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THE FROG POND INTERPRETIVE TRAIL

Being a Guide to Understanding the Life of the Frog Pond Natural Area*

** And a Guide to What You and the Frogs Have in Common*

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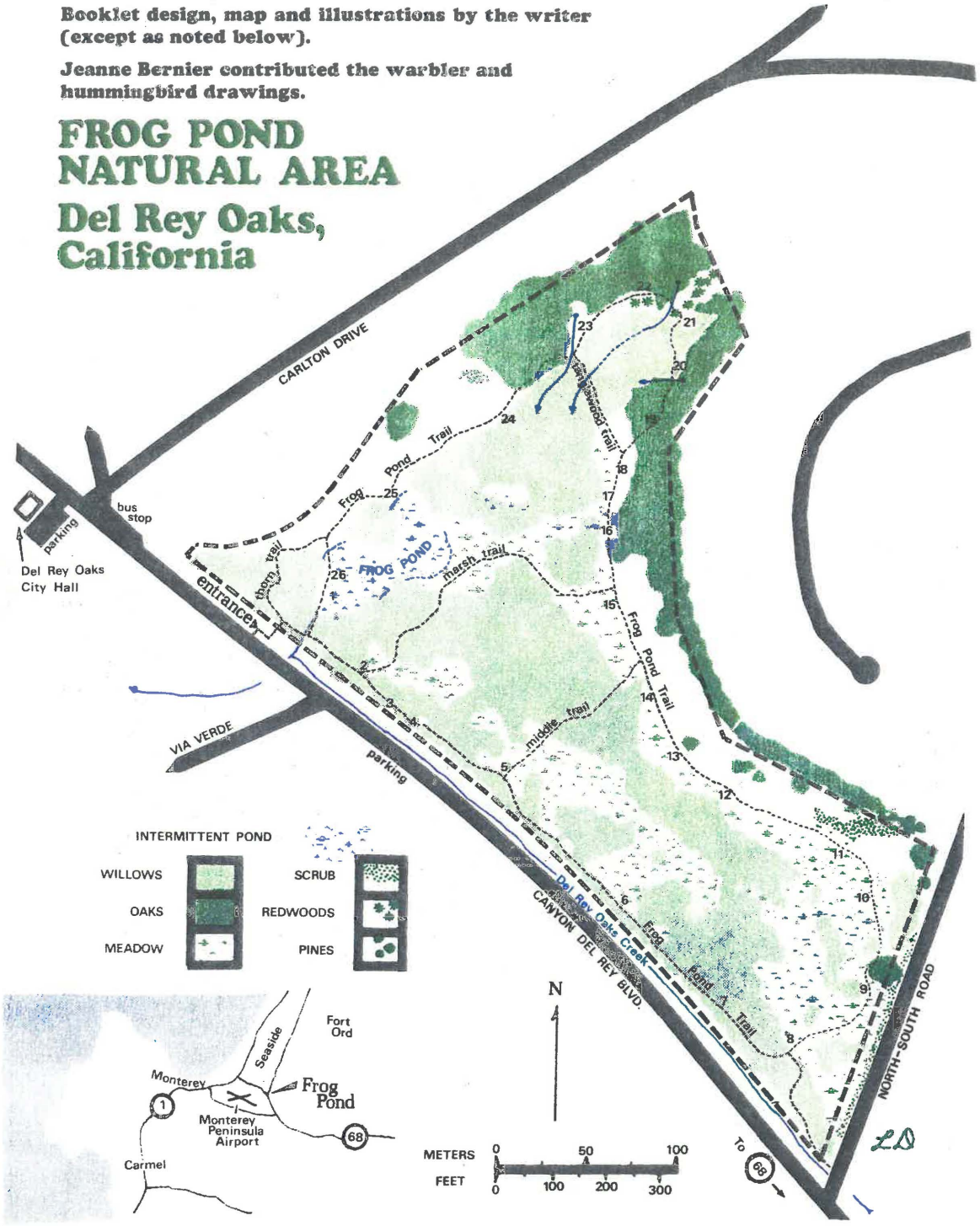
Booklet design, map and illustrations by the writer (except as noted below).

Jeanne Bernier contributed the warbler and hummingbird drawings.

FROG POND NATURAL AREA

Del Rey Oaks, California



BEGIN HERE

WHAT YOU'VE GOT TO DO FIRST

Slow down.

To see the life, slow down, walk quietly over the trail. This booklet introduces you to a few of the many residents — plants and animals — of this 17-acre natural area. Stop and read something about them at each of the numbered posts along the 1.2 km-long path (.75 miles).

Read, look, reflect. Our lives seem so different from the animals and plants which live here. It's easy to overlook that, in some ways, we are like every one of them. So read carefully, walk slowly, take your time. Allow one or two hours to explore this trail.

First we'll look at and explain some of the basic *needs* of the life here. Later, we'll relate these needs to some *characteristics* of plant and animal life. *Then,* we're going to look at *what you and the frogs have in common!*

1 SPLASHY WET STUFF

"Pond."

An area shallowly filled with that most important need of life, the splashy wet stuff, water.

Wherever there is water, life is more abundant. While over two-thirds of the surface of this planet is covered with water, bodies of *fresh* water are a bit rare. Fresh water covers only about 2% of the globe.

With an ample supply of fresh water in an area of yearly summer drought, the Frog Pond is rather special. Even when standing water is lacking, the soil is very moist. If you can't see the Frog Pond's water, as in summer or fall, the lushness of the vegetation tells you it's there underground.

We'll return to the pond later. But to continue the tour, turn around and walk back to the start of the boardwalk, then turn to your left.

2 SOLAR ENERGY

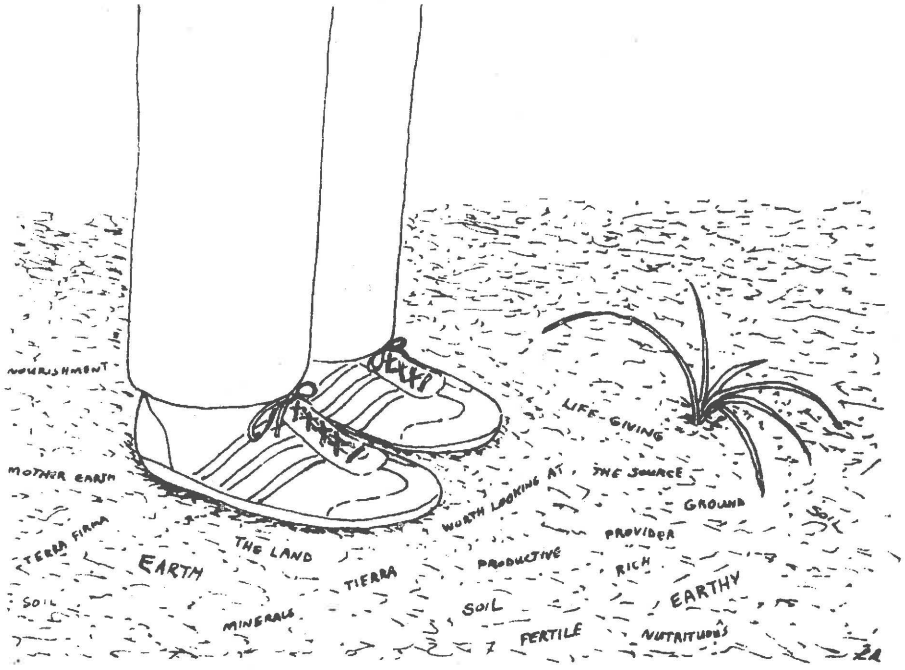
This area is full of *radiation* — solar radiation. The radiation from the sun is energy and light is one important form.

To grow, to move, or just to stay alive, all life needs energy. Directly or indirectly, the sun provides the energy that runs life.

But the amount of solar energy that actually reaches the ground is not the same at all places and times—due to events such as "winter" and "night," and barriers such as mountains, clouds and trees. And since it is essential to life, the abundance of solar energy, like water, directly affects the abundance of life forms.

Areas with the best combination of water and energy supplies have the most variety and greatest numbers of plants and animals. But life has other needs, as we will see.

3 DOWN-TO-EARTH

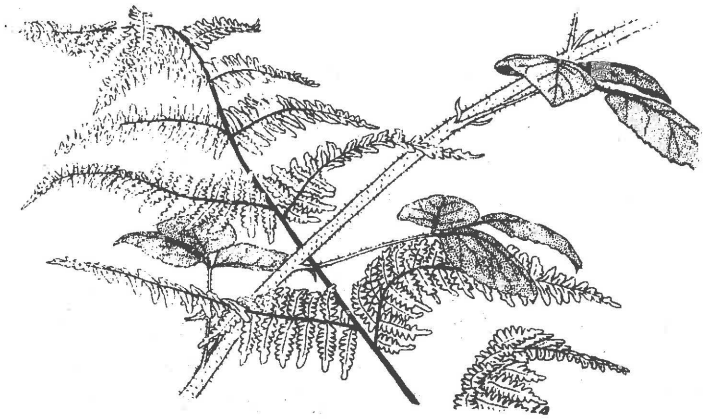


Look down. The soil, like that at your feet, is worth looking at. Plants get most of their nutrients from the soil. This being so, the kind and amount of nutrients in the soil greatly influences the kind and amount of plant growth.

The growth of plants is also affected by the amount of air in the soil. Many of us know that plants need air, but many of us don't realize that plants also need some of that air around their roots. This is important — few kinds of plants are able to grow in soil that's always muddy. Too much water keeps out air. In general, these areas have less variety of plant life than other moist but well-drained areas.

Plants need water, light, and soil with the right amount of nutrients and air. Since these essentials are limited, the number of individual plants which can grow in an area is also limited.

4 STRUGGLE WITHOUT PAIN



PLANTS COMPETE

Take a look at all the greenery here. Throughout the growing season — which in this moist area is from spring through fall — you'll see an abundance of plant growth. Look closer at all this luxuriant vegetation and you might see these plants doing something that maybe you didn't know they did — *competing*. Plants are intensely competitive, "struggling" among themselves for light, nutrients, space and, in dry areas, water.

Competition among plants is at least as severe as it is among animals. To be sure, there is no biting, snarling, tearing of flesh, no pain or "hard feelings" whatsoever. But when a plant gets too little light because its neighbors have overshadowed it, or if it gets too severely weighed down by other plants, or if its roots aren't able to penetrate soil occupied by its neighbors' roots, or if there just isn't space for it to even get started, the result will be the same — death.

The only species (kinds) of plants which survive here, then, are those which are especially well adapted to competing in this environment — willows, bracken fern, blackberries and rushes. You can be sure that many other species of plants would grow here if not for the plants already here. And you can expect that even the plants which *do* grow here don't grow as *well* as they would with less competition.

5 WILLOWS AND WATER

You are surrounded by **Arroyo Willows.** They're the trees all around you here. Look up the hill — you'll see oaks and pines, but no willows.

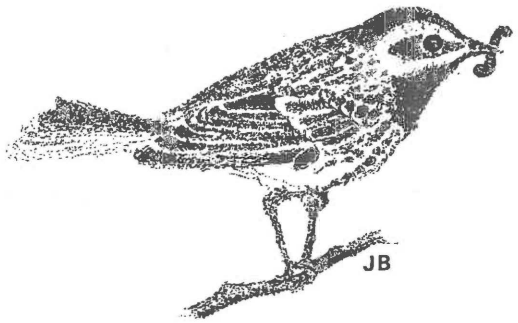
Willows need a lot of water. And water, as you know, has a way of not staying on hills, accumulating instead in low areas. Willows do so well in water that they can even grow in areas where water stands for a long time — weeks, even months — even though this makes it trickier for their roots to get air.

Many thousands of seeds are produced by each willow, but willow seeds can only sprout in a bare, well-lit spot of wet sand. That explains why there aren't any young willows in this meadow of densely growing rushes.

6 ANIMAL FOOD

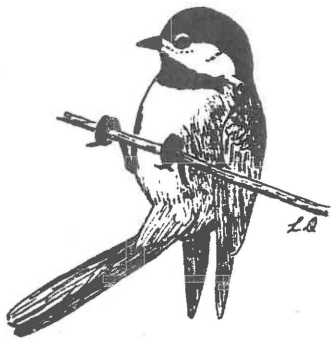
Up to this point we've talked mostly about plants. This is because animals tend to be very uncooperative about staying in one place. Every time you try to put a numbered post next to one, it moves. So, while admitting that this post has been somewhat arbitrarily set, we shall say only that by this time you ought to have seen or heard many small birds. Their names are chickadees, bushtits, vireos, sparrows, warblers, titmice, kinglets, and others.

Why do they live in the willows?



TOWNSEND'S WARBLER (11 CM LONG)

Just watch one of these feathery little animals as it makes its living hopping and flitting about in the willow woods, picking off small insects. It sees a caterpillar, snatches it and — but wait! Let's leave our small bird, caterpillar in mouth, for just a moment, and look at a basic difference between plants and animals.

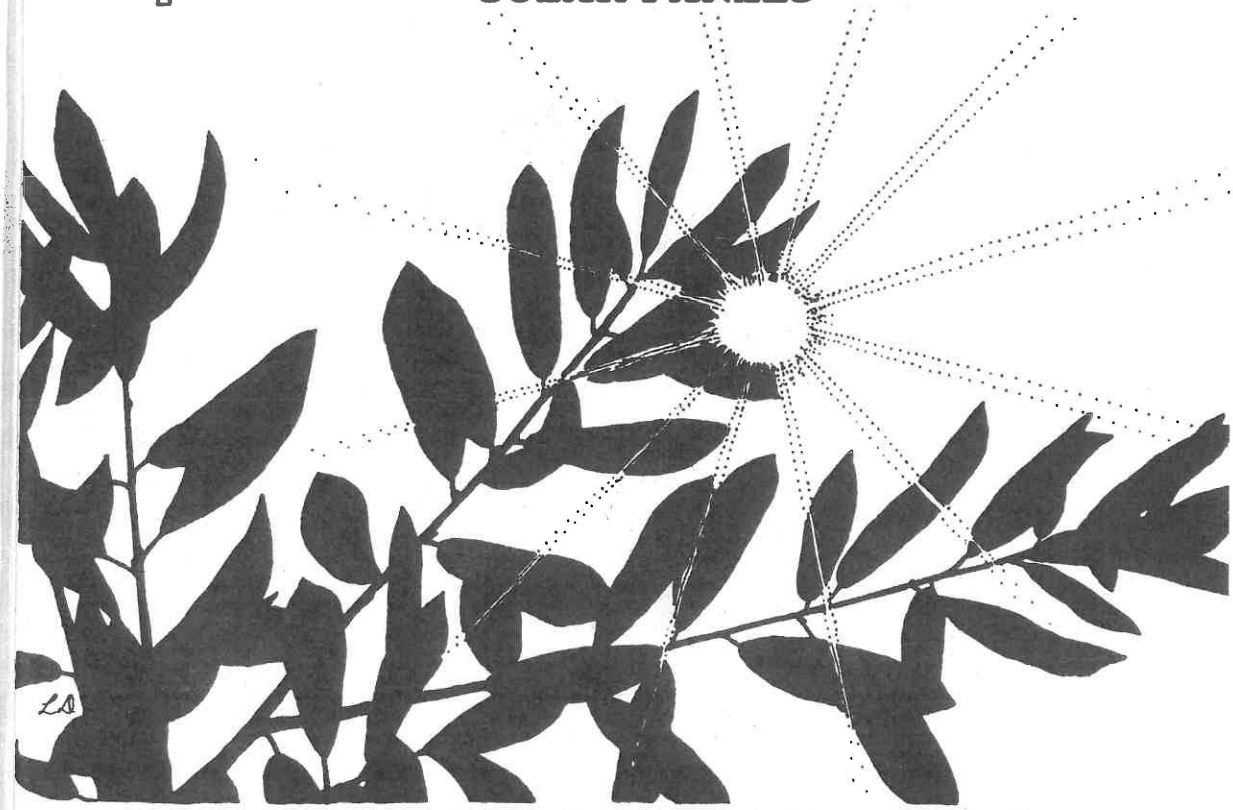


CHESTNUT-BACKED CHICKADEE (11 CM LONG)

Both plants and animals need nutrients with which to maintain their bodies or grow. But plants need only fairly simple elements and compounds as nutrients, which they get from the soil. In contrast, animals need much of their nutrition in a more complex, built-up form. Only plants can make these complex nutrients, so all animals must eat plants or other animals which have eaten plants — or *other* animals which have eaten *other* animals which have eaten plants, or — you get the idea.

Okay. Back to our small bird munching on a caterpillar. Why does it live in the willows? One reason is that it can find a good source of complex nutrients among the willow leaves — like caterpillars. Another reason is that the foliage helps to keep the small bird from becoming a source of complex nutrients *itself*. A cat or larger, predatory bird is less likely to catch and eat it if the small bird stays among the willow branches.

7 SOLAR PANELS

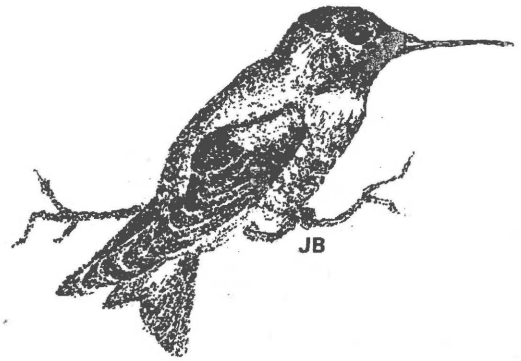


Here you are in the midst of a thicket of Arroyo Willows. In winter, all willows are leafless. But even in summer, the "stick" trees here have few leaves except at the very top.

We've already said that plants must have light to live, without saying how it is used. All the green parts of a plant contain the complex chemical **chlorophyll.** With this substance, plants can use the energy of sunlight to make sugar, and other compounds the plant needs, from simple nutrients. This process is called **photosynthesis.**

Containing most of a plant's chlorophyll, leaves are really **solar panels,** *photosynthetic factories* which collect the energy of sunlight. They are useful to the plant as such only when frequently exposed to light. When too little light reaches them, they are dropped — and that's why this thicket is so bare of leaf.

8 PUGNACIOUSNESS



AN ANNA'S HUMMINGBIRD DEFENDS A TERRITORY

A male **Anna's Hummingbird** perches on top of these willows. If you wait here for a while — maybe an hour, no more than a few *months* at most — you are sure to see him. You might have heard him already, though. The male Anna's Hummingbird is different from other "hummers" in that he is the only kind in California which has a "song" — a series of harshly squeaky notes as full of vigor as his buzzing flight.

"Pugnacious," meaning quarrelsome: that's a hummingbird. An Anna's Hummingbird aggressively defends a feeding territory and allows no other hummingbirds to enter. By chasing the other hummers out of his area, he assures himself sufficient food. Without such a territory, the hummingbird would have to patrol a wider area to find enough.

It takes energy to explore a large area for food. The less energy an animal uses in getting all the nutrients it needs, the more it will have available for other activities — such as finding a mate. In this way, efficient energy use is rewarded.

The vigorous song that an Anna's Hummingbird puts forth while perched on top of willows like these is one way he announces his presence to "hummerdom." He is alive and well — so those other hummers out there had best not trespass!

9 HOW PLANTS COPE WITH ANIMALS

POISON-HEMLOCK

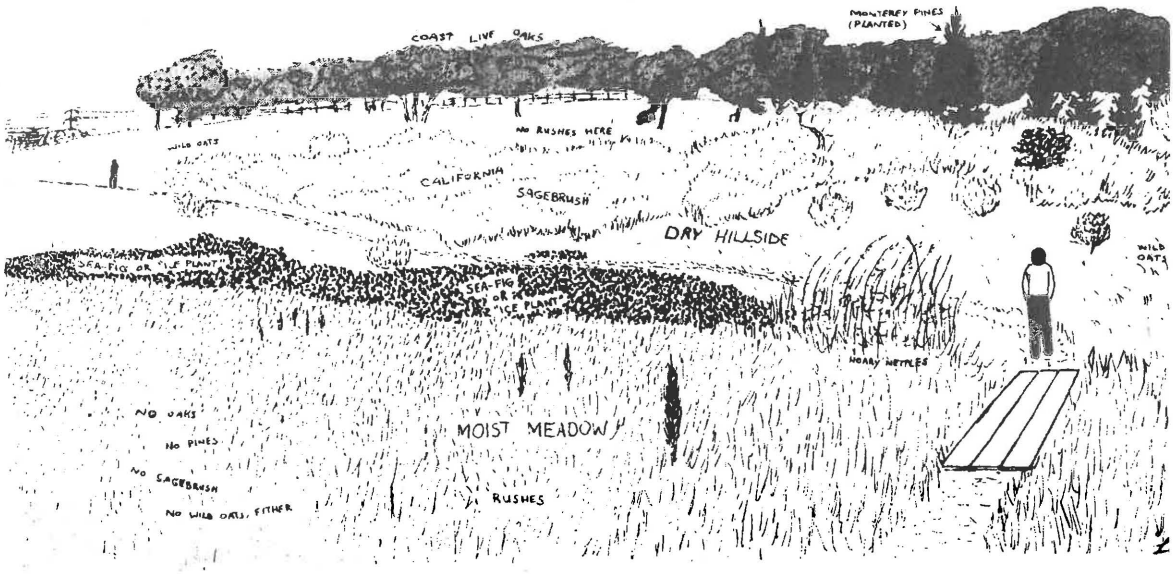
Hummingbirds have a lot of problems. But plants, as we have seen, also have a lot of problems. They need sunlight, water, and nutrients. But often there are other plants overshadowing them. Or there's too much water. Or they can't get enough nutrients out of the soil — either because the nutrients just aren't there or because of more efficient nutrient-getting plants growing in the same place.

If that weren't enough, plants have another problem — *animals.* The animals keep *eating* them. Lacking chlorophyll, animals can't use the energy of sunlight to produce anything except warmth, sometimes vitamin D, and maybe a suntan. So animals have got to eat plants, dead or alive, or other animals which have eaten plants.

This places something of a burden on the plant kingdom. Plants have managed to cope with all this in several ways. Some grow so fast that they can withstand a few nibbles. They can also grow in such abundance that some will escape being some animal's meal. *Or*, they can be undesirable as food — like being leathery, spiny, or gummy. Or *poisonous.*

Here grow some **POISONOUS PLANTS.** These particular plants, which start out looking like carrots or parsley, grow many feet tall and develop clusters of lacy white flowers. They live only a year or two and die after flowering, leaving behind tall, hollow brittle sticks of wood. The name? **Poison-hemlock.** If eaten, Poison-hemlock can make a person quite sick, or even cause death — but it's not poisonous to the touch.

10 A VERY DIFFERENT HABITAT



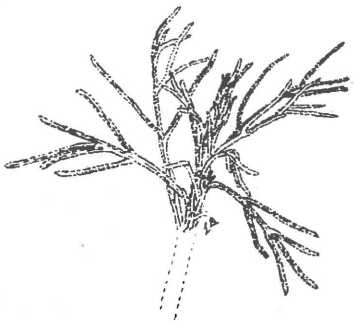
The area ahead of us is a very different habitat from what we've seen so far. The species of plants found on the well-drained slope we are approaching are almost completely different from those which grow in the low, meadowy areas.

We've said that plants need sunlight, water, and nutrients. They need these, but the exact amount that they need is different in every kind of plant. Some need to have direct sunlight all day, while others do best in shade. Some need to be constantly wet, while others grow well only in soils that drain rapidly and are only wet in winter.

Plants also vary in the *range* of conditions they can tolerate. Some can grow only in places where their needs are met exactly. Many will tolerate a fair amount of variation in their requirements — these might, say, do well in both direct sunlight or part shade.

But although some plants will tolerate a broad range of conditions, the habitats you see here — the well-drained slope and the moist meadow — are so different that only a few species of plants can grow in *both* habitats.

11 WHY SAGEBRUSH THRIVES HERE AND NOT DOWN THERE



Each species of plant has different requirements — but why?

Remember that areas with the best combination of sunlight, water, and nutrients have the greatest number and variety of plants. Remember, too, that plants compete with each other for these needs. A plant will have *less competition* if it can adapt to areas where other plants can't grow.

Now let's look at this area. The soil is poor — low in nutrients. It tends to dry out quickly since it is porous and since water has a way of not staying on hillsides, and also since this slope, facing south, is exposed to more sunlight throughout the year. Although plentiful sunlight might improve photosynthesis, for most plants, the disadvantage of an increase in dryness is far greater than the solar energy advantage.

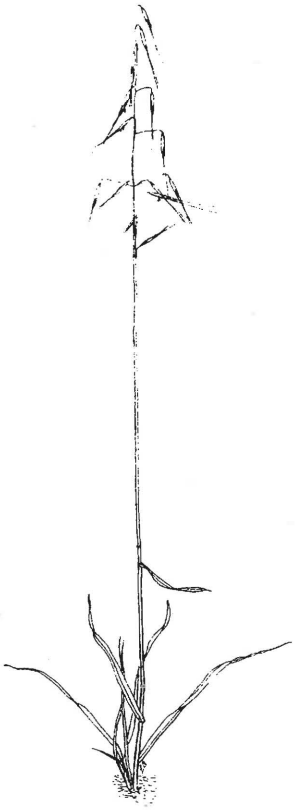
So why does **California Sagebrush** thrive here? Unable to withstand the pressures of competition in areas with better growing conditions, its ancestors had to adapt to living in an inferior habitat. You can see some of the ways it has changed by noticing some of the traits which make it different from most other shrubs.

First, note how its leaves are pale and finely divided. This helps reduce the heat build-up that would otherwise result in excessive water loss through the leaves. Its strong scent makes it unfavored as animal food, important so that the plant doesn't have to use up scarce water and nutrients in order to replace its "solar panels." On the other hand, a loss of some leaves is helpful during the warm, dry summer, as a way to cut back on water loss that would otherwise occur through the leaves' pores. So in summer the shrub goes dormant and many of the leaves die.

You can see by its abundance here that the California Sagebrush is doing well in this inferior habitat. It is so well adapted to places like this, that it is abundant near the coast from Baja California to Marin County.

12

WANDERING PLANTS



WILD OATS

SEED OF WILD OATS

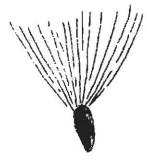
We have seen how plants compete with each other, and how they are used — and abused — by animals. With such "fierce" competition, plants need to find new, more hospitable places to live. If only they could move. Now, you know that plants can't move when rooted in the ground — very far. But they *can* move around as *seeds*. The ways that a plant can move around while in the compact form of the seed are wide and varied.

One method of seed travel, employed by grasses like the wild oats you can see here, is **fur-hitching** — going places via a furry, moving mammal. When mature, the bristly seeds may catch in the fur of a mammal as it passes by the parent plant. Sooner or later the seeds fall out — or are pulled out — far from the parent, often where there is soil for the seeds to sprout.

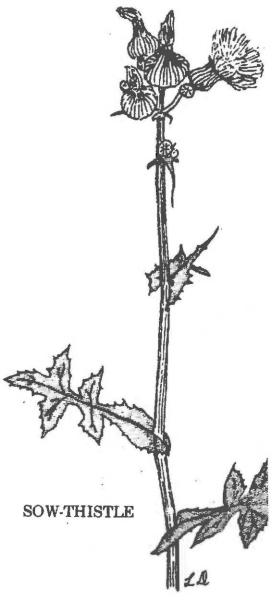
A second method occurs in willows, sow-thistles, and horseweed (to name a few): **air-floating.** Each seed is topped with delicate hair-like fuzz which catches the wind and floats the attached seed into the air, usually not returning to the earth until it is far from the parent plant.

A third, more active way that seeds travel is **flinging** — or rather being flung. This is used by lupine and Calif. Poppies. Both of these have a seed case, which, upon reaching a certain stage of dryness, explosively splits open, flinging seeds many feet away.

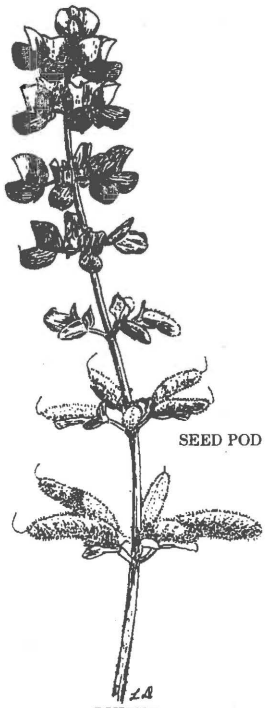
The effect of all these methods of seed dispersal is that, over the generations, plants can wander far away from their original range. We'll look at other ways plants wander — soon.



SEED



SOW-THISTLE



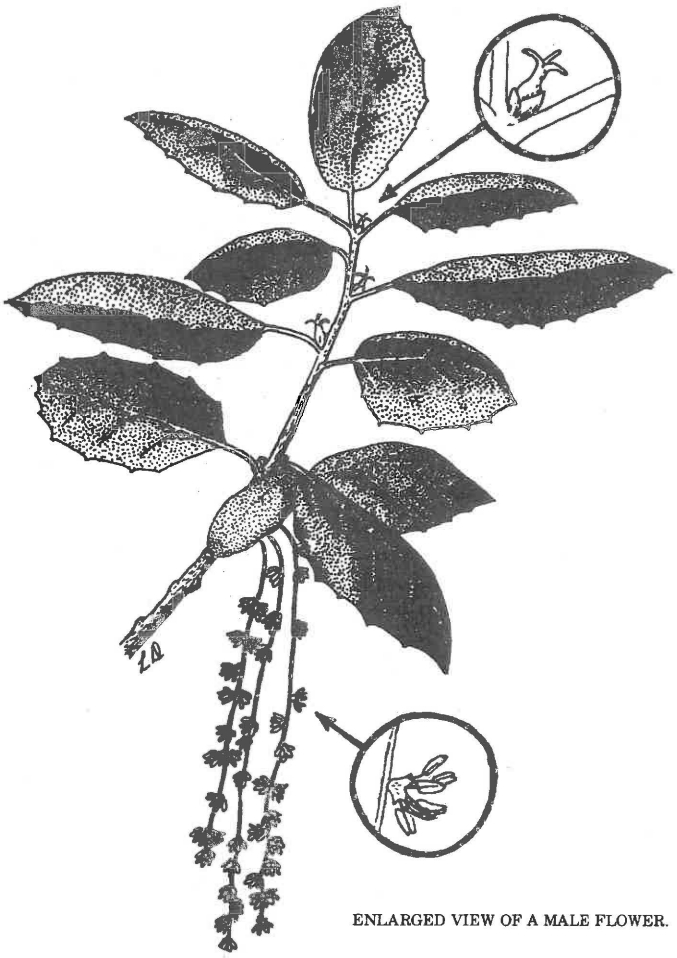
SEED POD

LUPINE

13 FLOWERS OF THE WIND

Here is a **Coast Live Oak**. It usually blooms around March or April — though you may have never noticed the flowers. The tiny flower clusters, although numerous, are not brightly colored.

Like grasses, sagebrush, and many other plants with inconspicuous flowers, oaks are wind-pollinated. The very light pollen blows from male flowers and is caught by receptive female flowers. This leads to the production of seed. Protruding petals would only get in the way of the wind-blown pollen, so oak flowers lack such extras. Like other wind-pollinated plants, the flowers are arranged so that the pollen is easily released to the wind and easily captured by other oak flowers.



OAK FLOWERS DON'T NEED PETALS

14 FLOWERY ATTRACTIONS

BRIGHTLY COLORED FLOWERS ATTRACT INSECTS

These thorny shrubs are **California Wild Roses.** In summer, they produce an abundance of fragrant, pink, 4-cm-wide* flowers. Instead of relying on the wind to spread their pollen, they rely on that large group of small animals called insects.

Insects are attracted to flowers which are scented, or colored so that they stand out from the prevalent greens, browns, and greys of the surrounding landscape. Flower petals also serve as landing platforms for flying insects, and their symmetrical arrangement is like a target which leads the insect to the center. There, it can find the sugary nectar — one edible reason for its interest in flowers.

But in their efforts to obtain the nectar, insects get dusted with pollen. And that is just fine for the plant, for the pollen then often gets carried to another flower of the same species, leading to the production of seed.

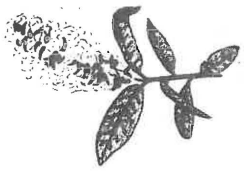
Some insects eat the protein-rich pollen, too, but they are not agile enough to get all of it and end up pollinating many flowers anyway.

* If you are not used to the metric system, refer to the ruler reproduced on the back cover of this booklet.

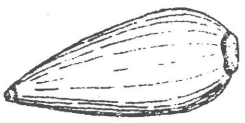
15 TWO DOMINANTS

The trees to the left are willows. The trees to the right, and the one that the trail passes under, are oaks. Willows are quite different from oaks. Take a look at them and the chart below and notice some of the differences.

WILLOWS	OAKS
Slender, ascending branches	Thick, spreading branches
Leaves narrow and pointed, supple	Leaves rounded with spiny edges, leathery except when new
Deciduous, loses all leaves in fall	**Evergreen, retains many leaves all year, loses many of its older leaves in spring**
Seeds lightweight, topped with fuzz, transported by wind	Seed heavy, inside hard fruit (the acorn), can only fall to ground from the tree or be transported by animals such as Scrub Jays
Seeds need sunlight and wet, bare sand to sprout, die within a few days if not sprouted	Seeds can be partially or completely covered to sprout, sun or shade, soil or humus, can live many weeks or months without sprouting if not too warm or dry



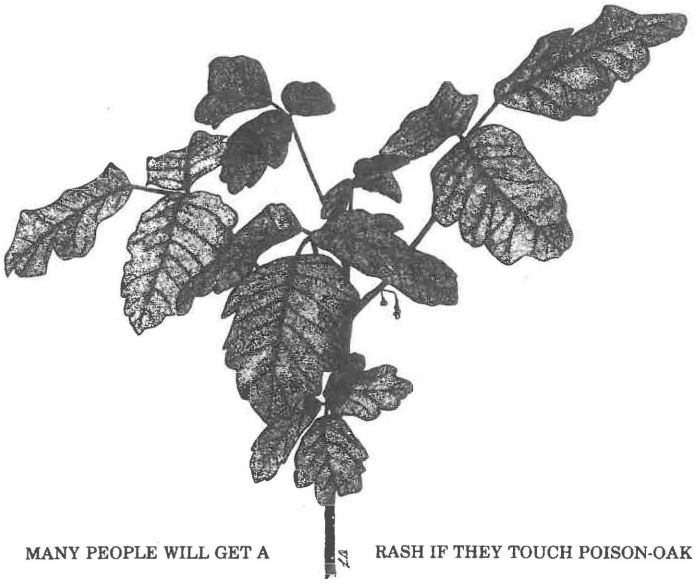
WILLOW WITH CLUSTER OF SEED "CAPSULES" RELEASING FUZZY SEEDS



THE HARD FRUIT OF AN OAK, AN "ACORN"

You could probably list other differences between the two. But one important way they are *alike* is this: both willows and oaks are not only common in their own habitats here, they are *dominant*. This means that each has a *controlling influence* on the other plants and animals which live in, on, under, and near them.

16 NOT TO TOUCH



MANY PEOPLE WILL GET A RASH IF THEY TOUCH POISON-OAK

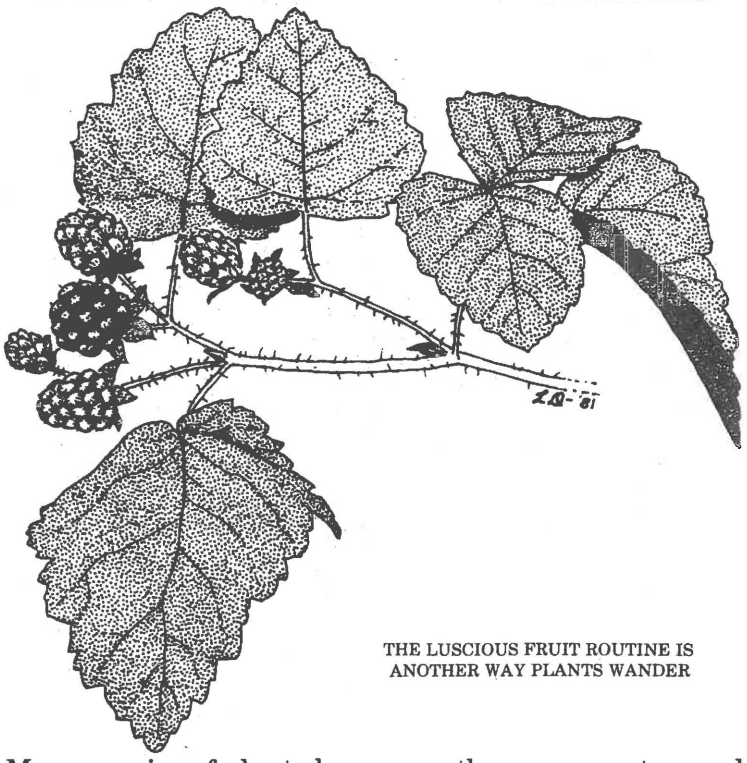
Illustrated above are a few leaves of **Poison-oak.** In spring and summer, this drawing may bear a striking resemblance to the bush growing next to the post. That is because the bush growing next to the post *is* Poison-oak.

In fall and winter, after the leaves have turned a vivid red and dropped off, it will bear little resemblance to the drawing. But it will still be capable of causing a rash.

Even if you don't touch Poison-oak directly, but your clothes do, you can still get a rash. And even if you've touched it many times before and have never been affected, it is possible to *lose* your "immunity." As a precaution, scrub your skin thoroughly when you gét home, and wash your clothes. Laundering destroys the plant's toxic oil.

From now until post 24,Poison-oak is sometimes abundant, so be especially careful about staying on the trail. If you are exceptionally susceptible to this species, take the Tanglewood Trail just after post 18 — that way you'll avoid the thickest concentrations of the plant, which are near posts 19 and 20. A left turn at the end of the Tanglewood Trail will put you back on the Frog Pond Trail.

17 MORE ON WANDERING PLANTS

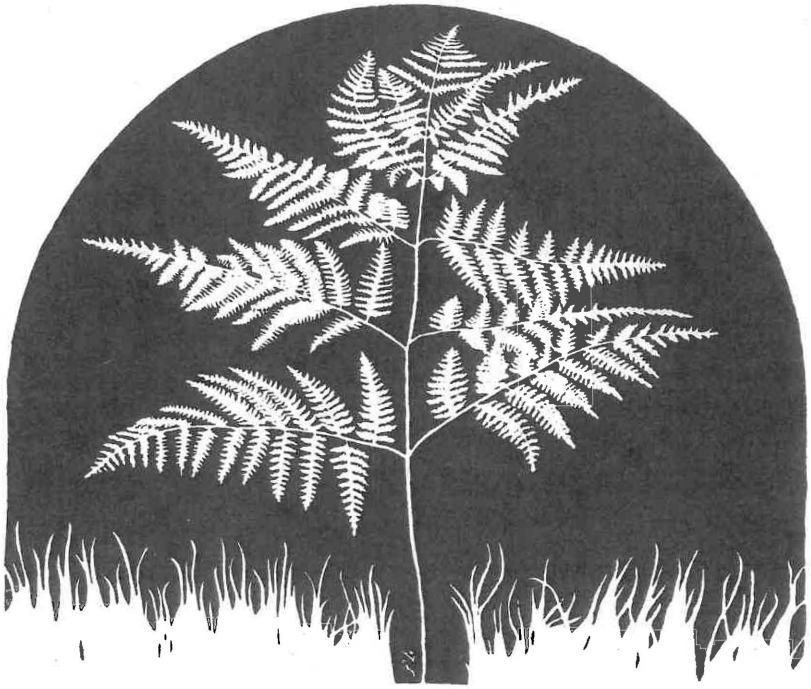


THE LUSCIOUS FRUIT ROUTINE IS ANOTHER WAY PLANTS WANDER

Many species of plants have more than one way to wander, and blackberry is one of these plants. It wanders as seed, too — but not by using any of the three methods we mentioned at post 12. Blackberry uses a fourth way: the **luscious fruit routine.** This method involves growing seeds inside a juicy, sometimes sweet fruit, colored so that it is more obvious to birds and mammals partial to such things. Since animals seldom stay in one place, the seeds are transported to other areas *inside* the moving animals.

Plants can wander while in the form of seeds, but that's not the only way. Notice how the **California Blackberry** here grows long, trailing branches. These vine-like stems can take root where they touch the ground and enable the plant to wander several feet at a "jump." Much of the thicket of blackberries you see here might be all part of one plant.

18 WORLDWIDE BRACKEN

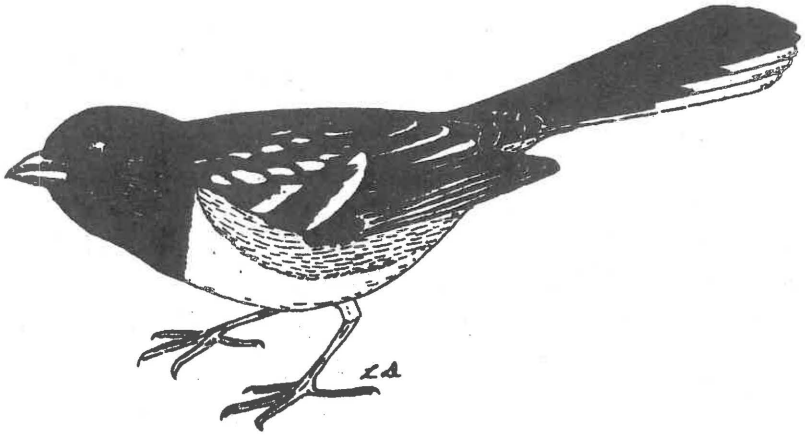


The large fern here, and the only kind you've seen along the Frog Pond Trail, is **Western Bracken.** The basic form of bracken and other ferns is rather primitive, for ferns have been around for maybe 400 million years. This is in contrast to the ancestry of pines, which goes back 180 million years, and flowering plants, which first appeared 135 million years ago

This is not to say that bracken itself has been around 400 million years. But it is more like those first ferns than, say, a willow, an oak, or any other flowering plant, the ancestors of which were also ferns, or fern-like.

Even though it is not dominant anywhere and retains many primitive features, Western Bracken is often abundant in a variety of habitats throughout the western United States. Western Bracken, however, is only a "race" (subspecies) of **Common Bracken,** which has an even broader distribution. Like us, Common Bracken is a *worldwide* native.

19 AVOID FIGHTS - SAVE ENERGY



These woods, thick with undergrowth, are a favored habitat of a medium-sized bird called the **Rufous-sided Towhee**. It is found only in certain habitats — it won't live just anywhere. A towhee's usual foraging place is on the ground. There it scratches noisily through dead leaves with its feet, eating insects or seeds as it uncovers them. Its nest is also on the ground, or in a low brush pile. Few other kinds of birds that live here have similar requirements — and *none* have requirements that are *identical* to those of a Rufous-sided Towhee.

But Rufous-sided Towhees are not the only animals of which this can be said. Like plants, every kind of animal has its own unique set of requirements. Each kind of animal makes use of different habitats, foods, and feeding methods. With this situation, there is less need for competitive conflict over food and space.

Conflict uses energy. Sources of energy are usually in high demand. Any animal which is able to avoid conflict — while still getting all of its needs — will need less energy to live, and in this way is more likely to survive. From this we should understand that the phrase "survival of the fittest" doesn't have to mean survival of the one which can "beat-up" its competitors. Sometimes it *does,* but *usually* it means survival of those which have evolved ways to *avoid* direct competition — like adapting to specific habitats and making use of resources not in use by others.

20 A BERRY BRIEF NOTE

These shrubs, **Coffeeberry** by name, also wander using berries to attract animals. The 1-cm-round berries are black when ripe. Eat a lot of them, and you'll find they are good for diarrhea — producing it, not curing it.

21 THE LAST WORD ON WANDERING PLANTS

We've looked at a variety of ways that plants use to wander, methods used for millions of years. But there is another method which plants use to move around — one which is relatively new. This technique involves the attraction of a Human.

People are attracted not only by a plant's edible parts, but also by its flowers or even by its general appearance. When a plant succeeds in attracting Humans this way, it prompts them to collect and grow the plant — or reward others who grow it for them — often so that they can have it growing near their homes, no matter how far away their homes may be. With widespread Human travel over the last several hundred years, this has resulted in an unprecedented amount of plant wanderings.

YOUNG COAST REDWOOD USING HUMAN TO HELP IT WANDER

That is the technique these **Coast Redwoods** used to get here. The appearance of the species attracted Humans and was so effective in pleasing them, that they planted these here, outside of their usual habitat. Using this same technique, other Coast Redwoods have induced people to help them travel farther — to Europe and Asia.

Any kind of plant with qualities *favored* by people will now be able to wander throughout the world. **Being favored** is a technique — albeit, like all the others, one with no thought or planning from the plant — used by all garden plants.

22 ANOTHER DOMINANT

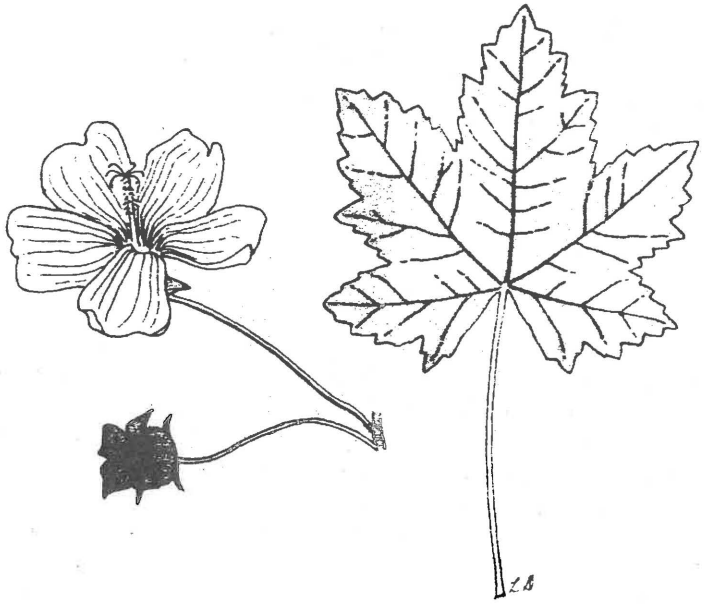
The Coast Live Oak has been the dominant life form along much of this trail since post 15. From this spot, the habitations of another dominant life form are visible. This life form is an animal, rather than a plant. It is a species of mammal which has a tremendous controlling influence over its surroundings — usually much more than an oak or willow. In part, it is able to do this because it is organized in vast, usually cooperative social systems with most of its members involved in very specialized activities. Also, this dominant mammal is able to make use of not only the energy it obtains from its food, but in addition, it can make use of energy stored in the remains of dead plants and animals, and even the energy from moving water and radioactive elements. By using great quantities of these supplementary energy sources, it is able to manipulate other species in a manner greatly disproportionate to its physical size.

It would be easy to go on and on about the nature of this interesting mammal, because the writer is a member of the same species. So is the reader.

We Humans are a dominant species in many areas. Garden plants and domestic animals are especially under our dominance, but yet we often think of them as if they are typical of *all* plants and animals. They're not. In order to discover important traits common to all life forms, we need to study those which are *not* under our dominance, as well as those that *are*.

This is one reason why it's important to preserve natural areas like the Frog Pond; natural areas are the only places where our species is not dominant.

23 SPECIAL EFFECTS



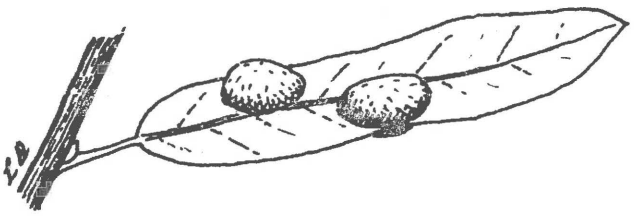
THE FLOWERING SHRUBS ABOVE THE GULLY ARE TREE-MALLOWS.

Dominant species are not the only ones which affect others. *All* species influence other species in the very act of living. So even though Humans are not *dominant* here in this park, we do *influence* other forms of life. Some ways that we have affected life forms in this area are apparent.

The concrete block in the gully below, for example, is obviously Human-made. It had something to do with a spring-water bottling enterprise located here in the 1940's. Now it holds water throughout the year, and since the splashy wet stuff is so important to life forms, it undoubtedly affects them. Maybe there are a few more birds living in this area because of it, or at least there is an additional permanent home for tiny aquatic animals.

A less obvious effect of Human presence within the boundaries of this reserve is the addition of the pink-flowered **California Tree-mallows** to the local flora. They are native to the Channel Islands off the coast of southern California.

24 LEAF LUMPS



THERE'S A LOT GOING ON IN WILLOW LEAF GALLS

Look for small, red or yellow-green, bean-sized lumps on some of the willow leaves here (unless there are no leaves).

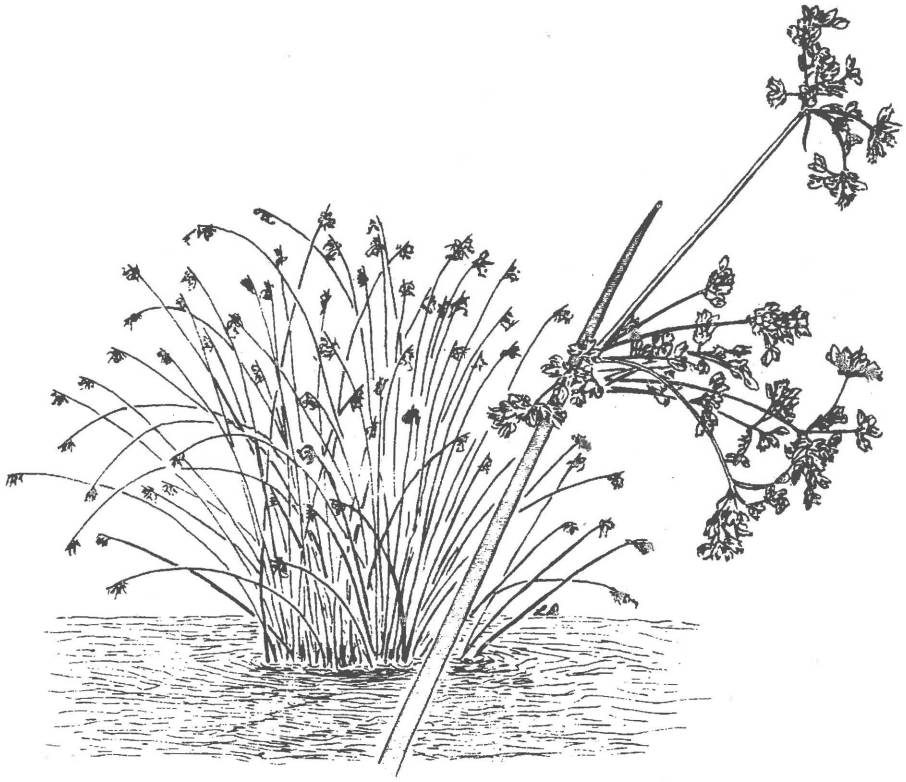
These protrusions are **galls.** They come in many sizes, shapes and colors. Other kinds are found on oak stems and rose leaves in this park. A gall is a tumor-like growth of plant cells, usually the result of the invasion of a fungus or insect.

In the case of these willow leaf galls, the swelling begins after a tiny **sawfly**, an insect related to wasps and bees, deposits an egg into the leaf — along with an irritating fluid. The willow responds to this fluid with the growth of the gall. As it grows, the young, wormlike larva inside is provided with a ready supply of food — the gall tissue. After a period of time, the larva eats its way out of the gall and drops to the ground on a silk strand. There, it builds a cocoon in which to change into an adult.

But that is only part of the story — there are more characters in this act than just the willow and the sawfly. There are two kinds of wasps which may parasitize the sawfly larva. There is a third kind of wasp, a moth, and a weevil, whose young eat the tissue of the gall, and, if they should happen to find the sawfly, will eat it, too — *and* each other, if they happen to meet. There is a fourth kind of wasp which parasitizes the third kind. And still another wasp feeds on the moth which feeds on the gall.

Although all of these animals will not be found in any *single* gall, the story is still rather complex. Try to imagine *all* of the interacting relationships among life forms in this reserve — of which the animals involved in willow leaf galls are not even a thousandth of the whole.

25 RETURN TO THE POND



CALIFORNIA TULES WILL GROW IN STANDING WATER

Here, again is the Frog Pond. In summer or fall you may well ask, "What pond?" This pond is a seasonal pool with surface water usually only during the winter and spring when it fills as deep as one-half meter (1.5 feet).

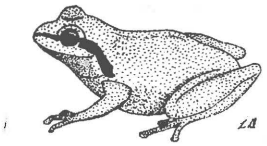
The greatest extent of the pond is made apparent year-round by the presence of such marsh plants as **tules** and **cattails.** These plants will grow only where there is standing water some part of the year. Red-winged Blackbirds are common here in the tules and cattails in spring.

Follow the trail up around the willows and out onto the boardwalk and get a better view of the pond.

26 THE LIFE OF THE FROG POND . . .

The animals who can live in this pond are in some ways privileged. With so important a substance as water all around them, they need not expend energy searching for it. The water also insulates, reducing extremes in temperature. Many nutrients wash down into the pond from the surrounding land, providing plentiful food.

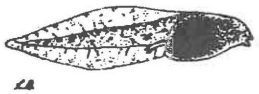
But the pond has its hardships. Because of the benefits of abundant water, it's also a very competitive place to live. Each resident has its own special ways of staying alive. But let's consider just one of these residents — the frog for which it is named.



OUR HERO

The **Pacific Treefrog:** at times there can be so many that it takes great care to avoid stepping on them. More often they are either scarce or well-concealed. This, the most common amphibian in the reserve is usually two to four cm in length.

The treefrog's eggs are laid in quiet, shallow water, and it is here that every kid's favorite "pollywog," or **tadpole,** begins its life. The tadpole is thoroughly aquatic, breathing through gills and swimming with a long, paddle-like tail.



TREEFROG TADPOLE

Gradually absorbing its tail and sprouting legs, the wiggling tadpole becomes the hoppy frog, no longer with gills, but now with good, sound, air-breathing lungs. Instead of the tadpole's vegetarian diet, the adult is now a consumer of insects — or anything else that moves and can be swallowed. This dual life cycle gives treefrogs and other amphibians the ability to use both land and water resources.

(CONT'D ON NEXT TWO PAGES)

. . . AND . . .

Can you see yet how all of the life forms we've talked about are related? What they have in common?

All told, we mentioned over 40 different life forms. This is out of a total of — who knows? Thousands!

All are different. Yet all are alike.

Even though of different form and habits, in some ways, a fish is like a frog.

In some ways, a dragonfly is like a frog. A hummingbird is like a frog. A redwood is like a frog. A rose is like a frog.

And dear reader, guess who *else* is like a frog?

. . . WHAT YOU AND THE FROGS HAVE IN COMMON

You are like a frog.

You're like a frog in the same way you're like a caterpillar. And in the same way you're like a hummingbird, mosquito, or Rufous-sided Towhee. You're also like an oak, a willow, or sagebrush.

You are like a frog in the same way we are *all* like them.

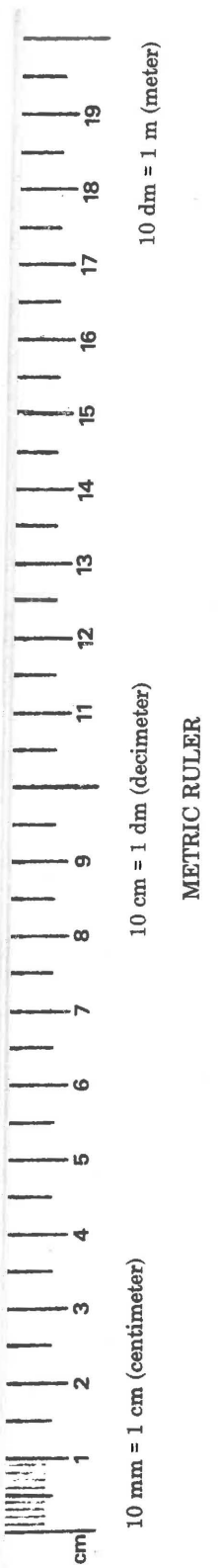
Beneath the differences, the most basic motivation of all is to *continue* — to *carry-on* — evolving, *changing* between generations, but only as much as is needed to *continue* in a changing world. We all have this in common: interaction with our environment and a striving to continue.

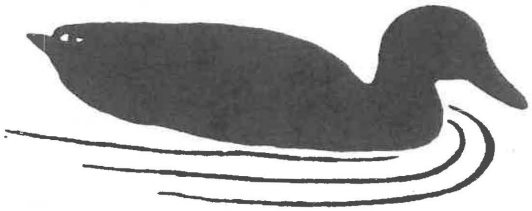
But that's not all. The most amazing, the most fascinating thing about it is that the *means* by which we and practically all life forms *continue* is based on a special chemical called **deoxyribonucleic acid — DNA** for short.

In the operation of living bodies, plants and animals alike, DNA is the *master molecule.* You have it inside each of your cells. DNA contains a chemical "code" which directs your growth and development, a code which you received from your parents at your conception. This inherited DNA code is copied every time a new cell is grown in your body.

DNA is shaped something like the design on this page — two coils twined around each other. The code it contains determines the kinds of protein used in cell building. And the way our cells are built determines the way our body can develop, the way it can run, and the way we can act.

We've seen many different forms of life today. But even in all of its variety, this *same* kind of chemical is used by *all life.* When you get right down to it, all of the differences between us and the frogs — and among everything alive — are the result of just two things: a different DNA code, and a different *environment* in which the DNA works.





The production of this booklet was sponsored by the **Monterey Peninsula Audubon Society.** We hope that you've learned something new about our environment today. If you would like to learn more about the Audubon Society, please write us at **Box 5656, Carmel, CA 93921.**

The Frog Pond Natural Area

The 17-acre Frog Pond reserve was purchased by the Monterey Peninsula Regional Park District in December of 1977. One-half of the total purchase price of $125,000 was funded by a federal Land and Water Conservation Fund grant. Prior to the reserve's acquisition, local residents had expressed concern over construction that had been planned for the site.

The Monterey Peninsula Regional Park District

The Park District is a special purpose district formed by the voters in November of 1972. Its main purpose is to acquire scenic park and "open space" land within its boundaries and to advocate its preservation.

The Regional Park District should not be confused with the larger Monterey County Parks Department. In addition to acquiring park land, the County Parks Department also develops recreational facilities. The County Parks Department owns and operates Jacks Peak and Toro Regional Parks, Laguna Seca Recreation Area, and several parks in other parts of this county.

In addition to the Frog Pond, the Regional Park District owns and operates Garland Ranch Regional Park, has worked with Monterey and Seaside in the acquisition and development of Laguna Grande, and holds several other parcels.

For more information, write the **Monterey Peninsula Regional Park District, P. O. Box 935, Carmel Valley, CA 93924,** or phone the Garland Park Visitor Center at **(408) 659-4488.**

Typesetting by Budget Graphics, Salinas
Economy Printing Service, Marina June 1982