

Neruda's *Maremoto*: Hidden Biological Treasures in Art and Poetry

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"For thinking concerning the animal, if there is such a thing, derives from poetry."

(Derrida, "The Animal That Therefore I Am" 377)

Abstract

Maremoto is a playful collection of marine-themed poems and prints produced together by Chilean poet Pablo Neruda and Swedish artist Karin Oldfelt Hjertonsson. Neruda loved the sea, and was an informed natural historian and scholar who collected and studied marine life and scientific literature. Oldfelt Hjertonsson's fifteen woodcuts are based on her close observation of coastal Chilean species, and the poems are similarly accurate in their biological detail. We adopt a modified geopoetics approach to analysing the paired images and poems of *Maremoto* in the context of contemporary scientific knowledge of these organisms and their ecosystem. This approach enhances the meaning of the work in four primary ways. First, identifying the focal organisms to species reinforces the literal meaning and the biogeographic patrimony of the work. Second, these identifications deepen our understanding of metaphors and narratives in the individual poems. Third, they complexify meaning when the identifications highlight contradictions between image and poem, or between poem and current scientific knowledge. Finally, the identifications allow us to extend our view of the volume as a whole: by lifting the poems and images from their separate pages and placing them together into the web of ecological interactions we see that they are all connected to each other – and to us. Our biogeopoetic approach thus reinforces the theme of the overall volume, in which the persona is transformed through close observation of the central species from a distant witness to one who is united with the organisms and who belongs to the sea.

Poetry imitates Art imitates Life: *The Poet and the Sea*

Maremoto is a playful collaborative volume of marine-themed poems and prints produced by Chilean poet Pablo Neruda (1904-1973) and Swedish artist Karin Oldfelt Hjertonsson, who is one of the present authors. Neruda is well known for his love of the sea; it was "his universe" (Suárez 400). In his *Memoirs*, he related that "The first time I stood before the sea, I was overwhelmed" (16); later in life, he recounted "I observe the sea with the complete detachment of a true oceanographer . . . with a connoisseur's relish, a cetacean's palate" (217).

Although Neruda was raised in the Chilean south and served as senator for the north, he chose central Chile for his homes. In the early 1940s he purchased a beachside house in Isla Negra, perched on what he described as a "wild coastal strip, with its turbulent ocean" (*Memoirs* 140) where "[t]he sea resounds like an ancient battle . . . When it makes its hardware tremble, my house trembles" (*The House in the Sand* 105). It was here, within sight, sound, smell and feel of the ocean, that Neruda wrote many of his works including *Maremoto*. Writing from and about this favourite location two

decades later, he reflected that "I was intrigued by and have loved passionately the battling waters . . . the teeming ocean life, . . . the splendor of the sea's foam" (335).

Neruda's love of the sea extended to an enthusiastic and accomplished study of natural history, particularly malacology (Teitelboim 413). He collected "[b]ooks on conchology or malacology" that he said "overflowed my library" (*Memoirs* 161). An examination of his cataloged collection at the Universidad de Chile reveals not only these specialist treaties, but a broad collection of works by natural historians from the eighteenth to the twentieth centuries, including Beebe, Buchsbaum, Buffon, La Cépède, Cuvier, Darwin, Hornaday, Humboldt, Milne-Edwards, and Molina. He collected shells close to home and abroad. Of Isla Negra, he wrote that:

Everyone walks across the sandy shore and crouches, searching, picking through the sand, to such an extent that someone called this coast "the Island of Lost Things."

The ocean is an incessant provider of . . . detritus of crab shells, conch shells, limpets, objects that have been eaten away, aged by pressure and insistence. It lives among brittle fish skeletons, miniscule sea urchins or purple crabs. (*The House in the Sand* 27)

Of his world travels, he recounted that "I roamed the beaches . . . and collected magnificent seashells . . . gradually swelling my sea treasure until it filled room after room in my house" (161). Ultimately he accumulated over 9000 shells representing more than 1000 species (Rivadeneira Valenzuela), and reflected that they were "[t]he loveliest things I ever collected" (*Memoirs* 272).

In Neruda's poetry, the sea features as the dominant symbolic figure (Cárcamo-Huechante 587), taking many forms. It is the conflicted self: "[t]he menacing sea locked inside each person" (*Memoirs* 59). It is the school of life: "I need the sea because it teaches me // . . . I move in / the university of the waves" ("The Sea" lines 1, 7-8). It is the indifferent lover:

and although the sea has many hands,
many mouths and many kisses,
no hand reaches out to you,
no mouth kisses you; ("Strangers on the Shore" lines 13-16)

It rages:

the truth is that there are no words
as tough as the surf,
nor are there as many teeth in the world
as in the sea's fury. ("Swell in 1968. Pacific Ocean" 5-8)

Its storms and surges throw its "crushed debris" ("The Great Ocean" line 29) up onto the shore where the reader is urged to

. . . look for what the sea undid
insistently, carelessly,
what it broke up and abandoned
and left behind for us. ("Forget About Me" 7-10)

These leavings of the sea are the main subject of Neruda’s *Maremoto*, written in Isla Negra in 1969. Neruda was at this time in his mid-60s, a globally acclaimed poet returned from political exile and actively at work on his memoirs and what would become several posthumous volumes of poetry. The following year he would be awarded the Nobel Prize for Literature (Neruda, *Memoirs* 303-308; Feinstein ch. 14). He was an experienced diplomat, the newly elected Senator of the Chilean Communist Party, and would soon accept a conditional candidacy to run for President of the Republic before ultimately supporting Salvador Allende’s campaign and subsequently being appointed ambassador to France (Neruda, *Memoirs* 336; Feinstein ch. 14). During this period of tremendous accomplishment and extraordinary demands on his time, Neruda turned his attention to a small volume of short and whimsical poems about the sea and its inhabitants.



Fig. 1 Woodcuts in Pablo Neruda’s *Maremoto*. Images shown in order, top to bottom and left to right, as they appear in the 1991 Spanish edition. The ground plates of the originals measure 20 cm x 24 cm. Poem titles as in Table 1. Images reproduced with permission of the artist, Karin Oldfelt Hjertonsson.

The Poet and the Artist

The impetus for *Maremoto* was a series of woodcuts (Figure 1) made by Oldfelt Hjertonsson, a Swedish artist and diplomat who lived in Chile from 1967-1970. These were her first woodcuts. She would go on to produce another series based on the animals and plants of Cuba during her time there as Swedish Ambassador, before continuing her career in oils and watercolours. As recounted in detail by Suárez (396), one evening after dinner at Isla Negra, while Neruda and Oldfelt Hjertonsson's husband Ulf were talking, Oldfelt Hjertonsson made a woodcut of a bronze dolphin figurine that was in the house (Figure 1). She gave it to Neruda who, enchanted, wrote to her proposing she make ten more illustrations for which he would write ten short poems, about "objects and snails" for a "beautiful co-produced book" (Neruda "letter"; Figure 2).

A keen naturalist and beachcomber, Oldfelt Hjertonsson made fourteen more woodcuts of organisms from the Chilean coast (Figure 1). As she completed each one, printing it by hand on rice paper and using the back of a wooden spoon to press the paper onto the inked pine block, she gave it to Neruda. Knowing the same species intimately, he wrote and titled the corresponding poems. As Ulf Hjertonsson recalls from a two-week stay at Isla Negra while convalescing from hepatitis: "[t]here was one holy hour, between eleven and twelve. That hour Neruda was always writing sitting in a special small room overlooking the Pacific. He always wrote with green ink. Surely the small poems in *Maremoto* were conceived in that small room written in green ink" (personal interview).

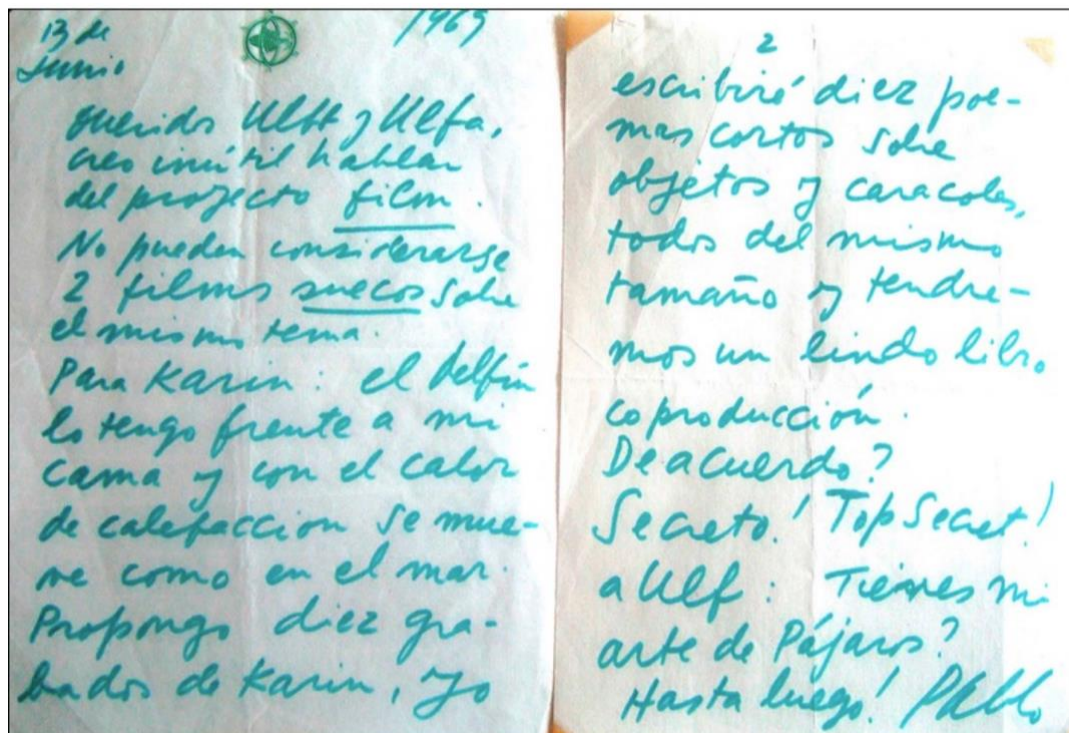


Fig. 2. Letter from Pablo Neruda to Ulf Hjertonsson and Karin Oldfelt Hjertonsson 13 June 1969, in his characteristic green ink, proposing the collaboration that would become *Maremoto*. The section bearing on *Maremoto* reads "For Karin: I have the dolphin in front of my bed and with the heat from the heating it moves like in the sea. I propose ten of Karin's engravings, I will write ten short poems about objects and snails, all the same size, and we will have a nice co-produced book. Ok?" Reproduced with permission of Karin Oldfelt Hjertonsson.

With the species poems complete, Neruda added the longer introductory and concluding poems to bracket the central collection and provide a context for the assemblage of creatures. The introductory "Seaquake" gives a first-person contemplation of ". . . the varied and useless treasures / that the sea left me, the ocean's dismantled love" (Jacketti and Maloney 81). The concluding "Farewell to the Offerings of the Sea" bids the organisms return home:

return to the waist
of the Pacific,
to the giddy kiss
of the wave, to the secret
logic of the rock. (5-9)

The volume thus develops two marine themes that Neruda explored throughout his opus: his ongoing love affair with a sometimes violent sea (with close precedents in "Strangers on the Shore," "Forget about Me," and "Swell in 1968. Pacific Ocean"), and his deep knowledge of marine life (with precedents in some of the poems of *Odas Elementales*, *Cantos Ceremoniales*, and *Canto General*).

For the first edition of *Maremoto* the images were hand printed by Oldfelt Hjertonsson and an assistant, and the text was silk-screened. Published in 1970 by the *Sociedad de Arte Contemporáneo de Santiago*, the short run of only 110 copies was soon dispersed. (Oldfelt Hjertonsson recalls that the first copy, hand-written by Neruda, was sold in an auction.) Neruda was posted to France shortly afterwards; he later became ill, returned to Chile, and died only days after the 1973 military coup. With the upheaval of the nation and ransacking of Neruda's homes, the volume remained largely unknown. It was rediscovered in Neruda's library and republished in 1991 in Spanish and German (Barros T.), at which time Oldfelt Hjertonsson was Swedish Ambassador to Cuba. Although it has since been translated into Swedish (by Oldfelt Hjertonsson's husband, diplomat Ulf Hjertonsson), Finnish, English, and Italian, *Maremoto* remains little known and little studied.

In the prologue to *Maremoto*'s 1991 Spanish edition, the poet Raúl Zurita follows critics Radován Pineda and Ignacio Valente in characterizing the poems as celebrations of the quotidian, the Chilean, the "tactile and metaphysical," similar in style to Neruda's *Odas Elementales*, *Arte de Pajaros*, and *Estravagario*. The title translates as "tsunami" or "seaquake," which along with earthquakes are recurring and devastating features of the Chilean coast (Castilla et al., "Coseismic" 17). Several of these occurred in Neruda's lifetime and feature in his works (reviewed by Solís). Despite the title's promise of catastrophe, Robert Pring-Mill finds the introductory poem unexpectedly "whimsical," while Pineda (96) finds it "tranquil" and the concluding poem "contemplative." Biographer Eulogio Suárez (396) and editor Hernán Loyola (986) both follow Valente in reconciling this paradox by viewing the title as simply a device for binding together and contextualizing the central poems. In contrast, Zurita and Cárcamo-Huechante both interpret *Maremoto* in terms of the intensity of a tsunami; the latter explores it as a reflection of Chile's political and socio-economic tumult. This small handful of commentaries, reviews and analyses focus primarily on the longer introductory and concluding poems of *Maremoto*, devoting little attention to the central fifteen illustrations and poems. It is these portrait-poems showcasing individual sea creatures that are the focus of the present analysis.

A Biological Perspective

Our approach is to identify and highlight the biological content of the woodcuts and poems of *Maremoto*, with the goal of exploring and enhancing their literal and metaphorical meanings. This approach borrows inspiration from geopoetics, in that we use the geographic location of the central Chilean coast to help identify the focal species, but departs thereafter to delve into their biology and ecology. In Hawkins's (465) terminology, we follow a "dialogues" approach, in which biologists (cf. geographers) interpret and analyze a work of art and literature. It is a literally bio-poetic, eco-poetic, and (mostly) zoo-poetic approach, although we apply a broader biological lens than the more specialized evolutionary-psychology focus of biopoetics, environmental advocacy of ecopoetics, or animal rhetoric of zoopoetics.

Our approach has precedents of two main varieties. In one, the use and meaning of a biological theme are traced across a range of works, such as depictions of fish in visual art (Begossi and Caires; Guidetti and Micheli; Jett and Moyle), the use of botanical terms (McKertich and Shilpa) and butterflies (Terblanche) in poetry, or the biological content of haiku (Marshall). In the other, the focus is on a particular author: thus, Samuel Beckett's use of "larva" as a metaphor (Murray), Ted Hughes' use of terminology from freshwater biology (Reddick), and A.S. Byatt's and Emily Dickinson's uses of natural and scientific concepts and terms (Walezak and White, respectively). With respect to the works of Neruda, our approach complements several geopoetic and ecocritical analyses of his poetry including those by Cocola (geography), Handley (conceptualization of nature), Latta (Edenic narratives), Solís (seismic events), Donoso Aceituno and Araya Grandón (animals), and Contreras and Étienne, and Osario and Dannemann (both seashells). However, none of these analyses addresses *Maremoto*, despite it being one of Neruda's biologically richest works, and none delves deeply into the biology of the organisms, which is our purpose here.

As the authors, we are two biologists familiar with the species, the ecosystem, and the scientific literature of the central Chilean coast, and the artist whose original woodcuts, informed by her observation and appreciation of the organisms, inspired the poems. Today, of course, we are revisiting this work some fifty years after it was produced, with the benefit of the scientific knowledge generated in the intervening decades. Chilean marine biology in the 1950s and 1960s was in an early descriptive era and the nation's fisheries were primarily artisanal; both have grown dramatically since then (reviewed by Castilla, "Fifty years"). In interpreting *Maremoto*'s content in light of this half-century of science, we highlight the careful natural-history observations made by both the artist and the poet at the time, and we embrace a broad biological scope from molecules to organisms to ecosystems, from phycology to zoology, from biomechanics to trophodynamics, and from ecology to fisheries to gastronomy.

By observing and dissecting the central fifteen images and poems as a biologist might approach the organisms themselves, we find their meaning is enriched in four ways, each of which we develop further in a section below. The meaning is reinforced when the subjects are identified to genus and species: this effect is illustrated with individual words and lines from the poems. It is deepened when these identifications add context to metaphor and coherence to narrative, and complexified when the identifications reveal contradictions among the image, text, and biological knowledge. These enrichments are illustrated with longer excerpts from the poems. Finally, it is extended when we examine the poems together, situating the collection of species in an interconnected ecosystem. In taking this biological approach to analyzing art and poetry, we are motivated by Darwin's observation that ". . . as in music, the person who understands every note will . . . more thoroughly enjoy the whole, so he who examines

each part of a fine view, may also thoroughly comprehend the full and combined effect” (242).

To engage in this biological analysis, we adopt the following methodological choices and conventions. All English quotations from *Maremoto* are from the 2001 translation *Seaquake* by Jacketti and Maloney, unless otherwise indicated; in a separate study we explore translation alternatives offered by a biological perspective (Wonham and Castilla in prep.). All page references are to the Jacketti and Maloney translation, as the Spanish editions are unpaginated. Each species is introduced in the text with its full Latin name, and for ease of reading is referred to thereafter by genus alone. Nomenclature follows the WoRMS online database. Recent landing statistics for fished species are reported as mean annual fresh wet weight \pm one standard deviation in metric tonnes (MT) for the most recent available five years (2011-2015), extracted from the Chilean Fisheries Service (SERNAPESCA) online database. The fifteen poems are listed by title in Table 1, included as an appendix.

The Woodcuts

Xylography has long been used for natural-history illustration, peaking in precision and detail in the 16th century, and remaining an art form today (Bridson 123-127). The fifteen woodcuts of *Maremoto* are bold and solid images of marine organisms. In the published editions, the images are printed one per page facing their accompanying poems. Each is printed in one or two colours; they alternate white-space and solid-colour backgrounds (Figure 1). The “Crab” woodcut is featured on the covers of the 1970 Spanish and 1991 German editions, and is reproduced as a small image on the covers of the 1991 and 1992 Spanish editions. The “Squat Lobster” and “Octopus” woodcuts are both featured on the covers of the Swedish and Finnish translations. The woodcuts are not reproduced in the English and Italian translations.

A biological perspective on these images asks which organisms are depicted, and how. Most of the woodcuts show a single species; “Shells” shows three and “Fish Market” shows five, for a total of twenty illustrated species in the collection (Figure 1, Table 1). (Although the bronze dolphin was based on an inert figurine, it is included in this “species” count.) For most of the organisms, only a single individual is illustrated. Exceptions are the barnacles in a typical cluster, the seastars in the aggregated piles in which they are often found under rocks, the two seals in the water, and the many fishes hanging in the market stall. The alga is shown as multiple stipes arising from a single base, reflecting the tendency for genetically distinct juveniles of this species to fuse together as they grow. Most of the species are printed within an order-of-magnitude of the size range of a juvenile or adult of the species, although the snail in “Conch Shell” is vastly larger than in life, and the very large organisms are of course much reduced (alga, seal, swordfish, market fish) (Figure 1).

The woodcuts generally depict the animals as they would appear in life, many of them in their habitat: the snail in “Conch Shell” is creeping, the two animals in “Seal” are bobbing in the waves, the swordfish is leaping out of the water, and the alga is bending as it would in the surf. Despite their red (cooked) colour, the squat lobster is swimming, and the crab has adopted the habitual stance of this species with the larger claw held in front of the smaller one (Figure 1). Only three woodcuts show non-living animals: the empty seashells of “Shells,” the suspended fishes of “Fish Market,” and the inert “Bronze Dolphin.”

Several of the woodcuts are printed in colours true to life: the vibrant blue anemones against a green background that represents kelp, the white-shelled barnacles, the black-and-white striped snail of “Conch Shell,” the silver-blue swordfish (Figure

1). Others show more artistic license: in life, the alga is olive green, the urchin is green and red, the sun star is golden brown, and the mottled colours of the seastars are more subdued than in the image. Minor printing variations exist among editions, in the copies we have examined. The German edition has more vivid colours, and prints "Seastars" upside down relative the other editions. The image for "Crab" is printed in a darker burgundy more representative of the "violet-coloured crab" at the beginning of the poem in some (original 1970 Spanish edition; German, Swedish, and Finnish translations), or in a brighter red more representative of the "delectable red rose" that emerges from a boiling tureen at the end of the poem in others (1991 Spanish edition; cover of German edition).

The Poems

The concise, straightforward, and realistic style of the illustrations is mirrored in the fifteen short poems that accompany them (Table 1). Each poem contains seven to sixteen lines, across one to three stanzas. The focal organism is introduced in the title, and treated in the poem as a concrete subject with form, behaviour, experience, and emotion. Most of the poems refer to the organisms generically in the third person; two refer specifically to a single individual ("Seal," "Sun Star"). Two poems address the species directly ("Oh, octopus," (line 1) in "Octopus" and "Stop! Casual leopards" (1) in "Squat Lobster"), two are written from the first-person ("I am the seaweed" (1) in "Alga" and "at Isla Negra I found / a sun" (1-2) in "Sun Star"), and in one the reader is invited to share in the experience of the persona when the tumbling "Seal" finally "gazes at us" (12) at the end of the poem.

A biological perspective on the poems again asks which organisms are featured, and how they are represented. Most of the poems begin in direct response to the woodcuts, describing the organisms as they are depicted in the images: the incarcerated barnacle, the surf-tossed alga, the round sea urchin, the empty shells, the curved squat lobsters, the rubber-skinned seal, the opening and closing anemone, the lurking crab, the centrifugal sun star, the hanging fishes. They then go on to reveal more about the organism's inner life: its morphology, behaviour, physiology, and even personality.

Some of the organisms are frenzied (barnacle), feverish (squat lobster), tormented (seal), or abused (alga), whereas others are satanic (octopus), menacing (crab), hostile (urchin), and armed or armoured (squat lobster, swordfish, crab). The poems portray some as isolated by defenses (barnacle), consumed with pride (bronze dolphin), abandoned by lost loves (anemone, shells), longing to fulfill a dream (conch), or invisible (sun star), whereas others suggest optimism or peace: the still gaze of the animated seal, the hidden vulnerability of the defended barnacle, the secret love of the prickly sea urchin, the triumphant resilience of the battered alga, the transcendence of sea itself in "Fish Market." Two simply end up cooked (squat lobster, crab). Further examining the biological content of these poems offers deeper understanding and appreciation of their meaning.

Meaning reinforced

Each image-poem pairing clearly represents a type of organism – a crab, a sea star, a fish – that would generally be familiar to most readers. But we know that the artist was inspired by the flora and fauna of the central Chilean coast, and the poet was an accomplished naturalist long familiar with this same biota. When we look more closely at the biological detail of the woodcuts and the text, we find enough clues to be able to identify most of the focal organisms with biological Latin names (Table 1). These identifications transform the subjects of the poems from the general to the specific,

making each subject at once global (every ocean has its anemones, every beach its shells) and local (only here do we find this anemone, these shells). Understanding that these images and poems are inspired by specifically Chilean species reinforces the patrimonial sense of identity and place (Cárcamo-Huechante 597) found in many of Neruda’s works.

In most pairings the title is general but the image and text allow a biological identification: the colour and shape of the blue anemones, the mottled and webbed seastars, the red squat lobster, the swaying kelp, the gastropod shells, the short-spined urchin (“centrifugal and orange”) (line 2), and sturdy crab (“violet” and “delectable”) (1, 8) identify these ones unambiguously. The fish that hang by the mouth and by the tail on either side of the “Fish Market” woodcut still hang in the same fashion in central-coast Chilean fish markets today (Table 1).

In three poems, the species is precisely identified by the title. “Picoroco” is the common Chilean name of the giant barnacle (*Austromegabalanus psittacus*), which can reach an impressive 30 cm in height and whose shape and characteristic shell talons are shown clearly in the woodcut. “Sol de mar” is the common Chilean name for the sun star (*Heliaster helianthus*), whose typical forty arms are faithfully reproduced in the woodcut; the handful of shorter arms in the animal’s lower-right quadrant reminds us that this species has the extraordinary adaptation of being able to shed its arms when attacked, only to regenerate them later (Gaymer and Himmelman 147). “Albacora” is the common Chilean name for swordfish (*Xiphias gladius*), whose bill length and fin shape are unmistakably rendered in the leaping fish of the woodcut; the swordfish in the poem come “from Iquique” (6), the northern Chilean port city in which the swordfish all-tackle world record, weighing over 500 kg, was landed some sixteen years before the poem was written (IGFA).

Identifying the species of *Maremoto* also allows us to add a gastronomical dimension to the experience of the work. Most of these organisms are not only the familiar sights, but also the scents and flavours of coastal Chilean markets and restaurants. The tangy sea-urchin gonads (*lenguas*) and the creamy crab casserole (*pastel de jaiva*) were favourites of Neruda’s (Oldfelt Hjertonsson pers. obs.). The turban snails and *loco* illustrated in “Shells” are used to fill *empanadas de mariscos*, and the barnacle is made into traditional soups and stews. Cusk-eel soup (*caldillo de congrio*) is immortalized in Neruda’s “Ode to Conger Chowder.” In recognizing the species, we can conjure them through multiple senses and imagine the gastronomic pleasure of the poet, a “committed epicurean” who very much enjoyed consuming them (Feinstein ch. 8; Oldfelt Hjertonsson pers. obs.).

Thus, the identification of these species reinforces for the reader a very particular biological and cultural location in central Chile. Examining the species-specific content in more biological detail also deepens our understanding of both the literal and metaphorical meaning of the poems, as the next section will show.

Meaning deepened

Current biological knowledge can provide a tool for coming to a deeper understanding of the biological imagery in the poems, best illustrated in the vivid metaphors of “Octopus” and in the narrative of “Seaweed” (Jacketti and Maloney 89, 84).

Pulpos / Octopus

The octopus woodcut shows half the body and three of the eight arms of a stylized animal rendered in black, as though printed with cephalopod ink. The image and text could represent almost any octopus, but the mainland Chilean coast is home to three

species: the larger *Enteroctopus megacyanthus* and *Octopus mimus*, which live in deeper waters, and the smaller *Robsonella fontaniana*, which can be encountered on the intertidal shore.

Octopuses are renowned for their ability rapidly to alter form. This polyphenism is mimicked by the poem itself, which moves quickly through a series of metaphors addressing the animal as an embodiment of church, guts, flowers, state, and weather, as though the poem itself were changing shape:

Oh octopus, oh bloodshot monk,

 Oh visceral testimony,
 bouquet of frozen rays,
 head of a monarchy
 of arms and premonitions:
 portrait of a shiver,
 plural cloud of black rain. (our trans.; 1, 5-10)

In the opening line, "bloodshot" accurately reflects the red-and-white mottled colouration frequently adopted by *Robsonella* and *Octopus*; the translations "blood-coloured" (Jacketti and Maloney 89) and "fierce" (Espada, in Stavans, *Poetry* 917) would also serve: both species can turn red, and octopuses in general are active predators of crustaceans, molluscs, echinoderms, and fishes, and cannibalistic to varying degrees. The image of a monk reflects the animal's hood-shaped body, which is also captured in the scientific label "Bishop", one of nearly 300 cataloged cephalopod body configurations (Borrelli et al. 230).

The poem's central lines accurately describe the basic body plan and neurobiology of an octopus, in which the head ramifies into eight muscular and sensitive arms extending out around the mouth. Since each arm is extensively and semi-independently innervated (Sumbre et al. 2001), and used for walking, mating, defense, and prey capture, it is not much of a stretch to imagine one of them generating premonitions of its own.

In the final lines, a "portrait of a shiver" is an arresting metaphor for the rapidly changing colour patterns that octopuses pass across their skin in waves (Darwin 7; Hanlon et al. 145), particularly the display dubbed "Passing Cloud" (Borrelli 331, 339). The inky "cloud of black rain" ejected by an octopus is a mixture of mucus and ink hypothesized to confuse or distract predators: since octopuses often ink as they jet away, this is an apt final line for the poem. The poem reads as an address to an octopus, but a biological context helps us also see the poem as an octopus.

Alga / Seaweed

The "Seaweed" woodcut shows the intertidal kelp *Lessonia* spp., a common alga that reaches up to 4 metres in length and dominates the rocky-shore surf zone of the central Chilean coast. It is depicted in wave-tossed motion, its holdfast anchored at the base and fronds swaying in the surf. *Lessonia*'s habitat is particularly harsh, with crashing waves, powerful drag forces, and prolonged exposure to desiccation and heat stress (Finke et al. 60; Koehl, "Stiffness" 634). The poem opens by situating the species directly in this demanding environment, but later reveals that its apparent "submission" to the sea is only "simulated":

I am the seaweed of the storm
 dashed by the surf:

 here you have my cold flowers:
 my simulated submission
 to the wind's judgement:
 I survive the water,
 the salt, the fishermen,
 with my elastic latitude
 and my vestments of iodine. (1-2, 6-12)

This narrative of resilience is biologically complex, with three intensively-studied natural phenomena appearing in these lines: kelp's elasticity in its wave-bashed habitat, its response to desiccation and osmotic stress (salt) with sequestered iodine, and its uncertain future in the face of an ever-growing fishery.

The species *Lessonia* stands tall in the Chilean surf, gripping the rock with its gnarled holdfast as its sturdy stipe and robust fronds rebound from every crashing wave. In a now-classic study, Koehl ("Biomechanics" 3474) compared its elasticity to that of *Durvillaea*, a longer and floppier kelp common in the same habitat. She found that both species are difficult to break, but for different reasons: *Lessonia* because it is stiffer and stronger; *Durvillaea* because it is more stretchy. Although *Lessonia* is the less elastic, its stiffness allows it to bounce back and its strength allows it to survive the intense winter storm forces that exceed the elastic capacity of *Durvillaea*.

Iodine is concentrated from seawater by kelp, by a factor of ten to a hundred thousand: greater than any other known organisms. When the algae are exposed to sun and air at low tide, their internal salt concentrations rise dramatically. In response to increasing salt, as well as to other biotic stressors like grazers and bacteria, iodine is released and helps reduce tissue damage. The characteristically tangy haze of temperate coasts, including the Isla Negra region, results from the moisture-nucleating effect of the iodine released by exposed and decaying kelp (Küpper et al. 11612; Leblanc et al. 1774).

Lessonia is heavily fished, representing some three-quarters of the Chilean kelp harvest (Vásquez et al. 417-418). *Lessonia* were historically collected primarily as beach-cast algae, but today they are collected mostly by artisanal fishers using a pry bar that removes the entire holdfast from the rock, preventing the possibility of regeneration. The algae are dried on the beach, bundled, and sold primarily for alginate extraction for the manufacture of detergents, cosmetics, processed foods, and textiles. Chile is the world's dominant extractor of brown algae, which has a global annual export value of over USD 60 million. The Chilean *Lessonia* fishery has increased exponentially since data collection began in the 1980s, and in the last five years averaged 231,801 ±73,854 MT yr⁻¹. The poem does not tell us how this species will survive its fast-growing fishery.

"Alga" is the only *Maremoto* poem in which the persona is identified with the species ("I am the seaweed . . ."). Since Neruda had, at the time of writing, lived through decades of personal and political turbulence and was deeply engaged with the politics and populace of the nation, we speculate that his first-person account of triumphant resilience is something of a self-portrait.

Meaning complexified

A biological perspective on the images and poems also exposes contradictions and perspectives that enrich the reader's experience through differences that arise between the poem and current scientific knowledge ("Sun Star") or between the poem and the image ("Conch Shell"; "Sea Urchin").

Sol de mar / Sun Star

This woodcut illustrates *Heliaster helianthus*, one of the largest, most abundant, and ecologically significant intertidal sea stars in the region (Castilla et al., "Heliaster" 154, 157). (In English as in Spanish, sun star is a common name for sea stars that bear more than the typical five arms.) The poem's persona recounts that:

One day at Isla Negra I found
a sun sleeping in the sand,
.....
I picked up the sandy sun
and raised it to the light,
comparing it to the sun in the sky.

They didn't see each other. (1-2, 6-9)

The non-event of the final line, which translates literally as "They neither looked at nor saw each other" may not seem surprising. After all, seastars don't have conspicuous eyes, and could easily be mistaken for being among "the blind animals of the wave" (4, 3) delivered by the seaquake in the first poem of the volume.

It has been known since the early 1800s, however, that sea stars do perceive light. A seastar's tiny eyes are found at the tip of each arm; in some species the field of view may overlap among arms, giving a 360° visual field (Beer et al. 28). They may also have light receptors in their epidermis, and lens-forming elements in their skeleton (Castilla, "Responses" 495; Vinogradova et al. 83). Some species appear to use their vision to navigate (Garm and Nilson 1). With this photoreceptive capacity, the seastar in the poem could hardly have helped seeing the sun. Did it not because the poet or the persona understood it to be blind? Because it was still (metaphorically) asleep? Because it was moribund? (This rock-dwelling species would not otherwise likely have been "in the sand.") Was it able to see but chose not to? Knowing that seastars do see, and that Neruda would likely have known that, leads to a wider array of possible interpretations of this poem.

Caracola / Conch Shell

The zig-zag zebra-striped snail in this woodcut is unmistakably the high-intertidal periwinkle *Echinolittorina peruviana*. A common rocky-shore species from Panama to central Chile, this tiny animal weighs up to a gram, and reaches only about 2.5 cm in length. The poem, in contrast, features the *caracola*, or conch, a common name for several genera of large marine snails (including the world's largest) that are weighed in kilograms and measured in tens of centimeters. Unlike the woodcut, which shows a snail crawling with antennae extended, the poem recounts the desires of an empty conch shell that "awaits the wind" because:

it wants a black-coloured voice
 that may fill all the distances
 like the piano of the powerful,
 like God’s horn. (3-6)

Conch shells have long been used in many cultures around the world as trumpets for ceremonial, religious, military, signalling, and musical purposes (Montagu 273). In Peru, 3000-year old trumpets carved from shells of the genus *Strombus* have been recovered from the Chavín UNESCO heritage site; blowing them produces powerful reverberating sounds (Rick and Lubman 2366). If a tiny periwinkle shell could be blown in similar fashion, its sound would be barely detectable. Assigning conch-sized aspirations to a diminutive periwinkle makes the shell’s dreams all the more expansive – either aspirational or delusional – and its failure at the end of the poem to have “. . . its silence blown away” (our trans.; 8) all the more poignant. Since Neruda was an avid malacologist and had in his shell collection both *Echinolittorina* and a variety of conch shell genera (Rivadeneira Valenzuela), we suggest that he juxtaposed these two snails for intentional effect.

A similar juxtaposition is found in “Seal”: the image depicts the South American sea lion common in the port of Valparaiso, where Oldfelt Hjertonsson recalls seeing them (*lobo de mar*; family Otariidae). The text, however, refers to a seal (*foca*; family Phocidae), which are not found on the central Chilean coast. Unlike in “Conch Shell,” however, the interpretation of the poem is unaffected by this taxonomic collage as both species frolic playfully in waves, and both could have “the planet’s most penetrating eyes” (13). Loyola (986) speculated that the *Maremoto* poems were written in 1968, and then matched to the woodcuts the following year. Although this possibility could account for these hybrid species pairings, Neruda gave no indication to Oldfelt Hjertonsson that this was the case, and appeared to write each poem expressly for the image. We suggest the alternate hypothesis that the woodcuts of one familiar species inspired the poet to recall another, intentionally in the case of “Conch Shell” and casually in the case of “Seal”.

Erizo / Sea Urchin

Here the species of the woodcut and poem are the same, the Chilean red sea urchin (*Loxechinus albus*), but the perspective is strikingly different. The woodcut shows the animal as a rather nondescript mass of short spines flattened in various directions, much the way it looks when it is lifted from a shipping crate or served on a platter. The poem, in contrast, proceeds like a laboratory manual or a cookbook from the external morphology of a submerged living animal to its coveted inner contents:

The urchin is the sun of the sea,
 centrifugal and orange,
 full of quills like flames,
 made of eggs and iodine.

The sea urchin is like the world:
 round, fragile, hidden:
 wet, secret, and hostile:
 the sea urchin is like love. (1-8)

“Centrifugal” describes the animal’s pentaradial symmetry, its bands of vibrant green

and orange spines radiating from the anus on the top to the mouth on the bottom. In the water, its red tube feet extend beyond the sharp spines and wave with a flickering effect. *Loxechinus* typically hides in crevices, but once extracted its skeleton (“round, fragile”) can be cracked open to reveal its five enormous, “wet, secret” gonads, which are also “centrifugal and orange.” Known gastronomically as tongues (*lenguas*), the gonads can exceed an impressive 80% of the body mass (Pérez et al. 445). They are the rich and raw delicacy, long held to be an aphrodisiac, for which the species is fished, and they smell and taste powerfully of iodine, acquired from the animal’s almost exclusive diet of kelp. Oldfelt Hjertonsen recalls that Neruda was a great fan of urchin gonads, which they enjoyed at the Isla Negra restaurant, Santa Elena. Bringing a biological background to the poem helps us recognize all three perspectives: the unprepossessing animal depicted in the woodcut, and the vibrant symmetrical exterior and luscious hidden interior described in the poem.

Meaning extended

The woodcuts and poems of *Maremoto* depict each species in isolation, removed from its ecological context without competitors, predators, or prey. Knowing the species identifications allows us to place them into the larger ecosystem and fishery contexts that have been elucidated over the last fifty years of scientific research.

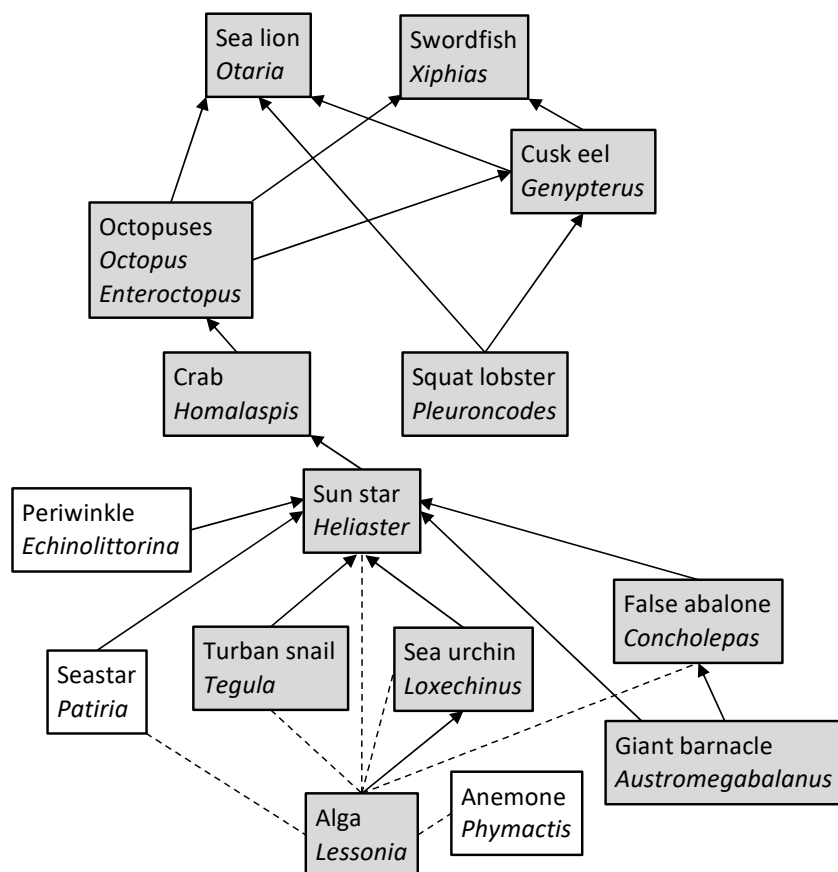


Fig. 3. Ecological interactions among the species of Pablo Neruda’s *Maremoto*. Solid lines represent predator-prey relationships, with arrow leading to predator. Dashed lines indicate taxa that shelter in the holdfasts of the alga. This selection of species is, of course, embedded in a much larger and more complex ecosystem (see text). Shaded boxes indicate species extracted in artisanal or commercial fisheries. Organisms are denoted by genus; full names are listed in Table 1.

All the organisms featured in the *Maremoto* collection are linked to each other through a complex web of ecological interactions synthesized over decades of observational and experimental work (Castilla “Coastal”; Castilla and Durán; Camus et al.; Kéfi et al.; Moreno; Pérez-Matus et al.; Santelices et al.). Figure 3 shows a much simplified version connecting only the focal species. In the intertidal zone, the alga (*Lessonia*) is an ecosystem bioengineer that alters the habitat by reducing incident light, sweeping away larger animals with its whiplashing fronds, and housing dozens of smaller species including the seastars (*Patiria*), gastropods (*Tegula*, *Concholepas*), urchin (*Loxechinus*), and anemone (*Phymactis*) in the cavities of its holdfasts. Through the benthic food web, the alga is consumed by the urchin, which along with the periwinkle (*Echinolittorina*), gastropods, and barnacle (*Austromegabalanus*) is consumed by the voracious sun star (*Heliaster*). The barnacle is also consumed by one of the shell species (*Concholepas*). The sun star is eaten by the crab (*Homalaspis*), which is eaten by two Chilean octopus species (*Octopus* and *Enteroctopus*).

Linking the benthic to the pelagic food web, octopuses are consumed by the three vertebrates (sea lion *Otaria*, swordfish *Xiphias*, cusk eel *Genypterus*). The squat lobster (*Pleuroncodes*) is also eaten by the sea lion and the cusk eel, and the cusk eel is eaten by the swordfish. Although the woodcuts and the poems isolate each species in its own frame, a biological perspective reminds us that these species are inextricably linked to each other. They are also all linked, directly or indirectly, to humans.

Most of the species in *Maremoto* are collected in artisanal or industrial fisheries (Figure 3). Biological insight into this fisheries context is illustrated most tellingly through the image and poem “Shells”:

Empty shells of the sand
that the sea abandoned when it receded,
.....
whitened by so many kisses
from the waves that left to travel. (1-2, 7-8)

At the bottom left of this woodcut is an empty shell of a *loco*, or false abalone (*Concholepas concholepas*). A snail-like animal of rocky intertidal and subtidal shores, the *loco* is famous for its ecological keystone role, and its iconic place in the global history of community-fisheries management. The common name comes from the Mapuche language both for shellfish, and for this species (Castilla et al., “Recolección” 49-50). The scientific name was assigned by one of Chile’s earliest naturalists, the 18th century Jesuit priest J. I. Molina, who characterized it as a meat much appreciated but tough, that needed pounding before cooking (397). A century later, Darwin’s Chilean encounter with the *loco* led him to discover his famous shell-boring barnacle (Barlow 117). *Loco* shells would have been very common on the beach at Isla Negra when Neruda and Oldfelt Hjertson were there, but today those empty shells tell a different story.

The *loco* has long been collected for human consumption: it appears in middens dating back 8–9,000 years (Jerardino et al. 51). Since at least the 1930s, local fishers have extracted *locos* at night using stones baited with crabs, exploiting the animal’s nocturnal habits and keen sense of smell (Castilla et al., “Recolección” 47). With the arrival of hookah diving in the late 1960s, artisanal fleets expanded to a peak extraction of about 25,000 MT by 1980, export returns exceeded USD 50 million yr⁻¹ and a frenzied fishery war was underway among the coastal fleets (Castilla et al., “Telecoupling” 501). When the populations rebounded locally following small-scale

closures, biologists and fishers were prompted to collaborate on co-management plans that led to Chile's first fishery law. Passed in 1991, the law transformed the governance of marine resources by assigning exclusive extraction rights for benthic species to organized coastal communities, and established Chile as a leader in artisanal fishery co-management (Castilla, "Shellfisheries" 56; "Fisheries" 223; Gelcich et al. 16795). In the past decade, industry competition and local fishery organizational problems have translated into reduced *loco* landings: the Chilean average over the last five years was less than 10% of the peak. As the species recovers from over-exploitation, its empty shells are returning to the beach where they can once again be kissed – and abandoned – by their sea lover.

Of the other species, the alga constitutes the largest fishery, with an average of 231,801 MT (± 1 SD 73,854) collected annually to process into alginates used in food, cosmetic, and medical industries. Among the invertebrates, the false abalone, barnacle, urchin, octopuses, and crab are collected for direct consumption. The Chilean red urchin harvest in the early 2000s stands out as the world's largest urchin fishery, constituting more than 50% of global landings and generating over USD 30 million in export earnings annually (Defeo and Castilla 275); today some 30,987 MT ($\pm 11,256$) are collected annually. The turban snail in "Shells" and the sun star are unrecorded fisheries: the former is sold fresh in markets, mostly for empanada filling, and the latter are dried and made into crafts to sell to tourists. Among the vertebrates, the swordfish fishery (5594 ± 662 MT pa) is 86% artisanal: the fish are harpooned individually by a fisher perched in a metal basket at the prow of a small wooden boat, some 8-16 km offshore. The cusk-eel and sierra fisheries are both approximately half that magnitude and are predominately artisanal, via spearguns, long lines, and nets. Sea lions are now protected from commercial harvest, but were hunted for millennia by indigenous coastal populations: along the desert coast of northern Chile and Perú, their skins were sewn shut to make raft pontoon boats (Berenguer 36-38, 63-65). Some are still killed today in bycatch, or illegally. None of the *Maremoto* species are specifically granted conservation status either federally or internationally; the swordfish and sea lion are IUCN-listed as "Least Concern."

Conclusion

This essay offers a contemporary biological perspective on the visual and poetic portraits of marine organisms in *Maremoto*, a collaboration between the poet Neruda and the artist Oldfelt Hjertensson. Knowing that the inspiration for the work was the biota of the central Chilean coast, we identified the majority of the organisms to scientifically-recognized species, reinforcing the sense of place that inspired and informed the work. These identifications enrich the reading of each poem, either deepening its imagery and narrative through the congruence between the natural history of the woodcut/poem and current scientific knowledge, or complexifying it through the juxtaposition of different species, different views of the same species, or a difference between literary representation and current scientific understanding. The identifications also allow us to lift each organism out of its isolated portrait and poem, and extend the meaning of the volume by placing them into the ecosystem web of interspecific interactions that includes human fishers.

The persona of the introductory poem does not express this sense of interconnection, but develops it through the close examination of the central poems, and articulates it in the concluding one. At the outset, the persona is distant and separate from the organisms of the seaquake: "I am mere witness / to the electricity and

splendour / that fill the devouring calm" (our trans.; 5-7). It is in the focused attention to individual species of the central poems that the connection develops.

The fifteen woodcuts bring the organisms to life, and the poems give them agency: they attack and defend; they embody anguish, longing, pride; resilience, love, hope. The persona's gastronomic delight in "Crab" is recognized as the animals' "catastrophe" in "Squat lobster." Human and non-human interact ("Sun star"); eyes lock ("Seal"); identities merge ("Alga"). Empathy builds. A faint hint of protection and conservation ethic emerges: the alga survives the fisherfolk, a pair of swordfish guard the sea, and among the dead fishes, the sea itself "neither dies nor is for sale" ("Fish Market" our trans.). Fishery and conservation themes are familiar from Neruda's earlier works, although the more pronounced gusto (e.g., "Ode to Conger Chowder"), and the intense brutality (e.g., "The Fisherman"), dark lament ("Ode to a Large Tuna in the Market," "Ode to the Tooth of the Sperm Whale," "Leviathan," "La ballenera de Quintay, vacía,") and explicit environmental ethic (DeVries 139-151) are absent from this tender collection.

After the close observation and empathy of the central pieces in *Maremoto*, the persona in the concluding poem is transformed. In "Farewell to the Offerings of the Sea" he bids the organisms adieu, citing obligations to correspondence and to the Chilean citizenry. But in promising to return he announces his kinship with this biota: "I will return, we will return / to the unity / now interrupted," (37-39) and goes on to declare:

I belong to the sand:
I belong to the round sea
and to its flora
and to its fury. (40-43)

Not only has he come to identify with these creatures (switching from "I" to "we"); he has come to belong to them. This depth of connection was authentic to Neruda, whose poems responded to the woodcuts and were informed by his profound knowledge of the species. In surfacing the biological knowledge embedded in these poems, we have offered contemporary scientific "portraits" to accompany the original artistic and poetic ones.

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Table 1. Organisms of Pablo Neruda’s *Maremoto*. Poem Title in English and in Spanish. Page numbers are given for the English translation by Jacketti and Maloney; our translations are given square brackets. Identification gives the Latin name (genus, species, taxonomic authority) and the Major taxa in which it is classified. Common Name gives the Spanish names used in Chile and the English names used in field guides and fishery databases. For woodcuts with multiple species, the organisms are listed by location in the image; when the woodcut and poem feature different species, both are listed.

Poem Title		Identification		Common Name	
English (page)	Spanish	Latin name	Major taxa	Spanish	English
[Barnacle] (83) ¹	<i>Picoroco</i>	<i>Austromegabalanus psittacus</i> (Molina, 1788)	crustacean: cirripede	<i>picoroco</i>	Chilean giant barnacle
The Bronze Dolphin (88) ²	<i>Delfin de bronce</i>	--	--	--	--
Conch Shell (86) woodcut	<i>Caracola</i>	<i>Echinolittorina</i> (= <i>Littorina</i>) <i>peruviana</i> (Lamarck, 1822)	mollusc: gastropod	<i>caracol turbante</i>	periwinkle
poem		unspecified conch (genera <i>Strombus</i> , <i>Turbinella</i> , <i>Charonia</i>)	mollusc: gastropod	<i>caracola</i>	conch
[Crab] (88) ³	<i>Jaiva</i>	<i>Homalaspis plana</i> (H. Milne Edwards, 1834)	crustacean: decapod	<i>jaiva (or jaiba) mora</i>	giant stone crab
Fish Market (91) ⁴ woodcut left	<i>Pescadería</i>	<i>Xiphias gladius</i> Linnaeus 1758	bony fish	<i>albacora</i>	swordfish
woodcut right		<i>Genypterus</i> spp. Philippi 1857	bony fish	<i>congrio</i>	cusk-eels
Octopus (89)	<i>Pulpos</i>	octopus, generic	mollusc: cephalopod	<i>pulpo</i>	octopus
Sea Anemone (87)	<i>Anémona</i>	<i>Phymactis papillosa</i> (Lesson, 1830)	cnidarian: anthozoan	<i>potos del mar</i>	anemone
The Sea Urchin (84)	<i>Erizo</i>	<i>Loxechinus albus</i> (Molina 1782)	echinoderm: echinoid	<i>erizo rojo, erizo del mar, erizo comestible</i>	edible red sea urchin
Seal (87) ⁵ woodcut	<i>Foca</i>	<i>Otaria byronia</i> (de Blainville, 1820) [also known as <i>O. flavescens</i> (Shaw 1800)]	mammal: pinniped	<i>lobo común</i>	South American sea lion

poem		unspecified seal	mammal:	<i>foca</i>	seal
Seaweed (84)	<i>Alga</i>	<i>Lessonia spicata</i> (= <i>L. nigrescens</i> in part) (Suhr) Santelices 2012	pinniped chromist: phaeophyte	<i>chascón</i>	Chilean kelp
Shells (85) ⁶ lower left	<i>Conchas</i>	<i>Concholepas concholepas</i> (Bruguère, 1789)	mollusc: gastropod	<i>loco, chanque,</i> <i>tolima</i>	false abalone
lower right		<i>Tegula atra</i> (Lesson, 1830) or <i>T. tridentata</i> (Potiez & Michaud, 1838)	mollusc: gastropod	<i>caracol negro</i>	turban snail
[Squat Lobster] (86) ⁷	<i>Langostino</i>	<i>Pleuroncodes monodon</i> (H. Milne Edwards, 1837)	crustacean: decapod	<i>langostino</i> <i>colorado</i>	carrot squat lobster
Starfish (85)	<i>Estrellas</i>	<i>Patiria chilensis</i> (Lütken, 1859)	echinoderm: asteroid	<i>pata manchada</i> <i>de pato</i>	Chilean bat star
[Sun Star] (89) ⁸	<i>Sol de mar</i>	<i>Heliaster helianthus</i> (Lamarck, 1816)	echinoderm: asteroid	<i>sol de mar</i>	sun star
Swordfish (90)	<i>Albacora</i>	<i>Xiphias gladius</i> Linnaeus 1758	bony fish	<i>albacora</i>	swordfish

1 This title is rendered as “The Picoroco” in the English edition; we translate it as “Barnacle” (Wonham & Castilla in prep.).

2 The bronze dolphin was a figurine in Neruda’s Isla Negra home. It is a widespread artistic motif that more closely resembles a fish than a mammal.

3 This title is not translated in the English edition: we translate it as “Crab.”

4 In the woodcut, Oldfelt Hjertsonsson recalls that the fish on the far left were swordfish. Of the common fish in today’s markets, they most closely resemble snoek (*Thyrstites atun* [Euphrasen, 1791]), although it is their lower jaw, not the upper one as in the image, that protrudes. The two fishes in the middle are hard to identify definitively: the one on the left plausibly resembles *Isacia conceptionis* (Cuvier, 1830) (*cabinza*, cabinza grunt) and the one on the right perhaps *Cheilodactylus variegatus* Valenciennes 1833 (*bilagay*, *pintacha*; Peruvian morwog) (A. Pérez-Matus, pers. comm.). The crab shown at the bottom is the same as that in “Crab.”

5 The poem title is “Seal,” but the woodcut shows a sealion. The former are absent on the central Chilean coast, whereas the latter are common. They are classified in different pinniped families.

6 In the woodcut, the uppermost shell is a product of the artist’s imagination, with no corresponding species identification.

7 This title is rendered as “Crayfish” in the English edition; we translate it as “Squat Lobster” (Wonham & Castilla in prep.).

8 This title is rendered as “Sun of the Sea” in the English edition; we translate it as “Sun Star” (Wonham & Castilla in prep.).