not been visible on the photos taken immediately after sampling in the field laboratory on Rapa Nui, as they were covered by other organisms. They were first detected on the thawed plates at the marine biology laboratory in Coquimbo, where they were measured and photographed under a stereo binocular microscope while still attached to the plates (Figure 2a). Afterwards, the colonies were carefully detached from the plates and stored in 95% ethanol. These samples were later used for light microscope (LM; Figure 2b) and scanning electron microscope (SEM; Figure 3) analysis. For SEM analysis, the samples were dried in an oven at 40 °C for 24 hours, mounted on glass slides using double-sided carbon tape and coated with gold in a JEOL JFC-100 evaporator. The specimens were photographed under a JEOL IT300LVSEM in the Microscopy Laboratory of Universidad de Chile, Santiago, Chile.

Genetic barcoding (following the protocol detailed in McCann et al. 2019) was attempted, but no DNA could be yielded from the colonies. This is probably due to the relatively long period of preservation in the refrigerator (see above), as well as repeated freezing and thawing, which leads to degradation of the genetic material. The colonies were tentatively identified based on the original material and LM images and their identity was confirmed based on SEM images. The remaining alcohol-preserved colony

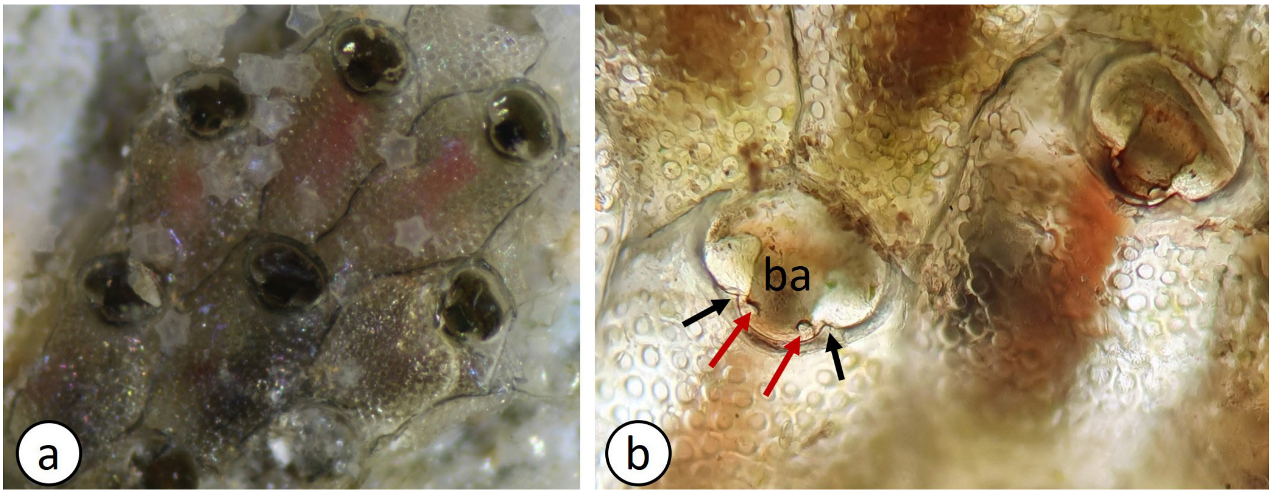

Figure 2. *Watersipora subtorquata*, thawed samples. a) Colony overview with red polypides visible. b) Closeup of zooids, showing operculum with dark central band (ba), lucidae (red arrows), and condyles (black arrows). Photo credit: Sabine Rech.

fragments of *Watersipora subtorquata* (d'Orbigny, 1852) were deposited in the zoological collections of the Faculty of Marine Sciences at Universidad Católica del Norte in Coquimbo, Chile (catalogue number SCBUCN 5570).

Results

Systematic Account

Family Watersiporidae Vigneaux, 1949
Genus *Watersipora* Neviani, 1896

Watersipora subtorquata **(d'Orbigny, 1852)**

Cellepora subtorquata (d'Orbigny, 1852)

Watersipora subtorquata: Vieira et al. 2014 (cum syn.); Chimenz Gusso et al. 2004, 2014; Harmelin 2014; McCann et al. 2019; Pestana et al. 2020; Susick et al. 2020; Xavier et al. 2021; Gauff et al. 2023.

Material analyzed: SCBUCN 5570. Colonies from 8 settlement plates (frozen at −20 °C) on a floating device installed in Hanga Piko, Rapa Nui (Easter Island). Latitude: 27°9′16.7″S; Longitude: 109°26′21.8″W. Collection date: 16.03.2023.

Characterization: Colonies found on settlement plates were small, with a maximum area of 9 cm^2, but sometimes only consisting of few zooids, encrusting, multiserial and unilamellar. The material is consistent with the description given in Vieira et al. (2014). Frozen colonies were greyish in color, with red polypides (Figure 2a). The characteristic dark and parallel-sided central band with two lucidae was clearly visible in the operculum (Figure 2b). Zooid shape was variable within each colony, ranging from subrectangular to hexagonal (Figure 3a–d). The orifice is wider than long, with a well-defined proximal sinus and sharp triangular condyles. Latero-oral intrazooidal septula were absent in all analyzed zooids (Figure 3e–f). Overall, morphological measurements of key characters coincide between specimens from Rapa Nui, Galápagos and other world regions (Table 1), albeit there are some minor variations.

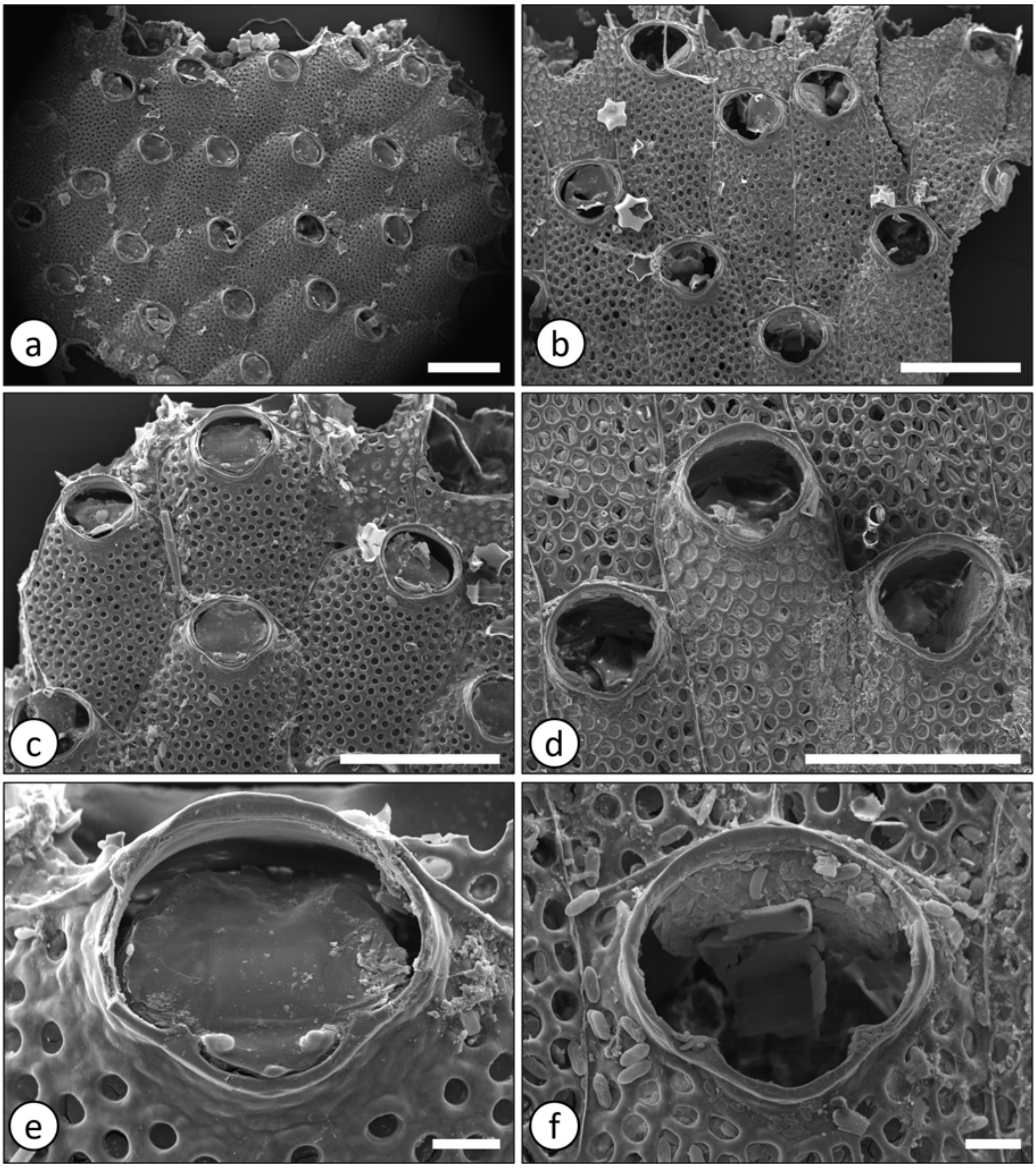

Figure 3. *Watersipora subtorquata*. a–b) overview of two colonies, c–d) close-up of zooids, e–f) close-up of orifice, showing tooth-shaped condyles and absence of latero-oral intrazooidal septula. Scale bars: a–d) 500 µm, e–f) 50 µm. Microphotographs by Rocio Orellana.

Remarks: Zooids of the colonies found on Rapa Nui were slightly larger than those from Brazil, Hawaiian Islands, Israel, Ghana and Oman examined by Vieira et al. (2014). This is reflected in length and width of the zooid, orifice, and sinus (Table 1). The diameter of frontal-wall pseudopores in our colonies is at the lower end of the range presented in Vieira et al. (2014). With respect to these measurements, our colonies are more similar to those found by McCann et al. (2019) on the Galápagos Islands, representing the geographically closest record for this species and the only other verifiable record for the Southeast Pacific. Our colonies very closely

Table 1. Measurements. Comparison with Vieira et al. (2014) and McCann et al. (2019). Number of zooids for our measurements: N = 34 for ZL, ZW, ZA; n = 29 for OL, OW, OA; n = 11 for SL, SW; n = 10 for PD, 5 pores measured per zooid, N = 50 pores.

		This study (Rapa Nui)	Vieira et al. (2014) (Brazil, Hawaii, Israel, Ghana, Oman)	McCann et al. (2019) (Galápagos)
Zooid length, ZL [µm]	Min–Max	666–1233	636–1184	
	Mean ± SD	906 ± 140	775 ± 75–864 ± 158	877 ± 159
Zooid width, ZW [µm]	Min–Max	319–522	226–436	
	Mean ± SD	431 ± 52	299 ± 56–372 ± 32	411± 51
Zooid area, ZA [x10^3 µm^2]	Min–Max	293–492	185–346	
	Mean ± SD	387 ± 49	254 ± 40–322 ± 21	
Orifice length, OL [µm]	Min–Max	163–243	161–198	
	Mean ± SD	201 ± 22	171 ± 6–189 ± 5	212 ± 10
Orifice width, OW [µm]	Min–Max	220–268	185–242	
	Mean ± SD	241 ± 15	202 ± 12–227 ± 8	240 ± 14
Orifice area, OA [x10^3 µm^2]	Min–Max	37–64	23.5–36.6	
	Mean ± SD	49 ± 8	28.0 ± 2.5–32.5 ± 2.5	
ZL/OL	Min–Max	3.52–5.80	3.4–6.1	
	Mean ± SD	4.45 ± 0.55	4.4 ± 0.5–5.0 ± 0.5	
OL/OW	Min–Max	0.72–0.96	0.72–0.99	
	Mean ± SD	0.83 ± 0.06	0.80 ± 0.05–0.92 ± 0.03	
ZA/ OA	Min–Max	6.68–10.16	6.8–12.3	
	Mean ± SD	7.94 ± 1.01	8.0 ± 0.9–10.9 ± 0.7	
Sinus length [µm]	Min–Max	40–57	26–48	
	Mean ± SD	47 ± 5	34.9 ± 5.9–41.5 ± 3.4	43 ± 8
Sinus width [µm]	Min–Max	101–129	86–128	
	Mean ± SD	118 ± 8	106 ± 8–113 ± 9	122 ± 22
Pore diameter [µm]	Min–Max	23–27	20–37	
	Mean ± SD	24 ± 1	24 ± 3–31 ± 4	

match the descriptions of both authors. One of the defining characteristics for *W. subtorquata* is the absence of the latero-oral intrazooidal septula, which was confirmed through scanning electron microscopy for the Rapa Nui samples (Figure 3e–f).

Invasion history: The species' invasion history is difficult to reconstruct, due to long-standing taxonomic confusion with closely related species (reviewed and discussed in Vieira et al. 2014, see also Gauff et al. 2023). *Watersipora subtorquata* was originally described from Rio de Janeiro, Brazil (Taylor and Gordon 2002), but its origin and native range are unknown due to taxonomic confusion with other *Watersipora* species. Therefore, in the present publication, all distributional information is based on our examination of original material or published SEM images and/or genetic data (see updated distribution map in Figure 4 and Tables S1, S2). *Watersipora subtorquata* is now widely distributed in tropical to temperate waters of the global ocean (Vieira et al. 2014; Figure 4). As noted above, the only other record of this species in the Southeast Pacific is from the Galápagos Islands, where it was collected as early as 1987 (McCann et al. 2019).

There are no published records of this species along the continental coasts of Ecuador, Peru and Chile. A recent plate-based survey of strategic sites along the Chilean coast (29°S–42°S), including the International Port of San Antonio (33°S), did not detect the species (Rech et al. *unpublished data*). Similarly, it was not found in recent samples of settlement plates and hull fouling in another Chilean international port (Talcahuano, 36°S; Pinochet et

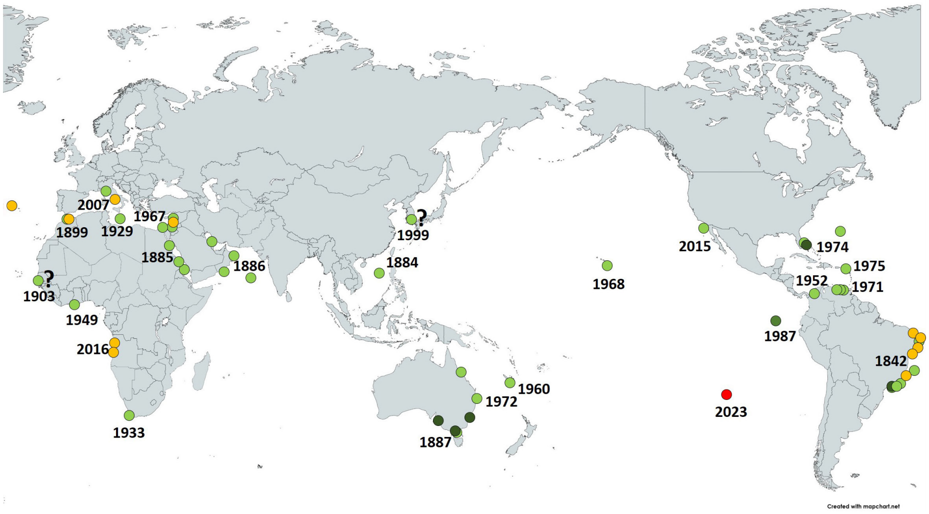

Figure 4. Updated distribution map for *Watersipora subtorquata* showing records reviewed in Vieira et al. (2014; light green dots) and Gauff et al. (2023; dark green dots), as well as validated additional records (yellow dots) based on the available evidence (original material, genetic sequences, or SEM images), and our new record from Rapa Nui (red dot). Numbers indicate the year of the oldest known material from each location. ? = uncertain records/needing re-examination. Geo-referenced species record data, as well as detailed information about the available material and evidence for each record is given in Table S1. World map from: www.mapchart.net.

al. 2023). In the Southwest Pacific, *W. subtorquata* is known from the Australian East Coast and New Caledonia and in the Northeast Pacific from California and the Hawaiian Islands (Vieira et al. 2014; Gauff et al. 2023). On Rapa Nui, another small colony of *Watersipora* sp. was detected attached to the cut upper part of a PET (polyethylene terephthalate) beverage bottle, found on Anakena beach (see map in Figure 1b) in the course of a beach litter sampling on November 5th, 2022 by S. Rech (Figure S2, Rech et al. *unpublished data*). Unfortunately, the colony was lost when handling the item and could therefore only be analyzed based on a single photo that did not allow for species-level identification (Figure S2).

Discussion

Putative origin, transport vector, and current status on Rapa Nui

While there are no known records of *W. subtorquata* from the Chilean continental coast, invasions of this species are known from Australia and New Caledonia in the Southwestern Pacific (Gauff et al. 2023) and, given the lack of monitoring in most global locations, might also be present on other Polynesian Islands. Therefore, no robust assumption about the origin of the Rapa Nui colonies can be made at present.

International vessel traffic drives marine invasions globally (e.g., Carlton 1987; Gollasch 2002; Katsanevakis et al. 2013) and to oceanic islands in particular (e.g., Carlton et al. 2019; Castro et al. 2020). Rapa Nui's offshore cruise ship and cargo anchorage site is located about 500 meters off Caleta Hanga Piko, where our settlement plates were installed. Hanga Piko is protected only by a very narrow headland (see Figure S1) and is strongly affected by high tides, storm surges and intense seiches, which frequently lead to extreme sea levels and flooding of the small harbour (Carvajal et al. 2021). *Watersipora* larvae have a relatively short planktonic larval duration of about 24 hours, but they have been found to disperse over distances of several kilometers (Page et al. 2019 and references therein). It can therefore be assumed that larvae released from vessels at the offshore anchorage site could quickly arrive in the small port under both normal and extreme sea conditions. Moreover, larvae released from hull fouling communities at the offshore anchorage site might settle and establish colonies on the local barges used to fetch goods from cargo ships. Those would then be transported back to Hanga Piko, where the barges are anchored (see Figure 1c).

Rapa Nui is a very remote island and, despite being a famous tourist destination, receives significantly fewer international vessels than other South Pacific islands and archipelagos (see vessel traffic density map in Figure S3). Nevertheless, Rapa Nui is frequently visited by international recreational vessels such as yachts or sailing boats (about 45 per year), most of which come from the Juan Fernandez or Galápagos Archipelagos and usually stay for several days or even weeks (Table S3). At present, the Galápagos Archipelago, at a distance of more than 3500 km to Rapa Nui, is the only location with known records of *W. subtorquata* in the Southeast Pacific. Given the frequent connectivity between the two sites via recreational vessels, those can be regarded as a possible, if not likely, vector of dispersal. Apart from that, large cruise ships arrive at Rapa Nui about once a month, mainly from French Polynesia or the South American continental coast (Chile, Peru; see Table S3) and cargo vessels arrive from the Chilean continental coast about twice a month (SASIPA 2022).

It is not known if *W. subtorquata* is present on other (artificial or natural) substrata within or outside of Caleta Hanga Piko. However, the finding of another (congeneric or conspecific) colony on a stranded piece of a PET bottle at a beach approximately 20 km (alongshore distance) from Hanga Piko is alarming, as it either presents a second record of the same species or indicates the presence of at least two species of *Watersipora* sp. on Rapa Nui shores. Made from a negatively buoyant material (PET), the bottle piece carrying the colony was probably stirred up from the adjacent seafloor, indicating that *Watersipora* sp. might already have colonized this habitat. These NIS have a high invasion potential and tolerance to the harsh conditions of exposed outer coast habitats (Zabin et al. 2018a and references therein), like those of Rapa Nui. *Watersipora subtorquata* can build large colonies (up to 25 cm in diameter), overgrow other two-dimensionally encrusting species (e.g., native bryozoans and other small sessile species), and outcompete them in boundary interactions. Therefore these NIS would pose a serious risk to the island's natural marine habitats.

Risk factors and prevention measures for NIS introduction and secondary dispersal

Prevention of NIS introductions and secondary dispersal is crucial to protect susceptible ecosystems. However, although hull fouling is increasingly recognized as an important vector of NIS invasions, legislation regulating this threat is still emerging. Strict rules, including for non-commercial vessels, are now in place for a few oceanic islands and archipelagos, such as Galápagos, New Zealand and parts of the Hawaiian Islands and Australia (e.g., Zabin et al. 2018b; Georgiades et al. 2020). These types of regulations and their strict enforcement will surely be necessary to reduce the risk of more NIS arriving to Rapa Nui. Vessels, such as local fishing boats and recreational yachts, are also important vectors for secondary NIS dispersal along coastlines or within archipelagos (Peters et al. 2019; Ashton et al. 2022; Castro et al. 2022) and may disperse NIS to natural habitats, like diving sites (Parretti et al. 2020). On Rapa Nui, smaller local boats might disperse such biofouling between the local marinas (Hanga Piko and Hanga Roa) and the smaller coves spread along the 70 km coastline (see map and images in Figures 1 and S1), as well as the main maritime tourist spots (i.e., diving sites, caves etc.). Regular cleaning of local boats might significantly reduce this risk. Vessel cleaning should also be considered for Motu Motiro Hiva, a small and uninhabited island about 400 km from Rapa Nui with a relatively pristine benthic community and high levels of endemism (Friedlander et al. 2013). Although few vessels reach the island (estimated < 10 arrivals per year), each one may significantly endanger the local biodiversity if not cleaned of hull fouling before arriving.

Another putative vector of secondary dispersal is floating plastic litter, which arrives on the island's shores in large quantities from the South Pacific Subtropical Gyre (Thiel et al. 2021; Rech et al. 2023). To date, however, *Watersipora* has not been found in Rapa Nui on any debris thought to come from overseas sources (Rech et al. 2018, 2023). Nevertheless, the observation of a *Watersipora* colony on a PET substratum suggests that this species could also colonize intact and floating plastic substrata, which could arrive with ocean currents. This has been seen for another encrusting bryozoan, the pelagic species *Jellyella eburnea*, which is frequently found on floating and stranded plastic litter in the Rapa Nui region (Moyano 2005; Rech et al. 2018, 2021, 2023). Plastic pieces are also frequently trapped between rocks or pebbles on Rapa Nui and colonized by local species, which are dispersed when their plastic raft is released from the rocky intertidal due to breakage or strong wave action. This was shown by the frequent occurrence of plastic fragments carrying locally abundant inter- or subtidal species during samplings of Anakena and Ovahe beach (Rech et al. 2018, 2023; Wares et al. 2022). Therefore, while at present international vessel traffic seems to be the most likely vector of *Watersipora* arrival to the island, floating litter might be a vector of secondary dispersal around the island's coastal habitats.

A critical factor for NIS establishment in a given location is the presence and density of artificial shoreline infrastructure, which may serve as a propagule reservoir and stepping stones for their dispersal (e.g., Ruiz et al. 2009; Rogers et al. 2016; Carlton et al. 2019; Susick et al. 2020). Such infrastructure is still relatively scarce along Rapa Nui's exposed rocky shoreline and in its small harbours. However, no regular monitoring is in place in the island's natural and artificial habitats, which makes it very likely that the presence of additional NIS has gone and is going unnoticed, especially in earlier developmental stages, when individuals are smaller and more difficult to detect. Lack of regular (or any) monitoring, as well as the scarcity of taxonomic experts, hinder the early detection of marine NIS in many global regions (e.g., Fernandez et al. 2014; Ferrario et al. 2018; Gauff and Liwouwou 2019).

Settlement plates are a simple and cost-efficient tool for early detection of NIS, especially when installed at putative arrival sites with high risks of first introduction (see Carlton and Schwindt 2024 and references therein). Floating settlement plates offer, at least temporarily, bare spaces, where "newcomers" may attach with little or no competition with other species. If settlement plates are retrieved after relatively short periods of time (here: 4 months), they allow for the detection of species that might not be present in later successional stages of the fouling community as, for example, on permanent port infrastructure or vessel hulls. Moreover, if settlement plates are suspended in the upper water layers, as in the present study, they may offer a protected habitat that represents a refuge from benthic predation (e.g., Dumont et al. 2011; Rogers et al. 2016). This may be important in the Hanga Piko context, where consumption rates of an experimental prey (squidpops, see Duffy et al. 2015) were much higher on the seafloor than at the sea surface (Rech et al. 2024). *Watersipora subtorquata* and other global invaders have been successfully detected with a plate-based approach in several locations (e.g., Marraffini et al. 2017; McCann et al. 2019; Tamburini et al. 2021), and we suggest that settlement plates could strongly aid in the monitoring of high-risk sites for secondary dispersal and in the prioritization of future systematic monitoring efforts. Additionally, the training of local boat owners, fishers and divers to be able to recognize and report this and other notorious marine NIS, may be helpful.

Authors' contribution

SR: research conceptualization, sample design and methodology, investigation and data collection, data analysis and interpretation, ethics approval, funding provision, writing – original draft, writing – review and editing; BA: sample design and methodology, investigation and data collection; PA: sample design and methodology, investigation and data collection; EPT: investigation and data collection; MSRB: data analysis and interpretation, writing – review and editing; DPG: data analysis and interpretation, writing – review and editing; LMV: data analysis and interpretation, writing – review and editing; MT: research conceptualization, sample design and methodology, funding provision, writing – review and editing.

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Ethics and permits

All procedures involving animals were in compliance with the European Community Council Directive of 24 November 1986, and ethical approval was granted by the Ethics Committee of Universidad Católica del Norte (CEC UCN N° 07/ 2020, Coquimbo, Chile). Permit for the study was granted by Koro Nui o te Vaikava o Rapa Nui (Consejo del Mar de Rapa Nui; Permit N°3_2022) and Comunidad Indígena Ma'u Henua (Application N°10).

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Supplementary material

The following supplementary material is available for this article:

Figure S1. Caletas and bays of Rapa Nui.

Figure S2. Colony of *Watersipora* sp. found on the upper part of a PET bottle, landed on Anakena beach November 5, 2022.

Figure S3. Density map of vessel traffic.

Table S1. Records of *Watersipora subtorquata* considered in the distribution map (Figure 4), with detailed information on location, type of evidence, and examined material.

Table S2. Complete references for literature cited in Table S1.

Table S3. Overview of international vessel arrivals on Rapa Nui.

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