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Seaweeds in mythology, folklore, poetry, and life

José Lucas Pérez-Lloréns[1] · Ole G. Mouritsen[2] · Prannie Rhatigan[3] · M. Lynn Cornish[4] · Alan T. Critchley[5]

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Abstract
Seaweeds have been around since well before the dawn of mankind and have had varying degrees of influence on societies throughout history. Today, they have a well-established position of value after much scientific endeavour and commercialisation of applications. In the distant past, however, seaweeds were seen as a fundamental component of the sea and the beings associated with it, and they also held an essential connection to the land and the people who dwelt there. In the absence of science, myths and legends typically prevailed, and in the case of seaweed science today, many kernels of truth have now been exposed. This review traces myths and legends and some poetry which has been influenced by macroalgae over the ages, and it describes some of the early uses of seaweeds by humankind across the globe. With such a prominent role in the minds and imaginations of story tellers, artists, musicians, and poets, seaweeds command a position of respect in the evolution of ecological goods and services. While not strictly scientific, the information reviewed and laid out in this article underpins some of those uses of seaweeds that have now been established following thorough evidence-based research. Such research leads to a myriad of values of the goods and services rendered by seaweeds and their extracts, providing significant benefits to mankind, both currently, and into the future. Seaweeds were around well before the Anthropocene and are very likely to survive and contribute to global survival much longer than this current epoch.

Keywords Seaweeds · Myths · Legends · Folklore · Poetry · Ethnophycology

Introduction

The algae, this hodgepodge of autotrophs, ranging from unicellular microalgae to the first multicellular, macroscopic marine organisms, the macroalgae, provide the greatest portion of the earth's photosynthetic capacity. As such, the algae dominate in the production of the earth's oxygen upon which humankind depends (Chapman 2013). Besides this primordial and indispensable service to the aerobic life forms of the Earth, seaweed (and seagrass) beds also provide a myriad of ecosystem goods and services whose economic value has been estimated to be about US$ 3.8 billion per year which, compared to the US$ 4.7 billion from terrestrial forests, is not a negligible figure (Costanza et al. 1997). Since terrestrial forests occupy an area almost 25 times greater, and if we recalculate the figures per unit surface area, the value of marine vegetation (i.e. US$ 19,000 ha^{-1} $year^{-1}$) is almost 20 times higher than that of land forests (i.e. US$ 969 ha^{-1} $year^{-1}$) (Pérez-Lloréns et al. 2018). Among such ecological goods and services are multiple and various uses that humans have

✉ José Lucas Pérez-Lloréns
joselucas.perez@uca.es

Ole G. Mouritsen
ole.mouritsen@food.ku.dk

Prannie Rhatigan
irishseaweedkitchen@gmail.com

M. Lynn Cornish
lcornish@acadian.ca

Alan T. Critchley
alan.critchley2016@gmail.com

[1] Instituto Universitario de Investigación Marina (INMAR), Universidad de Cádiz, Av. República Saharaui s/n, 11510 Puerto Real, Cádiz, Spain

[2] Department of Food Science, Taste for Life, Design and Consumer Behaviour, University of Copenhagen, 26 Rolighedsvej, DK-1958 Frederiksberg, Denmark

[3] Irish Seaweed Kitchen, Streedagh House, Streedagh, Grange, Co. Sligo, Ireland

[4] Acadian Seaplants Limited, James S. Craigie Research Centre, Cornwallis, NS B0S1A0, Canada

[5] Vesrchuren Centre for Sustainability in Energy and Environment, Cape Breton University, Sydney, Nova Scotia, Canada

made of seaweeds. Since very ancient times, various seaweeds have been used in medicine, as a staple food, raw material for obtaining different products such as phycocolloids, iodine, and calcium carbonate, for the fertilisation and/or conditioning of fields, or as fodder for livestock (Chapman 1950; Mouritsen 2013; Pérez-Lloréns et al. 2018). Other curious traditional uses include mattress fillings, roof construction, wall insulation, knife handles, musical instruments, contraceptive devices, baby teethers, hygrometers, fire-crackers, fishing lines, baskets, dolls, jugs, jewellery, and buttons. As an anecdote, the Roman emperor Julius Caesar, in his book *Commentaries* (50 BCE), described how he won a crucial battle because he fed his hungry horses with dry seaweeds when the grain supply was running out. Also, in ancient Roman warfare, *tortoises* or *testudos* (mobile siege sheds) were covered with a double layer of fresh hides, which were stuffed with brown seaweeds or chaff to serve as protection against incendiary missiles (today it is known that alginates have natural, non-flammable properties) (O'Connor 2017; Pérez-Lloréns et al. 2018).

Although seaweeds have been used, mostly by coastal inhabitants, since ancient times, there are important contrasts between Eastern and Western countries regarding the respective appreciation towards seaweeds. In the Eastern world, they were very much valued, even revered, and included in the daily menus, as well as a means to pay taxes to the court of the Japanese Emperor, or as a present for guests (Mouritsen 2013). In the year 600 BCE, the Chinese scholar Sze Teu wrote: 'some seaweeds are a delicacy for the most honourable guests, even for the king himself'. Seaweeds were so respected that they constituted one of the Twelve Symbols of Sovereignty painted or embroidered on official robes worn by the Chinese emperors, as such they symbolised brightness and purity (O'Connor 2017). In contrast, seaweeds in most of the Western world (i.e. Europe and North America) did not enjoy the same elevated status. Their consumption was often synonymous with penury and frugality. Apparently neither the Greeks nor the Romans seemed to be too keen on them, if we consider some of the opinions of famous characters of the time: *immo ego Sardoniis videar tibi amarior herbis*, *horridior rusco*, *proiecta vilior algâ* (translated as: you would sooner think of me as more bitter than the grass of Sardinia, rougher than butcher's broom, and more vile than the seaweed thrown up by the sea) (Bucolic VII, Virgil, 70 BCE); *et genus et virtus*, *nisi* cum *re*, *vilior algâ est* (translated as: high birth and meritorious deeds, if not linked to wealth, are as useless as seaweed) (Satires II, v8 by Horace, 65 BCE) or *refunditur algâ* (translated as: the sea detests seaweeds and casts them ashore) (anonymous) (Pérez-Lloréns et al. 2018). Indeed, just the name, made up of the combination of 'sea' and 'weed' conjures an image of smelly, slimy and rotting masses stranded on beaches. This is in marked contrast to 'kaisō', a generic Japanese term for any edible seaweed derived from 'kia' (ocean), to denote a highly appreciated source since ancient times, or 'hǎicǎo' in China, used metaphorically as a great compliment (Nishizawa 2002).

Currently, it seems that many seaweed goods and services are being discovered or perhaps re-discovered: e.g. from an environmental perspective, they are used as biological filters to remove excess nutrients from effluents in aquaculture facilities (Troell et al. 1999); as biological indicators of the water quality (Juanes et al. 2008); as candidates in mitigating climate change by removing excess carbon dioxide (Sondak et al. 2017); and in lowering methane emissions (and alleviating global warming) by reducing farting and burping by certain herbivorous livestock when added to the fodder (Machado et al. 2016). Seaweeds are also used in healthcare, wellness, or nutrition, as a source of bioactive molecules, nutraceuticals, cosmeceuticals, etc. (Duan et al. 2019; Shannon and Abu-Ghannam 2019). Because of their comprehensive nutritional profiles, singular organoleptic characteristics, and the fact they lend themselves to sustainable cultivation, seaweeds are becoming more and more trendy in the haute-cuisine of Western countries. Their innovative utilisation as such is practised in the world-renowned restaurants Noma (Denmark), Boragó (Chile), and by the 4-star Michelin chef Ángel León of Aponiente (Spain), winner of the Michelin's inaugural sustainability award in 2019 (Mouritsen et al. 2018, 2019; MacCaferty 2019; Pérez-Lloréns 2019). In fact, eating sustainably and greener are the principal aims of the Eat-Lancet Commission report on the conditions for providing a sustainable, healthy, and nutritious diet for a global population of 10 billion in 2050 (Willett et al. 2019). Seaweeds will have to be part of the realisation of more sustainable eating in the future.

This review provides readers with some insight into the historical background to this polyphyletic group of marine, multicellular macro-autotrophs called the seaweeds. The following are non-scientific reflections and selections from the wider literature (no, indeed not nonsense!). The paper explains how macroalgae have played a role in the lives and psyche of Humankind and how this has manifested itself in myths, legends, poetry, and song, these all being fore-runners to the enlightened age of phycological and phyconomic endeavour. Indeed, seaweeds for their pure aesthetics and artistic renditions of the frequent hardships, as well as the romance associated with them have been made into great art, particularly in paintings, writings, and some songs (Becker 2001; Hunt 2005). Unfortunately, not all of these will be dealt with here. The prefix phyco- has entered into the modern lexicon as pertaining to things algal, more often seaweed-related, i.e. phyco-geography, phyco-gastronomy, phyconomy, and phyconometrics. Perhaps some of the evolution of the stories around the myths and legends is their origin in the oral and written languages of the many different cultures which were first disseminated as oral stories (and we all enjoy a good

yarn? It was a dark and stormy night …); but many stories have a basis in facts. Some of these likely manifested as indigenous know-how or ethno-botanic knowledge, highlighting pre-existing links and a chain of information leading to the knowledge of seaweeds and their benefits, eventually being written down. We have much to thank our forebears for. These are perhaps now known as 'old-wives' tales'—but how much science has proven there are elements of fact, once we begin to study and reveal the inner truths? Likely there are many more discoveries and applications of selected seaweeds to come. It is beneficial that as fundamental and applied phycologists and adaptive phyconomists we appreciate some of the myths and legends of seaweeds that have perhaps brought us to where we are today.

Mythology, myths, and legends

Mediterranean world

Although seaweeds were not greatly appreciated in ancient Mediterranean cultures, they were associated with some of their deities and myths. The Greek god Nereus, father of the Nereids (the beautiful sea-nymphs), was a venerable elder inhabiting a gorgeous grotto in the depths of the Aegean Sea. He had the gift of divination and could turn himself into any form. He is depicted with seaweed hair adornment and a sceptre or trident (Westmoreland 2006). Triton, Poseidon's son, has a fishtail covered in fine scales and green seaweed is to be found along his body. He was a merman who owned the depths of the sea, blowing his shell-trumpet, either to frighten giants during war, or to raise or lower the waves (Westmoreland 2006). Thalassa, the primordial Greek goddess of the sea, the origin of fishes and other sea creatures, can be found to be represented in Greco-Roman mosaics as a matron half-submerged in the sea, with seaweeds for clothes, crab-claw horns, and a boat's oar in her hand (Smith 1853). Neptune as the Roman monarch of the sea was supposed to take possession of the deep, and all the treasures which the stormy winds sent to his domain (De Vere 1843):

> Yet more, the depths have more! Thy waves have rolled,
> Above the cities of a world gone by!
> Sand hath filled up the palaces of old,
> Sea-weed o'er-grown the halls of revelry.
> Dash o'er them, ocean! In thy scornful play!
> Man yields them to decay.

Salacia, a Roman goddess of the sea used to be portrayed as a charming nymph, crowned with seaweed and enthroned beside Neptune (her consort) driving a pearl shell chariot pulled by sea-horses, dolphins, or other fantastic creatures of the deep, and attended by Nereids and Tritons (Smith 1853).

The Greek fisherman Glaucus discovered by chance a magical seashore plant that could bring back to life his catches. He became immortal after eating the herb, but it also fostered the growth of a fish tail and fins forcing him to dwell forever in the sea (See 2014). His appearance was described by Philostratus the Elder (Fairbanks 1931):

> Ah, the breast! What a shaggy covering of seaweed and tangle is spread over it like a coat of hair; while the belly beneath is undergoing a change and already begins to disappear.

Glaucus was in love with the beautiful nymph Scylla but Circe, the goddess of sorcery, urged him to forget Scylla and turn to her instead. Glaucus, shocked, affirmed: 'As long as Scylla lived, and until the grass grew on the ocean floor and seaweed rested on the mountain-tops, I will always be loyal to Scylla' (Fairbanks 1931) (Fig. 1).

The Greek god of love, the sleeping Eros, was also represented with a seaweed cladding: 'Of old on sea-washed rock my home was in the deep. With the luxuriance of sea-weed clad' (Douglas 1928). Dionysus, the Greek god of wine, was given safe refuge by the Nereid Thetis within a seaweed bed when he was thrown out of Thrace by the King Lycurgus (Hansen 2005).

Probably, the most beautiful myth involving seaweeds in the ancient Mediterranean world is that of the Gorgon Medusa and the Greek hero Perseus. This was used to explain how coral in the Red Sea was created: Perseus, after decapitating Medusa's head, washed his hands, and to safeguard the head, it was laid down on some seaweeds on the rocky shore of the Red Sea. The gorgon's blood was spilled onto the seaweeds, and the mysterious power of the head metamorphosed the affected seaweeds into hard coral (this myth also conferred

Fig. 1 Scylla and Glaucus (from Ovid's Metamorphosis, 1606) (Public Domain, https://bit.ly/33ZMGSS)

magical powers to the coral resulting in a high demand for pieces of it throughout the ancient world). Ovid wrote how the Sea Nymphs spread coral through the ocean's waters (Tarrant 2004):

> Be bruised on the hard shingle, [Perseus] made a bed
> Of leaves and spread the soft seaweed of the sea
> Above, and on it placed Medusa's head.
> The fresh seaweed, with living spongy cells,
> Absorbed the Gorgon's power and its touch
> Hardened, its fronds and branches stiff and strange.
> The sea-nymphs tried the magic on more seaweed
> And found to their delight it worked the same,
> And sowed the changeling seeds back on the waves.
> Coral still keeps that nature; in the air
> It hardens what beneath the sea has grown
> A swaying plant, above it, turns to stone.

Seaweeds were also cited in the Strasbourg papyrus (attributed either to Archilochus or to Hipponax), considered a Eucharistic prayer that started with a blessing for Creation (Jasper and Cuming 1975):

> Drifting about in the swell;
> When he comes nude to Salmydessus, may the kind
> Thracians, their hair in a bun,
> Take him in hand– there he shall have his fill of woe,
> Slavishly eating his bread
> Stiff with the freezing cold; emerging from the froth,
> Clung to by piles of seaweed.

Seaweeds are also mentioned in the Bible in relation to Jonah (and the whale): 'The waters engulfed me up to the neck; the watery depths overcame me; the seaweed wrapped around my head'. It has even been said of Leviathan, the Biblical creature in the form of a sea monster from Jewish belief (Landsborough 1857):

> Now, though the monsters of the deep live not on sea-weeds, they live on creatures which in their turn live on those minute animals that fix on sea-weeds, both as their food and habitation.

The Celtic world

In old Celtic culture, there were also gods/goddess and myths related to various seaweeds. In contrast to the Greco-Latin world, most of these myths involved a huge variety of creatures (good and evil) and those legends have been used to frighten people, especially children.

Manannan mac Lir (in Ireland) or Manawyddan (in Wales) was a sea-god that dwelt in a sea palace, rode a chariot of seaweeds pulled by horses made from the foams of the largest waves. He could whip up the ocean's waters or make them calm. Driving his chariot through the waves, he left in his trail a field of flowers. The white caps of the waves became flowering shrubs and the seaweeds then turned to fruit trees (Joyce 1906). The female merrows (Moruadh or Murrúghach in Irish) were beautiful mermaids, green-skinned with seaweed hair wearing a red cap (called a cohuleen druith) usually covered with feathers. If this was stolen, they could not live submerged under the waves (Yeats 1993). Gwydion, a magician of Welsh mythology, in one of his adventures conjured up a haunted boat built from red seaweed and kelp so as to sail un-opposed into the port of the castle of his enemy, the Queen Aranrhod (Freeman 2017).

The crodh sidhe ('fairy cow') from the Scottish Highlands was a breed of affable fairy-cow. Dwelling on seaweeds, this creature would sometimes join up with a mortal herd to improve the stocks quality but eventually, it would always return back to its sea home (Bane 2016).

The each-uisge was a lethal shape-shifting creature from Scottish folklore that lived in the sea and sea lochs. If it was ridden when in horse form, its skin became glue and it dove into the water. Once the victim was drowned, the creature tore him apart and ingested the whole body excepting the liver, which floated to the surface. In its human shape, it looked like a handsome man, being only recognisable by the seaweeds or copious sand and mud in its hair. Because of this, the Highlanders were often cautious of solitary animals and strangers by the water's fringe, near where this creature was supposed to dwell (Rosen 2009).

A tangie was another shape-shifting sea creature in the folklore of the Orkney and Shetland Islands that took the appearance of either a horse or an elder. Usually described as being covered with seaweed, its name derives from 'tang' (black tang, is one of the common names for *Fucus vesiculosus*). 'Tang' is from the old Norse word *þang* that means something longish. It is known for frightening solitary travellers, especially young women at night on sidewalks near the lochs, who it kidnapped and then devoured them under the water (Monaghan 2008).

However, the most malicious monster of the Scottish islands was the nuckelavee (Fig. 2). With roots in Norse mythology, it was depicted as a kind of skinless centaur; it had an exaggeratedly wide mouth, a pig-like nose that snorted vapour, and one big blood-shot eye in the middle of its front. Its body was coated in thick yellowish veins that impelled its black blood. Nuckelavee was the bane to all living creatures. Should it breathe upon a person, he would start to wither up and perish. It triggered epidemics and droughts on land despite being mostly a sea-inhabitant. This creature was repelled by the odour of burning seaweed, which was frequently collected and burnt as a safeguard. During summer, it was locked away by Mither

Fig. 2 Nuckelavee (Public Domain, https://bit.ly/347xXFx)

O'the Sea, the Orcadian concept of Mother Nature (Marwick 2000).

A Scottish myth tells that on the day of Saint Columba, at night time, people from Lewis Islands (Hebrides) poured libations and invoked the sea deity Shony (Seonaigh, in gaelic) to ensure a good harvest of seaweed (Martin 1703):

> Shony, I give you this cup of ale hoping that you will be so kind as to give us plenty of sea-ware [seaweeds] for enriching our ground the ensuing year.

In the book *Carmina Gadelica*, it is reported with great joy that the arrival of seaweeds produced, in a way of a 'praise hymn' where Celtic Saints and heroes were cited (Carmichael 1900):

> Come and come is seaweed,
> Come and come is red sea-ware
> Come is yellow weed, come is tangle,
> Come is food which the wave enwraps
> Come is warrior Michael of fruitage
> Come is womanly Brigit of gentleness
> Come is the mild Mother Mary
> And come is glorious Connan of guidance.

Nordic culture

A draugr (ghost in Norse) was a monster-like, huge sea creature with supernatural strength (Fig. 3). It was described as being black as hell and bloated to the size of a bull, its body covered with curly hair and seaweed and its testicles and penis were also noted as being oversized. It emitted a horrible scream when he emerged during stormy nights at sea, drowning fishermen and sailors, and sinking their boats. There is a draugr story that took place on Christmas Eve back in 1857 (Bane 2010):

> On the Norwegian Isle of Lurøy, all the farmhands were celebrating the holiday. When they ran out of drink, everyone was too afraid to go out to the boathouse to retrieve more alcohol for fear of encountering a draugr (except for a young boy). He made it there, filled his jug, and on the way back to the celebration, a headless draugr confronted him. The boy attacked the draugr, knocking it off balance, which gave him just enough time to escape. As the boy ran for his life, he looked back over his shoulder and saw that not one but a great number of draugr were rising from the sea behind him, ready to give chase. The boy pressed on and jumped over the churchyard wall, hollering as loudly as he could, "Up, up, every Christian soul, save me!" As he landed in the churchyard, the church bell tolled the midnight hour and draugr began to rise from the earth. Within moments the two species of draugr were engaged in battle. The land draugr clutched the wood from their coffins to use as weapons; the sea draugr made whips of their seaweed. The boy fled to the servant quarters and told the tale of what had happened.

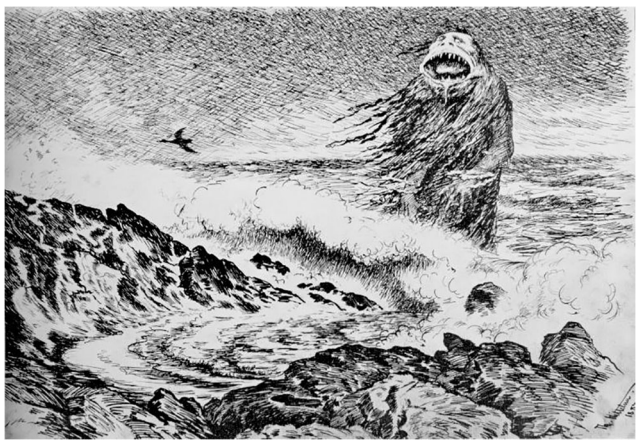

Fig. 3 Draugr (Public Domain, https://bit.ly/2UR7w2P)

> Christmas morning everyone looked to the graveyard. It looked like a battlefield. Bits of broken coffins, seaweeds, jellyfish, and slime were everywhere.

The Norse god (both good and bad) of the ocean was Aegir who could trigger tempests with his fury. He was crowned with seaweed and always accompanied by nixies (water fairies) and mermaids while in his hall. Aegir and his wife (Ran) dwelt beneath the ocean and they had nine daughters: the waves. Aegir brewed ale for the gods after Thor (the god of thunder) brought him a huge kettle. Early Saxons made human sacrifices to a god of the sea, possibly connected with Aegir (Simek 2008).

In the Icelandic Saga of Egil Skallagrimsson, which dates from the tenth Century, seaweeds (in this case, the red alga dulse, *Palmaria palmata*) were described in such a way that one gains the impression that they were something that could impart renewed vitality and love of life. The section of the saga below deals with the story of how Thorgerd, Egil Skallagrimsson's daughter, hoodwinks her father into eating dulse when he is going to starve himself to death after his son's unfortunate demise. After this episode, Egil kept his bedroom locked and lay for days ingesting neither food nor drink (Eiriksson 2004):

> Thorgerd went to the door of Egil's bedroom and called out, "Father, open the door, I want both of us to go the same way". Egil opened the door. Thorgerd walked into the bedroom and closed the door again. Then she lay down in another bed that was there. Then Egil said, "You do well, my daughter, in wanting to follow your father. You have shown great love for me. How can I be expected to want to live with such great sorrow?" Then they were silent for a while. Then Egil said, "What are you doing, my daughter? Are you chewing something?" "I am chewing dulse", she replied, "because I think it will be making me worse. Otherwise I expect I shall live too long". "It is bad for you?", asked Egil. "Very bad", said Thorgerd. "Do you want some?" "What difference does it make?", he said. A little later she called out for something to drink, and she was brought some water. Then Egil said, "That happens if you eat dulse, it makes you even thirstier". "Would you like a drink, father" she asked.
>
> She passed him the animal horn and he took a great draught. Then Thorgerd said, "We've been tricked. This is milk". Egil bit a lump from the horn, as much as he could get his teeth into, then threw the horn away. Then Thorgerd said, "What shall we do now? Our plan has failed".

And so, it was that Egil composed his famous funeral verse, *The Loss of Sons.*

The Americas

Caribbean and Central America

Awonawilona was a myth of the Zuni people (New Mexico). Awonawilona created the universe, fertilised the ocean with his own flesh, hatching it with his own heat. He personified the sun and created the deity the Sun-father, which led to the formation of several other gods from green seaweeds thriving over the sea (Spence 1914).

During the discovery of the New World, Christopher Columbus encountered enormous floating masses of *Sargassum* in the so-called Mar de los sargazos or Grassy Sea. Sailors, superstitiously considered this complication as a sign that their mission: 'had not received the sanction of the Almighty' (Landsborough 1857):

> When about 400 leagues to the west of the Canaries, he found the sea so covered with weeds, that it resembled a meadow of vast extent, and in some places they were so thick as to retard the motion of the vessels. This strange appearance occasioned new alarm and disquiet to the sailors. They imagined that they were now arrived at the utmost boundary of the navigable ocean, that these floating weeds would obstruct their further progress, and concealed dangerous rocks, or some large tract of land, which had sunk, and they knew not how. Columbus endeavoured to persuade them that what had alarmed, ought rather to have encouraged them, and was to be considered as a sign of approaching land.

Regarding the Sargasso Sea, Captain CC Dixon also wrote (Dixon 1925):

> Moonless, windless, silent nights in this weed-strewn sea became nights of horror. Who could know whether this weed got thicker and thicker till there was no turning back? Its changing tints and shadows as daylight faded and at the approach of dawn needed but little help from the imagination to be wrought into fearsome monsters that inhabited its depth and whose very appearance would steal away one's sanity.

South America

The Huilliche, a branch of the Mapuche people at the archipelago of Chiloé (Chile), have the myth of 'La Pincoya' (Fig. 4). It is a gorgeous young woman with hair covered in kelp, and who is highly respected by fishermen. If she dances

Fig. 4 'La Pincoya' with seaweeds around her body (Public Domain, https://bit.ly/3dISHYB)

facing the ocean, catches will be copious; but if dancing is towards land, the nets will be empty. When she appears to someone, they must close their eyes and run; otherwise, she will seduce them and drag them down to the seabed (Andrade and Nieto 2014).

Another mythological creature from these islands is the Chilota. This is a water horse with a golden mane, four fin-shaped legs and a long tail resembling that of a fish. Seaweed is its main foodstuff, mostly luche (*Porphyra*) and cochayuyo (*Durvillaea antarctica*), which confers this creature its characteristic dark yellowish green colour. Chilota can only be seen and ridden by sorcerers. When the sorcerer needs its services, he approaches the seashore and calls it by four special whistles. When the creature arrives, the sorcerer attaches it with a rope made of *Sargassum*, and after that, he must pat his legs to be able to climb the soft back of the animal and give him the order to slide quickly behind the Caleuche (a ghost ship), leaving a trail along the water surface. Since the sea horses have a short life of only four years, they die and become jelly that dissolves in the sea; the sorcerer must then capture and tame another sea horse (Molina Herrera 1950). Another mythological creature from Chiloé Islands is the Camahueto. It looks like a green calf, with a small golden horn on its head (very appreciated by shamans because of its magical and medical powers), and having sharp claws and teeth; it spends its youth in marshes and shallow lakes, but as an adult migrates to the sea. During its migration, the Camahueto destroys gardens and landscaping. Only a shaman can safely drive the creature to the ocean by wrapping kelp around his neck and leading the way. Once the Camahueto has reached the sea, it is feared because it causes shipwrecks (Bingham 2004).

North America

Marine plants play an important role in the traditions and legends in the Northwest Coast people, specially *Nereocystis luetkeana* (bullwhip kelp) by its majestic appearance. In Haida folklore, a double-headed bullwhip kelp indicated the entrance to the house of a supernatural chief under the sea, and anyone who could follow it down to the seabed and meet the supernatural people there was destined to increase power, respect, and good luck when they went back to their town of origin (Turner 1995) (Fig. 5). A central figure in Haida, Tsimshian and Tlingit (First Nations) mythology is the Raven (Yehl or Txamsen) myth. It created man, triggered the plants growth, and set the sun, moon, and stars in the Universe. It brought

Fig. 5 Mythological depiction of bullwhip kelp (*Nereocystis luetkeana*) by Giitsxaa, a Haida artist from the Pacific coast of British Columbia

also the fire to the people and contributed to create the Haida land (Judson 1917):

> Raven went northward on the surface of the sea. Far out at sea a big kelp was growing out of the water, but the kelp head was gone, and many sparks came out of it. It was the first time that Raven has ever seen the fire. [...]. Raven stood up. His cradle was floating against a kelp with two heads. He stepped upon it, and behold! It was really a two-headed house pole made of stone. [...]. In the back part of the house sat old Sea-Gull Man. He took two pieces and showed them to Raven [...]. Then the pieces stuck. These were going to become land. He put this into the water, and it stretched itself out and became Haida country. Of the other piece he made the Seaward Country—the mainland.

The most respected and secret society of the Kwakwaka'wakw (Indigenous people of the Pacific Northwest Coast) is the Hamatsa. In ancient times, the nutamat (or fool dancers) were Hamatsa ritualists who participated in the Winter Spirit Dances wearing masks and moving as if mad. Today, in Potlatch ceremonies, the nutamat wear masks and may use a grey blanket which hides a pocket containing pieces of green seaweeds, which are then thrown at visitors and sometimes wiped on certain people (Glatzer 2014). Kelp was also employed in dramas that were represented in the big houses of the Kwakwaka'wakw and other coastal peoples as part of the Winter Ceremonials. A long, hollow kelp stipe was buried under the earth in the floor of the house, from the outside of the wall leading right to the fireplace in the centre. Somebody standing outside the house could chant or yell into the kelp stipe, and it would sound surprisingly like someone, or someone's spirit, was calling from the fireside. This was just one of many theatrical tools natives used to bring their rituals and dances to life, and to give them dramatic effect (Turner 1995).

Another example of the important role of marine plants for the First Nation peoples was the case of a brown seaweed, the sea palm (*Postelsia palmiformis*). This seaweed was highly valued for its strength and flexibility. In ancient times, some Pacheedaht ('peoples of the sea foam') made a salve from the stipes of the seaweed by drying them in the summer, then burning them, powdering the charcoal, and mixing it with raccoon bone marrow. Newborn babies who were predestined by birth, or inheritance, to be whale hunters would have their backbone rubbed with the charcoal from the burnt sea palm to make them strong and resilient. This was said to make the child strong and as tough as the sea palm, which is able to withstand the continuous pounding of the open North Pacific surf. The ashes could also be rubbed on the face of a person having convulsions or mixed with water and taken for a medicinal purpose (Turner 1995).

Sedna: mistress of the underworld is a very popular Inuit tale involving seaweeds. The beautiful girl Sedna made the error of marrying a crooked seagull, which starved her. After a long winter, her father freed her, but afraid of the screaming, pursuit of the seagull, he threw her out of their kayak. As Sedna hung to the side, her father cut off her fingers with his axe. In the water her fingers turned into fishes, seals, and deep-sea creatures. Finally, Sedna fell with a cry of agony into the ocean and her body sank. There, she transformed into a sea goddess, nourishing the local people, but only when they helped her by combing her tangled seaweed hair, since she could no longer do it herself. The Inuit pray to her for good fishing and calm waters (Frankel 2010).

Oceania

New Zealand

In Maori mythology, the origins of seaweed use are to be attributed to Hine-Moana, the incarnation of the ocean and the second wife of Kiwa (one of several divine guardians of the ocean). Seaweeds grew attached to Rakahore and Tuamatua, who symbolised rocks and stones, providing shelter for the other progeny of Hine-Moana: several fish species, eels, cockles, molluscs, oysters, sea-urchins, and octopus. The seaweeds were Rimu-rapa (bull kelp), Rimu-tarake, Rimu-rurupu, Rimu-rapa-a-tai, Rimu-wawatai, Rimu-hoka, Rimu-pipiwai, Rimu-kawekawe, Rimu-kopuku, Rimu-puhi, Rimu-piroriki, Rimu-tatara, Rimu-rehia, Rimu-raupiri, Rimu-kopuwai, and Rimu-toheriki (Best 2005).

Whangai is a traditional Maori practice of child adoption. Its origins can be found in the myth of Primordial Children, Maui (or Maui-titikitiki-a-Taranga), the child god of the Polynesians (Fig. 6); he told of his own birth (Carter et al. 2018):

> I was borne at the side of the sea, and was thrown by you [Taranga, his mother] into the foam of the surf, after you had wrapped me up in a tuft of your hair, which you cut off for the purpose; then the seaweed formed and fashioned me, as caught in its long tangles the ever-heaving surges of the sea rolled me, folded as I was in them, from side to side; at length the breezes and squalls which blew from the ocean drifted me onto shore again, and the soft jelly-fish of the long sandy beaches rolled themselves around me to protect me.

In this same myth, the Maui's older brothers were jealous and suspicious of the newcomer (Maui), saying (McLintock 1966):

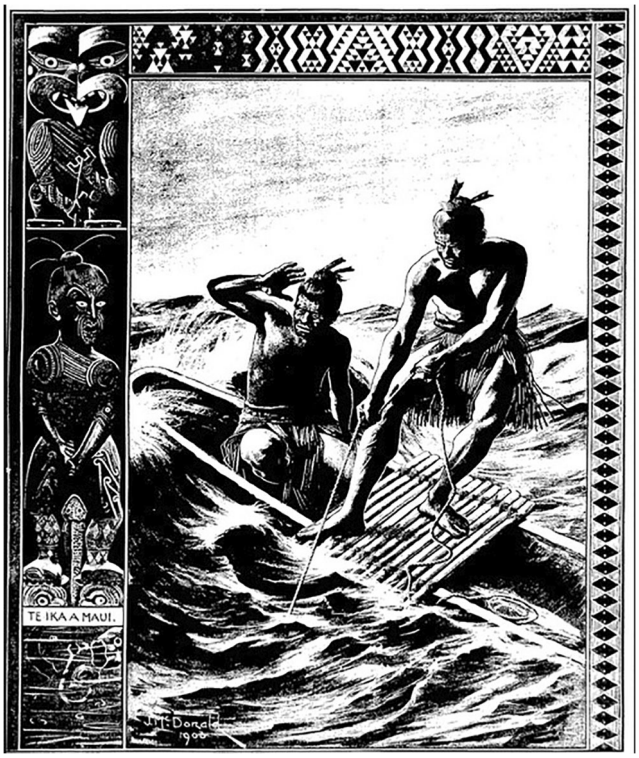

Fig. 6 Maui or Maui-titikitiki-a-Taranga, the child god of the Polynesians (Public Domain, https://bit.ly/2JxhZeh)

> We were conceived in wedlock, and born on the wide-wafted sleeping mat of legitimacy, and we are not asked to sleep with our mother. Yet this abortion, cast into the sea, and nursed by seaweed, returns to life and is called to her couch. How are we to know he is really our brother?

According to the Maori mythology, spirits went to Po (the underworld) from Muriwhenua (end of the world), a place located in a cliff on Cape Reinga (Northwest of the New Zealand's North Island). From here, spirits would look back for the last time, cry and say farewell their relatives. When the waves retreated, revealing an entrance to an underwater grotto among the seaweed, the spirits could jump (Buckova 2011).

In the Maori version of the great deluge (or flood, as with Noah), survivors adored Rangi (the god of heaven), Tane (the god of forest and birds), Rehua (the god of food), and all the gods, each at a distinct shrine. After making fire by friction, they made thanks-offerings of seaweeds for their rescue. In addition, Tane had a child called Hine-Ata-Uira (daughter of the sparkling dawn) who descended into the underworld where she took the new name of Hine-Nui-Te-Po (great woman of the night), the goddess of death with eyes like jade, seaweed hair, and the teeth of a shark (Izzet 1904).

Australia

In the mythology of the indigenous Australian people (Kunwinjku), Yawkyawk are fertility female spirits that dwell in holy waterholes. They look like mermaids with seaweed as hair, although they are shape-shifters adopting the form of a crocodile, swordfish, snake, or dragonflies. Aboriginal people believe that floating or drifting seaweeds come from Yawkyawk's head (Rosen 2009). Seaweeds also feature in other aboriginal dreamtime narratives (Thurstan et al. 2018).

Hawaii

Seaweed plays a central role in Hawaiian mythology. An aumaka legend (a Hawaiian family god) tells about a gorgeous young girl who dreamed that a lover emerged out of the ocean. After a while, the girl gave birth to a shark, being recognised by her parents as the descendant of an akua mano (shark god). The young mother took the baby, wrapped it in green pakaiea (a coarse seaweed), and threw it into the sea. The young shark was always identifiable by its green coat and became the aumakua of that family. One day a foreigner went fishing and was attacked by two sharks. When he asked for help, he saw a small green shark approaching him and attacking the man-eaters. After that, the shark and the man became great friends. The shark would chase the shoals of fish to the shore and anything the man caught would be divided between them (Beckwith 1982).

In ancient Hawaiian mythology, the Kumulipo is the holy creation chant of a family of *alii*, or ruling chiefs. In 1779, Captain James Cook arrived in Kealakekua Bay on the island of Hawaii during the season and was greeted by the Hawaiians reciting the Kumulipo. Fully communicated, in the oral tradition, its 2000 lines offer a long genealogy that demonstrates the divine roots of the family and traces the history of the family since the beginning of the world. The Kumulipo is divided into 16 sections (or wa-). In the first wa-, the sea urchins and limu (seaweeds) were born. The limu were connected through their name to the land ferns. Some of these limu and fern pairs include: Ekaha (*Pterocladiella caerulescens*) and Ekahakaha (*Asplenium nidis*), Limu ʻAʻalaʻula (*Codium tomentosum*) and ʻalaʻalawainui mint (*Plectranthus parviflorus*), Limu Manauea (*Gracilaria coronopifolia*) and Kalo Maunauea upland taro (*Colocasia esculenta*), Limu Kala (*Sargassum echinocarpum*) and ʻAkala strawberry (Beckwith 1951).

There was a Hawaiian ceremony (ʻaha hulahula') involving an ʻaha, or divine chord, which was a sacred woven chord made from strands of interwoven sennit or coconut fibre, or the inner bark fibres of olona (*Touchardia latifolia*). It also contained a rare red seaweed found only in the deep sea. This seaweed was so important that the ritual could not be accomplished until it was obtained. During the ceremony, the

braided chord was displayed, stretched, and tied, and its divine powers called upon. It was through the handling of ‘aha chords during rituals that the divine power was controlled. The gods became a helpful and productive power only after having been bound in the ‘aha binding rite inside the sanctuary (Gross 2017).

Asia

Japan

Seaweeds are very deeply appreciated in Japan. An example can be found in the seventh-century book *The Tales of Ise*, in which the lady of the house sent some young servants to the beach to collect the seaweeds left on the sand after a storm. She then placed the seaweeds on a tray and presented it to her guests, along with an oak leaf on which she scribbled the following poem (Craig McCullough 1968):

For these lords
The God of the sea
Has gladly relinquished
The seaweed he treasures
To adorn his head.

Another example of reverence for seaweeds is found in the *norito*, which are Shinto liturgical texts or ceremonial invocations recorded in the tenth-century Japanese book *Engishiki* (about laws and customs) that offered praise to kami (sacred spirits which took the form of things and concepts important to life, such as wind, rain, mountains, trees, rivers, and fertility), emperor, and nation, and invoked divine blessings. In one of these offerings to kami by the priest, seaweeds are mentioned (Philippi 1991):

The soft grain and the coarse grain;
That which lives in the mountains
The soft-furred and the coarse-furred animals;
That which grows in the vast fields and plains
The sweet herbs and the bitter herbs
As well as that which lives in the blue ocean
The wide-finned and the narrow-finned fishes,
The sea-weeds of the deep and the sea-weeds of the shore
These all are piled up like a long mountain range and presented.

The shojō is a nature spirit in Japanese folklore. It is sometimes described as being a humanoid with skin the colour of pink cherry-blossom, long red hair, and wearing green seaweed girdles about their loins. Dwelling on the seabed, this amphibious creature is a master of the herbal and medical arts; the shojō also produces a kind of liqueur (saki) which when drunk by a ‘good’ person tastes like sweet nectar but when drunk by a wicked one tastes and acts like poison (Hadland Davis 1912).

One of the most prominent Japanese mythological beings is the minogame or ‘straw raincoat-turtle’ due to its tail resembling a farmer’s straw coat (Fig. 7). The minogame lives at least 1000 years and possesses a long, hairy tail which is actually seaweed that has stuck to its shell while swimming around in rivers, ponds, and the ocean. The minogame is regarded as a very fortunate creature in Japanese culture representing wisdom and longevity. In art, it is often accompanied by other gods such as Jurōjin (one of the seven Japanese gods of good fortune) (Lobo 2016).

Seaweeds are mentioned in many traditional Japanese tales. In the *Legends of the Sea*, Isora (the spirit of the seashore) was described as ‘a lazy fellow, and when he finally appeared above the waves of the sea, he did so without gorgeous apparel, for he was covered with slime and shells, and seaweed adorned his unkempt person’. In the *Palace of the Sea God*, Hoori, an accomplished hunter, descended to the seabed in a basket made by the old man Shiko-tsutsu no Oji (‘salt-sea-elder’) and ‘came to a pleasant strand rich with all manner of

Fig. 7 Minogame or ‘straw raincoat-turtle’ (Public Domain, https://bit.ly/3aytu0V)

fantastic seaweed'. In *The Crystal of Buddha*, the palace of the Sea King was 'a great and gorgeous building of coral, relieved here and there with clusters of many-coloured seaweeds. The palace was like a huge pagoda, rising tier upon tier' (Hadland Davis 1912).

Korea

In Korean folklore, Jangjamari are water spirits from Talchum, a form of drama featuring the wearing of masks, singing and dancing. These creatures have huge swollen bellies and are dressed in large clothes decorated with rice seedlings or seaweed, appropriate for the early summer transplanting season at which the drama was performed (Saeji 2012).

As in Japan, seaweeds are present in some popular Korean tales. For example, in *Bride Gives Birth on Wedding Night*, after giving birth, the boyfriend told to his mother-in-law that he had a desire for seaweed soup ('miyeok-guk'), which he brought to his wife to help her recover from the delivery (Chung and Pangmulgwan 2014). This is still practiced by some folks today. The oral myth *Grandmother Seolmundae*, from Jeju Island, tells about a goddess of enormous size and strength (Seolmundaehalmang), who created the island by digging mud from the seabed. While she slept, her grandmother initiated the creation of the universe: 'Grandmother's body was rich and fertile, carrying everything inside. The people of Tamna [a former name for Jeju] ploughed fields on her soft flesh; her hair turned into grass and trees; the powerful streaks of her urine gave birth to all types of seaweeds and fish, octopus, abalone, and sea conch, enriching the sea and making the way for the profession of Jeju's women divers' (see later) (Chung and Pangmulgwan 2014). The origin of the Haeshindang Park (or Penis Park), a tourist attraction in the Korean city of Samcheok (Fig. 8) could be linked to the Korean *Myth of Samcheok Sea God Shrine* which dates back to the seventeenth century, following the massive Japanese invasions of the peninsula (Chung and Pangmulgwan 2014):

Fig. 8 Haeshindang Park (or Penis Park) in the Korean city of Samcheok (by Stuart Wainstock, CC BY-NC 2.0, https://bit.ly/2QZO9Do)

> A long, long time ago in Galnam Village in Samcheok lived two young lovers. One day the maiden headed out, on her beloved lover's boat to a rock at sea to gather sea laver. The man returned after taking her to a rock with abundant sea laver growing, and while the maiden was gathering the seaweed, a gust of wind blew and waves rolled, sweeping up the maiden and throwing her into the sea. She struggled to survive, calling out for help, but died in the end. Villagers later called the rock Aebawi, meaning, 'struggle rock'. After the maiden's death, the fishermen never had a good catch, and when villagers sailed out to sea, their boats capsized, killing many men. [...]. Then one day, an old man had a dream in which the dead maiden appeared, asking for appeasement of her grievance, having died an unmarried virgin. So, the villagers built a village guardian shrine (Seonangdang), where they held rituals and offered a wood-carved penis to appease the maiden's spirit. Good catches resumed for the village's fishermen, who were safe at sea and happy in the village.

China

According to Chinese mythology, k'uh-lung dragons are not born of calcium carbonate type eggs but rather jewelled eggs; they are created from seaweed (Bane 2010).

Armenia

Seaweed is cited in one of the ceremonial songs of the old heathen Armenians that exemplifies the birth of the Divine Child archetype that represents hope, new beginnings, transformations, and miracles (Jung and Kerenyi 1969):

> Heaven was in labour, earth was in labour,
> And the purple sea was in labour.
> The blood-red seaweeds had birth-pangs.
> The hollow stem of the seaweed emitted smoke,
> The hollow stem of the seaweed emitted flame,
> And out of the flame sprang a little boy:
> Fire for hair, and fire for beard,
> And his eyes were suns.

An everyday scene in coastal towns: seaweed gathering

Ancient uses of seaweeds by humans were rather numerous: as staple food, in medicine, as a raw material for obtaining different products such as iodine and calcium carbonate, for

the fertilisation and/or conditioning of fields; as fodder for livestock, mattress fillings, roof construction, knife handles, fishing lines, jewellery, buttons, etc. (Chapman 1950; Mouritsen 2013; Pérez-Lloréns et al. 2018).

For all these purposes, harvesting seaweeds was the first step. The gathering was such an everyday task in coastal areas that many painters of the time left a graphic testimony on their canvasses; most of them entitled *Seaweed Harvesting* or *Seaweed Gatherers*. Among the most famous artists are the British (Frederick Lee, 1798–1879; James Drummond, 1816–1877; James George Philip, 1816–1885; Frederick Gerald Kinnaird, 1840–1890; Henry George Todd, 1846–1898; William Pratt, 1855–1936; Harold Harvey, 1874–1941), Irish (Joseph Malachy Kavangh, 1856–1918; Jack Butler Yeats, 1871–1957), Dutch (Anton Mauve, 1838–1888; Johannes Barend Koekkoek, 1840–1912; Johan Scherrewitz, 1868–1951), French (Jean-François Millet, 1814–1875; Jean-Charles Cazin, 1841–1901; Alfred Guillou, 1844–1926; Paul Gauguin, 1848–1903; Émile Schuffenecker, 1851–1934; Henry Moret, 1856–1913; Maxime Maufra, 1861–1918), Czech (Karel Špillar, 1871–1939); Portuguese (António Carvalho de Silva Porto, 1850–1893), Spaniard (Juan Martínez Abades, 1862–1920), Americans (Albert Bierstadt, 1830–1902; Clement Nye Swift, 1846–1918; Frederick Arthur Bridgnan, 1847–1928; Howard Russell Butler, 1856–1934), Canadian (Edward Mitchell Bannister, 1828–1901), Japanese (Hokkei Totoya, 1780–1850; Utagawa Kuniyoshi, 1797–1861; Shūtei Tanaka, 1810–1858) (Fig. 9).

Below, we compile some of the most beautiful texts, poems, and songs that describe the seaweed gathering process around the world.

Europe

In some regions of Northern Europe, seaweed harvesting has been a traditional task contributing to the economy of many households, and even a vital resource, as was the case in Ireland during the 'Great Famine' (1845–1852) (O'Connor 2017) (Fig. 10). Harvesting practices for knotted wrack (*Ascophyllum nodosum*) have remained rather unchanged for centuries in Ireland. Harvesting of familial patches of the foreshore or 'stripes' has been practised since the nineteenth century, with strategically placed rocks, 'mearing stones', delimiting the edges of individual stripes helping to regulate rotational cutting (McErlean 2007; McMonagail and Morrison 2020). We can see a beautiful, though harsh example in Robert J. Flaherty's *Man of Aran* an ethno-fiction documentary (1934), which chronicled the daily life of the inhabitants of these islands on the west coast of Ireland. It showed the struggle for survival of a family of islanders and the harshness of their work on the sea coast. In order to grow just a few potatoes, they had to gouge out holes in the rock and fill them with the little soil they were able to find. This was then supplemented with the seaweeds transported by the women in large baskets on their backs. This story was then glamorised in the Hollywood movie *The Field* (1990) where one of the dialogues 'God made the world, but we made the field' was in tune with the quote by the famous Irish playwright J. B. Keane (1928–2002): 'God created seaweed...The seaweed made the world'.

The novel *Trinity* narrates the incredible history of a formidable Irish family saga in their struggle to become independent from British rule, which stretches from the eighteenth century to the late nineteenth century. Seamus, one of the main characters, reminisces about a part of his childhood in the following passage (Uris 1976):

> Of all the things I remember of Ballyutogue, nothing warms my heart more than an annual event that came into being because of the famine. In those blue months of midsummer when we waited for the first harvest, it was quite possible to go hungry […].

Fig. 9 Gathering seaweeds on the banks of the Berbés (1892) by Juan Martínez Abades (Public Domain, https://bit.ly/2R2UE8C)

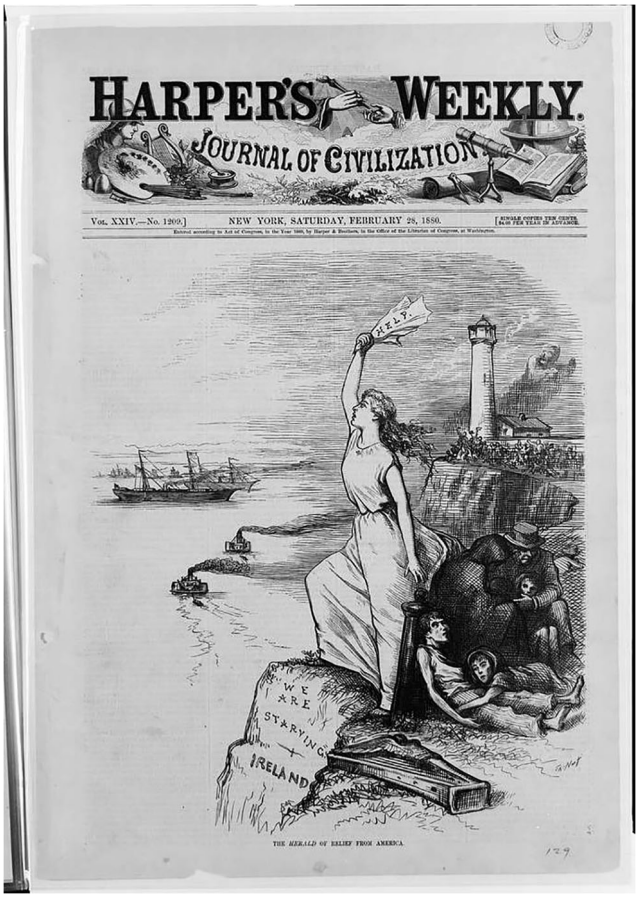

Fig. 10 Woman, on a shore in Ireland, holding up a sign for help to American ships; her foot rests on rock inscribed 'we are starving'. Family huddled behind her (Public Domain, https://bit.ly/340aCFP)

Daddo Friel told us that before the famine the seaweed harvesters would work naked, which was both practical and comfortable […].

As Conor and I grew older we were allowed to use the knives, scythes and specially sharpened hoes. Yards upon yards of coiled rope were readied on the shore. When low tide came we moved out in curraghs to the offshore kelp beds towing a raft behind every two boats. […].

Tomas and Fergus laboured in adjoining curraghs to cut loose and pile kelp on the raft […]. The piles of seaweed were tied, then dragged by hand over the soft sand to firmer ground where the cart wheels wouldn't sink under the weight. Carts and ass creels were loaded and the weed carried to a long stone wall to be shaken out and laid over to dry. […]. Kilty and the older villagers rummaged through the drying kelp, picking out thousands of trapped cockles and mussels, and separated the seaweed by its variety and use.

At the same time my ma and Finola and Brigid went out into waist-deep water to harvest kelp that had been tossed up by the storms, cutting it loose and carrying it back and forth with all they could hold in their arms.

If low tide came during the night, everyone worked by lantern light. When the shoreside harvest was completed and the sea calm, we'd go out with our daddies as part of sixteen-curragh teams into the deeper water and cut loose an entire bed and drag it ashore like a waterlogged whale. […].

Separating the kelp was a great and messy chore. Some of it was used for animal fodder, some for making iodine and some for fertilizer. There were edible seaweeds that my ma mixed with potatoes and another type that could be jellied to thicken the milk and butter.

Oily fires smoked along the coast to burn the weed down and boil it for use in making soap and bleach, and yet other kelp was watered down to preserve shellfish. Shells were crushed and made into whitewash. A few weeks after the wracking was done our cottages gleamed with new coats.

After clam digging with the girls the feasting was best. Those who had survived the famine still had the bitter taste of seaweeds and shellfish in their mouths. Loathing famine food was traditional and remained with us all our lives but in the blue months it was the difference between a full or empty belly. Besides, not having lived through the famine, I wouldn't mind dying with the smell filling my nostrils that came from the great cauldrons of boiling cockles.

The kelp was slimy and the water dirty and sticky and the stink from the burning as bad as rotting flax. It was the lowest kind of croppy work, yet recalling the nights under the lanterns and sleeping on the sand with the girls, it was also our first step into the world of men and women in love.

We did so many things together in Ballyutogue. We prayed together and farmed together. The joy at birth, the tears of weddings and the wailings of anguish at death were all a communal affair. But nothing again in my life was as dear as the harvesting of the wrack.

Dúlamán (Irish name for channelled wrack, *Pelvetia canaliculata*) is a lovely Irish folk song that narrates the Irish practice of collecting seaweed dating from lean periods when seaweed was appreciated as a defence against famine (Wood 2013).

Dear daughter, here come the courtin' men,
Dear mother, oh bring me my spinning wheel.
Seaweed from the yellow cliff, Irish seaweed,
Seaweed from the ocean, the best in all of Ireland.
Two black thick feet are on the Irish seaweed,
Two narrow ears are on the Irish seaweed.
We'll go to Derry with the Irish seaweed,
And we'll buy expensive shoes on the Irish seaweed.
Black spotted shoes on the Irish seaweed,

> There's a cap and trousers on the Irish seaweed.
> O I told her the news, that a comb would be bought for her,
> That's the story she told me, that it was a fine one.
> What did you bring from the land? said the Irish seaweed,
> Courting with your daughter, said the upstart seaweed.
> O you're not taking my daughter, said the Irish seaweed,
> Well, I'll take her away with me, said the upstart seaweed.

Winter seaweed traditions are still alive in many parts of Ireland: on Tory Island, dúlamán is considered at its best at Christmas when the tips are cut to about thumb-length and then boiled to make 'the healthiest food imaginable'. An ancient poem claims that the dúlamán was one of the two foods that St Columba survived on – the other being green clover (Magan 2019). Also, in Ireland the ancestral common name for the kelp *Laminaria hyperborea* was 'feamainn gheimhridh' or winter seaweed. Once the winter storms strike, this seaweed tumbles ashore in abundant jumbles of brownish-reddy clumps with bent sea rods (*Plexaura flexuosa*) attached. It was regarded as an offering from the ocean to be spread upon the dormant land to nourish the soil for the season ahead. On bleak December mornings when a swell was spotted, men, women, and children would rush to the shore to collect up the 'feamainn gheimhridh' before the undertow of the ebbing tide covered it with sand and ruined it. It was no easy task, involving wading out to their necks in the freezing waters to haul in this bounty and then long hours spent cutting the rods off each piece of seaweed so that they could be burnt separately for the making of kelp powder. All this toil and risk was worthwhile only because the seaweed was so valuable (Magan 2019).

The article 'Purple shore' published in the weekly magazine Household Words edited by Charles Dickens described the dulse (*Palmaria palmata*) gathering and selling in Aberdeen (Scotland) (Robertson 1856):

> Dulse is a regular relish on the tables of all ranks in Aberdeen, my native town. When I was a boy, from half-a-dozen to a dozen dulse-wives, according to the season, used to sit every morning on the paving stones of the Castlegate selling dulse. [...]. Recollections crowd upon me when I ought to be thinking only of the dulse-wives. I see shore-porters dressed in blue cloth, with broad Scottish bonnets and broader shoulders; carters standing upright in their carts, while driving them, and looking ruddy and sleepy; recruiting sergeants of the Highland regiments beguiling the country lads; and ladies, followed by their maids, making purchases of fish. However, of all the figures on the Castlegate, none were more picturesque than the dulse-wives. They sat in a row on little wooden stools, with their wicker creels placed before them on the granite paving stones. Dressed in clean white mutches, or caps, with silk-handkerchiefs spread over their breasts, and blue stuffed wrappers and petticoats, the ruddy and sonsie (an attractive and healthy appearance) dulse-women looked the types of health and strength. Every dulse-wife had a clean white cloth spread half over the mouth of her creel at the side furthest from her, and nearest her customers. The cloth served as a counter on which the dulse was heaped into the handkerchiefs of the purchasers. Many a time, when my whole weekly income was a halfpenny, a Friday's bawbee, I have expended it on dulse, in preference to apples, pears, blackberries, cranberries, strawberries, wild peas, and sugar-sticks.

In the Channel Islands, there were also whole families dedicated to collecting brown seaweeds, mainly *Fucus* (wrack) and *Laminaria* (kelp), both on the shore and using small boats. This activity, which involved very intense physical effort, became more widespread from the eighteenth century onwards, when seaweeds started to have a significant economic value, since the soda ash obtained by burning them was used to make glass (Pratt 1850):

> But nowhere is sea-weed an object of greater interest than in the Channel Isles, where the gathering of these plants from the rocks is made the subject of frequent legislative enactions. At all seasons of the year, groups of women and children may be seen on the shores of Jersey, diligently collecting the dark species of fucus. It is used as a manure both in its fresh state, and after having been reduced to ashes by being burned as fuel. So general is its use as fuel, that it is only on grand occasions that coal or wood is added; and it must be on a festive day, a birth-day, or some season sacred to the 'superstitions of the heart', that a coal fire glimmers in the stove of a Jersey parlour. [...]. The French name of these plants is varech, and in Jersey dialect it is vraic, being somewhat similar to our common name of wrack. In the daily gatherings from the shore, the inhabitants are prohibited by their island laws from collecting it between sunrise and sunset, in order to allow some advantage to those who reside at a distance from the coast. But besides these daily gatherings from the tide, there are two times of the year called vraicking seasons, when, at dawn of day, large parties sally from every part of the island, and rest not till they reach the shore. Merry parties they are, for though they must labour hard, yet singing gleefully to the music of the waves, they with their scythes cut away from the rocks the useful weeds, and filling their carts with them, sit down to their humble meal of the vraicking cake, made of flour, milk and

> sugar, and to other articles both of eating and drinking which they carry with them. The carts proceed as far as the tide will admit; but boats carry the vraickers to the more distant rocks; and the stranger to the scene is often amused at seeing the busy crowds covering the rocks and the shore, while, when the ruthless tide sets in, the carts and horses may sometimes be seen floating on the waves; and if some of the noviciates get a few tumbles, occasioned by the slippery nature of their standing, it only adds to the merriment at the time, and serves for amusement when the labours of the day are finished.

Also, the English poet Eliza Cook (1818–1889) wrote a poem about gathering the vraic (Cook 1844):

> The Vraic! the Vraic! oh! the Vraic shall be.
> The theme of our chanting mirth,
> For we come to gather the grass of the sea.
> To quicken the grain of the earth.
> That grass it groweth where no man moweth,
> All thick, and rich, and strong,
> And it meeteth our hand on the desolate strand,
> Ready for rake and prong.
> So gather and carry, for oft we need.
> The nurturing help of the good seaweed.

Seaweed gathering was also a traditional activity in Brittany where collectors were (and are) known as *goémoniers* (from *goémon*, 'seaweed' in the Breton dialect). Here, seaweeds were collected by hand, although simple instruments were also used, such as the 'guillotine', a type of sickle with a long handle, or rakes for collecting beach-cast seaweeds. Trollope (1840) wrote about *goémoniers*:

> As on some of our own coasts [Britain], the peasants on the shores of Brittany are in the habit of gathering the seaweed, which the ocean casts, in great abundance, upon the numerous rocky reefs of their rugged coast for manure. It is very valuable for this purpose, and the collecting and stacking it on shore forms an important portion of the labours of the seaside population.
> A large party of peasants, consisting of all the members of more than one family, had gone for this purpose to some isolated rocks, at a little distance from the coasts, in a boat, which they hoped to bring back loaded with the fertilizing 'goémon', as the seaweed is termed. They safely reached the reef of rocks, secured their boat, and all hands were busily engaged in gathering the weed into heaps.
> The morning had been a very fine one; but gradually the sky became overcast; and the poor seaweed gatherers might have perceived, had they been less intent upon their occupation that it was high time for them to secure their retreat to land. The gathering storm, however, was neglected in their anxiety to collect a lading for their voyage home, till it burst in fury above their heads. And then, when they hastened to the spot at which their boat was left, they found that it had been carried away by the rapidly increasing violence of the surf.

In Galicia (Spain) and Northern Portugal, the gathering of beach-cast seaweeds (*argazos* or *sargazos*) was an activity also carried out largely by women, the *argaceiras* or *sargaceiras* (InfoMAXE 2015):

> The *sargazo* must be sought in the storms, when the waves crash on to the beach and the sea throws its salt into our faces. From the light-houses at Cabo Silleiro, which turns the ocean white, to the Insua in Portugal, at the mouth of the Minho, we can find this wild coast of the *sargazos*.
> Everywhere there is savage granite, with nests of barnacles and octopuses. Here is where the *argaceiras* come, whom it would be better to see –as we would prefer– in other places. Many of them come from the hinterland; they arrive as country folk and bring to the shore their green songs of pines and resin. But they all know that the sea sings a different song. As in the case of the ballad, it only sings its song to its companion. The *argaceiras* surrender to it and dance to its rhythm, while tragedy churns in the foam of the surf. And then they depart, as sea-folk, from the shore to the meadows. In their caravans of *sargassum*-coloured horses they carry the suggestively named seaweeds: *soja*, *folla de maio*, *carallote* [*Laminaria* spp.], all of them used –except *xerez* [*Himanthalia elongata*] from which iodine is extracted– as valuable fertilizers.
> This is the harvest of the sea being returned to the harvest of the fields. One must steal from the ocean, little by little, what the ocean has stolen forever from the land: those nitrates, potash, phosphates and manganese that the sea carried away, but that are absorbed by seaweeds in great amounts, thereby representing an excellent fertilizer for hungry crops.
> These seaweed seekers go down to the mouth of the Minho and the island of Insua with its cottages for the *argaceira* seasons in Portugal: women from La Guardia, El Rosal, Santa María de Oya, Bayona, Gondomar. All along the rugged and raging coastline, the open sea wrenches off the seaweeds and casts them up, while the women with their *clamoeiro,* a simple device like a huge butterfly net, *fish* for them, floating on top of the sea. Also, small boats go out on dangerous coastal forays with the *arrastón*, a tool consisting of a net, fitted with an iron bar below and a slat on top. In Portocelo and other places of our coast there are small groups of

fishermen's cottages dotted along the Atlantic which are at one and the same time storehouses for *argazo* and home for the *argaceiras*.

A small group of fauna, biologically adapted to the seaweeds, inhabit this great natural aquarium at the bottom of the sea. The beautiful snails, tiny crabs, and iridescent bivalves —a source of joy for the children who collect them when the *sargazo* is cast ashore— live nestling amid the golden forest of this submerged and beautiful world of silence.

The seaweeds cast up by the sea, that here are used almost exclusively as fertilizer, contain an unexpected wealth. The agar-agar and other more important, higher-yielding and virtually unknown applications, will be recalled by many. Their industrialization has already begun, with fine results, in some places of Galicia.

For as long as we do not see these new factories producing the valuable seaweed by-products and there are still no more advanced systems for their harvesting, we will continue to see the beautiful, though doleful image of the *argaceiras,* who dance with the sea and dice with death, searching for our daily ration of bitter *sargazo*.

The Americas

The most commonly eaten seaweed by indigenous communities or First Nations (e.g. Kwakwaka'wakw, Haida, Heiltsuk, Tsimshian) along the Northwest Coast of North America, especially as a famine food in times of scarcity, was red laver (*Porphyra* / *Pyropia*), simply called 'edible seaweed'. Harvesting, in May when seaweeds were tender and tastier, was generally women's work (Fig. 11), undertaken while the men were fishing, hunting, or trapping, women handled their own canoes; often they travelled together to the seaweed beds and worked in companionship, gripping and pulling the seaweed off the rocks with their fingers and piling it up or putting it into bags, to be gathered up and placed in the canoes, or later into boats, for transport back to the seaweed camp or to home base (Boas 1921; Turner 2003).

In Prince Edward Island (Canada), the harvesting of beach-cast seaweeds (mostly *Chondrus crispus*) using horses hauling a kind of sled with a net was once quite typical and it has become an important tourist attraction. The village of Miminegash is considered the 'World Capital of Irish moss' (Chopin 1998). The Canadian singer Charles Thomas 'Stompin' Tom' Connors (1936–2013) wrote and sang *The Song of the Irish Moss*:

On old Prince Edward Island, where the Irish Moss is found
With bags and ropes and baskets they come from miles around

Fig. 11 Two Clayoquot Indians with baskets gathering seaweeds (Public Domain, https://bit.ly/2Jw5TSY)

Crashing through the water, being careful not to fall
With one good dash and a hell of a splash you could lose your overalls.
There's horses in the water, and horses on the road
And here comes old Russell Aylward, and he's hauling up another big load.
And the party lines keep ringin', and the word keeps passin' on
You can the hear them roar from the Tignish Shore, "There's moss in Skinner's Pond".
On old Prince Edward Island, there's one big hullaballo
The boys and the girls and the old folks, they're gonna make a few bucks too
Getting' wet to the neck in the ocean where the waves all turn and toss
But it's a free-for-all and they're havin' a ball: They're bringing in the Irish Moss.
Now the moss plant boys are waitin': they pay so much a pound
And there goes a guy on horseback, and they both look darn near drowned
But all those smilin' faces just mean one thing to me:
For every man with a calloused hand there's a blessing from the sea.

> There's an Islander out there lonesome 'cause he can't be home today
> to have a little sip of the moonshine and to haul another load away
> In the land of the great potato, where the lobster feasts are wild
> We can thank the Boss for the Irish Moss on old Prince Edward Isle.

The novel *Knee Deep in Seaweed* by Hickman (2013) relates, in first person, and throughout humorous anecdotes, the unusual summertime occupation of gathering Irish moss ('mossing') in Scituate, a small coastal town in Boston, where 'mossing' was brought to this place by Irish immigrants during the mid-1800s.

Grand Manan Island, in the Bay of Fundy (Canada), is at the heart of a prosperous harvest and trade industry of dulse that started at mid-1800s. It is known as the 'Dulse Capital of the World', and the seaweed gatherers as 'dulsers' (O'Connor 2017). After the weir fishery, there is probably no more typical and historically important activity than the gathering of dulse. There are about 35 families for whom dulse is the major source of income, but another 50–60 people also collect it regularly, supplementing other income from the fishery or fish plant work (Marshall 2008):

> For Grand Mananers, the shore has been the gathering place for the dulsers for generations, those intrepid islanders whose work day, even at 3:00 AM, begins four hours after high tide when ebb is almost at its lowest. They arrive in their trucks and waste no time transferring the burlap bags and plastic baskets to their dories. Within minutes they will be pushing out the dories or hauling them across pebble beaches or up and over the steep rocky ridges of natural sea walls to set out for their favourite dulse areas.

In Peru and Chile, seaweeds have been consumed since pre-Hispanic times. *Durvillaea antarctica* (cochayuyo in quechua; and kollof in mapuche) was also used as funeral offerings. Drying cochayuyo and luche (*Porphyra*) was an everyday practice by the indigenous people as a preservation method as well as for transportation to locations far away from the coast. After the Spanish conquest, the consumption of cochayuyo declined in the native population since seaweeds were not characteristic ingredients of the Mediterranean diet. However, after a while, the seaweeds were incorporated into the menu of the conquerors (Lacoste et al. 2017). Muñoz (1916) tells about how mareros or algueros gathered cochayuyo:

> The marine plants detached from the cliffs moved at the mercy of the waves and, scourged by them, they left the sea, remaining lifeless on the shore of the long beach. The cochayuyo arrived in abundance to the shore, where patiently waited a poor man who, at a short distance, had a donkey to carry it. He worked slowly and cherished this beautiful hope: after he sold his marine harvest, he could give abundant food to his little children.

The song *Coyof* composed by the songwriter Rodrigo Qowasi (2019) seeks to value the Chilean families that do the trans-humance with the cochayuyo, a process in which they gather, load the carts, move and sell this seaweed:

> They [cochayuyo gatherers] hold in carts a fragile future.
> Tells the story that saw them born
> on the shore of stones struck by thirst
> there is a name for them and they know well
> from Pilico to the star who saw them born
> Collecting hands, women of the past
> Playing to be great, children also work
> Coyof, coyof, ancestral cochayuyo
> Coyof, coyof, medicine of the sea
> Sea gardeners untangle the waves
> and fire and mate braid what they prune.

Asia

In Eastern countries, harvesting seaweeds has been a common practice because they have been eaten and even venerated there since ancient times. *Porphyra* (*nori*) was gathered in Japan as early as the fourth century. The harvesters, very often women, used to work in intertidal zones because of the ease of accessibility, or collected the seaweeds cast up on the shore after storms. Men, by contrast, used to harvest the subtidal seabeds of kelp (*kombu*) from small boats, using hooks with long handles with which they twisted the fronds and hauled them into the boat. These were then loaded on deck or left to dry on the shore before being transported to their final destination.

The grand Japanese haiku master Matsuo Bashō (1644–1694) often uses seaweeds (*kaiso*), in particular nori, in his poems (Bashō et al. 2013):

> Seaweed soup
> shows such skill
> in a decorated bowl.
> Rather than oysters
> it's dried seaweed one should sell
> when one is old.
> Getting weak
> when a tooth bites downs
> and in seaweed.

Koyorogy a fuzoku (erotic) song based on folk melodies, but arranged in a court style, tells about seaweed gathering (Konishi 1986):

> At Koyorogi
> There is a beach she always goes,
> A beach she always goes,
> This girl gathering seaweed.
> Don't get her wet,
> Don't get her wet!
> Stay back in the offing,
> Stay back,
> You waves!
> I may be dripping wet,
> But I'll gather seaweed for you,
> Seaweed for your table:
> I want to gather it!

Both, Ama and Ainu are at the very heart of the seaweed gathering folklore in Japan. Ama ('women of the sea') are divers famous for collecting shellfish, seaweed, and pearls off the coasts of Japan. They were first cited in the oldest Japanese anthology of poetry, the *Man'yoshu*, in the eighth Century. Traditionally, they dove naked except for a waistcloth and a cord with one end tied to a wooden barrel as a buoy. They have long worked hard to feed their families in isolated rural regions where other types of jobs were limited (MacEacheran 2016).

The Ainu are the original inhabitants of the island of Hokkaidō, in northern Japan (Fig. 12). They are animists and have a deep reverence for nature. It appears that the word *konbu* (or *kombu*) comes from *kompu*, a word these people used to refer to things that grow on the rocks of the seabed. Their activities included the harvesting of seaweeds, mainly *kombu* (Landor 1893):

> All along the beach between Hammanaka and Hattaushi, a distance of nearly twenty miles, there are fishermen's and seaweed gatherers' huts; but none of them is inhabited by Ainu. Men, women, and children are all occupied in the seaweed gathering industry; and it is when the sea is stormy that the largest quantity of kelp is collected. The numerous reefs and rocks all along the shore-line afford suitable ground and bottom for its growth and production; and during a stormy sea quantities of kelp float on the breaking waves, to be finally thrown on shore. The industrious gatherers seldom wait for this 'jetsam', as the long weeds, after they are washed off the rock, and before they are finally swept on shore, are apt to be damaged by the waves, and are therefore of less value for the export market than when long and fresh; wherefore, each gatherer provides himself with a long pole or hook, and from morning till night these half-naked 'toilers of the sea' can be seen running to and fro in and out of the waves dragging bunches of long ribbon-like seaweeds, which are then carefully disentangled, stretched on the sands to dry, and, after several days of exposure, are packed for the market.

Fig. 12 Anu Chief wearing a crown of shavings and seaweed solemnly placed in his head (Public Domain, https://bit.ly/3bzEZFE)

The South Korean island of Jeju is famous for the Haenyeo (or 'women of the sea', just like the Japanese Ama) who, since the seventeenth century, would skin-dive to depths of over ten metres to collect seaweeds and mollusks. This practice became widespread when high taxes and wars forced a large part of the male population to emigrate, and therefore, the responsibility for keeping the household economy afloat fell to the women. It is an occupation that is passed on from mother to daughter, although it is now being lost due to the harshness and danger involved, and the few Haenyeo that still exist are sexagenarians, some of them even nonagenarians. In an ancient ceremony before each dive, they would entrust their fate to their particular ocean goddess, the Dragon King's Grandmother, to whom they pray every spring for protection and abundance. The Haenyeo have always occupied the lowest stratum of society, but for some years now their work has been recognised, to the extent that they have recently become candidates for

UNESCO's Intangible Cultural Heritage list (Pérez-Lloréns et al. 2018).

Oceania

Hawaiian women used to collect beach-cast seaweeds and sell them in local markets to supplement their family income. Before the arrival of Christian missionaries, the consumption and sale of seaweeds were vital for the survival of women, since they were banned from consuming many varieties of fish. Reed (1907) wrote about seaweed (limu) gathering:

> Most of the limu is gathered by native women and children, except that which grows in the deeper or rougher water, far out on the coral reefs, or on exposed rocks, where expert swimming and more strength are required, and also where a boat is usually needed. In such places at least two people are required, and often a party of three or more men and women go together. The women usually gather the limu while the men are fishing and caring for the boat and nets. The limu gatherers go out at low tide with tin pails, old sacks, and pieces of sharpened iron or an old knife, and scrape the seaweed from the coral or rocks. The seaweed is freed from sand and pebbles and each kind placed in a separate receptacle, if possible. If the limu grows nearer shore in the sand or mud, or floats in near the beach, the women and children wade out, gathering it without any implements, carefully washing out the sand, mud, or small sea animals, and pulling out all inedible limu before placing it in their pails or sacks. They often wade out into the water above the waist, following the tide as it recedes.

Ka Uluwehi O Ke Kai [plants of the sea] is a song about gathering several types of limu based on a traditional chant (O'Connor 2017):

> Such a delight to see
> The great big ocean
> So familiar and very cherished
> With its fragrance of the lîpoa [*Dictyopteris australis*]
> It is lîpoa which washed ashore
> Onto the shiny white sand
> Hot from the heating sun as you step on it
> Don't think that this is fun
> How enticing is the display of limu kohu [*Asparagopsis taxiformis*]
> Atop the rocks
> Enticing one to pick them
> As they sway to and fro
> Let the story be told
> Of the lîpoa and the limu kohu
> Close companions of the pâhe'e [*Porphyra* spp.]
> Intermingled with the lîpalu [*Cladophora* spp.].

Seaweed and poetry

As with paintings, seaweeds have been also mentioned in poetry. In this last section, we compile, in chronological order, verses of some of the most beautiful poems mostly from the Romantic and Victorian periods, characterised by revering and adoring the nature (Romantic) or by a more realistic and less idealistic focus on nature (Victorian).

The Sea of Iwami (Kakinomoto Hitomaro, 662–710; Japanese poet and aristocrat) (Addiss et al. 2006):

> In the sea of Iwami
> By the cape of Kara
> There amid the stones under sea
> Grows the deep-sea miru weed;
> There along the rocky strand
> Grows the sleek sea tangle.
> Like the swaying sea tangle,
> Unresisting would she lie beside me
> My wife whom I love with a love
> Deep as the miru-growing ocean.
> [....]
> On the rocky shoreline,
> The blue, blue
> Jeweled seaweed, just offshore,
> With the wings of morning,
> Will the wind bring closer;
> With the wings of dusk,
> Will the waves draw closer;
> And with the waves,
> Moving forth and back,
> As the jeweled seaweed,
> My darling, once cuddled close,
> Like frosted dewdrops.

River Alde (George Crabbe, 1754–1832; British poet and naturalist) (Crabbe 1846):

> Here samphire-banks and salt-wort bound the flood,
> There stakes and sea-weeds withering on the mud;
> And higher up, a ridge of all things base,
> Which some strong tide has rolled upon the place.

The treasures of the deep (Felicia Hemans, 1793–1835; English poet) (Ward 1883):

> Sand hath filled up the palaces of old,
> Seaweed o'ergrown the halls of revelry.

Dash o'er them, Ocean, in thy scornful play!
Man yields them to decay.

Devon (John Hamilton Reynolds, 1794–1852; British poet) (Hamilton 1821):

Tosses its hoar hair on the raving wind,
'Tis wild delight to watch it. But I love.
to see it gently playing on loose rocks,
Lifting the idle sea-weed carelessly;
Or hear it in some dreary cavern muttering
A solitary legend of old times.

The coral grove (James Gates Percival, 1795–1856; American poet and geologist) (Percival 1842):

Deep in the wave is a coral grove,
Where the purple mullet, and gold-fish rove,
Where the sea-flower spreads its leaves of blue,
That never are wet with falling dew,
But in bright and changeful beauty shine,
Far down in the green and glassy brine.
The floor is of sand, like the mountain drift,
And the pearl shells spangle the flinty snow;
From coral rocks the sea plants lift.
Their boughs, where the tides and billows flow;
The water is calm and still below,
For the winds and waves are absent there,
And the sands are bright as the stars that glow.
In the motionless fields of upper air:
There with its waving blade of green,
The sea-flag streams through the silent water,
And the crimson leaf of the dulse is seen.
To blush, like a banner bathed in slaughter.

Seaweed (Henry Wadsworth Longfellow, 1807–1882; American poet) (Longfellow 1848):

When descends on the Atlantic.
The gigantic.
Storm-wind of the equinox,
Landword in his wrath he scourges
The toiling surges,
Laden with seaweed from the rocks
[....]
Ever drifting, drifting, drifting
On the shifting.
Currents of the restless main;
Till in sheltered coves, and reaches.
Of sandy beaches,
All have found repose again.

The ring of the last doge (Francesco Dall' Ongaro, 1801–187; Italian writer and poet (Ward 1883):

I saw the widowed Lady of the Sea.
Crowned with corals and seaweed and shells,
That her long anguish and adversity
Had seemed to drown in plays and festivals.

The sirens (James Russell Lowell, 1819–1891; American poet) (Lowell 1890):

Look down, look down!
Upon the seaweed, slimy and dark,
That waves its arms so lank and brown,
Beckoning for thee;
Look down beneath thy wave-worn bark
Into the cold depth of the sea.

Sea-Weed (James Russell Lowell, 1819–1891; American poet) (Lowell 1890):

The drooping sea-weed hears, in night abyssed,
Far and more far the waves' receding shocks,
Nor doubts, through all the darkness and the mist,
That the pale shepherdess will keep her tryst,
And shoreward lead once more her foam-fleeced flocks.

To Mamartine (James Russell Lowell; 1819–1891; American poet) (Lowell 1890):

They raised thee not, but rose to thee,
Their fickle wreaths about thee flinging
So on some marble Phoebus the swol'n sea
Might leave his worthless seaweed clinging,
But pious hands, with reverent care,
Make the pure limbs once more sublimely bare.

The Lady Ribbrta's harvest (Margaret J. Preston, 1820–1897; American poet and author) (Ward 1883):

Drew on in its wake, the drift and wreck
Of many a shattered mast and deck,
And all the tangle of weeds there be
Afloat in the trough of the plunging sea;
Until, as the years went by, a shoal
Of sand had tided a sunken mole.

Song (George William Curtis, 1824–1892; American writer) (Ward 1883):

Like tangles of seaweed streaming.
Over a perfect pearl,
Thy fair hair fringes thy dreaming,

O sleeping Lido girl!

Hilda, spinning (Julia Caroline Dorr, 825–1913; American poet) (Ward 1883):

Ah! he came in with the tide.
Came alone.
Tossed upon the shining sands,
Ghastly face and clutching hands,
Seaweed tangled in his hair,
Bruised and torn his forehead fair.
Thus he came in with the tide.
All alone.

A dream of death (Dinah Maria Mulock, 1826–1887; British novelist and poet) (Ward 1883):

Sudden the shore curved inward to a bay,
Broad, calm, with gorgeous seaweeds waving slow
Beneath the water, like rich thoughts that stir
In the mysterious deep of poet's hearts.
[...]
One moved with moving seaweeds; one lay prone,
The tinted fishes gliding o'er his breast;
One, caught by floating hair, rocked quietly.
Upon his reedy cradle, like a child.
[...]
So we sailed on above the diamond sands,
Bright sea- flowers, and white faces stony calm,
Till the waves bore us to the open main,
And the great sun arose upon the world.

Sitting on the shore (Dinah Maria Mulock, 1826–1887; British novelist and poet) (Ward 1883):

The tide has ebbed away;
No more wild dashings 'gainst the adamant rocks,
Nor swayings amidst seaweed false that mocks.
The hues of gardens gay;
No laugh of little wavelets at their play;
No lucid pools reflecting heaven's clear brow:
Both storm and calm alike are ended now.

Seaweed (Sarah Eliza Tonkin, 1831-?; British poet) (Tonkin 1866):

Seaweed, seaweed, hapless seaweed!
(Like a drowned maiden's hair)
Tell me wherefore art thou weeping
On the wrinkled sand-bank there?
Shell-entangled, bright-hued seaweed,
From what mermaid-hunted bowers
Wert thou cast? did rude waves tear thee
From thy beauteous sister flowers?
Or dis glittering star-fish tempt thee?
Did the Nautilus say, Come?
Did they whisper' neath the crystal,
Of a fairer, brighter home?
Say, dis sparkling waters woo thee.
Kiss thy foam-enshrouded form?
Or dis angry, swelling billows.
Hurl thee shoreward in the storm?
Mournful seaweed! homeless seaweed!
Weep no longer on the strand;
Tell me now, in mystic murmur,
Of that wondrous, far-off land.
Wert thou fed with tears for lost ones,
Lying in the briny deep?
Did the music of the waters
Lull thy fragile form to sleep?
Drifting seaweed, child of the ocean!
Hast thou with the sea-vine played?
Hast thou slept where pearls are gleaming,
And 'mong coral branches strayed?
Didst thou twine round ship-wrecked sea-boy?
Didst thou deck the Nereid's hair,
Floating mid their golden tresses,
Adding grace where all was fair?
I was looking at my seaweed,
Waiting for her answer sweet,
When dark waves came rolling grandly
O'er the sand-bank–o'er my feet.
One short moment then I lingered;
'Twas enough–it brought to me,
Vision of my seaweed floating,
Floating o'ver the unconscious sea.

In the sea (Hiram Rich, 1832–1901; American author) (Ward 1883):

In dreams I pull the seaweed o'er,
And find a face not his,
And hope another tide will be
More pitying than this.
The wind turns, the tide turns:
They take what hope there is.

Drift (George Arnold, 1834–1865; American poet) (Ward 1883):

Seaweeds gleam in the sunset light,
On the ledges of wave-worn stone,
Orange and crimson, purple and white,
In regular windrows strewn.
[...]
The seaweed wreath that hangs on the wall,

She twined one day by the sea:
Of the weeds, and the waves, and her love, it is all
That the past has left to me.

Sea-drift (Thomas Bailey Aldrich, 1836–1907; American poet and writer) (Ward 1883):

The star-fish clings to the seaweed's rings
In a vague, dumb sense of peril;
And the spray with its phantom-fingers grasps
At the mullein dry and sterile.

The Sea (Thomas S. Collier, 1842–1893; American historian) (Ward 1883):

The vast immensity of waves
Came shoreward, full of murmurous sound,
Telling of far, dim, coral caves,
And wrecks by seaweed garlands crowned.

At sea (Thomas S. Collier, 1842–1893; American historian) (Ward 1883):

And in the west a mass of clouds, that rise
Fringed with the amber light that through their rifts
Comes in broad columns; while, like shadows dark,
The seaweed, from some reef that far off lies,
Through the cool silence of the water drifts
Fathoms below the swift keel of our bark.

Flowers of the sea (Eliza A. Jordson, 1848-?) (Duggins 2017):

Oh! Call us not weeds, but flowers of the sea,
For lovely, and gay, and bright-tinted are we!
Our Blush is as deep as the rose of thy bowers,
Then call us not weeds, we are Ocean's gay flowers
Not nursed like the plants of a summer parterre.
Whose gales are but sighs of an evening air,
Our exquisite, fragile and delicate forms
Are the prey of the Ocean, when vex'd with storms.

Sea-wrack (Agnes Shakespeare Higginson [Moira O'Neill], 1864–1955); Irish-Canadian poet (O'Neill 1904):

The wrack was dark an' shiny where it floated in the sea,
There was no-one in the brown boat but only him an' me;
Him to cut the sea wrack, me to mind the boat,
An' not a word between us the hours we were afloat.
The wet wrack,
The sea wrack,
The wrack was strong to cut.
We laid it on the gray rocks to wither in the sun,
An' what should call my lad, to sail from Cushendeen
With a low moon, a full tide, a swell upon the deep,
Him to sail the old boat, me to fall asleep.
The dry wrack,
The sea wrack,
The wrack was dead so soon.
There' a fire low upon the rocks to burn the wrack to kelp,
There' a boat gone down upon the Moyle, an' sorra' one to help!
Him beneath the salt sea, me upon the shore,
By sunlight or moonlight we'll lift the wrack no more.
The dark wrack,
The sea wrack,
The wrack may drift ashore.

The love song of J. Alfred Prufrock (Thomas Stearns Eliot, 1888–1965; American-born British poet) (Eliot 1915):

I have seen them riding seaward on the waves
Combing the white hair of the waves blown back
When the wind blows the water white and black.
We have lingered in the chambers of the sea
By sea-girls wreathed with seaweed red and brown
Till human voices wake us, and we drown.

Drowned (Thomas Garvie, 1891–1917; Captain of the Royal Artillery) (Ward 1883):

Under the froth and the foam,
And the yeasty surge, and the shuddering gusts of rain,
Lies the lad who will never come home,
His white face hid in the sand:
He neither has care nor pain
Under the seaweed and sand.
[...]
Above him the wrack and the drift,
The red-lit east, and the dark, sad glow in the west,
The currents that change and shift,
And the rain-blown face of the storm:
There is nothing but silence and rest
Under the beat of the storm.
Tangled in rigging and ropes,
And fenced by the wreck of spar and the ruin of mast,
The purple sea-plant gropes
And wanders over my dead:
He shall waken and rise at last,
When the sea gives up its dead.

The relic on the bocks (Anonymous) (Ward 1883);

Lying there, rotting, by night and by day,
Under that cruel and pitiless crag;
Only the curlew to watch its decay,
Only the seaweed for pennon and flag:
Nothing but timber and cordage, 'tis true;
Only a boat but the boat had a crew!

A sea-view (Alice Osborne) (Ward 1883):

I climbed the sea-worn cliffs that edged the shore,
And looking downward watched the breakers curl
Around the rocks, and marked their mighty swirl
Quiver through ancient seaweed dark and hoar.

Marinero en tierra [*Sailor ashore*] (Rafael Alberti, 1902–1999; Spanish poet and writer (Alberti 1924):

Oh! How happy would I be
to live with you in a garden under the sea,
my little gardener girl!
In a tiny cart, by a salmon drawn,
what delight to sell under the salty sea,
your garden harvest, my love!
Here's seaweed, fresh seaweed!
Get your seaweed straight from the sea!

You are the daughter of the sea (Pablo Neruda, 1904–1973; Chilean poet) (Neruda 1959):

And so, at last, you sleep, in the circle of my arms
that push back the shadows so that you can rest
vegetables, seaweed, herbs: the foam of your dreams.

Carnal apple, woman filled, burning moon (Pablo Neruda, 1904–1973; Chilean poet) (Neruda 1959):

Carnal apple, Woman filled, burning moon,
dark smell of seaweed, crush of mud and light,
what secret knowledge is clasped between your pillars?
What primal night does Man touch with his senses?

Brown and agile child (Pablo Neruda, 1904–1973; Chilean poet) (Neruda 1959):

Brown and agile child, the sun which forms the fruit.
And ripens the grain and twists the seaweed
Has made your happy body and your luminous eyes.
And given your mouth the smile of water.

My ladye, green weeds (Ralph A. Lewin, 1921–2008; Anglo-American phycologist; Borowitzka 2009) (Lewin 1987):

O, I have labour'd late and long
Researching in phycology,
And I must sing in simple song
My ladye, Chlorophyceae.
Green weeds are all my joy
And green weeds are my delight.
Green weeds are my latest toy
My lovely algae, green weeds.
O green algae absorb the light
Replete with chlorophylls a and b,
And green algae are my delight
My ladye, Chlorophyceae.
Green weeds are my passion now;
With green weeds my heart's afire.
Green weeds are my all, I trow
My lovely algae, green weeds.

Rimu rimu [*Seaweed*]. Anonymous Maori song. This lament was composed by a grieving mother for her recently deceased child, who observed a strand of drifting seaweed and likened it to the spirit of her child moving slowly back to Hawaiiki, the original homeland of the Maori (Murray 2014):

Seaweed drifting, drifting,
floating on the ocean.
Drifting in the whirlpool,
out there.
When I look out there
it is so calm
while within me
everything is storm tossed.
The snow is biting cold
on the ridges,
and lying curled up asleep
is your spirit.
Your behaviour is like that
of the fantail,
in the same way, your restless spirit
upsets me greatly.

Suzanne (Leonard N. Cohen, 1934–2016; Canadian singer, songwriter, poet, and novelist):

On Our Lady of the Harbour
And she shows you where to look
Among the garbage and the flowers
There are heroes in the seaweed
There are children in the morning
They are leaning out of love
And they will lean that way forever
While Suzanne holds the mirror.

Closing remarks: seaweeds for the future

As we have reviewed in the present paper, seaweeds and human beings have a complex and interwoven history and have interacted fruitfully for millennia. These mysterious marine organisms have always fascinated mankind and have had a great impact on our lives both as foodstuff and as a source for mythology, folklore, and our written expressions about our picture of and imaginations of the natural and spiritual worlds.

Seaweeds' impact on the human world continues to be in effect and it is likely that the importance of seaweeds for us will increase as we make ourselves ready to face and solve the pressing issues of changing our interaction with the material world in the Anthropocene epoch towards a more sustainable future.

It is now being recognised that the food production systems are one of the major drivers of environmental disasters involving climate changes, loss of biodiversity, pressure on freshwater use, damage to whole ecosystems, as well as the emission of excess nutrients and greenhouse gasses (Vermeulen et al. 2012; Aleksandrowicz et al. 2016). In addition, the mode of food production has disturbed crucial global cycles of carbon, phosphorus, and nitrogen. The future will have to imply acute and dramatic changes in the global food systems in order to produce enough healthy, nutritious, and sustainable food for a growing global population (Willett et al. 2019). This change has to involve a diet with much more plant-based food than now.

Globally seaweeds are a little exploited natural and vegetarian marine resource close to the bottom of the global food web with optimal interactions with its environment. It is a green food source that is both healthy and nutritious for human beings, which furthermore can be farmed sustainably with minimal impact on the environment. We expect that seaweeds will come to play a significant role in the move towards a more green and sustainable future for the planet hence fulfilling some of the promises inherent in the historical past reviewed in the present paper.

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Compliance with ethical standards

Conflict of interest The authors declare that they have no conflict of interest.

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