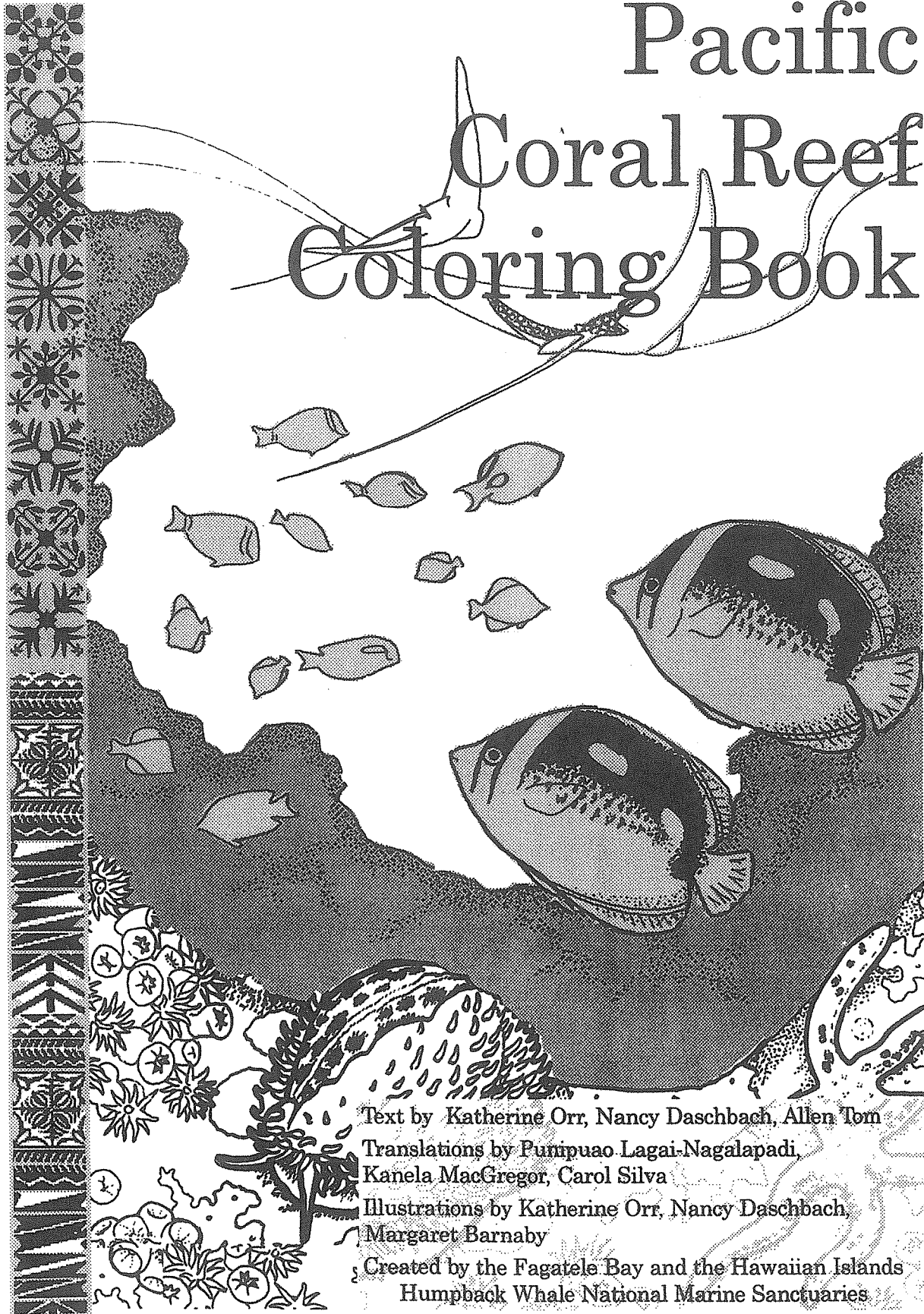


# Pacific Coral Reef Coloring Book



Text by Katherine Orr, Nancy Daschbach, Allen Tom

Translations by Punipua Lagai-Nagalapadi,  
Kanela MacGregor, Carol Silva

Illustrations by Katherine Orr, Nancy Daschbach,  
Margaret Barnaby

Created by the Fagatele Bay and the Hawaiian Islands  
Humpback Whale National Marine Sanctuaries

# The Pacific Coral Reef Coloring Book<sub>o</sub>



Written by:  
Katherine Orr, Nancy Daschbach and Allen Tom

Illustrated by:  
Katherine Orr, Nancy Daschbach and Margaret Barnaby

Samoan translation:  
Punipua Lagai-Nagalapadi  
Hawaiian translation:  
Kanela MacGregor, Carol Silva, with  
assistance from Claire Cappelle

Layout and design by: Nancy Daschbach

Adapted from books by Katherine Orr

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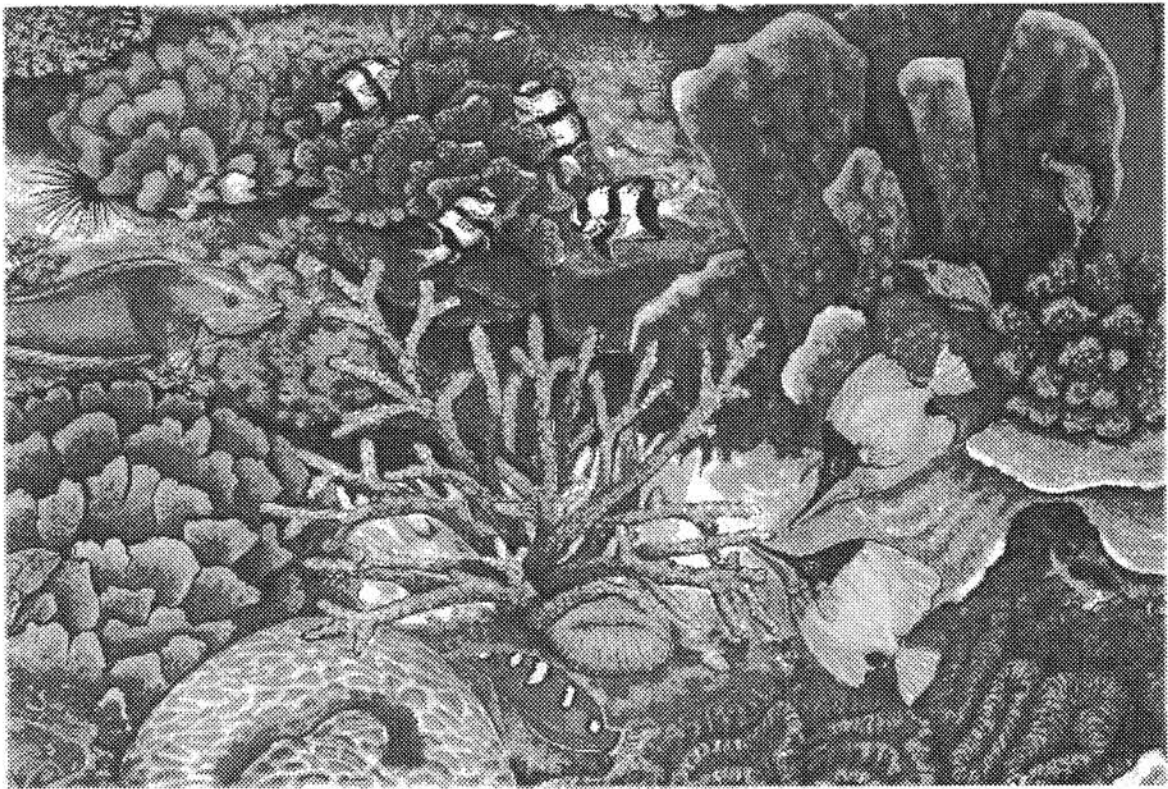


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*The blend of the Hawaiian and Samoan tapa design illustrates the underlying theme of this book: that the vast distances between islands in the Pacific are bridged by the cultures of the people and the natural resources of the coral reef. The Polynesian people developed in the world of the coral reef. Their appreciation of the life found in the reef ecosystem comes from millennia of dependence on the reef for their livelihood.*

## Pacific Coral Reefs

We who live in the Pacific—and those who visit here—are fortunate to be able to experience the amazing underwater world of coral reefs. Hawai'i and American Samoa are among the most geographically isolated group of islands in the world. Evolution has produced animals and plants that are found no where else. Understanding and learning about the coral reef ecosystems will help us to protect them. This coral book was created by the National Marine Sanctuary program to provide the reader with an introduction to the Pacific's fascinating coral reef ecosystem. For those of you who want to learn more about Hawai'i and the South Pacific's unique underwater world, we encourage you to check out several outstanding marine fish and invertebrate books that are available in your local bookstore or library.



*from a painting by Margaret Barnaby*



K ORR

## What are corals?

Coral is built from the joined skeletons of tiny animals called “**polyps**”. Some polyps form their skeletons from a chemical called “calcium carbonate”. This is the same white substance that forms bones, sea shells, chalk and our teeth. We call these the hard or stony masses. Different hard corals are sometimes named after objects they resemble. Can you identify some corals: mushroom coral, the cauliflower coral, and finger coral?

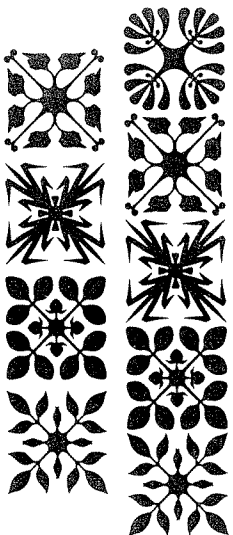
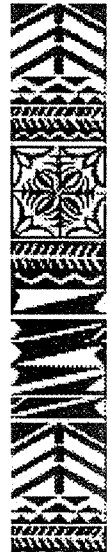
Most coral polyps (1) are smaller than a pea. Their soft bodies look like little sacks with tentacles surrounding a mouth at the top. Each polyp is joined to its neighbor by its skeleton and an outer skin. A layer of slippery mucus protects the skin and helps some polyps catch their food.

Polyps use their tentacles to capture bits of food that drift by. Special stinging cells in their tentacles paralyze the prey. Then the tentacles pass it to the polyp’s mouth.

## O a nei mea o amu?

O ‘amu o atigi ua fausia e le tele o meaola ninii e taua o *polipo* “*polyps*”. O nei meaola ninii e laititi ifo lava i le tamai pi lea e ‘ai. O le atigimalo o le polipo lea e taua e tatou o ‘amu, e fausia lea ini kemirale ua faaigoaina o “*calcium carbonate*” mai le sami. O le kemirale foi lea o faia ai o tatou ivi, nifo, atigi o figota faapea foi penisioka. O le vaega la o le ‘amu lea e vaaia e tatou e tusa o le pa’u lena e pito i fafo. Ua faaigoaina ‘amu malò nei i mea e faafoliga i ai, e i ai ‘amu e foliga o le *mushroom* faapea le *cauliflower* ma le ‘amu e foliga i tamailima.

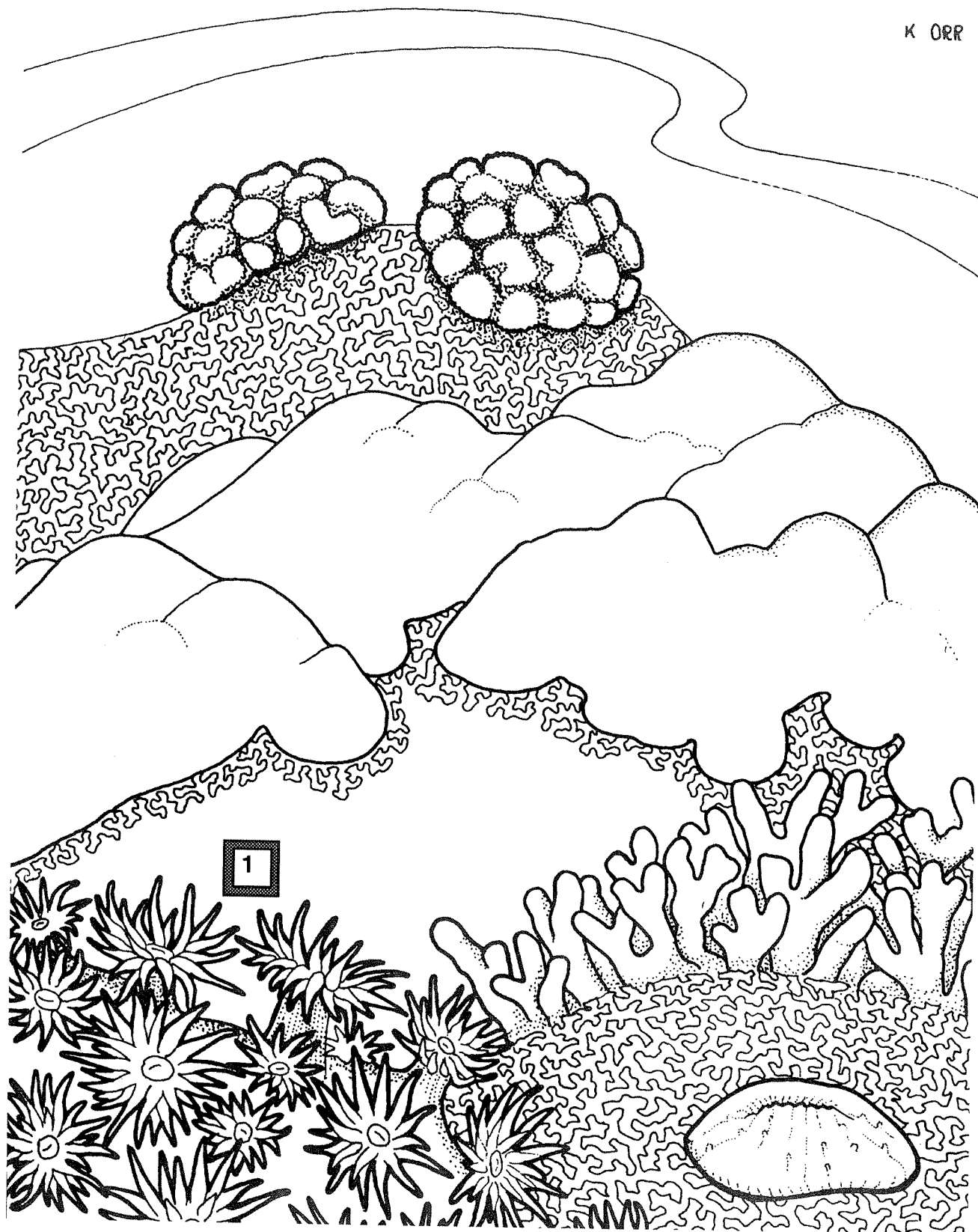
O nei meaola ninii o *polipo* e galemulemu o latou tino ma foliga mai pei se ipu ti ae siosiomia le pito i luga ini ave taufelegele. O nei ave e faaoga e le polipo e pueina ai ana mea’ai, o ana mea’ai e aafia ai mea o lo’o ope’opea ile sami. O ave o le polipo o lo’o iai ni vailaau o’ona e mafai ona faaumatia ai meaola pea tuia ai. A uma ona faaumatia meaola ninii mo mea’ai a le polipo ona pasi lemu ifo lea agai i lalo i lona gutu ma le manava.



## He aha nā ko’akā?

Ua ulu’ia ke ko’akā mai nā iwiami mai o nā holoholona iki kapa’ia “uku ko’ako’a.” Ho’okumu kekahi iwi mai kekahi kemikala mai kapa’ia “*calcium carbonate*.” O kēia ke kumukea like e hana nei i nā iwi, pūpū, poho, a me ko kākou mau niho. Kapa’ia kākou i kēia nā papa pa’a. Like nā inoa o nā ko’apa’a me nā mealike nō. Hiki iā ‘oe ke ‘ikepono i kekahi mau ko’a: ko’akohe (*mushroom coral*), ko’a (*the cauliflower coral*), a me ke ko’a (*antler coral*)?

‘Oi aku ka li’i o ka hapanui o nā uku ko’ako’a ma mua o kā pāpapa. Ua like nā kino palupalu me nā ‘eke li’i me kekahi mau ‘awe i ka’apuni ai me kekahi waha i ka luna. Ua hui ‘ia nā uku ko’ako’a pākahi i nā hoa me nā iwi a me ka ‘ili ma waho. Ho’opale a kōkua ka ‘ili he’e i nā uku ko’ako’a e ki’i ai i ka mea’ai. Ho’ohana nā uku ko’ako’a i nā ‘awe e ki’i i nā ma’ai i lewa ai. Ho’olōlō nā ‘awe i ka pio. A laila, ha’awi aku nā ‘awe i ko ka uku ko’ako’a waha.



1

## How do corals grow?

A single polyp builds a cup-shaped skeleton around its soft body. This polyp can multiply and eventually many polyps form a large mass of coral rock. In most corals, new polyps form by branching off from old polyps. They bud off from their parent much as a bud sprouts from the side of a tree.

As the polyps grow, they build new cup skeletons on top of the old ones. Polyps always grow at the surface of the colony. Below them, layer upon layer of old skeletons make up the coral rock.

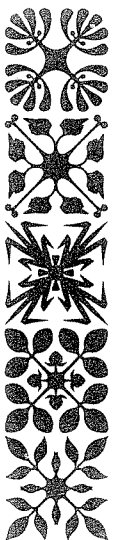
If we cut through the coral rock, we see skeleton growth lines showing how the polyps grew and multiplied. The living surface of a hard coral can be green, pink, yellow or even blue. But the coral rock inside is white (or, in the unusual case of blue coral, the inside is blue) because only the living polyps have color.

## Faapefea ona o la 'amu?

O polipo taitasi e fauina o latou atigi pito mai i fafo lea e vaايا e tatou ma taua o le 'amu. O le atigi e faata'amilomilo i le tino galemulemu o le 'amu aua le puipuia o le polipo. E amata o tasi le polipo i se nofoaga ae mafai ona faateleina e ala lea i le tatupu ifo o tamai polipo mai le polipo tèle e faapei o tamai la'au e tatupu ifo i le 'aa o le la'au tele. O le tele ma le tele o nei polipo e nonofo faatasi i koloni ma avea ai se nofoaga e tele ai ni 'amu ma a'au tele.

E vaايا le tutupu ifo o 'amu fou i luga o 'amu ua pèpè po ua foliga i maa. O le tele o 'amu i o tatou a'au ua pèpè ua na'o se pito i luga o ola ai nai tamai 'amu.

A tatou tata'eina se oga'amu, e mafai ai ona vaايا ai ni laina e iloa ai le tele o polipo na ola i totonu o se'amu e tasi. Ua na'o le vaega o le 'amu o ola e mafai ona vaايا o lanu mai, e i ai lanu meamata, piniki, samasama, ma le lanu moana; ao le tele lava o 'amu ua lanu papa'e, o 'amu ia ua pèpè.



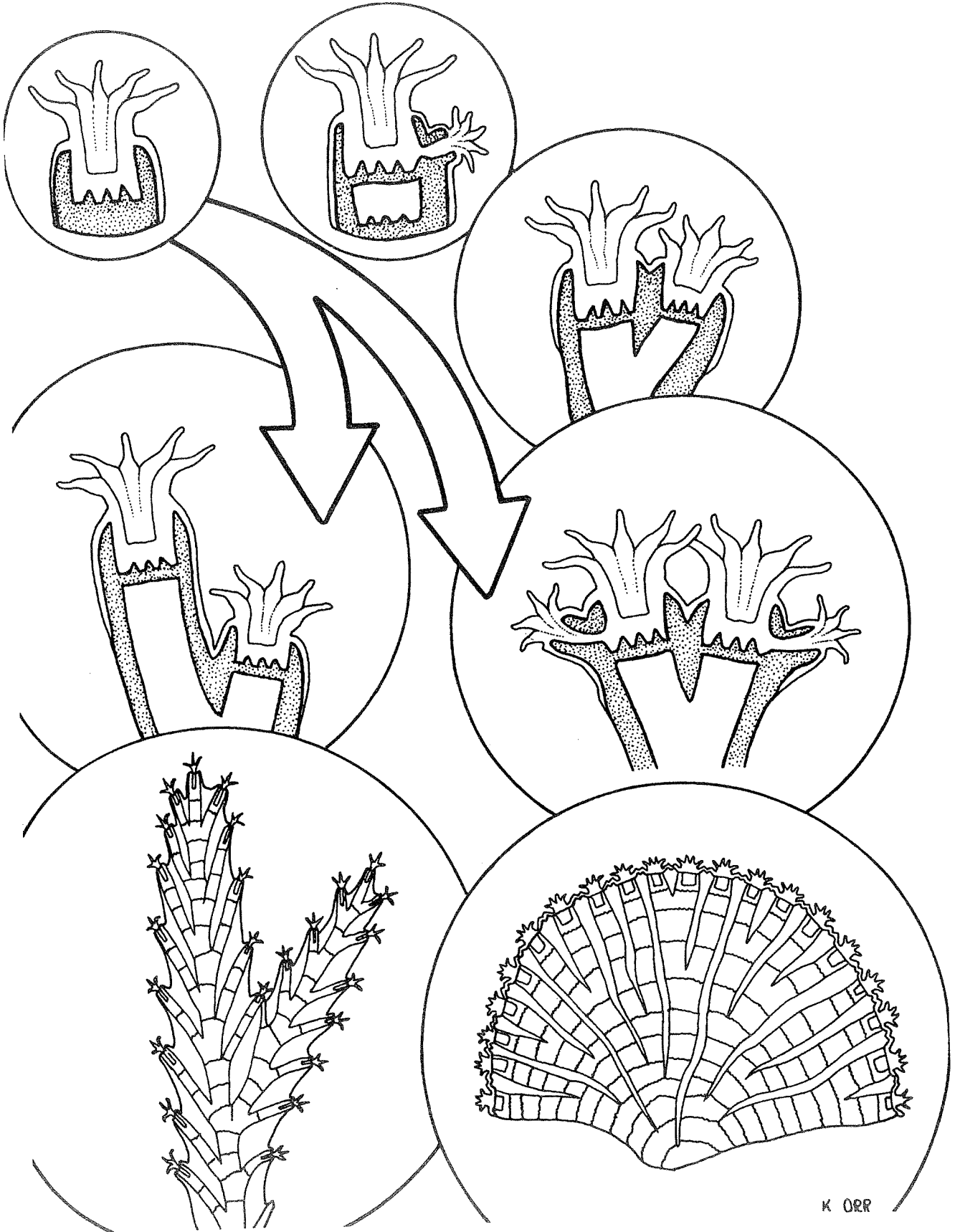
## Pehea e ulu ai ke ko'a?

Kūkulu ho'okahi uku ko'ako'a i kekahi iwi e like me ke kī'aha a puni o kona kino palupalu. Ua hiki i kēia ke ho'onuini a 'auane'i ho'okumu i kekahi papanui pūko'a. Ua ho'oulu ka hapanui o na ko'a mai nā uku ko'ako'a kahiko mai.

Ho'okupu lākou mai ko lākou mau mākua mai e like me kekahi kumulā'au.

I ka ulu'ana o nā uku ko'ako'a, kūkulu lākou i nā 'iwi a'apu hou ma luna o nā mea kahiko. Ulu mau nā uku ko'ako'a i mau ka papaluna o ka hui. Ma lalo, he papa ma he papa, ho'ohana nā iwi kahiko i ke ko'apa'a. Inā kalai i ke ko'apa'a, 'ike kākou i nā laina uluiwi e hē'ike nei i ka ulu ana o nā uku ko'ako'a. Ua hiki i ka papaola o ke ko'a e loa'a i ka 'ōma'oma'o, 'ākala, lenalena, ai'ole uliuli. Akā ua kea ka loko (koe na'e ke ko'a uliuli) no ka mea ua loa'a i nā ko'aola ka waiho'olu'u wale nō.





K ORR



## How are reefs formed?

From time to time polyps produce eggs and sperm. These join to form a baby coral animal, called a planula (1), that drifts in the sea. If the planula finds a clean, hard surface, it attaches itself and turns into a polyp (2). The polyp grows and multiplies by budding (3). In this way, corals spread from one place to another.

Dead coral rock provides a hard surface where young coral can settle, but many other creatures settle there too. Often plants and sponges cover the surface before new polyps can attach. Or, plants may grow over young polyps and smother them. Reef animals such as sea urchins, parrotfish, snails, and limpets graze on the plants and sponges, making room for new corals to settle and grow.

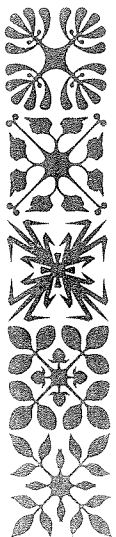
Most corals grow about one centimeter per year, so it takes hundreds of years for a coral reef to develop (4). Without the help of animals that feed on fast-growing plants, a reef could never develop.

## E faapefea ona fausia a'au?

O tamai meaola ia e fausia 'amu e tatau lava ona tuufaatasia vaega tane ma fafine e faia ai le tamai 'amu. O lea tu'ufaatasiga e masani lava ona tupu pe tasi lava i le tausaga. O le foliga mai o lenei faatasiga e faapei o le taimi lea e sau ai i luga le palolo. O tamai 'amu e ope'opea ma avesolo e galu i ogasami ese'ese. A maua se ogasami māmā ma mafai ona pipiimau ai lenei tamai 'amu ona aveva lea ma polipo 'polyp'. E tupu ma olaola polipo, ma faateleina i nei nofoaga e o' lava ina salalau ma tele lava 'amu i nofoaga ese'ese o le a'au.

O 'amu ua pèpè e aoga i polipo nei ao tau tuputupu ae, o le tele foi o isi meaola ole sami e lalafi ma nonofo i pūpū o ma'a nei. O luga o le a'au ua ola ai limu ma omomi ma ufitia ai le tele o nofoaga, o nofoaga ia e mafai ona ola ai 'amu. O isi nofoaga ua tutupu ai limu i luga o tamai 'amu o tuputupu ifo ma o'oi ina pèpè ai. O meaola o le a'au e iai kuikui/vaga/sāva'i, le i'a o le fuga, o sisi ma alili e latou fesoasoani tele i le faamāmāina lea o limu ma omomi o ola i luga o le a'au ina ia avanoa le mea e ola ai 'amu.

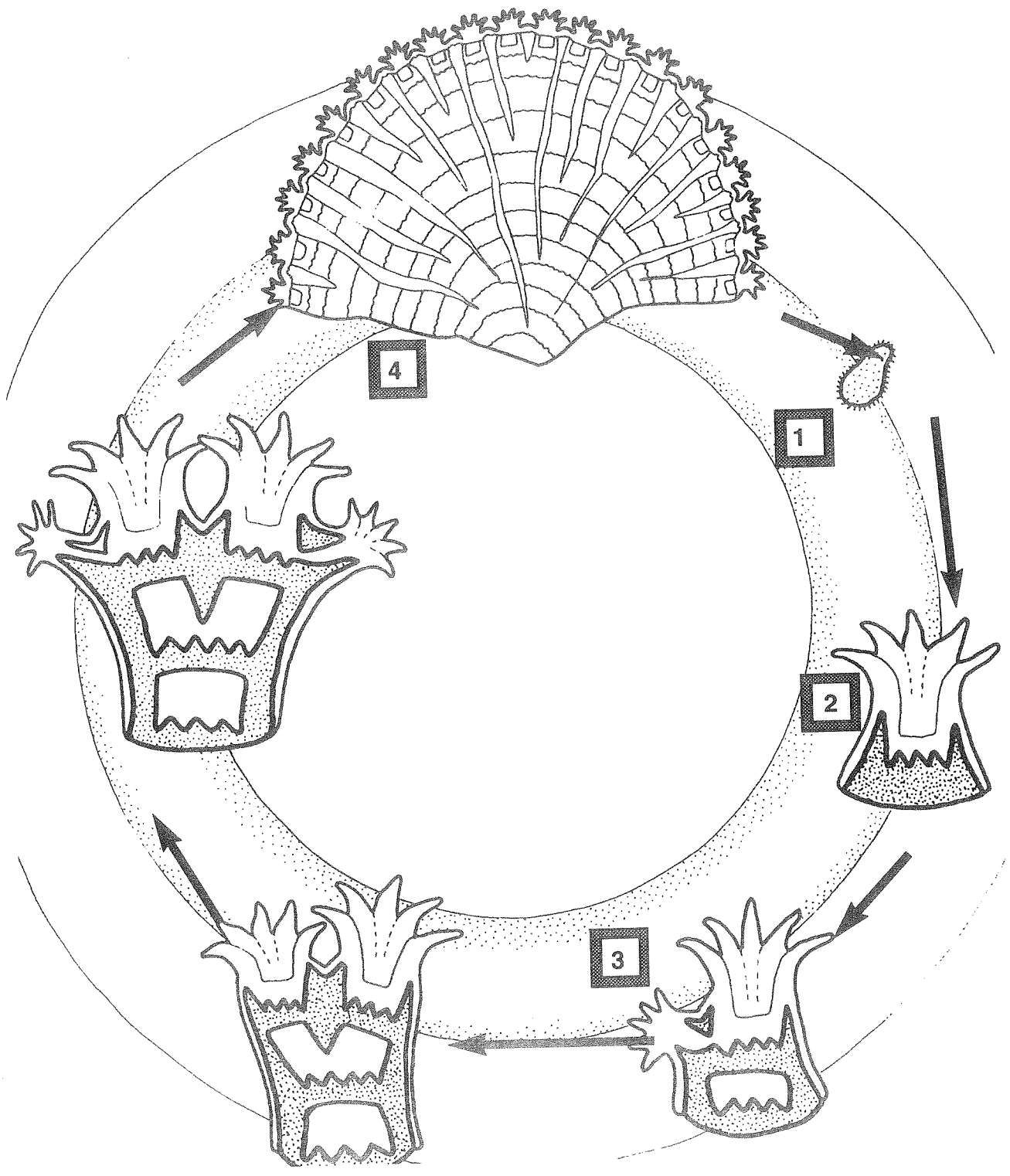
E telegese foi le tuputupu 'ae o amu, e tusa pe tasi le senitemita e tupu ai le 'amu ile tausaga e tasi. O le tulaga foi lea e faitau selau ai tausaga o tau fausia se a'au 'amu. O le a'au e manao-mia tele le fesoasoani le isi meaola i le isi aua le olaola lelei pea oi latou faapea tatou foi.



## Pehea e kūkulu ai nā ko'akā?

I kekahi manawa, ho'ohana nā uku ko'ako'a i nā hua a me nā keakea. Ho'ohui kēia e hānau i kekahi ko'a keiki e lanawale ai ma ke kai. Inā huli ke keiki i kekahi papa pa'a a pono, ho'ohui ia a lilo i uku ko'ako'a. Ho'onuinui ka uku ko'ako'a. A pēia, ho'oka'awale a laha i kēia wahi me kēlā.

Ho'okumu ke ko'a hala i kekahi papapa'a no ka noho'ana o nā ko'a keiki a me nā mea iki a'e. Ho'opo'i pinepine nā meakanu a me nā 'ūpī i ka papaluna ma mua o ka hui pū'ana o nā uku ko'ako'a hou. Ai'ole ulu nā meakanu ma luna o nā ko'a 'ōpiopio a ho'ohala iā lākou. 'Ai ka wana, ka uhu, ke alili, a i ka 'ōpihi, ma nā meakanu a me nā 'ūpī e ho'oho'onui i na wahi no ka ulu'ana o nā ko'a hou. Ulu akula ka hapanui o na ko'a i ho'okahi kenimika na pākahi i ka makahiki, no laila, ke pau ka ulu'ana ma hope o nā makahiki hāneli nui. Ina, 'alole kokua nā holoholona 'ai meakanu uluwiki, 'a'ole hiki i nā ko'akā ke ho'onuinui.



K ORR

## Where are coral reefs found?

Coral reefs grow in seas with warm, clear, and fairly shallow waters. Such waters are most often found on eastern shores of continents, around small islands, and in open tropical seas.

Reef-building corals need these conditions because tiny, single-celled plants live within the polyps. Without these tiny plants, called algae (*zooxanthellae*), corals do not make enough skeleton to build reefs. Algae need sunlight, so the water must be clear and shallow enough for light to reach the plants.

The coral polyps, and the plants within them, help each other. The polyps provide wastes that act as food for the plants. The plants, in turn, make oxygen and food for the polyps.

## O fea e maua ai a'au amu?

O a'au 'amu e ola i ogasami mafanafana, māmā, ma papau. O nei ogasami e maua i gatai o itu i sasae o konitineta, e faataamilomilo i taamai nu'u, faapea foi sami mafanafana.

O tamai la'au nini'i o se tasi o ituaiga limu e nonofo faatasi ma polipo i totonu o le tino o le 'amu. O lenei ituaiga limu e galulue faatasi ma le polipo i le fauina o le 'amu ae maise le a'au, e tatau ona ola i ogasami māmā ma papau. O ia tamai limu (*zooxanthellae*) e fesoasoani i le fauina o 'amu. O laau uma e i ai limu e tatau lava ona mauaina le susulu o le la ina ia mafai ona ola lelei ma faia ai ana mea'ai. E aoga tele le nonofo o polipo po'o meaola nini'i ia e fauina le 'amu faatasi ma limu nini'i nei e fesoasoani i ai. O limu foi nei e ala ai ona lanu ese'ese le 'amu. O polipo e maua ai mea'ai a le limu, a'o limu e faia mea'ai a le polipo ma maua mai ai le okesene e ola ai nei meaola.



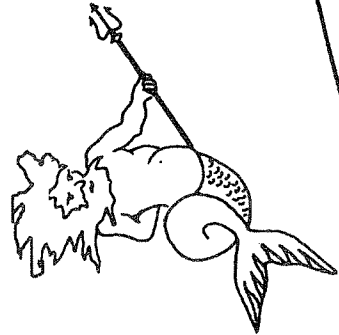
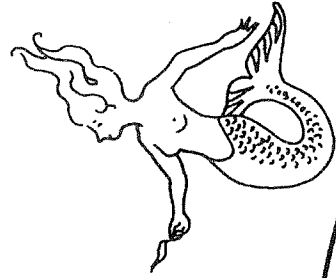
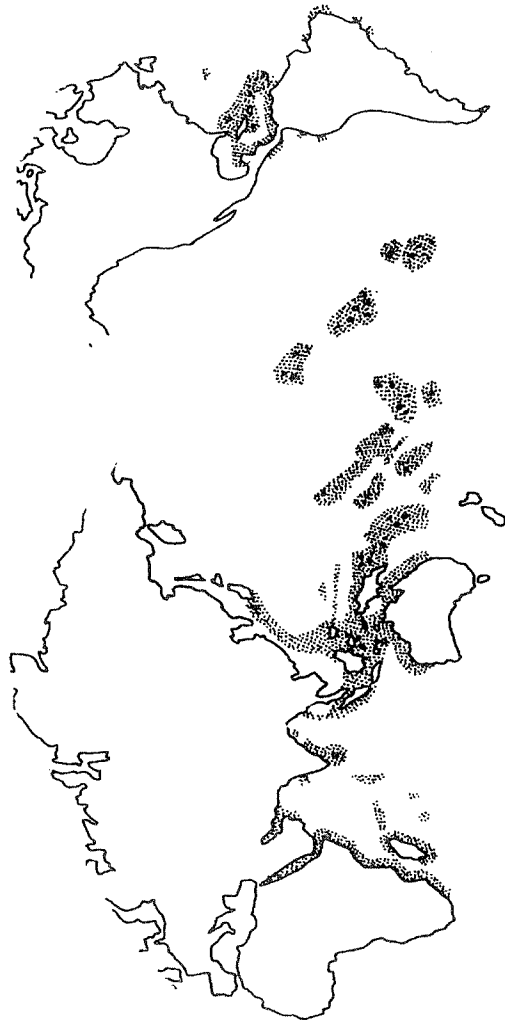
## 'Auhea a loa'a ana i nā ko 'akā?

Ulu nā ko'akā i nā kai mehana, moākaka, a ano pāpa'u. Ua loa'a kēia mau moana ma nā 'ao'ao hikina o na 'aina, a puni o nā mokupuni, a i moana.

Pono nā ko'a kūkulu ko'akā e noho ma kēia ano no ka mea noho nā meakanu lumihāiki ho'okahi ma laila. Ina, 'a'ole kei mau meakanu kapa ia "algae," 'a'ole kūkulu nā ko'a i nā iwi he lawa. He mea pono ka lā no ka "algae" no laila, pono ke kai e noho moākaka a pāpa'u no ke la'i 'ana o na meakanu i ke ao.

Kōkua nā 'āpana ko'a i kekahi i kekahi. 'O ka hanalepo o nā 'uku ko'ako'a ka mea'ai no nā meakanu. A hānai ea nā meakanu no nā 'uku ko'ako'a.

# Coral Reefs of the World



K. ORR.

## Biogeography: how do reefs differ?

Reefs are found all over the tropical world. Not all reefs are alike, though. The reefs with the most biodiversity, or different types of plants and animals, are found in the far western Pacific and southeast Asia. As reefs occur farther and farther from this rich "center" numbers of different organisms goes down.

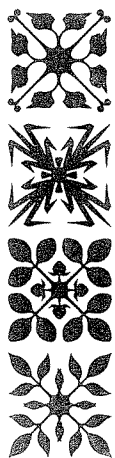
There are about 1,000 species of fish in American Samoa (as opposed to 2,000 in Australia), and less than 500 in Hawai'i. Corals, too, are fewer as you get farther east. In Samoa there are about 200 species, but in Hawai'i, which sits isolated in the northern hemisphere, there are only about 50 species. Atlantic reefs have even lower diversity compared to Pacific reefs.

Why? There are many reasons. Small island ecosystems cannot support the great diversity that a larger area, such as Australia Great Barrier Reef, can. Also, the huge distances between islands means that fewer plants and animals survive the long ocean journeys which allow them to colonize remote islands. Can you think of other reasons?

### Ese'esega o a'au?

O a'au e maua i itu vevela ole lalolagi, e ui lava ina 'ese'ese ituaiga a'au. Ole itu i Sisifo ole Pasefika ma Saute Sasae o Asia, o ogasami ia e pito i sili ona tele ai ituaiga meaola ma laau ese'ese o maua ai. O le mamao ese o a'au mai ia ogasami o le faaiti'itia foi lea o le tele o meaola ese'ese o maua ai.

E tusa ma le tasi le afe (1,000) ituaiga i'a o loo maua i Amerika Samoa (e fatusatusa ma le 2,000 o lo'o maua i Ausetalia), ae tusa e 500 ituaiga i'a i Hawaii. I Amerika Samoa, e tusa ma le 200 ituaiga 'amu o lo'o maua ai, ae tusa ma le 50 ituaiga i Hawaii. O ese foi ituaiga a'au o maua i le sami o Atalani ma e laititi lava ituaiga meaola ese'ese o maua ai. Pe aisea? E tele mafua'aga. E le mafai e motu laiti ona sapaapaia le tele o meaola eseese e pei ona maua i nofoaga tetele e i ai a'au tele i Ausetalia. O le vava mamao o motu ua le mafai ai ona feaveai meaola mai le isi motu i le isi. Pe ete iloa nisi mafua'aga?

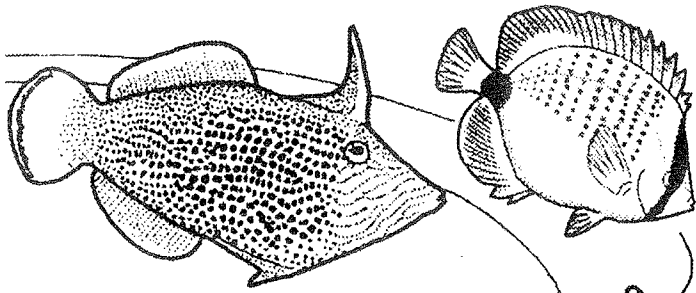


### Nā mea 'oko'a ma waena o nā ko'akā like 'ole?

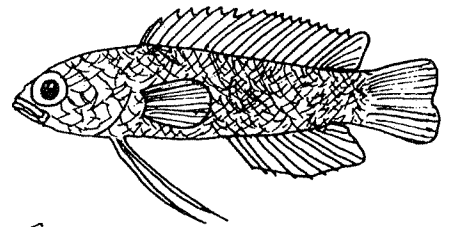
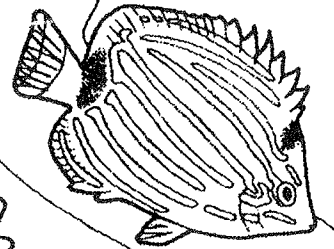
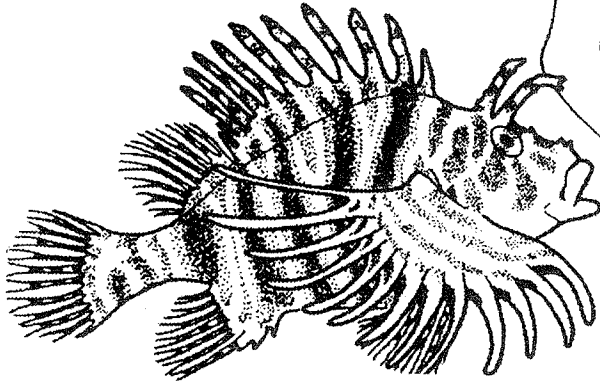
Loa'a nā ko'akā ma ka honua holo'oko'a. Akā, like'ole nā ko'akā. Loa'a nā ko'akā like'ole i ka Pakipika komohana mamao a me Asia hema-hikina. I ka hele 'ana akula mai kēia "piko" mai, emi 'ia nā mea 'oko'a.

Aia ho'okahi kaukini ano i'a ma Samoa Amelika (like'ole me 2,000 ma Australia) a emi iho 500 ma Hawai'i nei. Ho'emii'ia nā ano ko'a pū mai ka hikina aku. Ma Samoa aia ea 'ano o 200 'oi a emi mai, akā i Hawai'i, ma ka 'ao'ao 'akau, aia aa 'ano 50. Ua 'oi aku ka like 'ole o nā nā ko'akā Atenalika ma mua o nā Pakipika.

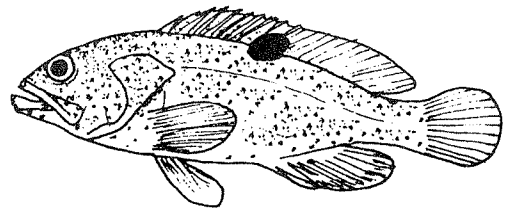
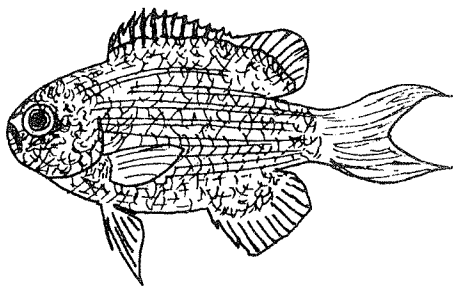
No ke aha lā? Ua nui nā kumu. 'A'ole hiki i nā mokupuni iki ke kākō'o i nā mea like 'ole e like me kekahi wahi nunui 'oia ho'i 'o "Australia Great Barrier Reef." A me nā mile nunui ma waena o nā mokupuni, 'no'emii'io ka helu o nā mea me ka 'ikaika lawa e ho'ola i na holo 'ana ma ka moana.



Fishes found only in Hawai'i



Fishes found in Samoa and other western Pacific reefs



## How do plants help build coral reefs?

Most sea plants are referred to as algae. Some algae form skeletons of calcium carbonate, just like coral do. These plants, called coralline algae, are important builders of Pacific reefs. Some form pink, brown and red crusts, while others grow in small branching clumps. Together with the crumbled shells of reef animals, their skeletons create sand grains which fill in the cracks and holes between corals. Some grow living crusts across the rock, which help protect the reef from wave action. Others grow among loose coral rubble and cement it together into solid reef.

Perhaps the most important reef-building plants are very small single-celled algae called "zooxanthellae". They live within the tissues of reef-building coral polyps and are too tiny for us to see with the naked eye. Without these plants, coral reefs could not develop, because the corals could not grow well enough or make enough skeletal material to build reefs. Zooxanthellae use sunlight to make oxygen and food which the polyps use. The polyps produce wastes that the zooxanthellae need. Thus, these plants and animals help each other to survive, and together they enable a coral reef to grow.

### Fesoasoani la'au ile fausiaina O a'au?

O le tele o la'au o le sami ua faaigoaina o limu. O isi ituaiga limu latou te fausia o latou atigi malò e pei lava o 'amu. O limuu nei ua faaigoaina o coralline algae e tàua mo le fausia o a'au ole Pasefika. O limu ia e iai o latou pau ua lanu piniki, lanu enaena, ma lanu mumu. O le faaputuga o atigi nuti o meaola ole a'au e gaosiaina ma potoi oneone o lo'o faatumuina pùpù o le a'au. O isi laau o lo'o feola i luga o ma'a e puipuia ai le 'aau mai galu malolosi, ao isi e ola faatasi ma maamaa o le a'au.

O la'au e pito sili ona taua i le fauina o a'au, ua faaigoaina ia limu o *zooxanthellae*. O limu nini'i nei e le mafai ona vaaia i o tatou mata, e nonofo faatasi i totonu o le totino o le 'amu ma tamai meaola o polipo. E galulue faatasi nei meaola ma limu i le fauina o le a'au. O nei ituaiga limu e faaaogaina le susulu o le la e fai ai mea'ai ma okesene mo le polipo. A'o toeaiga po'o mea lafoai a le polipo e fai ma mea'ai a limu. O le nonofo faatasi o polipo ma limu o se tulaga taua tele lea i le faaolaina ma tuputupu ose a'au 'amu.

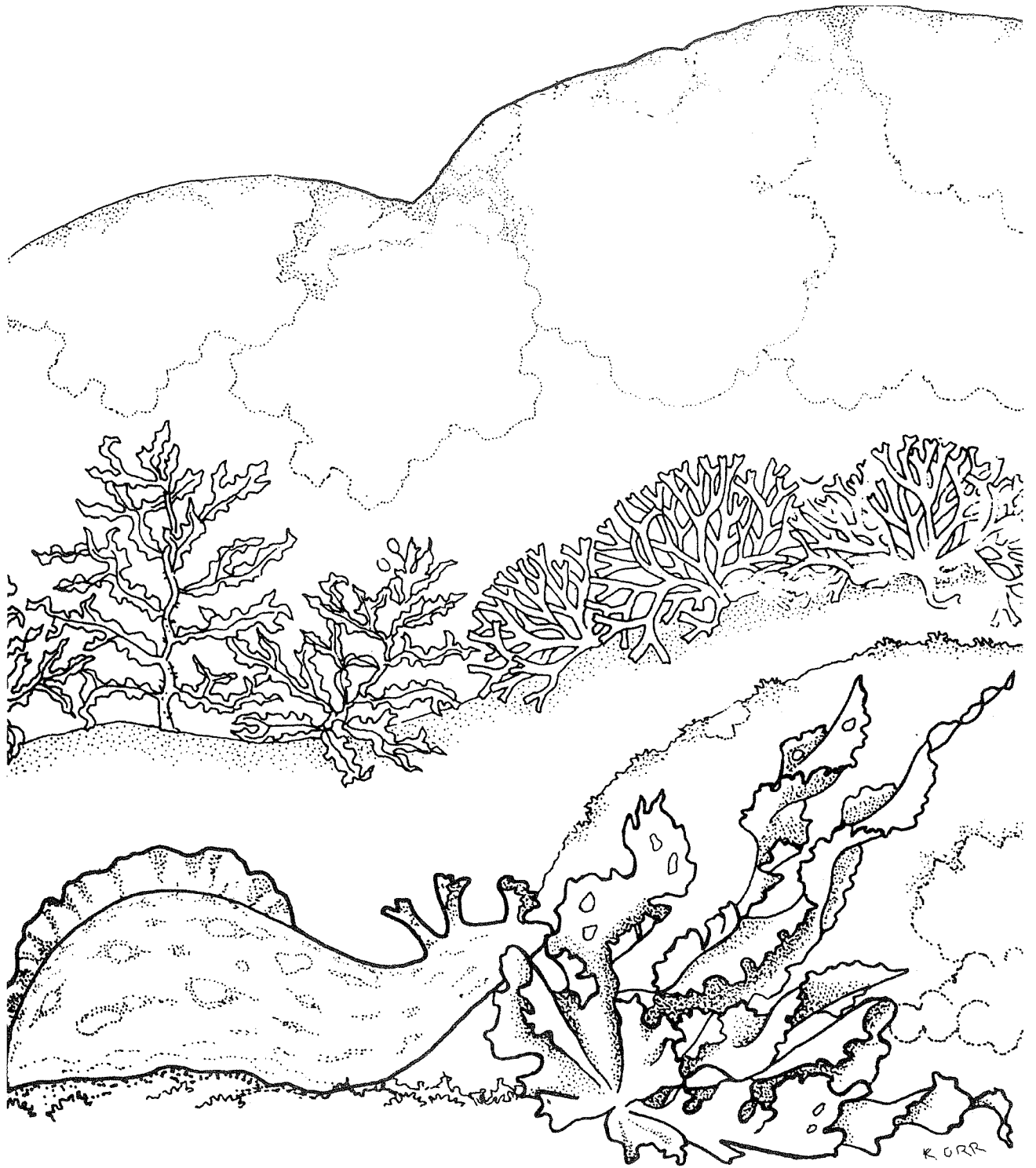


### Pehea nā la'au e kōkua 'ana me ke kūkulu `ana o ke ko'akā?

Ua kapa ia ka hapanui o nā meakanu, "na limu." Ho'okūkulu kekahi mau limu i nā iwi o *calcium*, e like me ke ko'a. He mea nui kēia mau ano. He mau 'apana 'ākala, māku'e, 'ula'ula kekahi, a he mau pu'u li'i ko nā mea 'ē a'e. 'O ka hui pū'ana o nā mea iwi li'i nā mea e ho'opiha ai i na puka ma waena o nā ko'a. Ho'opale kekahi i ke ko'akā i nā nalu. A ulu a'e kekahi me nā ko'a a ho'opa'a ia.

'O ia paha ka mea nui no ke kūkulu'ana, kekahi limu lumikahi kapa 'ia "*zooxanthellae*." Noho ma ke kele o nā 'uku ko'ako'a a 'a'ole hiki ke 'ike me kou maka wale nō. Ina 'a'ole kēia, 'a'ole hiki i nā ko'akā ke ulu a'ela, no ka mea 'a'ole hiki i nā ko'a ke ho'oulu i nā iwipa'a. Ho'ohana ka "*zooxanthellae*" i ka lā e hana i ka 'ea a me ka mea 'ai no nā ukuko'ako'a a laila ho'onana i kā nā ukuko'ako'a kūkae, a peia, kōkua nā meakanu kekahi i kekahi e ho'oulu i nā ko'akā.





## Pacific reef members: attached animals

Many coral reef animals drift when they are very young, but soon settle down to live attached to the reef. Because they cannot move around to find food, most capture or filter bits of drifting food from the water.

- 1, 5. Octocorals—colonies of polyps with eight tentacles—grow in encrusting and branching forms. Their relatives, the hydroids (4), form colonies which may look like tiny ferns or feathers. Hydroids grow on the reef and on pier pilings and docks in harbors. Watch out for their painful sting!
2. Sponges come in many shapes and colors. Their porous tissues are often homes for small worms and shrimps.
3. Sea squirts, or tunicates, live alone or in colonies. Although sponges and tunicates aren't related (tunicates are vertebrates—like us), they both pump water through their bodies and strain out food.
6. Sea anemones are coral relatives. They attach themselves to the bottom by a muscular foot. The hermit-crab anemones get to travel because they live on old snail shells inhabited by hermit crabs.
7. The Christmas tree worm lives hidden in a tube within living lobe coral. Its bright feathery tentacles vanish instantly when startled.
8. The spaghetti worm lives hidden from view except for long white tentacles spread across the bottom to gather food from the sediment.

## O meaola nofomau i le taele o le a'au

O le tele o meaola ole a'au e amata o latou olaga i le opeopea i le sami. E le umi se taimi ona maua lea o se nofoaga i le a'au e pipii ma nofo tumau ai i lona olaga atoa.

O le 'amu o le tasi lea o nei meaola. A maua loa se nofoaga tumau ona le mafai lava lea ona toe fealua'i pe sui foi sona nofoaga i luga o le a'au. O le tulaga lea e tatau ai ona latou faaogaina o latou ave felefele e pue ai mea'ai o lo'o opeopea ile sami.

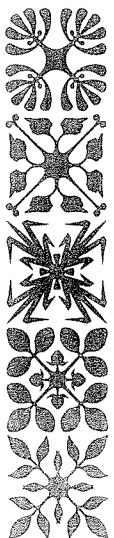
Amuvalu- O polipo e nonofo i koloni, o 'amu e valu ona ave felefele-e tupu maa'a ma lala solo. O isi meaola e nonofo i koloni e foliga mai o tamai fulu poo oli'oli' ua faaigoa o 'hydroids'. O 'hydroid' e ola ile a'au faapea lalo o nofoaga e taula ai vaa po'o uafu ma afai e tuia ai oe e matua tigà lava.

O lumane e i le aiga o meaola ma 'amu. E masani ona pipii nei meaola i le pito i lalo o vaa. O isi ituaiga lumane e pipii i luga o atigi o paa.

O omomi e maua i soo se ituaiga lanu ma foliga ese'ese. O le vava o latou tino e ave lea ma lafitaga mo anufe ma tamai ula.

O 'tunicates' isi meaola e nonofo taitasi pe koloni foi. O 'tunicate' ma omomi e mafai ona faaalu i totonu vai ma toe faasau i fafo ae pueina ai a latou mea'ai.

O anufe sami ua faaigoaina o le anufe laau kerisimasi e lafi i totonu o le tino o amu. A tago i ai e faafuasei ona faanunumi ona ave fulu. Ao le anufe supakeli e le vaia sei vagana ai ona ave papae e felefele solo mai i fafo au'a le sueina o ana mea'ai.



## Na mea ko'aka Pakipika: na holoholona pa'a'ia

Lanawale ka hapanui o nā holoholona ko'akā i ka wā 'ōpio, akā ho'op a'a koke laka i ke ko'akā. 'A'ole hiki iā lākou ke ne'e a'e, no laila, hopu i ka mea'ai i ke kai.

Ko'awalu- nā hui o na 'uku ko'ako'a me 'ewalu 'awe- ulu ia e like me nā lā'au. Ma ka 'ohana, nā hydroids, ho'oulu nā hui e like me nā hulu ai'ole nā pala iki. Ulu nā *hydroids* ma ke ko'akā ai'ole ma nā lā'aukū ma ke awa. E akahale i ke kiki eha!

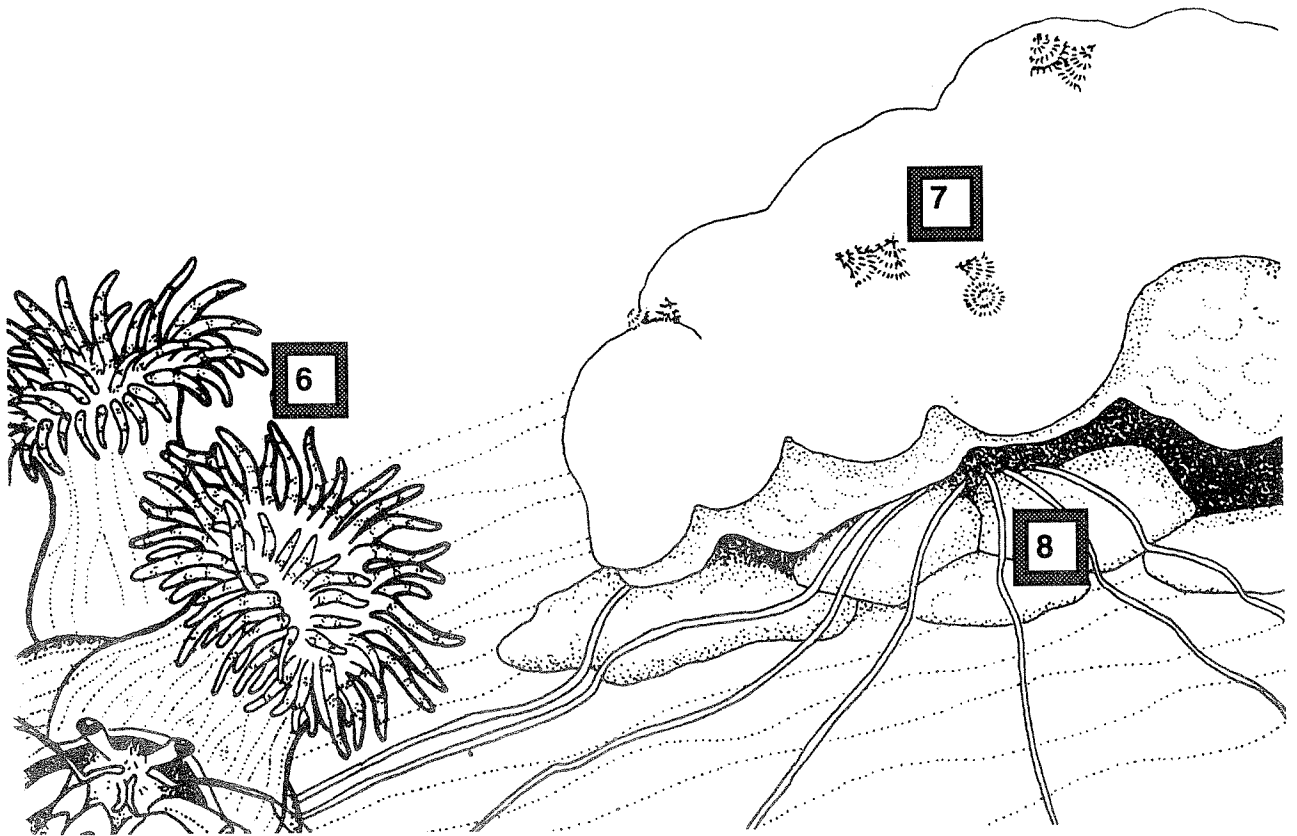
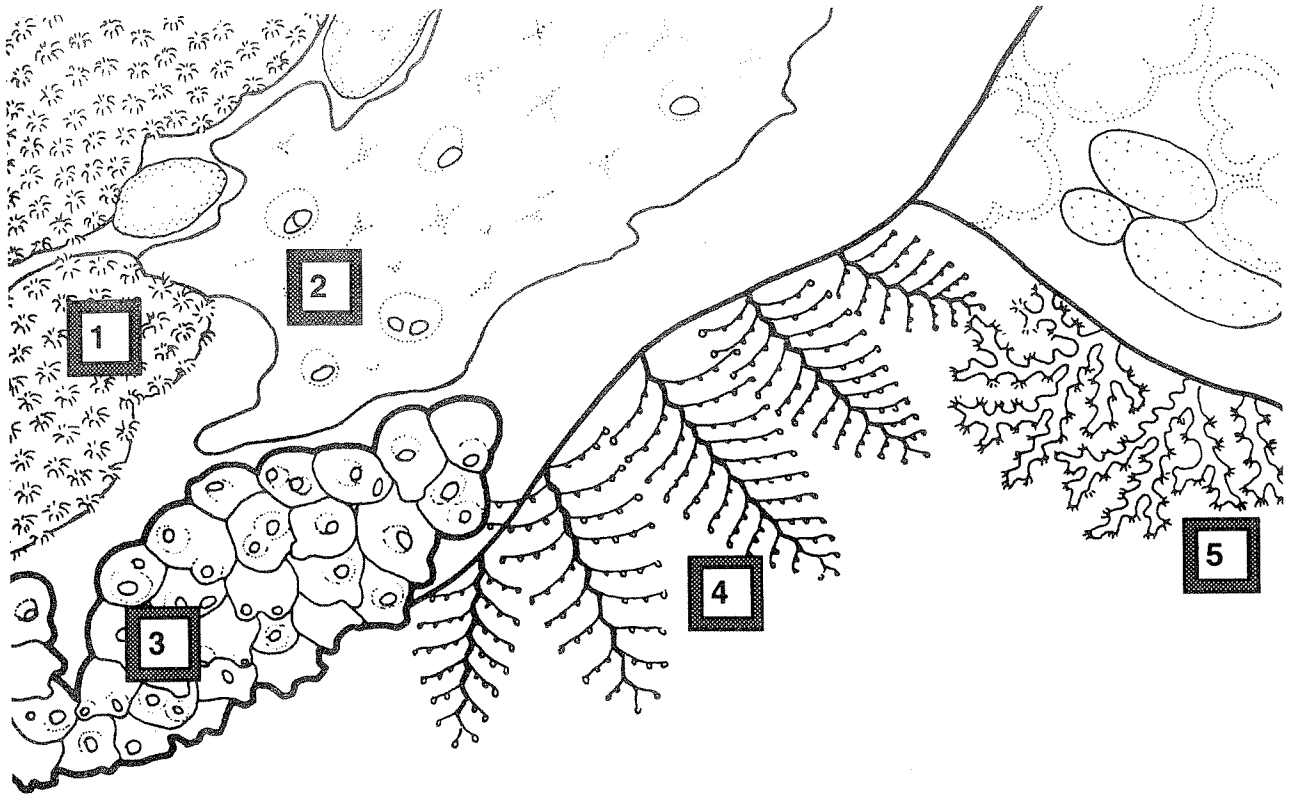
Nui nā kino a me nā waiho'olu'u like'ole o nā 'ūpī. He mau hale nā i'o pukapuka no nā "ko'e" a me nā 'opae.

Noho ho'okahi wale nā "*tunicates*," ai'ole nono laka i nā hui. 'A'ole he 'ohana ka 'ūpī a me ka "*tunicate*" akā ho'opahu nā mea 'elua i ka wai ma loko o ko lākou mau kino a kanana i ka mea'ai.

He 'ohana ko'a nā 'ōkole emiemi. Ho'opa'a lākou i ka lalo me kekahi lala i'o. Ua hiki i nā 'okole 'i emiemi papa'i ke ho'omāka'ika'i no ka mea noho lākou ma nā pūpū haka.

Noho pe'e ke ko'eko'e kumulā'au Kalikimaka ma kekahi 'ohe ma loko o ke ko'a ola. Pe'e iho nā 'awe hulu i ka ho'opū'iwa'ana.

Noho pe'e ke ko'eko'e kino "*spaghetti*" koe na'e nā 'awe iē'iluika ma ka lalo o ka lepo no ka 'ohi'ana i ka mea'ai.



## Pacific reef members: creeper and crawlers

Most of the reef's creeping and crawling members rest hidden within caves and crevices during the day and come out at night to feed.

(1) The triton's trumpet snail is active at night, hunting one of its favorite foods—the crown of thorns starfish.

Both the crown-of-thorns starfish (2) and all long-spined sea urchins (3) have poisonous spines and should not be touched. The crown-of-thorns feeds on coral polyps, while long-spined sea urchins feed on algae.

The black sea cucumber (4) lives in the open on sandy patches within the reef, sorting through the sand for bits of food. Its cousin, the light-spotted sea cucumber (5), lives under rocks, but stretches its long body out into the open to feed at night.

Most hermit-crabs (7), along with their relatives the lobsters (6), shelter by day and are active by night. Hermit-crabs live within empty snail shells. As the crabs grow, they must find larger empty shells to move into.

## Meaola tolotolo ma sosolo o le a'au

O le tele o meaola tolotolo solo ile a'au e momoe ile ao ae feoa'i ile po mo le sueina o a latou mea'ai.

O le sisi tèle lea e ili faapu e tagata e fealuai foi i le po aua le sueina o ana mea'ai masani o le alamea.

O vana (3) ma alamea (2) o ni meaola ia o le a'au e talatala o latou ave ma o'ona pea tuia ai se isi. O vana e 'aiina limu ao alamea e 'aiina amu.

O loli (4) e nofo i luga ole oneone ma suasuaina le oneone e maua ai ana mea'ai . O sea (5) e nofo i lalo o ma'a ae sue ana mea'ai ile po.

O pa'a uga (7) ma ula (6) e lalafi ile ao ae feoi ile po. O le uga e sueina atigi ua leai ni sisi o nofo ai ona fai lea mo a latou fale seia o'o foi ina ia le toe ofi i totonu ona toe sue foi lea o le isi atigi tele atu.



## Na mea ko'aka Pakipika: nā mea kolo

Ho'omaha pe'e ka hapanui o nā mea kolo ma loko o nā pao a me na naele ma ka lā a ho'opuka i ka pē no ka 'ai'ana.

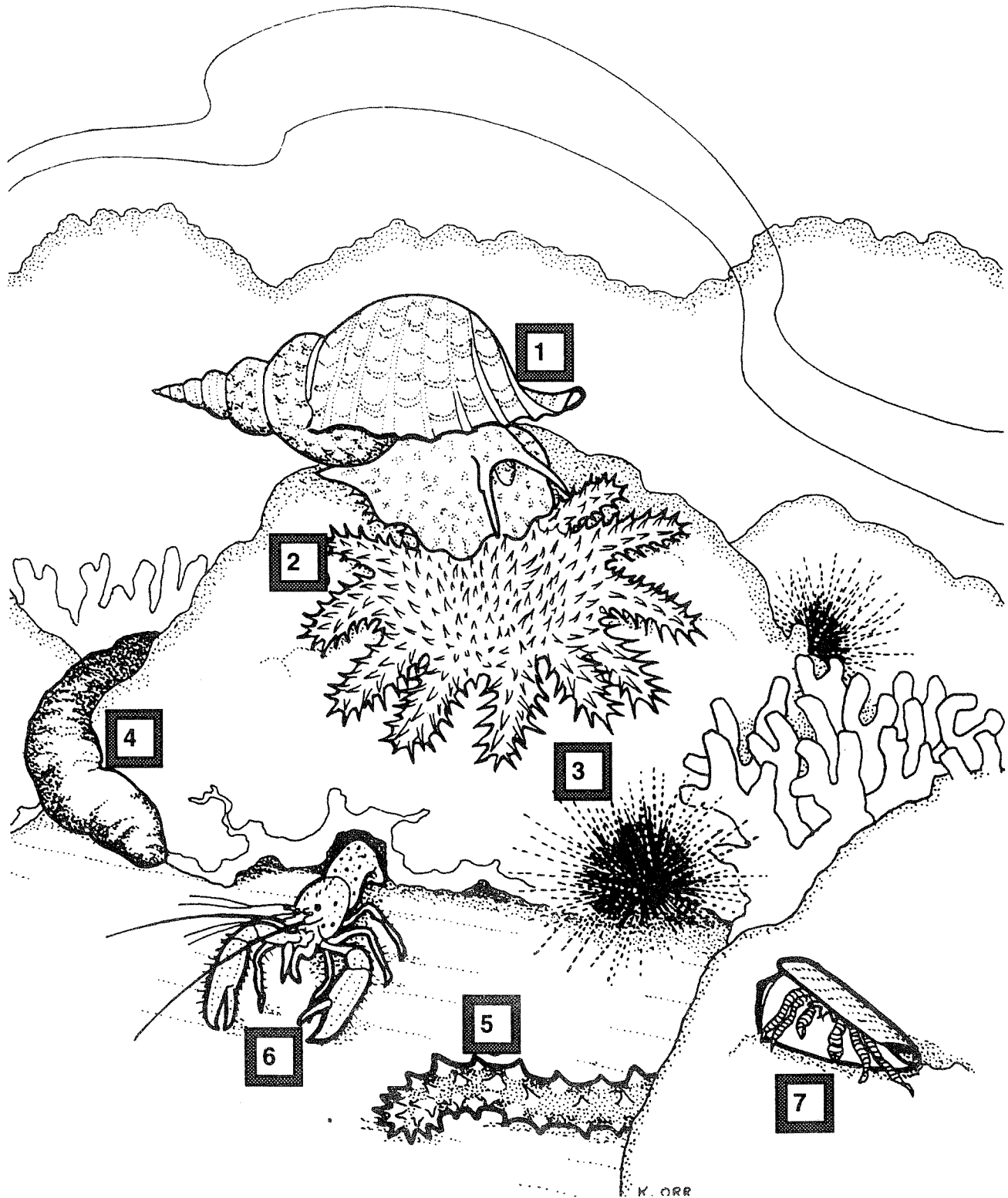
Ua maka'ala ka pū puhi ma ka pē, a hāhai 'o ia i kona mea'ai punahele- ka 'alamea.

He mau wanawana 'ino ko nā 'alamea a me ka wana, no laila 'a'ole ia e ho'opa'a ai. 'Ai ka 'alamea i nā uku ko'ako'a, a 'ai nā wana i ka limu.

Noho ka loli i nā wahi one ma ke ko'a ka, a 'imi i ka mea'ai i ke one. Noho kona hoahānau ma lalo o nā pōhaku, akā ho'opuka 'o ia i ka pō, no ka 'ai 'ana.

Ua maka'ala nā pāpa'i a me nā ula i ka pō a noho mālie i ka lā.

Noho nā pāpa'i i nā pūpū haka. I ko lākou ulu'ana, pono e huli i nā pūpū nui a'e.



## Pacific reef members: the swimmers

Coral reef fish vary widely in shape, color, size and behavior. Some travel long distances, while others stay within a limited reef area.

Blue jacks (1) are strong swimmers. They do not shelter in the reef, but may visit to hunt small fish for food. Some butterflyfish (2), by contrast may spend their whole lives near a single clump of coral.

A school of damselfish (3) swims above the coral, feeding on plankton, while a large scorpionfish (4) sits motionless on a rock. It actually looks like part of the rock as it waits to catch small fish that swim near.

A school of goatfish (5) swims close to the bottom, where they run their barbels through the sand in search of food. They pass a whitetip reef shark (6), resting in a coral cave after its lobster dinner.

### A'au o le Pasefika ma ona i'a

O i'a ole a'au e ese'ese uma lava, e amata mai i o latou foliga po'o faitino, o lanu, aemaise a latou amioga. O isi i'a e malaga mamao mai le a'au ao isi e nofonofo latalata lava i lona fasipito i luga o le a'au.

O malauli/ulua o tasi ia o i'a e malosi e fealua'i i le sami, e ui'ina le nofo tumau is nofoaga e tasi i le a'au ae vaaia o su'e mea'ai i luga o le a'au. O i'a e iai tifitifi, e nonofo latalata i faaputuga 'amu i o latou olaga atoa ma puipuia lea nofoaga pei o lana lava mea totino.

O mamō e feoi lava i luga ifo o 'amu ma a'ai i tamai meaola ninii o opeopea i le sami, ao mutu e sasao lelei lava i luga o ma'a poo 'amu e faatalitali ai tamai i'a mo se mea'ai.

O vete, pooiasina e feoa'i faatasi ma faalatalata i lalo o le oneone aua le faaaogaina o a latou 'ava ile sueina o mea'ai i le oneone. O le malie ua malolo lelei lava i totonu o se ana ina ua uma saga aiga tele o le afiafi i se ula lapoa.



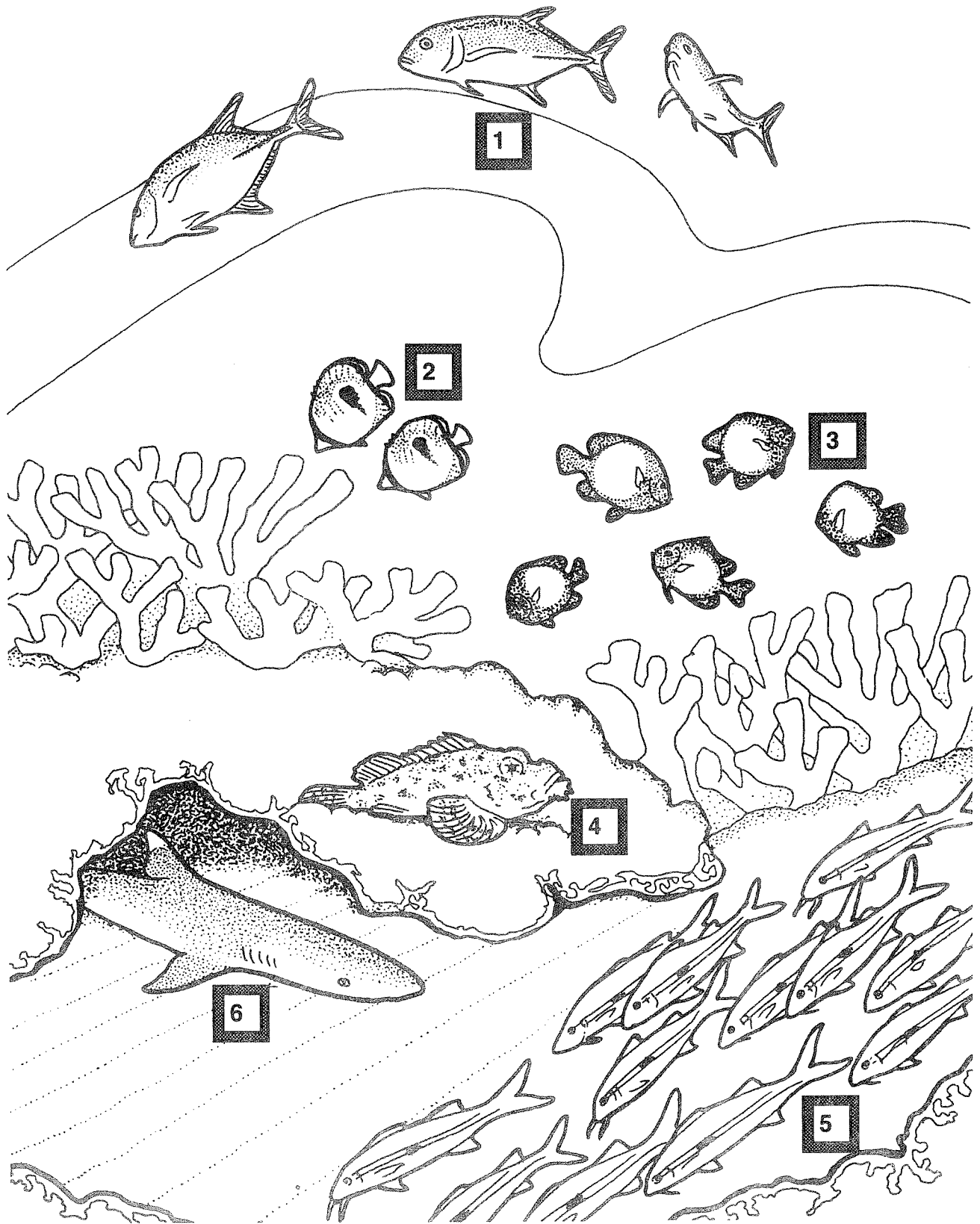
### Na mea ko'aka Pakipika: nā mea 'au'au

Ua like'ole nā i'a ko'akā me nā kinona, waiho'olu'u, a me ko lākou mau 'ano. Ho'omāka'ika'i mamao kekahi, a noho kokoke kekahi.

Ua 'ikaika loa ka 'ulua. 'A'ole lakau noho ma ke ko'akā, akā ho'okipa paha e hāhai i ka mea'ai. Noho wale kekahi lauhau ma ho'okahi 'apana ko'a.

'Au'au kekahi i'a ku ma luna o ke ko'a, e 'ai nei i ka limu, me ka noho wale'ana o kekahi nohu ma ka pōhaku, me nā helehelena like. He kohu pohaku ko ka nohu.

'Au'au ka weke kokoke i ka papaku, a laila hiki ke ho'opā i ka mea'ai me nā 'umi'umi. 'Ike lākou i kekahi manē lālākea e ho'omaha nei ma hope o kana 'ai 'ana i kekahi ula.





## The reef during the day

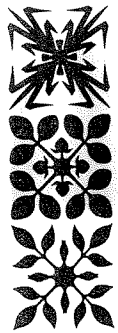
Two butterfly fish feed on a coral covered with limu (seaweed) (1). Nearby, a moray eel (2) pauses as a cleaner wrasse (3) nibbles at the small parasites living among the teeth of the eel. The eel does not eat or chase the cleaner wrasse away. Instead, the eel encourages the wrasse to keep removing pests by keeping its mouth open and remaining very still. In this way both fish benefit, the eel gets rid of parasites, and the wrasse gets a meal. This is called **commensalism**. Many creatures that live among the reef have developed different types of close relationships. In order to survive, one species must depend on the other.

The parrotfish (4) makes scraping sounds as it bits chunks of dead coral, which are covered with a green film of plants called algae. The parrotfish digests algae and passes out coral skeleton as sand. It swims on as a school of milletseed butterflyfish (5) glides past. Some butterflyfish also feed on algae. Their grazing helps keep the fast-growing plants from covering the reef.

## O le a'au ile ao

O tiftifi e lua o loo 'aai i limu o pipii i luga ose maa. E latalata ane i ai se pusi o loo faamamaina ona tainifo e le sugale faamama. Ua fiafia le pusi i le galuega lenei a le sugale o fai, ona e ave'esea mai ai manu iti faasoesa i lona olaga. E lè aia foi e le pusi pe tulia ese lenei sugale, e nao le ola fealofani i laua. O le aveesea o manu iti mai le tino o le pusi e maua ai mea'ai a le sugale ae māmā ai le tino ole pusi. O le tasi lea o mafutaga mafana i le va o le tele o meaola o le sami, e tatau lava ona lagolago le isi meaola i le isi pea fai e olaola umi ma lelei pea.

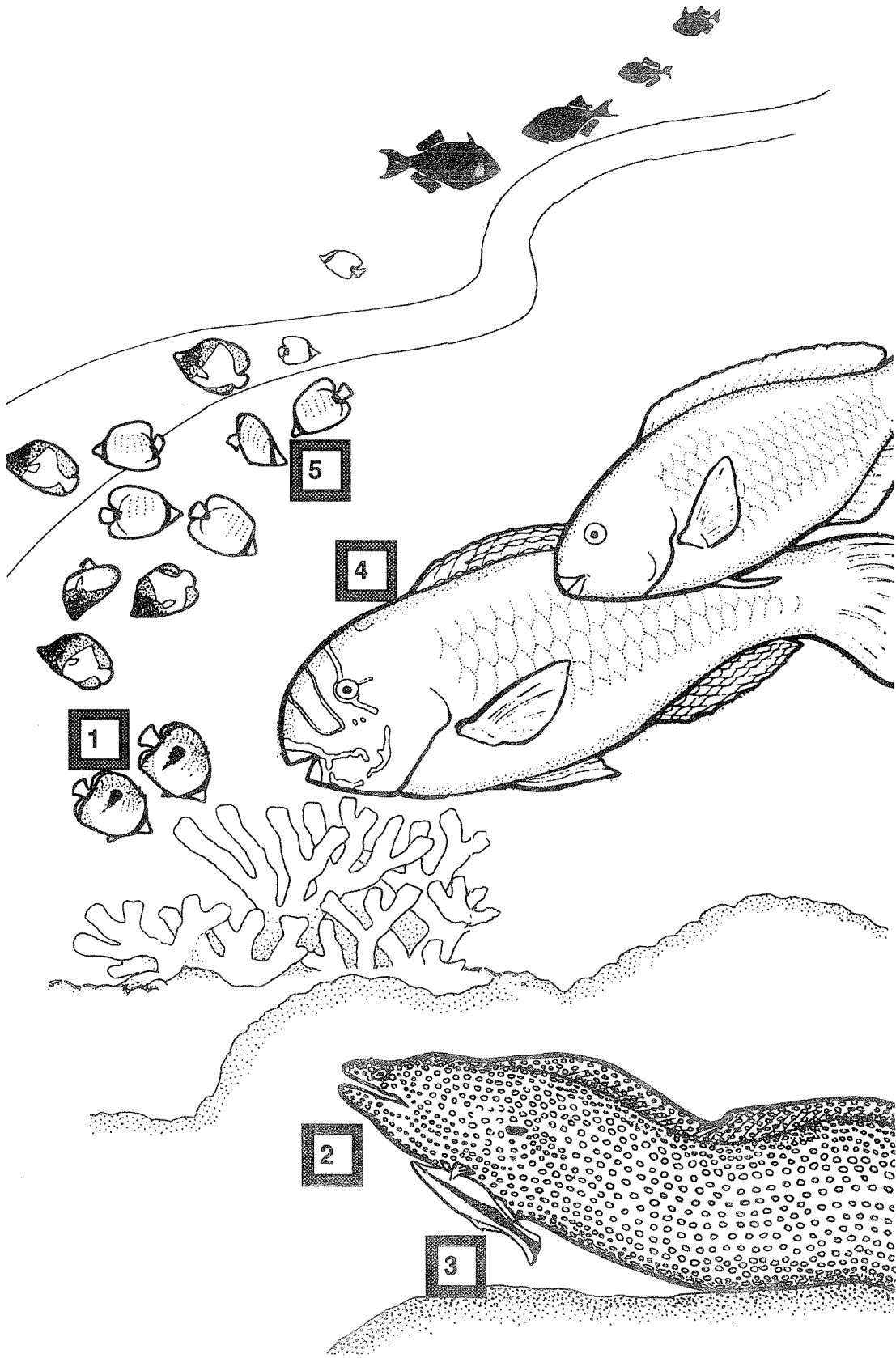
O fuga latou te galia pito o 'amu ae 'ai limu o pipii ai. E faaogaina limu ao 'amu e faasau i fafo ua manaia le papae ma avea ma oneone. O isi ituaiga tiftifi o lo'o pasi ifo, e fiafia foi i latou ia e 'aai i limu o lo'o ola faasolo atoa i luga o le a'au.



## Ma ka la

'Ai 'elua lauhau i ka limu ma kekahi pōhaku. Kokoke, kū kekahi puhi i kona 'ike'ana i kekahi "wrasse" e 'ai nei i ka mea'ai ma kona mau niho, me ka hāhai'ole. Paepae ka puhi i ka "wrasse" e ho'omau i kāna hana. 'O kēia ke alulike. No ka ho'omau'ana i ke ola, pono nā mea kai e alulike.

Ho'o kani ka 'uhu i kona 'ai'ana i nā 'apana ko'a hala ho'opo'i 'ia me ka limu. 'Ike 'o ia i kekahi lauwiwili, 'ai no ho'i ka lauwiwili i ka limu. A ua maika'i kā lākou 'ai ana no ka ho'oma'ema'e'ana i ke ko'okā.



## The reef at night

When nightfalls, some of the corals take on a different appearance. Some of the corals now look soft and fuzzy as the many polyps spread their tentacles to catch food. Uncurling its slender arms, a brittle starfish (1) emerges from its hiding place inside a rock crevice. Spiny lobsters (2) and octopi (3) leave their resting places to hunt for snails, worms and small crabs.

Fish that have been sleeping during the day come out to feed at night. Manta rays (4) awake to eat plankton. Other fish sleep at night, some wedge themselves into small cracks so that the current will not sweep them away while they sleep. The parrotfish (5) blows itself a cocoon of mucus to sleep in; the cocoon helps hide the parrotfish from predators.

## O le a'au i le po

A malu ae loa le afiafi ma oo i le po, ona sui foi lea o le vaaiga ile a'au. O meaola sa lalafi ile ao ua taufai o mai i fafo e saili mea'ai. O le tele o 'amu ua vaaia le lamolemole ma le falala mai i fafo ave felefele o polipo i le tau pueina o ana mea'ai. O le tasi foi o aveau lena ua oso mai i fafo mai lona faamoega. E oo foi i ula ma fe'e ua tuua o latou nofoaga ae saili i anufe, sisi poo tamai pa'a foi aua latou meaai.

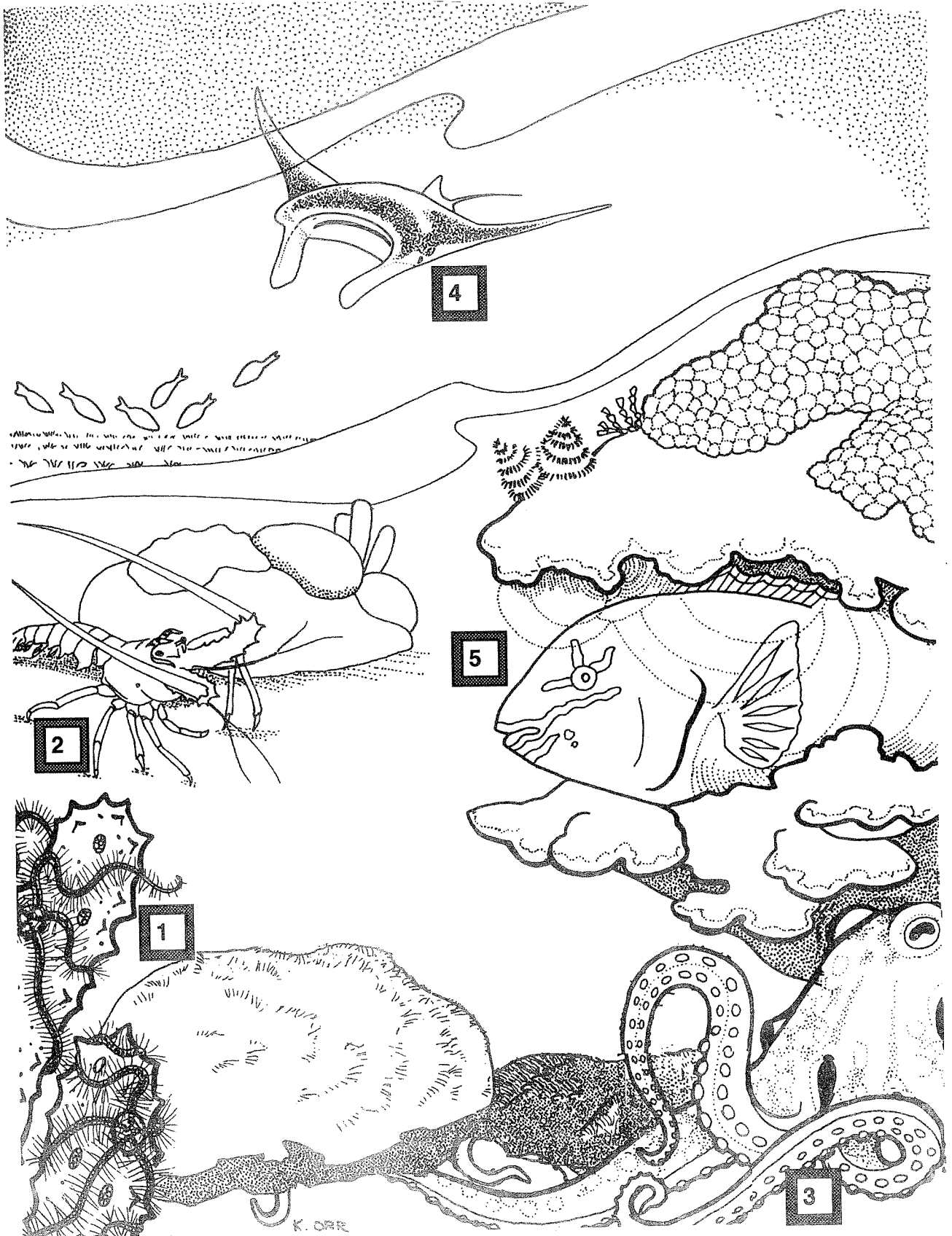
O i'a na momoe pe lalafi i pu o 'amu i le ao e ò mai i fafo i le a'au i le sueina o mea'ai. O isi i'a na feoi i le ao ua momoe i le po e i ai le fuga. O le fuga e saunia lava e ia lona falemoe e lafi ai ma moe filemu mai ona fili.



## Ma ka pō

I ka nāpo'o'ana o ka lā, lilo ke kohu o kekahi mau ko'a. I kēia manawa, ua palupalu kekahi, a ho'opuka kekahi. Ha'alele kekahi ula a me ka he'e e hāhai i ka mea'ai like'ole.

Ho'opuka kekahi i'a hiamoe lā e 'ai i ka pō. 'Ai ka 'aweoweo i ka limu. A hiamoe ika kekahi i'a'e a'e i ka pō ma kekahi lua pale. Puhi ka 'uhu i kona hale moe pale.



## The coral reef is a living system

Our visit to the coral reef has taught us many things: every plant and animal on the reef has a special role to play. Some animals are active by day; others are active by night. Each has its own living space. Each has certain kinds of food, and in turn may also be a source of food for others. Some animals create homes for others to live in. Many have close relationships, each providing something the other needs.

The coral reef is a balanced system where all things have their special place and function. In a system, all things are related. All the plants and animals of the reef depend on each other.

Our whole earth is a system, too. Does this mean coral reefs are important to us, even if we don't live near one?

## O le a'au ole nofoaga ola faatasi

I le tatou maimoaga i le a'au, e tele mea aoga ua mafai ona tatou maua: E tofu lava le meaola poo laau foi o le a'au mo lona aoga poo lona tulaga. E i ai meaola e feoa'i i le ao, e feoa'i isi ile po. E tofu lava le meaola ma lona nofoaga i le a'au. E isi meaola e faia mea e nofo ai isi meaola. E tofu lava le ituaiga meaola ma ana mea'ai pe 'ai foi e le isi meaola le isi. Ao le tele o meaola o le a'au e nofo fesoasoani le isi i le isi.

O le tulaga o faiga mea i le a'au e paleni lelei. E tofu lava le meaola ma lona aoga ma lona nofoaga foi ina ia mafai ona lelei le faasologa o mea uma. O le a'au foi e faalagolago tele le isi meaola ma laau foi i le isi, o le mea foi lea e tatau lava ona i ai uma meaola ma laau o le sami e ola faatasi. A ave'esea se fasipito poo le meaola foi o lenei tu'ufaatasiga e mafai ona talepeina ma faaleagaina le a'au atoa.

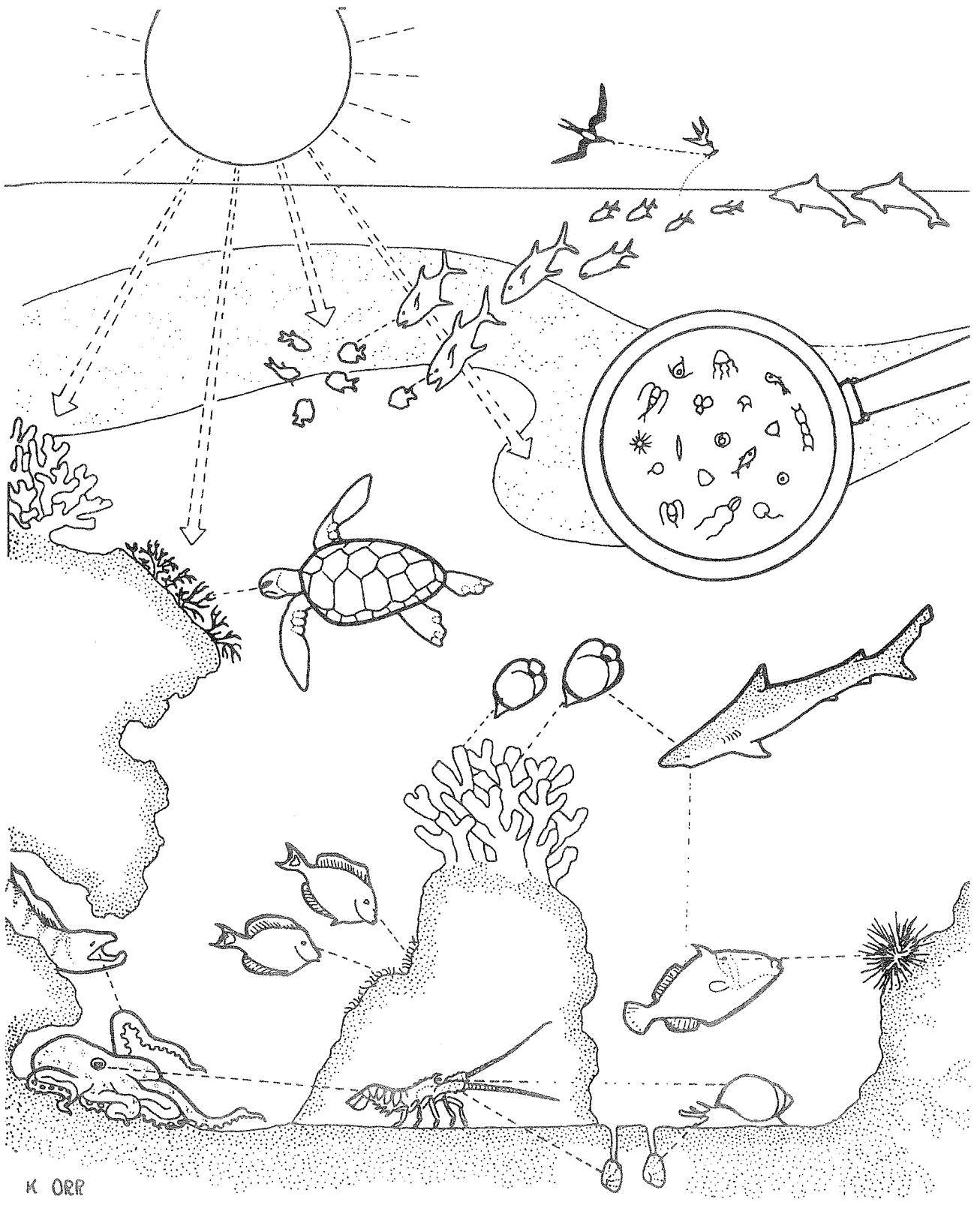


## He hui ola ke ko'akā

Ua a'o mai kākou i na mea nui: He lawelawe hana kā na mea pākahi. Maka'ala kekahi ma ka lā, a kekahi ma ka pō. He mau hale pōno'i k'o na mea a pau. Loa'a i na mea pākahi ka mea'ai pōno'i, a he kumu'ai kekahi no kekahi. Ho'okūkulu kekahi i nā hale. A alulike lākou i kekahi i kekahi.

He wahi pono ke ko'akā.

He wahi pono ka honua no ha'ii. No ke aha he mea nui nā ko'akā no kākou a pau?



K ORR

## Why are coral reefs important?

Many of the fish that we eat rely on the coral reef in some way; for food, shelter, a breeding ground or a nursery for their babies. Parrotfish (1), octopus (2) and lobsters (3) are just three of the many important animals that depend on the reef to survive.

Coral reefs act as barriers which protects our beaches. Strong ocean waves break on the reefs before they reach shore. This helps keep our shoreline from being washed away and creates safe anchorage's for our boats.

Coral reefs are an important source of sand for our beaches.

The reefs may one day be an important source of medicines. Researchers have found that some corals provide important pharmaceutical drugs.

Visitors come from around the world to see Pacific reefs. This creates jobs and other employment opportunities for the people of the Pacific.

Coral reefs are places of beauty and wonder. That alone makes them important.

## Aisea e taua ai a'au?

O i'a ma figota o loo fiafia tatou e 'ai e lagolago tua tele latou i le a'au: mo mea'ai, lafitaga, mo feusuaiga atoa foi ma nofoaga e faafailele ai a latou fanau. O le fuga, ulua ma le ula o ni meaola taua nei e manaomia tele le a'au.

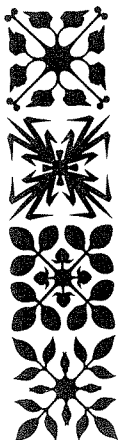
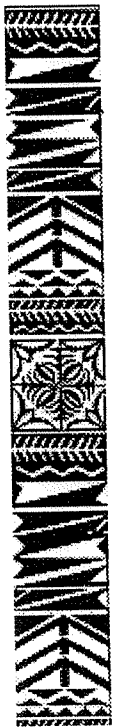
O a'au e puipuia o tatou matafaga matagofie ae maise foi tatou le tagata. A fati mai galu tetele, e muamua lava ona taofia le malosi o nei galu e le a'au ae lei oo mai i uta i matafaga. O le fesoasoani lenei a a'au 'amu e le mafai ai ona tafia ese o tatou matafaga. O le mea foi lea e le tatau ai ona tatou laua le onenone poo le iliili lea ei luga o tatou matafaga.

O a'au 'amu foi e maua mai ai le oneone paepae manaia lea e vaaia i luga o tatou matafaga.

Atonu e iai ni aso o i luma e mafai ona maua mai ai ni vailaau mai o tatou a'au. O tagata suesue ua mauaina e i ai ituaiga 'amu lea e aoga i le faiga o vai.

O le matagofie o a'au o le Pasefika ua ala ona o'o mamao mai ai tagata asisasi i lenei itu o le lalolagi. Ua mafai ona fesoasoani lea i tagata o le Pasefika i galuega ma isi tulaga o le soifuaga alu i luma.

O a'au o nofoaga ofoofogia ma maoa'e lona manaia. E le lava ea lena mafua'aga e tatau ai ona taua puipuia a'au!



## Nā mea nui?

Kāko'o ke ko'akā i nā i'a a kā kākou 'ai'ana. 'O 'ekolu o nā mea i kauka'i i ke ko'akā, 'o ia nō: ka 'ulua, ka'uhu, a me ka ula.

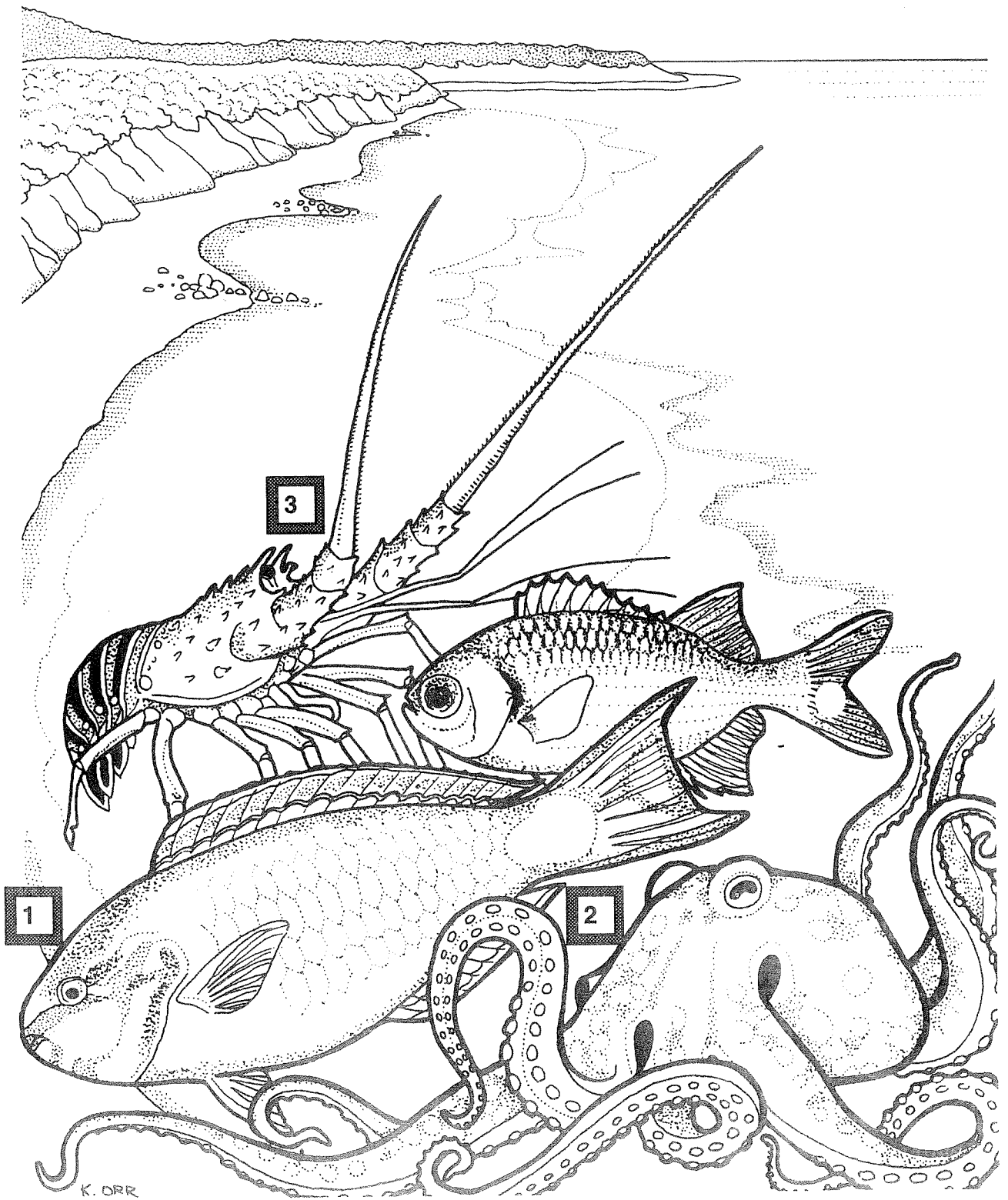
Ho'opale ke ko'akā i ke kahakai i nā nalu nui. Kōkua kēia i ka lihikai. He kumuone nā ko'akā no nā kahakai.

He kumu lā'aulapa'au kekahi.

Hele mai nā malihini mai na wahi a pau i ka honua e 'ike i nā ko'akā Pakipika. He wahi hana no kekahi po'e kekahi.

He mau wahi kamaha'o a nani nā ko'akā. No keia kumu wahi, he mea nui ke ko'ake.





## Reefs depend on their surroundings

Coral reef systems cannot exist by themselves. They depend upon warmth and light from the sun. The surrounding ocean must supply fresh, clear seawater. Some reefs need the help of nearby estuaries. Estuaries are areas where fresh and salt water comes together to form a marsh. Places such as – Hanalei (Kaua'i), Kāne'ohē Bay (O'ahu), Kealia Fishpond (Maui), Waipi'o Valley (Big Island) in Hawai'i and Leone and Nu'uuli Pala (American Samoa), are just a few examples. Estuaries keep seawater clean by trapping the soil from the land that may be washed down in a heavy rain storm. Many reef animals need the estuary to feed and shelter their young.

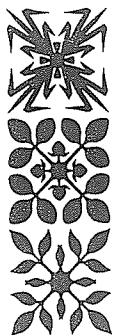
Because the coral reef depends on its surroundings, changes in the nearby environment will also affect the reef. Like the rainforests, the reef is a living system: damage to one part will hurt the rest. This means coral reefs can be damaged easily. And since corals grow so slowly, the damage is not easily repaired.

## E faalagolago a'au i le siosiomaga

O a'au e faalagolago tele i le mafanafana ma le susulu o le la. E le mafai ona olaola lelei le a'au pea palapala ma i ai faafitauli isi vaega o le sami. E tatau lava ona mamà ma manino le sami. O isi a'au e manaomia le fesoasoani a nofoaga e iai taufusi ma pala pei o Pala i Leone ma Nu'uuli. O taufusi o nofoaga ia e fetauti ai le sami ma le vai. E aoga tele taufusi poo pala e faamamà ai le vai lea e tafe mai i le laueleele agai atu i le sami ae maise lava taimi o timuga. O le tele foi o meaola ma i'a o le sami e faaogaina nei nofoaga e faafailele ai, fafaga ai ma tauti ai a latou fanau.

E mafai ona afaina le a'au i soo se suiga lava e tupu i lona siosiomaga. O le a'au e faapei o le vaomatua, ona o se nofoaga e ola faatasi uma ai meaola poo laau o maua ai, a tupu se faafitauli i se tasi vaega, o le a afaina ai le nofoaga atoa.

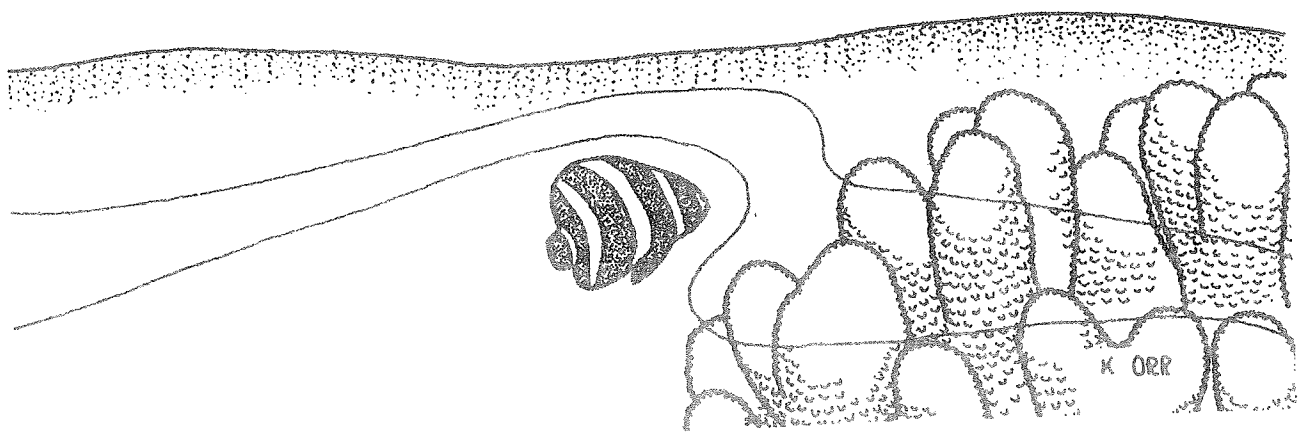
O 'amu e fai lava si tuai ona tupu, afai la e faaleagaina se vaega o le 'amu o le a atili ai ona faigata ona tupu. Pe ete iloa ea o le nofoaga pito sili ona tele i le lalolagi na faia e meaola o le A'au tele lea i Ausetalia?



## Kāko'o ke na mea e ho'opuni ana i ke ko'akā

Pono nā ko'akā i na mea e ho'opuni ana; ka ho'omehana o ka lā, ke kai, a me ke kōkua o kekahi muliu. e like me Hanalei (ma Kaua'i), Kane'ohē (ma O'ahu), Kealia (ma Maui), Waipi'o (ma Hawai'i), a me Nu'uuli Pla (ma Sāmoa). He mea pono no kekahi muhiwai e hānai'ai a ho'opale i kā lākou mau keiki.

Ho'ololi na mea ho'opuni ana i ke ko 'akā. 'O ka hana'ino o kekahi 'apana, he mea 'ino no nā mea holo'oko'a.



## How are coral reefs damaged?

Heavy storms smash and overturn corals.

People use explosives to blast channels and catch fish.

People collect chunks of coral to sell.

People who touch or stand on coral kill the soft polyps.

Catching too many fish unbalances the coral reef ecosystem.

In some areas of the world divers use bleach to catch lobsters and fish. Bleach kills corals and other reef animals.

Coral reefs have been killed by shoreline development. Land clearing, building construction and harbor dredging all put silt into the water. Silt smothers and kills corals.

Pollution from sewage, chemicals, and oil kills reefs.

Damage from storms cannot be helped, but damage by people can usually be avoided.

## Pe faapefea ona faaleagaina a'au?

O matagi malolosi e mafai ona nuti ai 'amu ma faaleagaina ai.

O le faaaogaina o fanai'a e fagogota ma faapà ai papa.

O le aoina ma le faatauina atu i tagata turisi o 'amu.

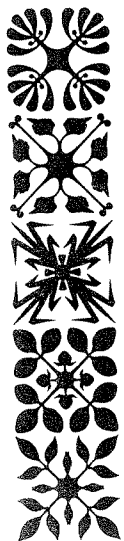
O le soli i vae ma le tago i 'amu e pèpè ai.

O le soona fagota ma le le faapalepale ua le mafai ai ona tutusa tulaga o le a'au.

O le faaogaina o vailaau e pu'e ai ula ma 'ia, e tele ona mamate ai i'a laiti, 'amu ma isi meaola.

O galuega e iai le suaina o mea e fai ai uafu i taulaga, suaina o fanua mo faiga o fale ma isi lava fuafuaga o le eli'ina o fanua e mafai ona tele ai le palapala e o'o atu i le sami. O nei palapala e pèpè ai 'amu ona ua le mafai ona maua se 'ea mai le sami màmà ma le manimo.

O figota, i'a ae maise 'amu o le a'au e tele ona pèpè i suauu ma kemirale faapea faletaele ua faaalu agai i le sami. O le faatama'ia o a'au e tagata e mafai ona fai i ai a tatou fuafuaga ma taumafai e taofi ia faiga leaga, ao matagi malolosi e iai afà ma isi faalavelave faanatura e faigata ona fai iai se fuafuaga a le tagata soifua.



## Pehea e ho'ino 'ia ai nā ko'akā?

Ho'ohuli 'ia nā ko'a mokumoku e ka puleileho.

Ho'opahū 'ia ke awa e ka po'e i make nā i'a.

'Ohi 'ia nā ko'a mokumoku e ka po'e no ke kū'ai 'ana aku.

Ke kū a i 'ole ho'opā nā kānaka ma luna o ke ko'akā, make nā 'ukuko'ako'a i loko.

Inā lawai'a 'oe i nā i'a he lehulehu, pau ke kaulike o ke ko'akā.

I kekahi mau wahi, ho'ohana nā kānaka i ke kuakea e ho'omake nā ula a me nā i'a.

Ho'omake ke kuakea i ke ko'akā a me nā i'a.

Ho'omake 'ia ke kuakea e ke kūkulu 'ia 'ana o nā hale ma ka lihikai. Kau 'ia ka lepo i ke kai e ke kūkulu 'ia 'ana. Uhi ka lepo i ke ko'akā a make ke ko'akā.

Ho'omake 'ia ke ko'akā e ka wai puna pilopilo.

'A'ole hiki ke alo a'e i ka hana'ino a ka 'ino i hana ai, akā hiki ke alo a'e ka hana'ino a nā kānaka i hana ai.



## Can a damaged reef recover?

Certain snails, worms and fish eat coral polyps. They create small dead spots on the living coral surface. In a healthy reef this is not a problem. The surrounding polyps can spread over these small spots and repair the damage. But large spots of dead coral cannot be repaired because the polyps grow more slowly than other creatures.

Algae and sponges settle on bare hard surfaces and grow rapidly. They quickly cover the area and prevent new polyps from settling there. Many boring sponges, clams, sea urchins, snails and worms scrape holes for their homes in the coral rock. The animals weaken the coral. Eventually the coral will crumble.

A damaged reef may take twenty to fifty years to recover. Those seriously harmed by silt or pollution may never recover.

## E mafai ona toe faaleleia se a'au ua faaleagaina?

E i ai meaola o le a'au e iai tamai sisi, anufe sami ma í'a ae maise le alamea e fiafia e 'aai i polipo o 'amu. Afai e laititi se nofoaga a'ia ma afaina e nei meaola, e faigofie lava ona toe ola mai 'amu i le fesoasoani a isi meaola o le a'au. Ae peitai, a tèle se pito o le 'amu ua a'ia ma afaina, e faafaigata ona toe foi le 'amu i lona tulaga lelei ona e tuai le tupu a le 'amu.

O limu e vave tele ona sosolo ma ola i luga o nofoaga e le'o ola ai nisi mea. O le pogai foi lea e faigata ai i polipo fou ona maua ni latou nofoaga e mau ma ola lelei ai. O le tele o meaola ole sami e faamoemoe lava i 'amu mo a latou meaai, lafitaga ae maise foi se nofoaga e faamautu ai.

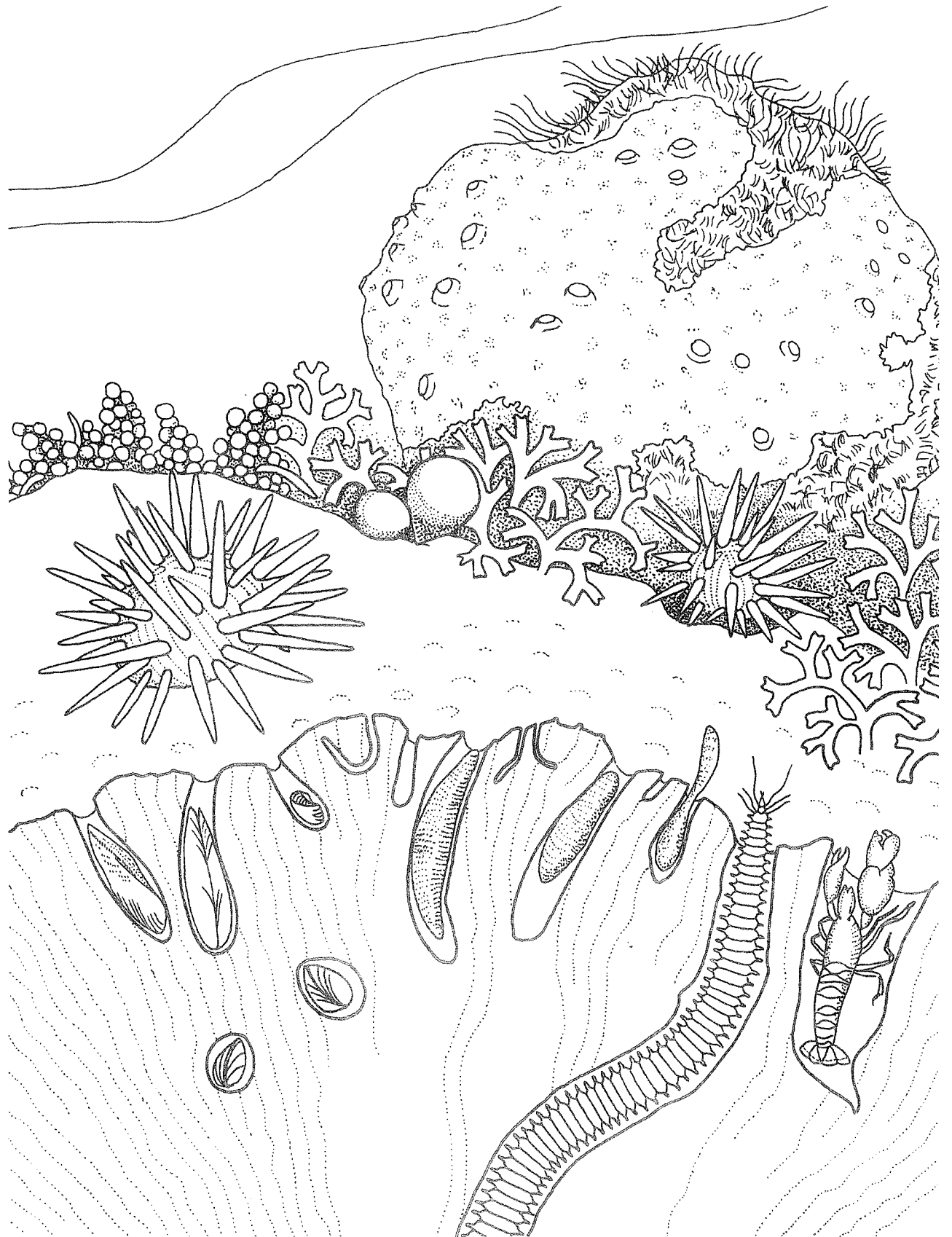
O se a'au ua faaleagaina, e tusa ole 20 e o'o i le 50 tausaga ona toe vaaia lea ua toe mataola mai. O a'au ua matua faaleagaina lava pei o le ufitia i palapala ma otaota e le toe mafai ona toe olaola lelei.



## Hiki i kekahi ko 'akā pō'ino 'ia ke hō'ola hou 'ia?

'Ai kekahi mau kamaloli, nā ko'e a me nā í'a i nā uku ko'ako'a. Hana lākou i kekahi mau wahi 'āpana make ma ka 'ili o ke ko'akā ola. 'A'ohē pilikia ma kekahi ko'akā maika'i. Hiki i nā uku ko'ako'a ke pālaha ma luna o kēia mau wahi 'āpana no ka hō'ola 'ana i ka pō'ino. Akā no na'e, 'a'ole hiki i nā 'āpana nui o ke ko'akā make ke hō'ola 'ia no ka me 'oi aku ka lohi o kēia ulu 'ana ma mua o nā mea ola 'ē a'e.

Noho nā limu a me nā 'ūpī ma luna on nā papa pa'a kohana a ulu koke lākou. Uhi koke lākou i kēia mau papa pa'a a 'a'ole hiki i nā uku ko'akā ke noho iho. 'Eli nā 'ūpī ho'owili, nā 'olepe, nā wana, nā kamaloli a me nā ko'e i nā poho i loko o nā ko'akā; 'o ko lākou mau home kēia. Ho'onāwaliwali kēia mau mea kai i nā ko'akā. Ho'opau koke 'ia nā ko'akā. Hō'ola hou kekahi ko'akā i nā makahikik lō'ihī-he iwakālua a he kanalima paha. 'A'ole hō'ola hou kēia mau ko'akā i pō'ino nui 'ia e ka lepo a í'ole nā mea ho'ohaumia.





## The future of our reefs

People are learning how easily coral reefs can be damaged, and how difficult it is for damaged reefs to recover. We recognize the importance of our coral reefs and are learning how to protect them. Many countries have established marine sanctuaries and reserves to protect certain reefs and the animals that breed and live there. Visitors to these areas can enjoy the beauty of the reef. Scientists can also protect the reefs. For example, by studying the ocean currents they can predict which reefs will be harmed by shoreline development before the damage is done.

We can help protect the reefs too:

By not handling or picking up live coral

By obeying our fishery regulations

By teaching others what we have learned about the reefs.

The coral reef is a place of wonder and importance. Let's keep our coral reefs healthy—for their sake and ours.

## Lumanai o aau

Ua toatele tagata ua malamalama lelei i le aogà o a'au faapea foi le faigata ona toe ola se a'au ua faaleagaina. Ua iloa foi e le lautele auale e mafai ona fesoasoani ai i le puipuia o a'au ae maise o tatou ogasami. E tele atunuu e matagofie tele o latou a'au amu ile maimoa a tagata. O nei atunuu ua faia ni nofoaga faapitoa ma puipuia e mafai ona ola lelei ai meaola o le sami ae maise amu. O tagata suesue e iai saienitisi e mafai foi ona latou fesoasoani i le puipuia o a'au. O a latou suesuega e aogà tele i le fuafuaina o galuega e tatau ona fai ina ia faaitiitia ai le faaleagaina o a'au ma le sami atoa.

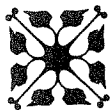
E mafai foi ona tatou fesoasoani i le puipuia o a tatou lava a'au:

Aua le 'ave'esea 'amu mai ile sami.

Usitai i tulafono tau faagotaga.

Ao'ao atu isi ina ia malamalama atili i a'au mo a tatou sami.

O a'au ose nofoaga ofo'ofogia le matagofie ma matalasi. Tatou puipuia ma faasaoina a tatou a'au mo le manuia o meola o le sami ae maise oe ma au.



### 'O ko kākou ko'akā i ka wā ma hope

E a'o mai ana nā kanaka i nā mea i ho'onāwaliwali i nā ko'akā; 'ike lākou i ka hana nui e hō'ola hou i nā kokākou pō'ino 'ia. 'Ike pono kākou i ka 'ano nui o ko kākou mau ko'akā a ko kākou mālama 'ana iā lākou.



Ka'awale kekahi mau aupuni i nā wahi ho'āno kai a me nā kai kapu no ka ho'omalū 'ana i kekahi mau ko'akā a me nā mea ola e noho a ho'olu ma laila. Hiki i nā kākou māka'ika'i ke ho'onanea i ka nani o ke ko'akā. Hiki i nā kākou akeakamai ke ho'omalū ho'i i nā ko'akā. I ka hākilo i nā au ma ke kai, hiki iā lākou ke wānana i nā ko'akā i pō'ino 'ia ana e ke kŭlulu 'ana ma ke kahakai.

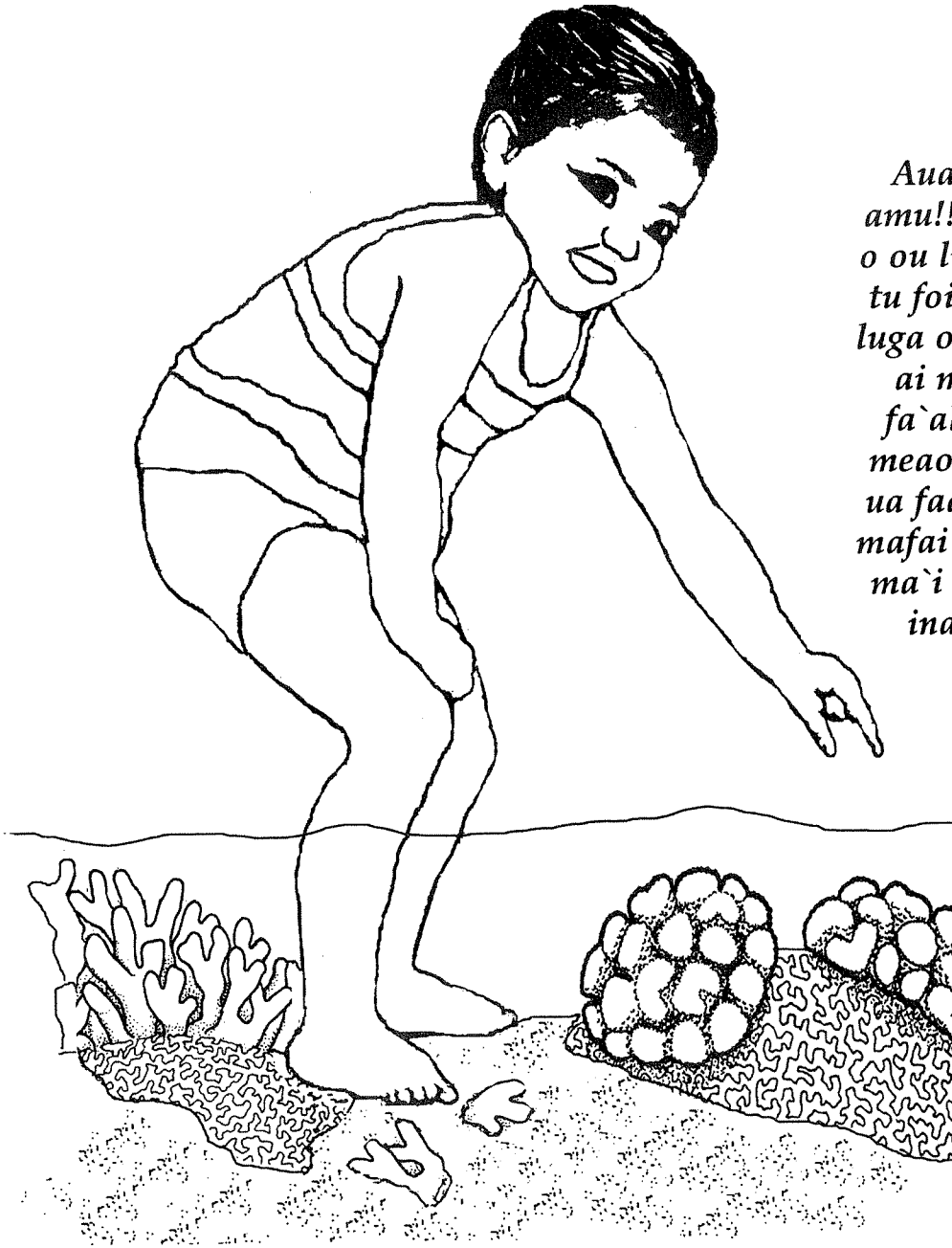


'Ike 'ia kēia mau mea ma mua o ka nāna 'ana i ka pō'ino. Hiki iā kākou ke kōkua, ke mālama ho'i i ke ko'akā. Mai pā a limalima 'oe i ke ko'akā, E mālama 'oe i nā kākou a me nā kapu i'a.

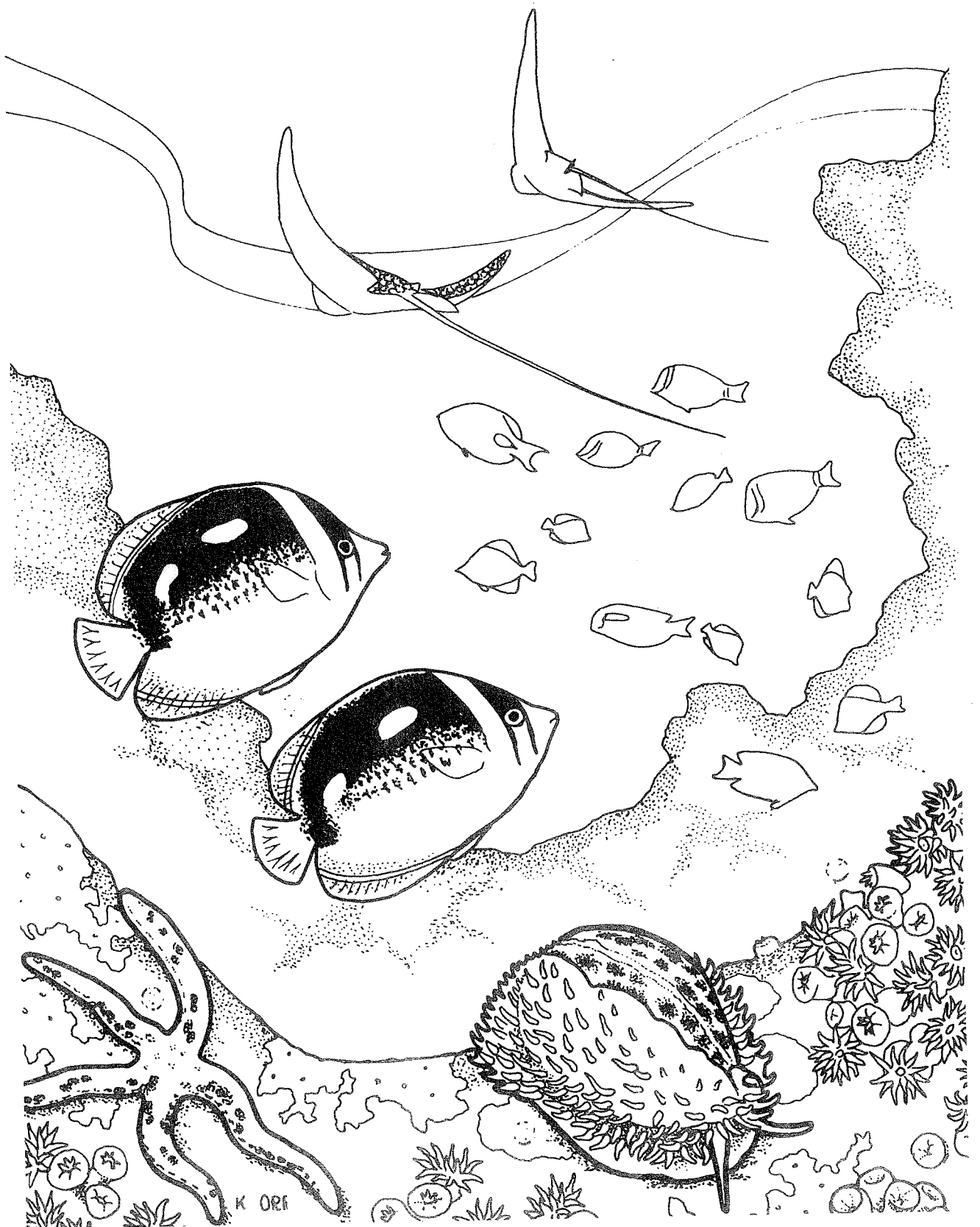


*Don't touch live coral!! Stepping on coral can break fragile pieces. Footsteps and handprints can damage the living coral. Damaged coral tissues can become diseased and die.*

*Aua le tago i  
amu!! O le tago  
o ou lima po`o le  
tu foi o ou vae i  
luga o amu e nuti  
ai ma oo ina  
fa`aletonu nei  
meaola. O amu  
ua faaleagaina e  
mafai ona maua i  
ma`i ma iu lava  
ina pepe ai.*



*Mai pā 'oe i ke ko'akā ola!! Inā hehi 'oe i ke ko'akā, hiki  
iā 'oe ke haki i ko lākou mau lālā palupalu.  
Hiki i ka hehi 'ana a me ka pā 'ana ke hō'ino i nā ko'akā  
ola. Lilo ke ko'akā pō'ino 'ia i ko'akā mai a make.*



# State and Federal laws protect the coral reefs of Hawai'i and America Samoa

## American Samoa:

It is against the law to take live coral  
above 60 feet.

## Hawai'i:

### Taking or damaging coral, live rocks and coral rubble

State law, prohibits the intentional taking of, breaking or damaging, with crowbar, chisel or any other implement, any live stony coral from the waters of Hawai'i, including any live reef or mushroom coral. HRS § 188-68

It is unlawful to intentionally take, break or damage, with crowbar, chisel or any other implement, any rock or coral to which marine life of any type is visibly attached or affixed. HRS § 188-68

The taking of sand, coral rubble or other marine deposits is permitted in certain circumstances. The material may not exceed one gallon per person per day, and may be taken only for personal, noncommercial purposes. HRS § 171-58.5, HRS § 205A-44

### Sale of corals

The sale of the following eight species of stony corals is prohibited in Hawai'i:

- 1) Rose Coral or Cauliflower Coral, *Pocillopora meandrina*
- 2) Lace Coral, *Pocillopora damicornis*
- 3) Giant Finger Coral, *Pocillopora eydouxi*
- 4) Yellow-lobed Coral, *Porites lobata*
- 5) Finger Coral, *Porites compressa*
- 6) Bracket Coral, *Montipora verrucosa*
- 7) Mushroom Coral or Razor Coral, *Fungia scutaria*
- 8) Orange Coral or Cup Coral, *Tubastraea coccinea*

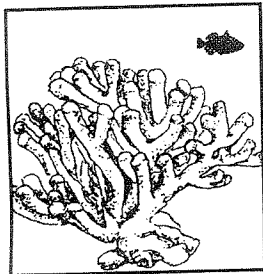
### Penalties

Most violations are subject to a fine of up to \$500 and/or thirty days in jail, plus up to \$100 per specimen taken illegally (first conviction).

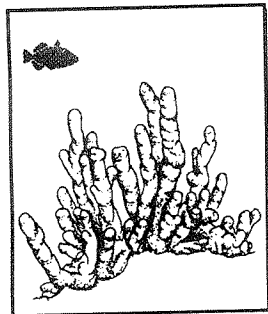
excerpt from *Coral and live rock - Laws of Hawaii*, June 1993 brochure  
produced by the Hawai'i Department of Land and Natural Resources,  
DIVISION OF AQUATIC RESOURCES



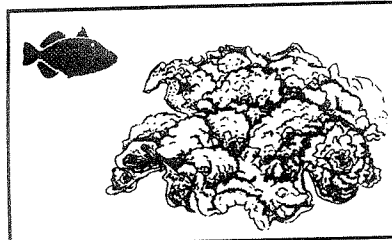
10 cm  
(4 inches)



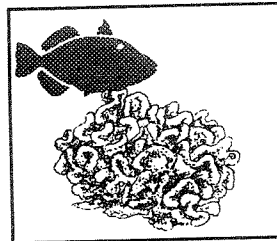
Antler Coral  
ko'a  
*Pocillopora eydouxi*



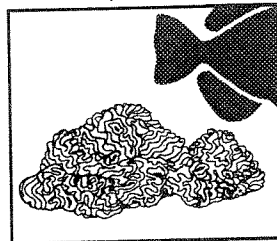
Finger Coral  
pōhaku puna  
*Porites compressa*



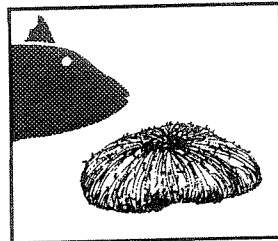
Blue Rice Coral  
*Montipora flabellata*



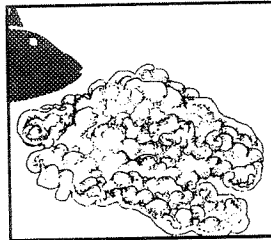
Cauliflower Coral  
ko'a  
*Pocillopora meandrina*



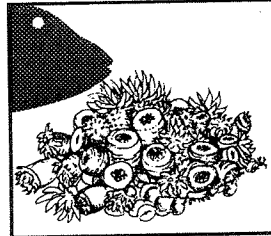
False Brain Coral  
*Pavona varians*



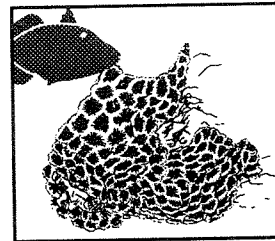
Mushroom Coral  
ko'a-kohe  
*Fungia scutaria*



Lobe Coral  
puna  
*Porites lobata*



Orange Cup Coral  
'ako'ako'a  
*Tubastraea coccinea*



no common name  
*Leptastrea purpurea*



Rice Coral  
ko'a  
*Montipora capitata (verrucosa)*

# Hawai'i Coral Card



## CARE FOR OUR CORALS

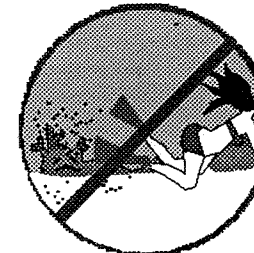
Corals are living creatures and will easily be harmed by careless people. Please help us protect our fragile corals.



Wāwāhi paha ka hapapa ke hehi a'e.  
Standing or walking on reefs can break or damage corals.  
Auf dem Riff stehen und laufen kann die Koralle zerstören.  
岩礁の上に立ったり、上を歩いたりするとサンゴが壊れてしまいます。  
Ole tu po'ou le savali i luga o a'au e faaleagaina ai 'amu.  
Ti agtakder wenno magmagna kadagiti rabao ti sabong ti batbato ket perdien na dagitoy nga sabong ti bato ti baybay.



Wāwāhi paha ke ko'a ke ho'opā.  
Touching reefs can break or damage corals.  
Das Riff (Koralle) anfassen kann die Koralle brechen und zerstören.  
岩礁にさわると、サンゴが壊れたり傷ついたりします。  
Ole tago i 'amu e mafai ona gau pe faaleagaina ai.  
Ti mangsgid kadagitoy nga sabong ti bato ket perdien na dagitoy nga sabong ti bato ti baybay.



Po'ipo'i a make ke ko'a i ka pekupeku o ke one.  
Kicking up sand smothers and kills corals.  
Sand aufwirbeln kann die Koralle ersticken.  
砂をけり上げると、サンゴを窒息させたり、死なせてしまうことになります。  
Ole kikiina o oneone i luga o 'amu e pepe ai.  
Ti mangkogtar kadagitoy nga dardarat ket mermeran na ket matay dagitoy nga sabong ti bato ti baybay.

**TAKING OF LIVE CORALS PROHIBITED BY LAW:** State law prohibits the taking of any live stony corals from the waters of Hawai'i, including any live reef or mushroom coral. Violators may be subject to a fine of up to \$500 and/or 30 days in jail.



*"A'o au i ka'u mau haumāna 'o ke kai kekahi mala, a e like me ka mālama'ana o kēlā ka mālama'ana o ka moana. Ma mua o ka 'ako'ana i kekahi mea, he mea pono e pule ma mua, i ka 'ako'ana e mahalo aku, a ma hope, e ho'i i ka lepo, ho'okanu i kekahi mea 'ē a'e, a laila, e pule hou. Na ke akua e mālama pono ana i ka honua a pau loa."*

"I teach my students that the ocean is like a garden and should be tended as so. Ask permission for taking, take only what you need while offering thanks, return the surroundings how they were found, give something in return, and then pray again for the continued growth. The akua is the one who ultimately provides the perfect balance for all of nature."

Kanela MacGregor, Hawaiian Language Teacher



*Ua faō figota ae sa'asa'a`amu o le a'au i le ta'alili mai o auma ma le aupeau.*

The sea creatures bowed while the corals danced to the thunderous roar of the waves of the sea. (Refers to the cooperation of the sea and all the living creatures. They live in harmony with and respect for their environment. Likewise, we should respect and live in harmony with ours.)

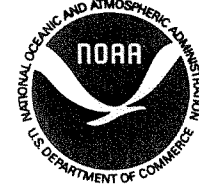
Samoan proverb provided by High Talking Chief Magele Aitaoto Seiuli



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## National Marine Sanctuaries

The United States Congress created the National Marine Sanctuary Program as a result of the *1972 Marine Protection, Research and Sanctuaries Act*. This act authorized the Secretary of Commerce to designate discrete areas as national marine sanctuaries to promote comprehensive management of their special conservation, recreation, ecological, historical, research, educational or aesthetic resources. The National Marine Sanctuary Program's mission is to serve as the trustee for the nation's system of marine protected areas to conserve, protect, and enhance their biodiversity, ecological integrity, and cultural legacy.

To find out more about the National Marine Sanctuary Program, visit our website:

[www.sanctuaries.nos.noaa.gov/](http://www.sanctuaries.nos.noaa.gov/)

**Fagatele Bay National Marine Sanctuary** was designated in 1986 in response to a proposal from the American Samoa Government. It comprises a fringing coral reef ecosystem nestled within an eroded volcanic crater on the island of Tutuila, American Samoa. Fagatele Bay NMS is the smallest and most remote of the National Marine Sanctuaries and is the only true tropical coral reef in the Sanctuary program.

For more information, contact...

Fagatele Bay National Marine Sanctuary  
P. O. Box 4318  
Pago Pago, American Samoa 96799  
phone: 011-684-633-7354  
fax: 011-684-633-7355  
fagatelebay@nms.noaa.gov  
Nancy Daschbach, Manager  
nancy.daschbach@noaa.gov

**Hawaiian Islands Humpback Whale National Marine Sanctuary** was designated by Congress in 1992 and approved by Hawaii's Governor in 1997, with a goal of protecting the humpback whale and its habitat within Hawaiian waters. Almost two-thirds of the North Pacific population of endangered humpback whales migrate every winter to the warm, shallow waters surrounding the Hawaiian Islands. The Sanctuary's mission is to ensure a healthy Hawaiian habitat for the humpback whale by providing innovative management through protection, conservation, community participation, research, education, compatible uses and cultural awareness.

For more information, contact...

Hawaiian Islands Humpback Whale National Marine Sanctuary  
726 S. Kihei Road  
Kihei, Hawai'i 96753  
phone: 1-800-831-4888, 1-808-879-2818  
fax: 1-808-874-3815  
hawaiian@nms.noaa.gov  
Allen Tom, Manager  
allen.tom@noaa.gov