



BioTrek

Pre-Curriculum Grades 6-12

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BioTrek



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GLOSSARY OF TERMS

Students may encounter any of the following terms while visiting BioTrek. We have provided definitions that might be helpful in preparing for your visit. It may be useful to review the terms that students may not be familiar with prior to your field trip. We have arranged them by topic for your convenience.

The Tropical Rainforest

adaptation	a particular structure, physiological process, or behavior that makes an organism better able to survive and reproduce
adhesive tendrils	a unique climbing adaptation; adhesive tendrils are actually modified leaves; the tendrils secrete an adhesive substance, allowing the plant to cling to sheer surfaces such as rock cliffs (or Ivy League buildings), an ecological niche not available to most vines
adventitious	referring to a structure developing in an unusual place such as roots growing from stems or leaves
aril	an additional seed covering which may aid in dispersal by attracting animals that eat it so the seed is carried away from the parent plant
bactericidal	substance capable of killing bacteria
biodiversity	the variation of life forms within a given ecosystem, biome, or for the entire Earth; often used as a measure of the health of biological systems.
biomass	the total amount of organic material produced
breadfruit	a large, round, starchy fruit borne by a breadfruit tree, <i>Artocarpus altilis</i> , of the mulberry family, native to the Pacific islands used baked or roasted for food
breeding season	the window of time where females are reproductively active to produce offspring.
bromeliad	Bromeliaceae (the bromeliads) is a family of monocot flowering plants of around 2,400 species native mainly to the tropical Americas; the family includes both epiphytes, such as Spanish moss, and terrestrial species, such as the pineapple (<i>Ananas comosus</i>); many bromeliads are able to store water in a "tank" formed by their tightly-overlapping leaf bases; the family is diverse enough to include the tank bromeliads, grey-leaved epiphytic Tillandsia species which gather water only from leaf hairs called trichomes, and a large number of desert-dwelling succulents
canopy	the uppermost continuous layer in a forest, formed by the crowns of the trees in a rainforest so dense as to make the interior of the forest quite dark occupied by distinct living plants and animals

carnivore	an animal that feeds on other animals
carrion	the dead body of an animal.
clasping tendrils	a threadlike, leafless modified stem of climbing plants which wraps itself around some other body, so as to support the plant
clutch of eggs	a clutch of eggs refers to all the eggs produced by one bird or reptile at a single time, particularly those laid in a nest
Crassulean Acid Metabolism (CAM Photosynthesis)	a type of photosynthesis where the gas exchange is performed at night so there is less water loss than if the gas exchange was carried out during the warmer day
downward pointing adhesive hairs	climbing aroids produce short roots, which develop adhesive hairs when they make contact with the climbing surface (and long feeding roots which may dangle in mid-air initially, but branch profusely as soon as they encounter the soil)
drip tip	Equatorial rainfall is so heavy that trees can easily get damaged during storms. Their solution is to shed the rain as quickly as possible. Each leaf has a spout called a drip tip which channels the water away in a quick but controlled manner so the tree crown isn't weighed down. Drip tips may protect the tree in another way. Releasing the rain at drop size reduces the risk of the thin soil below being washed away so easily. An unstable soil structure could spell disaster for the larger trees. They also can reduce colonization of the leave by parasitic fungi, mosses, and other small plants called epiphylls that prefer wet areas.
East Indies	South and southeast Asia or sometimes specifically east India compared to the west Indies which refer to more than 7,000 islands called the West Indies in the the Caribbean Sea. These islands are called the West Indies because when Christopher Columbus landed here in 1492 he believed that he had reached the east Indies in Asia.
epiphyll	a small epiphyte that grows on the surface of leaves such as mosses and lichen
epiphyte	a plant that derives moisture and nutrients from the air and rain; usually grows on another plant for structure and support but not parasitic on it
equator	the imaginary great circle around the middle of the earth's surface, equally distant from the poles
eugenol	an aromatic oil found in allspice, bay rum, and California bay
famine	extreme and general scarcity of food.
fermentation	the breaking down of and extraction of energy from organic compounds like sugar by yeasts or other organisms often into alcohols; this is done without the involvement of oxygen
fertile frond	a type of frond found on epiphytic staghorn, and other ferns, that have spore producing patches, of sporangia, where reproductive spores are produced; the other frond type is called a sterile frond or shield and anchors the plant to a tree but does not produce spores
fibrous	tough tissues made up of fibers that often resemble bundles of threads
freshwater	water that is not salty
host trees	a tree on which epiphytic or parasitic plants live
invasive alien species	species whose introduction or spread outside their natural distribution threatens biological diversity
invasive species	non-indigenous species (e.g. plants or animals) that adversely affect the habitats they invade
Jamaican jerk barbeque	a way of preserving meat by the indigenous people of Jamaica; meat is seasoned, and preserved, with a mix of peppers and spices including Allspice and Bay Rum and then dried over an open fire of allspice branches
leaflet	one of the separate blades or divisions of a compound leaf

liana	any of various usually woody vines that may climb as high as the tree canopy in a tropical forest
lithophytic plant	a plant that grows on rocks
machete	a large heavy knife with a broad blade, used as a weapon and an implement for cutting vegetation
mutualism	two or more organisms living together where each is benefited by the other
nectary	a plant organ or part that produces nectar
neotropical	a biogeographic region of the New World that stretches southward from the Tropic of Cancer and includes southern Mexico, Central and South America, and the West Indies
nutrient	a substance that provides nourishment for growth or metabolism
omnivore, omnivorous	an animal that uses both animal and vegetable sources of food
organic	having to do with living organisms or compounds formed by them; chemistry of compounds containing carbon
over-harvesting	gathering, using more than can be replaced by nature
Pacific Islands	a group of more than 2,000 islands and islets of the northwest Pacific Ocean
photosynthesis	the conversion of light energy to chemical energy by plants; the production of carbohydrates or sugars from carbon dioxide and water in the presence of chlorophyll by using light energy
plant adaptations	a special structure, physiology, or behavior that aids a plant fitting to its environment
plant phenols	comprise a large variety of compounds: cinnamic acids, benzoic acids, flavonoids, proanthocyanidins, stilbenes, coumarins, lignans and lignins; they are strong antioxidants and might prevent oxidative damage to biomolecules such as DNA, lipids and proteins which play a role in chronic diseases such as cancer and cardiovascular disease; these compounds can act as natural food preservatives when meat or fish is smoked
root anchorage	anchorage holds a plant in position and is a function of plant root systems
rosette	a circular cluster of leaves or other organs
Salmonella	an illness-causing bacteria that causes gastroenteritis; can be carried by animals including reptiles and amphibians; infection can occur through animal contact with clothing or hands and subsequent contact with your mouth; transmission can also be through open cuts
savanna	grassland region with scattered trees
silversword	a low-growing plant, similar to a yucca, with long narrow leaves often with silvery hairs; found only on Hawaii and Maui with one species found in volcanic craters
species	a kind of organism, a species name refers to the specific name of an organism
stem twining	some vines and lianas climb by twisting around the stem of a tree as they climb up towards the light
sterile frond	the frond on an epiphytic (living in a tree) staghorn fern that allows it to attach to the tree; this frond type does not produce reproductive spores so it is called sterile
strangler trees	trees that germinate on another tree (host) and through fast growth cover almost the entire host tree; by blocking the light the host tree slowly dies and rots away; this leaves just the strangler tree over the hollow space where the host tree once was; Solomon Island skinks live in these hollow trunks
sustainable	capable of being continued with minimal long-term effect on the environment
symbiosis	a close, prolonged association between two or more different organisms of different species
taro	a tropical plant grown primarily as a vegetable food for its edible corm, and secondarily as a leaf vegetable; it is considered a staple food in oceanic cultures; it is believed to be one of the earliest cultivated plants

tendrill	A threadlike organ of vines and lianas, often growing in spiral form, which attaches itself to or twines round some other body, so as to support the climbing plant.
terrestrial plant	A plant that grows on land rather than in water or on rocks or trees.
thorn	A hard, woody, pointed branch.
thorn scrub	Areas of dry habitat that contain thorny shrubs.
trace mineral	Minerals needed in minute amounts.
trichomes	Plant hairs that can function to hold water, reflect sunlight, or block sunlight. Trichomes can help plants to survive in dry and/or hot climates.
tropical	Warm and humid regions near the equator where the climate undergoes little seasonal change in either temperature or rainfall.
twining tendrill	A tendrill that grows in a spiral form.
vine	A growth form based on long stems. This has two purposes. A vine may use exposed rocks, or other plants, as supports for growth rather than investing energy in a lot of supportive tissue, enabling the plant to reach sunlight with a minimum investment of energy. The vine growth form may also enable plants to colonize large areas quickly, even without climbing high.
West Indies	An archipelago in the N Atlantic between North and South America

Museum

aquatic	The term aquatic refers to "things" that are in or of the water but not to water itself.
archeology	The systematic study of past human life and culture by the recovery and examination of remaining material evidence.
artisans	An artisan is a skilled person who crafts items that may be functional or strictly decorative, including furniture, clothing, jewelry, household items, and tools.
atmosphere	The gaseous envelope surrounding the earth; the air.
awl	A pointed instrument for piercing small holes often used in basket making to introduce a strand of material.
biome	A complex biotic community characterized by distinctive plant and animal species and maintained under the climatic conditions of the region.
canopy	One of at least five vertical layers of a primary tropical rainforest. Just under the highest layer, the emergents, the canopy is a dense ceiling of closely spaced trees and their branches.
carbon	Having to do with living organisms or compounds formed by them.
carbon chemistry	Chemistry of compounds containing carbon.
carbon dioxide	Carbon dioxide (chemical formula: CO ₂) is a chemical compound that is a gas at standard temperature and pressure. Carbon dioxide exists in Earth's atmosphere currently at approximately 385 parts per million. Carbon dioxide is a greenhouse gas as it transmits visible light but absorbs strongly in the infrared and near-infrared. Carbon dioxide is used by plants during photosynthesis to make sugars to be used as raw materials to form starch and cellulose, proteins and the wide variety of other organic compounds required for plant growth and development.
carbon sink	A natural environment that absorbs and stores more carbon dioxide from the atmosphere than it releases

cellulose	Cellulose is an organic (containing carbon) compound that is the structural component of the primary cell wall of green plants. Cellulose is the most common organic compound on Earth. About 33 percent of all plant matter is cellulose (the cellulose content of cotton is 90 percent and that of wood is 50 percent).
climate	the generally prevailing weather conditions of a region
coiled basket	Basketry based on a spirally coiled foundation. A basket is said to be coiled when a long bundle of fibrous material is laid up, spiral fashion. Each coil is sewn by a slender splint to the coil below it.
component sugars	Single units of carbohydrates are known as monosaccharides (one sugar), or simple sugars. Disaccharides (two sugars) and polysaccharides (many sugars) are formed from two or more monosaccharides joined by chemical bonds. Glucose linked to fructose, for instance, forms the disaccharide sucrose (cane sugar), and glucose linked to galactose forms the disaccharide lactose (milk sugar). Starch, glycogen, and cellulose are all chains of glucose units. When talking about component sugars we are talking about the single units of sugar, monosaccharides. Component sugars are what make up plant materials like lignin and cellulose. Carbohydrates like lignin and cellulose can be broken down into their component sugars to be fermented into ethanol.
condensation	Condensation is the change of the physical state of matter from gaseous phase into liquid phase. Water vapor that naturally condenses on cold surfaces into liquid water is called dew. Water vapor will only condense onto another surface when the temperature of that surface is cooler than the temperature of the water vapor.
condensation	the process by which atmospheric water vapor liquefies to form fog, clouds, or the like, or solidifies to form snow or hail
conservation	the practice that seeks to protect natural resources including plant and animal species as well as their habitat for the future.
crop	any plant that is grown in significant quantities to be harvested as food, livestock fodder, or for any other economic purpose.
decomposition	Breakdown or decay of organic materials.
deforestation	The cutting down and removal of all or most of the trees in a forested area.
deplete	To decrease seriously or exhaust the abundance or supply of something.
desert	Deserts can be defined as areas that receive an average annual precipitation of less than 250 mm (10 in), or as areas in which more water is lost than falls as precipitation.
diorama	A three-dimensional model, usually enclosed in a glass showcase for a museum.
diversity	Referring to biology, biodiversity, the variation of life forms within a given ecosystem.
ecological community	All the interacting organisms living together in a specific habitat
ecosystem	The term ecosystem was coined in 1930 by Roy Clapham to denote the combined physical and biological components of an environment.
emergent trees	Trees growing above the canopy making up the highest vertical layer in the rainforest.
emissions	Substances that are discharged into the air.
environment	The air, water, minerals, organisms, and all other external factors surrounding and affecting a given organism at any time.
ethnobiology	The scientific study of the way plants and animals are used by different human cultures.
evaporation	The change of a liquid into a vapor at a temperature below the boiling point

fluctuation	change from one point or condition to another.
food web	A set of interconnected food chains by which energy and materials circulate within an ecosystem. The food web is divided into two broad categories: the grazing web, which typically begins with green plants, algae, or photosynthesizing plankton, and the detrital web, which begins with organic debris. These webs are made up of individual food chains.
forest	A forest is an area with a high density of trees. Forests are differentiated from woodlands by the extent of canopy coverage: in a forest the branches and the foliage of separate trees often meet or interlock, although there can be gaps of varying sizes within an area referred to as forest. A woodland has a more continuously open canopy, with trees spaced further apart, which allows more sunlight to penetrate to the ground between them.
forest floor (rainforest)	Limited growth takes place here where it would be hard to read because it is so shaded by the canopy. Here you would come across large tree trunks, fungi and microorganisms are breaking down or decomposing dead plants and animals. Climbing vines and lianas, and a small number of soft, non-woody plants and most of the large animals like elephants and jaguars are here.
fossil fuels	coal, petroleum, and natural gas
foundation	the base that something is founded on
geography	the topographical features of a region
geology	the science that deals with the dynamics and physical history of the earth
global warming	Global climate warming thought to be brought on at least in part by greenhouse gases that in part are emitted by industry and urban use of fossil fuels.
granaries	A place where acorns, or other staple foods were protected from the weather stored covered and off the ground
grassland	Grasslands in California once likely consisted of a mixture of native grasses where some grew year around (perennial) or just one year (Annual) and dropped seed to grow in the next rainy season.
grazing	The process of cattle, deer, or other animals feeding on grass or pastureland
greenhouse gases	gases in the atmosphere that absorb and emit heat radiation. Some of these are emitted by industry and urban use of fossil fuels and are thought to be warming the climate.
hemicellulose	Like cellulose, hemicellulose is an organic (carbon containing) component of cell walls, but unlike cellulose it is not strong.
humidity	the amount of water vapor in the air
indigenous	Originating in and characteristic of a particular region or country; native.
infrastructure (rainforest)	The basic roads, bridges, and construction needed to drive into and access the rainforests.
lignin	an organic compound found in all vascular plants, mostly between the cells, but also within the cells, and in the cell walls. It makes vegetables firm and crunchy, and gives us what we call "fiber" in our food. It functions to regulate the transport of liquid in the living plant (partly by reinforcing cell walls and keeping them from collapsing, partly by regulating the flow of liquid), and it enables trees to grow taller and compete for sunlight. It is also a disposal mechanism for metabolic wastes.
logging	the process, work, or business of cutting down trees and transporting the logs to sawmills
medicinal plants	Plants used for medicine or from which medicines are extracted.
mining	The process of extracting ores, coal, etc., from mines
nitrogen (nutrient)	One of the three major mineral nutrients, which come from the soil, and are dissolved in water and absorbed through a plant's roots. There is not always enough in the soil for a plant to grow healthy. This is why many farmers and gardeners use fertilizers to add the nitrogen to the soil. This major nutrient is often lacking from the soil because plants use large amounts for their growth and survival and because rainfall can wash or leach it away.

nutrient cycle	Transfer of nutrients from one part of an ecosystem to another. Trees, for example, take up nutrients such as calcium and potassium from the soil through their root systems and store them in leaves. When the leaves fall they are decomposed by bacteria and the nutrients are released back into the soil where they become available for root uptake again.
oxygen	Oxygen is the third most abundant element in the universe by mass and the most abundant element by mass in the Earth's crust. Oxygen gas constitutes 20.9% of the volume of air. Oxygen in the form of O ₂ is produced from water by cyanobacteria, algae and plants during photosynthesis.
paddle	A short, flat bladed oar for propelling and steering a canoe or small boat.
percolation	The slow movement of water through the pores in soil or permeable rock.
phosphorus	one of the three primary plant nutrients that are usually lacking from the soil first because plants use large amounts for growth and survival
photosynthesis	the process in green plants and certain other organisms by which carbohydrates are synthesized from carbon dioxide and water using sunlight as an energy source
pigments	early pigments used were simply ground minerals, earth or clay, and were made into paint with oil from seeds or animal fat.
plant community	The plant populations existing in a shared habitat or environment.
plantation	Usually a large farm or estate, especially in a tropical or semitropical country, like Brazil, Chile or Nicaragua. The term is currently most often used for plantings of trees and shrubs, and for plantings maintained on an economic basis other than that of subsistence
potassium	one of the three primary plant nutrients that are usually lacking from the soil first because plants use large amounts for growth and survival
precipitation	Falling rain, hail, or snow as products of condensation in the atmosphere.
preservation	The activity of protecting something from loss or danger.
producers	Producers are green plants capable of making their own food using energy from the sun in a process called photosynthesis.
renewable resource	Resource that can regenerate quickly and that is replaceable.
resource	Natural resources like forests, mountains etc. are very beautiful so they have aesthetic value. Gifts of nature such as water also have a legal value because it is our right to enjoy them. On the other hand, resources have an ethical value as well because it is our moral duty to protect and conserve them for the future generations.
resource-conserving	A practice by which resources are used as minimally as possible so that they last longer
respiration	Any of various analogous metabolic processes by which certain organisms, such as fungi and anaerobic bacteria, obtain energy from organic molecules
revenue	The return or yield from any kind of property, patent, service
runoff	Something that drains or flows off, as rain that flows off from the land into streams
scrubland	A large natural plant community that consists of shrubs, mixed with grasses, herbs, and plants that store energy in their roots or stems
slash-and-burn agriculture	Cutting and burning of forests or woodlands to create fields for agriculture or pasture for livestock, or for development
socially supportive	A practice that has the approval of the community and the the world
stitching material	In basket making, the thinner, more pliable material that is used to sew together the foundation material
tapped	Or Tapping: A way to pierce or cut a tree and collect its sap without killing the tree.
Tongva	"People of the Earth", the indigenous people of the Los Angeles basin
transpiration	the passage of water through a plant from the roots through the vascular system to the atmosphere

twining tendril	The process of twisting two or more pliable sewing strands around stiffer vertical sticks. Twining is mostly used when utility baskets are needed for rough use. Often tendrils (curly ends of strands) stick out from the woven surface of the basket.
understory	The area of a forest which grows in the shade of the emergent or forest canopy.
water cycle	The water cycle, also known as the hydrologic cycle, describes the continuous movement of water on, above, and below the surface of the Earth.
woven basket	A method of making a basket, by weaving materials together into a shape of a basket. The materials may be the same or different sizes. The weaving may be very tight to hold liquids or loose to sift materials.

Animal Foyer

carnivore	an animal that feeds chiefly on the flesh of other animals
immunity	the condition that permits either natural or acquired resistance to disease
insectivore	an organism that feeds mainly on insects
mimic	to imitate or copy
nocturnal	active at night
parotid gland	a type of salivary gland that in some animals, like frogs, is developed into a venom gland
parthenogenesis	a form of reproduction in which an unfertilized egg develops into a new individual
pheromone	any chemical substance released by an animal that serves to influence the physiology or behavior of other members of the same species
predator	any animal that lives by preying on other animals
prey	an animal hunted or seized for food
propulsion	the act or process of propelling
secretion	a substance released by a gland for a specific purpose, i.e. oils, digestive enzymes, or hormones
setae	stiff hairs, bristles, or bristle like processes or parts on an organism
venomous	poisonous

Aquatic Biology

arid	extremely dry; parched
biodiversity	the number and variety of organisms found within a specified geographic region
brackish water	water that has more salinity than fresh water, but not as much as seawater
buttress	woody extensions that radiate outwards from the lower part of some tree trunks, often reach large proportions up to 30 feet high
calcium carbonate	a white, crystalline, water-insoluble, tasteless powder, CaCO_3 , occurring in nature in various forms, as calcite, chalk, and limestone, is secreted by live coral and forms coral reefs
canopy	an overhanging projection or covering
dispersal	the process or result of the spreading of organisms from one place to another
dorsal	situated on or toward the upper side of the body, equivalent to the back
drumming	any rumbling or deep booming sound; occurs in fishes when bones are hit against their gas bladder
endangered	in imminent danger of extinction

erosion	the process by which the surface of the earth is worn away by the action of water, glaciers, winds, waves
estuary	that part of the mouth or lower course of a river in which the river's current meets the sea's tide
flume	an artificial channel or trough for conducting water
habitat	the natural environment of an organism; place that is natural for the life and growth of an organism
holdfasts	an organ or structure of attachment, especially the basal, root-like formation by which certain seaweeds or other algae are attached to a substrate
hypoxia	oxygen deficiency
lowland	land that is low or near sea-level, in comparison with areas of higher elevation where cloud forests occur
mangrove	tropical tree or shrub of the genus <i>Rhizophora</i> , the species of which are mostly low trees growing in marshes or tidal shores, noted for their interlacing above-ground adventitious roots
native	remaining or growing in a natural state; unadorned or unchanged; adapted to a specific location
neutral buoyancy	a condition in which a physical body neither sinks nor floats upward
pectoral fin	either of a pair of fins usually situated behind the head, one on each side, and corresponding to the forelimbs of higher vertebrates
polyp	a sedentary type of animal form characterized by a more or less fixed base, columnar body, and free end with mouth and tentacles
propagule	any structure capable of being propagated or acting as an agent of reproduction
regenerate	to re-create, reconstitute, re-grow, or make over
restoration	renewal, revival, or re-establishment
sediment	mineral or organic matter deposited by water, air, or ice
silt	earthy matter, fine sand, or the like carried by moving or running water and deposited as a sediment
simulation	imitation or enactment
stridulation	to produce a shrill, grating sound; as certain tropical fishes do by rubbing bones together
substrate	an underlying layer
swim bladder	an air-filled structure in many fishes that functions to maintain buoyancy or, in some species, to aid in respiration
watershed	the region draining into a river, river system, or other body of water
zooplankton	plankton that consists of animals, including the corals, rotifers, sea anemones, and jellyfish

Ethnobotany

alien	Not native: A plant or animal that has been introduced to an area and uses resources (competes for resources) needed by the indigenous species.
anther	Part of the stamen of a flower which contains the pollen
aromatic leaves	Leaves that have a strong odor, usually an oil.
burl	A tree growth in which the grain has grown in a deformed manner. It is commonly found at the base of tree trunks
California Floristic Province	A geographic area with a Mediterranean climate located on the Pacific Coast of North America with a distinctive flora that bears similarities to floras found in other regions experiencing a winter rainfall, summer drought climate like the Mediterranean Basin.
carbohydrate	any of a group of organic compounds that includes sugars, starches, celluloses, and gums and serves as a major energy source in the diet of animals
companion plant	A plant that grows better with another specific type of plant, such as one that would provide shade in the desert that helps other plants get established

crown (root crown)	Point at which a plant's roots and top structure join, usually at or near the soil line
cuticle	a very thin film covering the surface of plants, derived from the outer surfaces of the epidermal cells
diversity	The variation of life forms within a given ecosystem
ethnobotany	how cultures use plants
evergreen	not having a dormant period without leaves; the leaves of the past seasons are not shed until after the new foliage has been completely formed
filament	The part of the stamen that supports the anther
fire resprouter	A plant that grows anew after a fire has burned its above-ground parts
flammability	the quality of being easily ignited and burning rapidly
fuel	something consumed to produce energy
gorge	a small canyon
granary	dry aboveground storage for collected nuts, grains, or other seeds
herbivore	any animal that feeds chiefly on grass and other plants
heterophylly	having different kinds of leaves on the same plant
hydrophyte	a plant that grows in water or very moist ground; an aquatic plant
lignotuber	a starchy swelling on underground stems or roots
Mediterranean climate	A climate of hot, dry summers and warm, wet winters. This climate is not only characteristic of Mediterranean lands, but is also found in California, central Chile and the extreme south of Africa
mesophyte	a plant growing under conditions of well-balanced moisture supply
mixed-conifer forest	Giant sequoia occurs mixed in an ecosystem with other conifers. This ecosystem is dependant on periodic fires for long-term maintenance.
native plants	plants that are adapted to a certain area, develop, occur naturally, or have existed for many years in an area
ovary	in the flowering plants, an ovary is a part of the female reproductive organ of the flower that contains the ovule
ovule	In seed plants, the ovule is the structure that gives rise to and contains the female eggs for fertilization
pollen	Pollen is a fine to coarse powder consisting of microgametophytes (pollen grains), which produce the male gametes (sperm cells) of seed plants.
pollen tube	a tube that grows from the pollen grain to transport sperm cells to the ovule tissue
post-fire	Conditions after a fire where new growth occurs
rain shadow	an area that has little precipitation because a tall mountain range causes the winds to lose their moisture before reaching it
riparian	situated or dwelling on the bank of a river or other body of water
sclerophyllous	with thickened, hardened foliage that resists loss of moisture such as in chaparral plants, such as in coastal sage scrub
scrubland	a habitat type dominated by woody shrubs
stamen	Male organ of a flower that produces pollen
stigma	Tip of the female organ of a flower that receives the pollen
stomata	one of the minute pores in the epidermis of a leaf or stem through which gases and water vapor pass
succulent	water-retaining plant adapted to arid climate or soil conditions
summer deciduous	shedding or losing foliage in the summer to conserve water
suppression	the act of withholding or withdrawing
understory	the shrubs and plants growing beneath the main canopy of a forest
water table	underground surface beneath which earth materials, as soil or rock, are saturated with water
wetlands	a lowland area, such as a marsh or swamp, that is saturated with moisture, especially when regarded as the natural habitat of wildlife
xerophyte	a plant adapted for growth under dry conditions



WANT TO KNOW MORE?

The following information sheets are provided as a precursory look at some of the highlights at BioTrek.

A Gecko Unlike All Others

Diet: crickets, worms, small mice, cockroaches, and even smaller lizards.

Reproduction: They reproduce from 10 months until 12 years old.

When threatened they will lose their tail, although it grows back it will never look the same.



**Leopard Gecko
Stands Alone**

Unique Characteristics

Leopard geckos are one of few types that have movable eyelids, which allow their eyes to be dust free, living in the desert.

Since these Geckos live in the desert sand they have no clinging toe pads to climb.

These geckos will bite if provoked. Their bite although slight, can make you bleed

These geckos have a fat tail, that is used for food storage.



Scientific Name:
Eublepharis macularius

Origin: Native to Afghanistan, Pakistan, Northeast India, and Iran

Average Length:

6-9 inches

Lifespan:

10-15 years



Egg Hatching



Swordtails are active from Mexico to Central America

They live in warm water (77°F)



Interbreeding has created different colors such as red, neon green, marigold, black and pineapple



The name swordtail comes from the male's sword shaped anal fin

aquatic nuisance

Swordtails have become an ecological problem when introduced into new areas.

They can outcompete the native fish when introduced because:

- They reproduce very rapidly
- They can bring diseases and parasites
- Sometimes they interbreed with the native fish
- Behavioral issues such as aggression between them and the native fish can arise



swordtail fish

Call of the Wild



Black Howler Monkey
(*Alouatta pigra*)



Male Black Howler Monkey Calling

- Black Howler Monkeys can be found in the rainforest of Central America
- Only the male Howler monkeys are black, females are brown. All infant monkeys are brown
- Grows 2-4 feet tall, 8-22 pounds, maximum lifespan of 20 years
- They are the loudest land animal. They can be heard 3 miles away. Male howls sound like a deep roar. Female howls sound like a pig's grunt
- They use their voice to communicate between groups or to protect their territory

- Black Howler Monkeys are folivores which means they eat only leaves
- They rarely leave the trees
- Howler Monkeys walk on hands and feet and their tails can support their entire body
- They're active only 20% of the time and are considered the least active monkey



female with infant

- Black Howler Monkeys are depicted as sculptors and artisans in Mayan culture
- In the Mayan ruins of Copan they were depicted as Gods of wind and comedy
- Explorer John Lloyd Stephen described them more as "grave and solemn as if officiating as the guardians of consecrated grounds."
- They were in the Mayan myth of Popol Vuh and in some mythology described as creators of life

DARE YOU TO TOUCH IT!

A Scorpion Mimicking Insect

Found in trees and shrubs in the rain forest of Papua New Guinea.

This leaf insect mimics a scorpion as a defense mechanism. When threatened both the male and female raise their abdomen in an exact copy of scorpion's threat.

But that's not all! They also have many defensive spines that can draw blood. The males have large spines on their back pair of legs.



Indigenous people use the spines from the hind legs for fishing hooks.

Insects grow up to 6 inches long, the length of a dollar bill.

This is an unusual leaf insect in that it hides under bark and leaves on the ground during the day, coming out only at night to feed.



Flashy Florid Frogs of the Rainforest

We Aren't Just Green You Know?

Red Eyed Tree Frogs don't just have striking green bodies with bright red eyes. In fact, they also have blue and yellow striped sides, orange or red feet, and a flash of blue on their thighs!



Peek a Boo! Red Eyes on You!

Why do these frogs have bright red eyes? Red Eyed Tree Frogs are able to scare enemies away by opening their eyes and making them bulge out! Gross, yet so cool!



Color "Confuzzling" Camouflage!

Being green act as camouflage on leaves. But when they are found, their colorful bodies move in a blur, which can confuse their enemies with flashes of colors!



Gentle Giant: How Can a Gentle Giant Protect Itself?

Giant African Millipedes release a Cyanide-based acid to discourage predators from eating them

When threatened these creatures curl up like a roly-poly and are protected by their hard shell.



These giants have holes for breathing called spiracles. Because they can't close their spiracles, water can escape from their body and they can dry out and die. They protect themselves from water loss by living in humid habitats like the rainforest.



You are most likely to see these during rain when they crawl up trees so they won't drown in the water below.

They spend most of their time underground, where they are safe from potential predators.

Just Your Local Neighborhood Snake

Common Name:

Gopher Snake

Scientific Name:

Pituophis catenifer



Photograph by W. Perry Conoway/Corbis

Called gopher snake because it generally feeds on gophers.

Often mistaken for rattlesnakes; when they are startled or angered, they often hiss and rattle their tails.

Description

Back region (Dorsal) coloration varies depending on the geographic region. Most are noted as having skin with dark blotches on a cream or yellowish background.

Adults are 90-183 cm (2.93 ft-6.00 ft)

Cold-blooded reptile that is active during the day. Often found sunbathing on rocks and/or pavement.

First documented near the mouth of the Nibobrara River located in Nebraska on August 5, 1804

One of the most abundant non-venomous snakes in North America; especially in California.



Reproduction

Lays 2-24 eggs per year

Reproduce once a year



Photograph by Mark Bratton

Feeding Strategies

Adolescents are carnivorous eating Insects and Lizards.

Adults are carnivorous eating small mammals, birds, bird eggs, small snakes, snake eggs, lizards, and insects.

This creature locates its prey by smell (olfaction) or sight.

Mainly forage food underground, but in some regions climb trees to prey on nesting birds

Rosy Boa



Mouthparts and Slow Movement = Constriction

- One of the slowest snakes in the world
- Secures prey with row of needle sharp teeth.
- Suffocates prey through constriction.



The Big Squeeze

Capturing Their Prey

Types of Prey

- Pack rats
- Baby rabbits
- Deer mice
- Kangaroo rats
- Birds
- Lizards



On The Hunt

- Nocturnal hunters, often unable to pursue prey
- Ambush prey within a few inches and strike with speed and accuracy

The Caiman: Prehistoric Survivor

CANNIBAL

- Caimans are nocturnal preferring to hunt at night.
- During the dry season caimans stop feeding. Under these conditions they will often eat other caimans.

SURVIVOR

- Crocodylians survived the dinosaur extinctions.
- Today Caimans are one of the few species that have benefited from the commercial harvesting and hunting of other species within its range.
- The caiman has taken over other habitats in which it was previously out-competed by other species.

FACTS

- Lifespan: 30 to 40 years
- Diet: crustaceans, fishes, insects, invertebrates
- Size: males 6 to 7 ft (9ft max) females 4-1/2 to 5 ft
- Population: ~1 million

RANGE

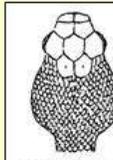


King Snakes will eat a variety of prey including: small mammals, lizards and other snakes.



Rattlesnake or King Snake?

Look at the head shape to tell the difference.

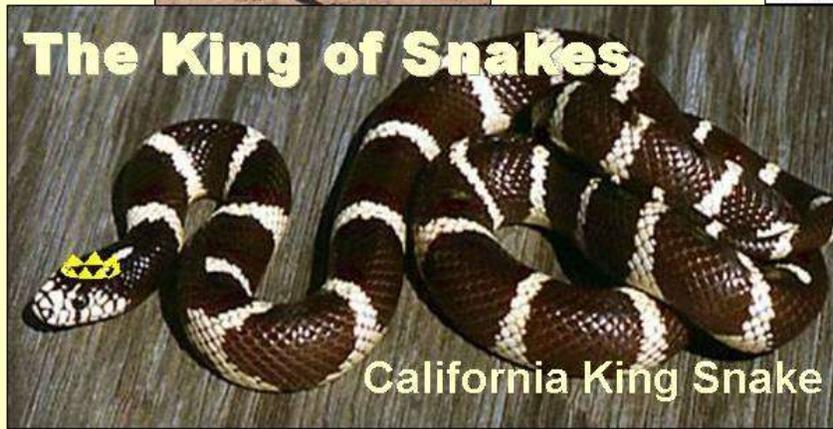


Venomous



Nonvenomous

What is impressive is their immunity to rattlesnake venom.



Venomous snakes have larger heads for their venom glands.



King Snakes eat by initially biting their prey then constricting around it until it suffocates, consuming it whole.



California King Snakes can be found in CA, NV, AZ, UT.

They live in a wide range of habitats including: coniferous forests, woodlands, coastal marshes, chaparral, and deserts.



What Can the Toucan Do???

Information

-Male and female toucans look the same (no sexual dimorphism)

-They can be recognized by their colorful bills

-Beaks are brightly blotched to blend in with light filtering into the rainforest.

-Beaks are also used to intimidate smaller birds to steal their eggs

Physical Characteristics

-Toucans range from one to two feet in height

-They have large bills which can measure more than half their body length

-Their beaks are made up of keratin and bony fibers, which makes them very strong, yet light

Eating Habits

-Toucans eat plants and animals (omnivorous)

-They hunt insects and can be found taking eggs from smaller birds nest.

-Using their beaks they reach deep into tree holes to grab food which other animals cannot reach

The layers start at... the forest floor

- Only a small amount of light reaches this level, where plants have large leaves that catch enough sunshine to make sugar from the sun's energy so it can grow.
- It is very dark here so this is where many of our house plants come from. Plants are soft and non-woody.

The next layer going up is... the understory

- Some of these plants are taller and more woody than the forest floor plants. Coffee is included in this layer.

Followed by... the canopy

- The canopy is ceiling of tree leaves without openings unless a forest giant falls. When this happens new young trees can get enough light to grow and fill the space. Most of the small animals live in the canopy

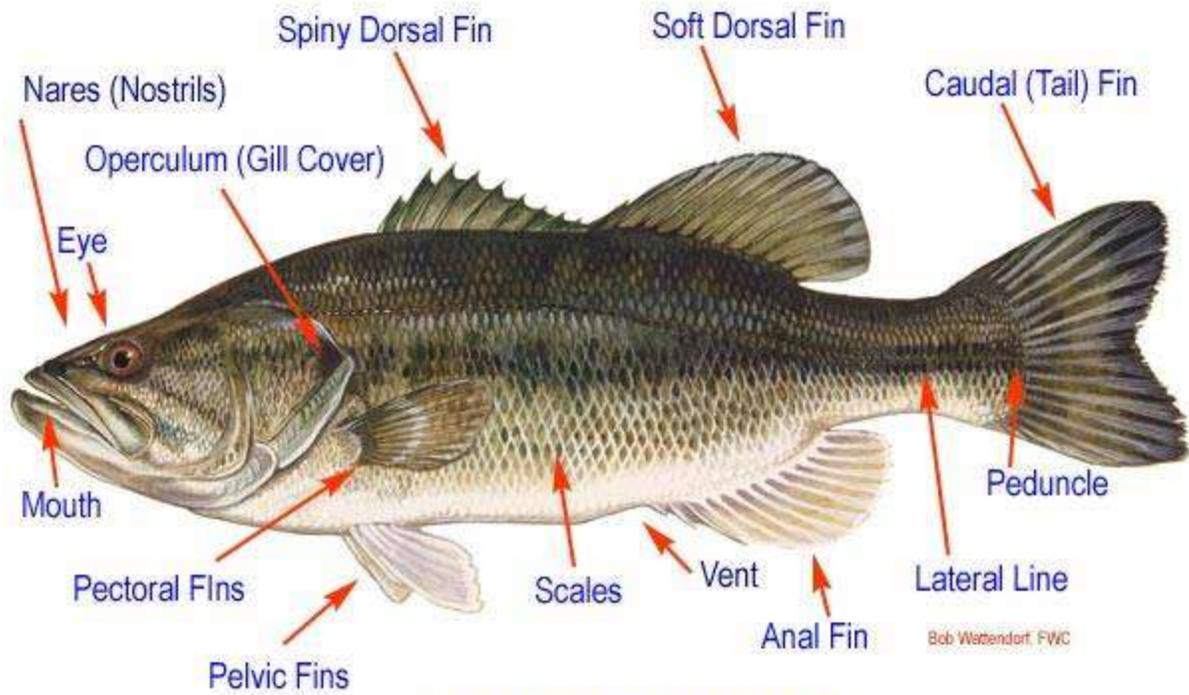
The very upper layer is the full sun... the emergent zone

- This is where you find a small number of forest giants above the canopy. The flatness of the top of the emergent trees allows additional layers to grow below.

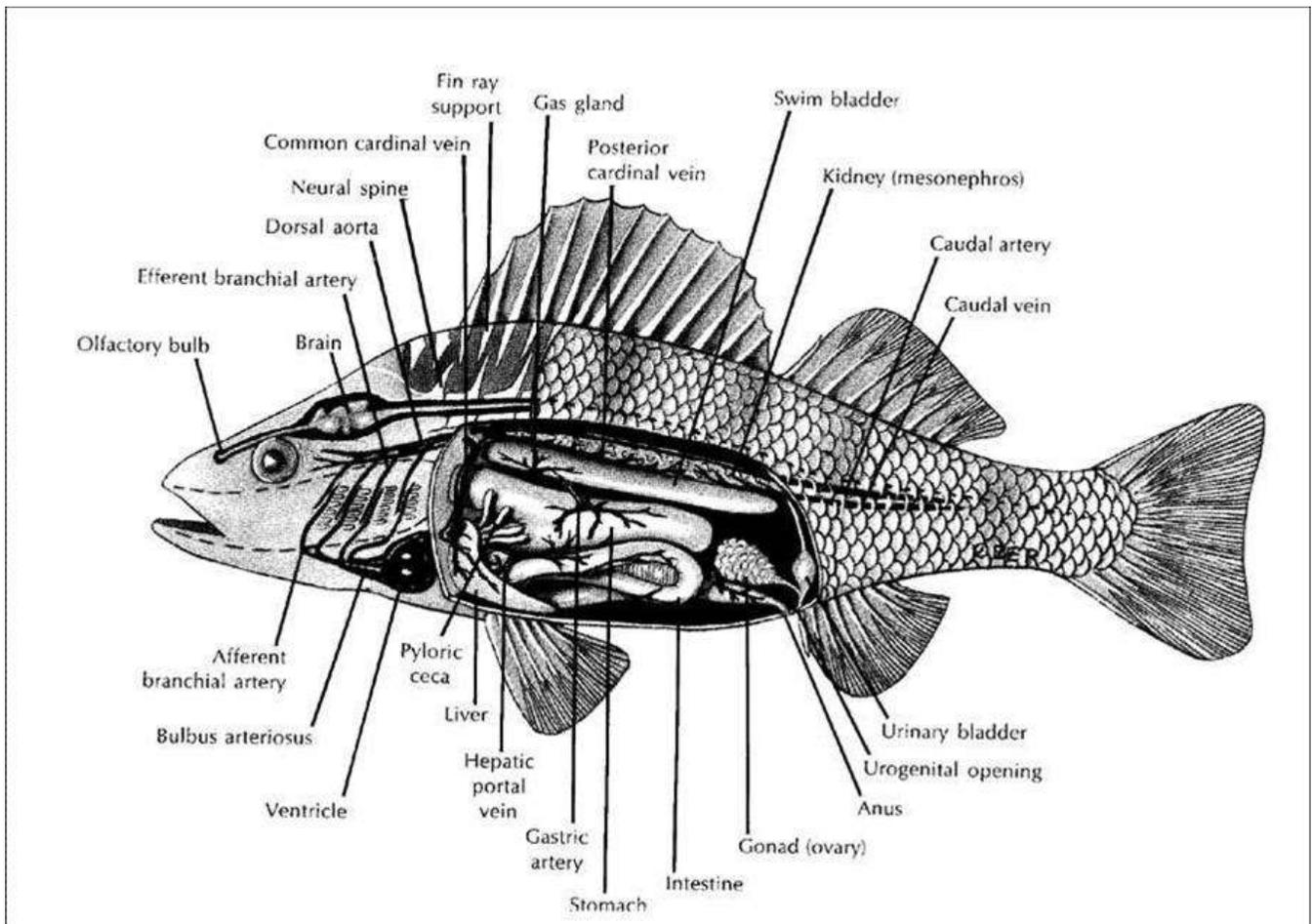
It's amazing what some plants will do to get enough sunlight!

- The plants in the rainforest are in a ferocious war with each other. You don't see or hear anything that sounds like fighting because the plants fight over light and space very slowly and quietly. Trees fight by trying to grow higher and faster to reach the light.
- Some plants called *vines and lianas* cheat. They lean against a big tree and just grow up the tree trunk. These climbing plants let the tree expend the energy of growing a big sturdy trunk and they just use the tree for support.
- Other plants, called *epiphytes*, cheat by growing suspended high on a tree branch where there is more light.
- Strangler trees germinate on an existing tree and slowly smother it often leaving the strangler tree with a hollow trunk where the old tree rotted away.





EXTERNAL ANATOMY



Art of Peoples Past

Rock Painting

A form of rock art where ideas as symbols are communicated through drawings, representing objects, activities, places or events. The color most often used in California is red. Another word for rock paintings are pictographs.



Rock Engraving

A form of rock art where images are created by removing part of the rock surfaces, by incising, pecking or carving. This is among the oldest form of art known to humans. Another word for rock engravings are petroglyphs.



Both rock paintings and engravings belong to the general category of rock art, and were made by indigenous people, often long ago. California is one of the four main areas with concentrations of rock art in North America.

Beautiful and Useful

Tongva - White Sage

Food

- Leaves dried, crushed with water, and eaten as mush
- Leaves also eaten straight off the plant

Medicine

- Leaves dried, crushed, then brewed as tea
- Used to clear nasal passages and for breathing illnesses



White Sage, *Salvia apiana*



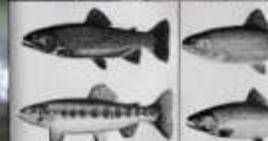
Smudging

- The Tongva burn herbs such as White Sage as a sacred practice
- The smoke is used in cleansing ceremonies

Sweat Huts

- Kept warm with hot rocks
- Leaves hung to release their aroma and add healing properties

Deadly: But Handy



- "Manroot" (*Marah macrocarpus*) has toxic properties that the Tongva use to paralyze or stupify fish.
- Its called Manroot because the underground base can get as big as a man.
- Their seeds are large, hard, smooth and oily. Tongva grind the oily seed with pigments to make paints.
- The plant browns and dies during our hot dry summer, but the root sprouts anew with the first winter rains, and the cycle continues. Seeds also sprout in the cool winter.

- Tongva use "Manroot" by crushing the fruits or roots and adding them to slow-flowing streams and rivers.
- Slow current concentrates its toxicity.
- The toxin can paralyze fish for easy capture.
- Downstream the Tongva then use baskets to gather the fish.
- The San Gabriel River was a primary area that Manroot was used for fishing.

Essential For Survival

Chaparral Community



Plants

There are five chaparral plant community: The Oak, Sumac, Buckthorn, Heath, and Rose These plants dominant our foothills and mountains

Essential for survival of their plants and animals

Tongva used many of the plants for food.



Fire

Fire is common in this community

Fire is important for reproduction and ecological succession of plants

Some seeds germinate only after fire. After the fire it takes five to ten years for the community to recover.



Animals

There are common animals found in this chaparral community.

They have adapted to the hot and dry weather of this community

These animals depend on the chaparral community for shelter and food.

HEALING THE SPIRIT



Shamans

Shamanism is the practice and belief that a person's well-being is solely dependent on their spiritual state.

Shamans have the ability to cure and heal many human ailments. By using many of the native plants.

Using mother nature, they connected with plants and animals as a whole.

•The practice of the Shamans is similar to modern day priests, doctors, pharmacist and psychiatrists.

•Many of the treatments known today, originated from Shamans of the past.

•This practice and knowledge was throughout generations.

Indigenous Medicine

•The Tongva used plants not only to feed their people but to heal them.

•The use of plants for medicinal purposes can be seen throughout the world.

•Many of the modern medicines today were derived from plants.

WHITE SAGE "Kasii"
(*Salvia apiana*)

•Native to the Southern California
•Used for medicinal and spiritual practices.

Used to treat:

- Colds
- Anti-inflammatory Agent
- Decongestant
- Deodorant

Spiritual

•The Tongva used white sage leaves, in numerous rituals;

- Purification
- Spiritual Cleansing
- Blessings

Shamans are primarily healers, but also have the ability to treat psychological illnesses.

They believed in using animal spirit and plant spirit helps to heal the mind, body and soul.

The belief is based on the interrelationship of the whole world around them.

Kich Homes of the Tongva



1. The homes were made by bending and tying willow branches into shape, then thatched with tules.



2. The form of the house was started by driving poles into the ground in a circle.



3. Then the pole tops were bent toward the center and tied together to form a dome-shaped shelter.

5. The door-way and the floor were also typically covered with mats made from tule.

Types of Kich:

- Storehouses
- Sweatlodge
- Ceremonial enclosure
- Menstrual huts
- Meeting places for adult males.



4. Tule matting was then attached to form walls, sometimes a half-foot thick.



Materials used for the Kich:

- Tules
- Willow branches
- Sycamore poles



Living Off The Land

Foods of the Tongva



Acorn Preparation

- Main food source
- Acorns were cracked open and ground on bedrock mortars or portable metates
- The meal was soaked to remove the tannins that are bitter
- The water was changed until it stayed clear
- The meal was cooked either as mush in a basket or made into cakes and cooked in an underground oven



Pemmican

Cherry, *Prunus spp.*

- Fruits were gathered, piled up, and left until the pulp rotted
- The pits were cracked open and kernel removed and dried
- The kernels may have been leached with water before cooking to remove some of the hydrocyanic acid and cooking probably removed more
- The cooked kernels were mashed and molded into cakes or balls and were sometimes rolled into pinole before eating



Holly-Leaf Cherry



White Sage



Pinole

Pinole

- Ground seeds from white sage mixed with other seeds and grains
- Seeds parched by putting them in a basket with glowing coals or hot pebbles
- Seeds were crushed and eaten, sometimes making them into a cake

Living Off the Land

California Sage Plants



Fig. 1 White Sage

Remedies

White Sage or *Salvia apiana* is used for colds, flu, sore throat, stomach ache, tooth ache, asthma, to promote menstruation, and to cleanse wounds. Black Sage or *Salvia mellifera* is used to relieve gas pain, ear ache, and for arthritic pain. *Salvia columbariae* or Chia is used for infections and gelled seeds are used to remove foreign matter from the eye.



Fig. 2 Black Sage

Environment

California Sage Plants occur in the California coastal scrub, chaparral, and woodland communities. They range from about one foot to about six feet tall. They have a pungent scent and tend to grow in clusters. They usually grow below 4,000 ft. elevation and provide nutrition for animals such as birds, and deer. Sages are aromatic and are drought tolerant shrubs that are well adapted to our Mediterranean climate.



Fig. 3 Chia Sage

Other Useful Purposes

White Sage is used for shampoo, deodorant, drinks, and food. Black Sage is used for food and spice. Sage seeds are highly nutritious with a rich nutty flavor. They were ground into a meal by the Tongva. The seed of Chia is also used to make beverages. Some sages are also used for their fragrance.

LIVING WITH NATURE

TONGVA BASKETRY



Soar - "Wire Grass"



Suul - "Deer Grass"

Two Tongva Basketry Plants

- The Tongva use Soar and Suul to make coiled baskets.
- Basket materials are dried and then re-moistened to reduce shrinkage.
- The flowering stalks of the Suul are used as the foundation of the coil.
- The Soar stems are split before using to wrap around the foundation.

The Two California Basketry Techniques:

Coiled

Woven



Uses of Basketry

- Food processing, serving, and storage
- Gathering and hunting
- Protection and ceremony
- Commercial trading or sale



Palm Oasis-Desert Survival

California Fan Palm Uses

Food

Fruit and seeds were ground into flour or mush

Fruits were soaked to produce a sweet beverage

Spongy pith in the tree center could be boiled and eaten



Fiber

Fronds were interwoven for sides or roofs of houses

The seeds were filling material for gourd rattles

Sandals or foot pads were made from leaves



Sashat - Ancestral Aspirin



Willow

What gives willow its aspirin characteristic?
Acetylsalicylic Acid

After proper preparations, the Tongva combined willow leaves with bark, twigs, and roots, and use them as tea, powders, washes, and poultices. It was used as aspirin to reduce fever and ease headaches.

Willow was used to make fishtraps, racks for drying and cooking food, gambling and counting sticks, fences, hunting bow, and baby carriers. The inner bark made aprons and clothing for women,

Willow branches were used as the foundation and twining for baskets. They were also used for acorn granaries.



Willow branches and their thin flexible trunks were bent and tied together to provide the structure of Tongva dome shaped homes or *Kich*.



Red Willow



Black Willow



Sandbar Willow

Ti'at: Vessel of Survival

Development of a wood plank canoe called the ti'at increased Tongva access to Earth's abundant resources and allowed for increased trade.

How ti'ats were made:

- Preferred wood was redwood logs that drifted onto shore.
- Only straight logs that lacked knotholes were split and then sanded with sharkskin.
- Wood planks were fitted together and then small holes were drilled along their edges.
- Planks were then sewn together, edge to edge.
- Mixture called *yop* made from asphaltum and pine pitch was melted and then boiled for the caulking.
- Canoe was coated with either pine pitch, or more commonly asphaltum.
- Finishing touch was decoration with red paint & shell mosaics.



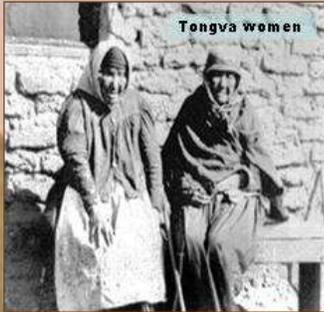
Benefits:

- The sea and Channel Islands were used more fully.
- Greatly expanded the Tongva trade routes.
- Allowed greater societal and political complexity.
- An elaborate economic system developed that was based on maritime exchange.

The ti'at:

- Used to carry all their gear and trade goods.
- Held as many as 12 people.
- Lengths ranged from 10 to 30 feet.
- Used for travel along shore or to the Channel Islands through established trade routes.
- They maneuvered the ti'at's by using double bladed paddles.

Tongva Life – Yesterday and Today



Ongoing Issues With Today's Government

- Tongva ancestral burial grounds repeatedly developed for other uses.
- Ongoing issue to become federally recognized.
- Since 1992 had to fight to protect a sacred Long Beach site called Puvungna from being built on.



Background of Tongva

- Tongva – The indigenous people who lived in the Los Angeles area before arrival of Europeans.
- Tongva = Gabrielino, the name given to them by European discoverers.
- Oldest Discovered Tongva site is at the base of San Gabriel Mountain near Azusa CA- 8,000 years old.



More Ongoing Issues with Today's Government

- In 1990, Kuruvyngna Spring was revitalized, one of last remaining sacred Sites.
- Though the government has listed many Indian grounds on the National Register of Historic Places the law protecting the land is not strongly enforced.
- The Tongva were and are forced to integrate with society without having a reservation as a center of culture and without federal recognition.