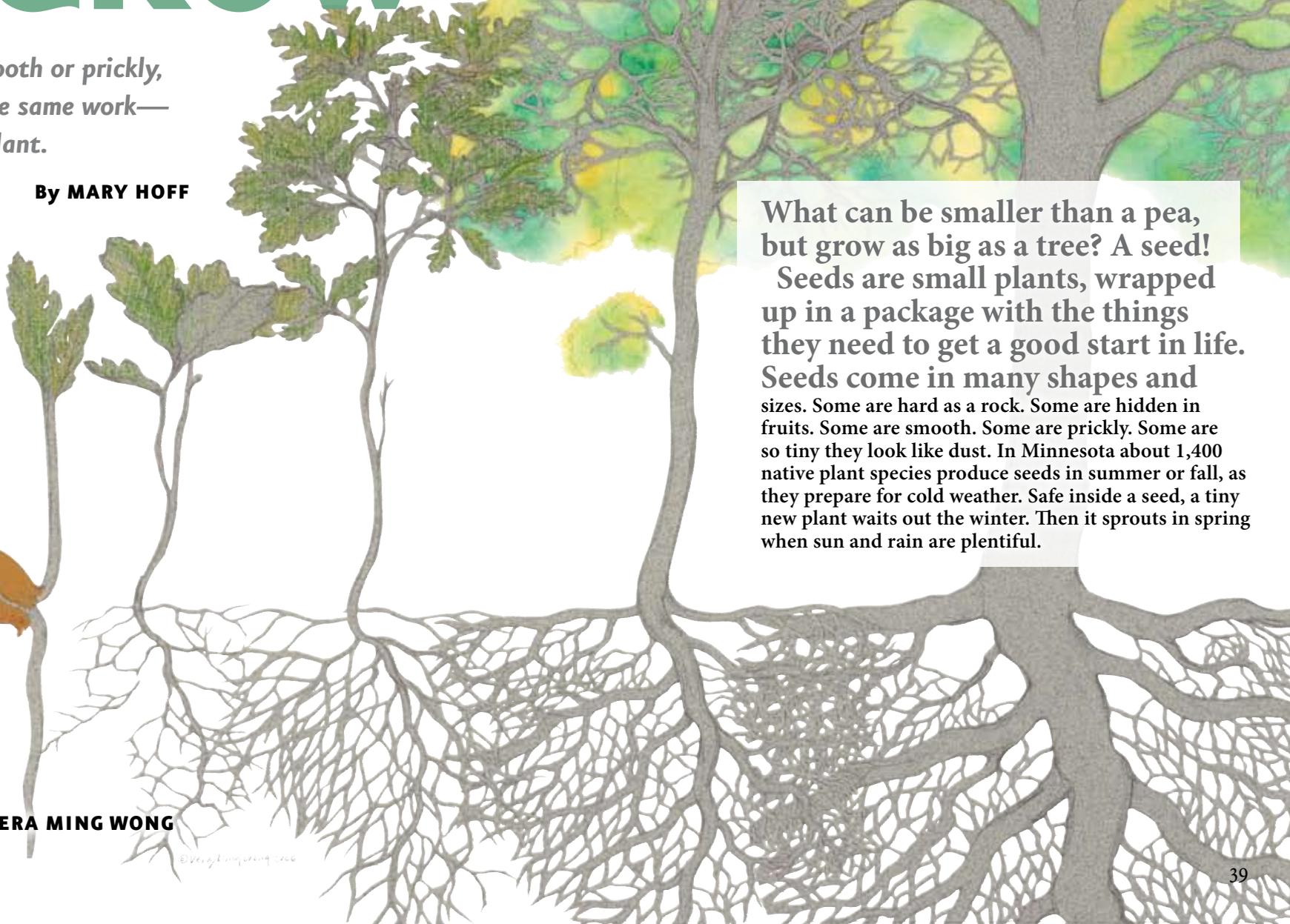


Ready, Set, **GROW**

Big or small, smooth or prickly,
all **seeds** have the same work—
growing a new plant.

By **MARY HOFF**

*An acorn is the
seed that grows
an oak tree.*



What can be smaller than a pea,
but grow as big as a tree? A seed!

Seeds are small plants, wrapped
up in a package with the things
they need to get a good start in life.
Seeds come in many shapes and
sizes. Some are hard as a rock. Some are hidden in
fruits. Some are smooth. Some are prickly. Some are
so tiny they look like dust. In Minnesota about 1,400
native plant species produce seeds in summer or fall, as
they prepare for cold weather. Safe inside a seed, a tiny
new plant waits out the winter. Then it sprouts in spring
when sun and rain are plentiful.

Illustrations by **VERA MING WONG**

The Story of a Seed

In the fall, a ripe acorn falls from a tall white oak tree. A squirrel might find and eat this nut, or seed. Or the acorn might grow into a new oak tree.

The story of this seed began early in the spring when frogs were croaking in the pond and birds were building nests. At the tips of the twigs of a tall white oak tree, tiny leaves were growing. On some twigs, tiny red *pistillate* flowers formed. These flowers contained *ovules*, which are like eggs—the female flower’s contribution to the seed.

On some twigs, yellow flowers shaped like caterpillars developed. These *catkins*, or *staminate* flowers, produced dustlike particles called *pollen*, the male contribution.

The male flowers released pollen into the air. Pollen grains went everywhere! One landed on a *stigma* atop a female flower. A long tube grew from the pollen grain down into a tubelike part

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(*style*) of the female flower and all the way down to the *ovary*.

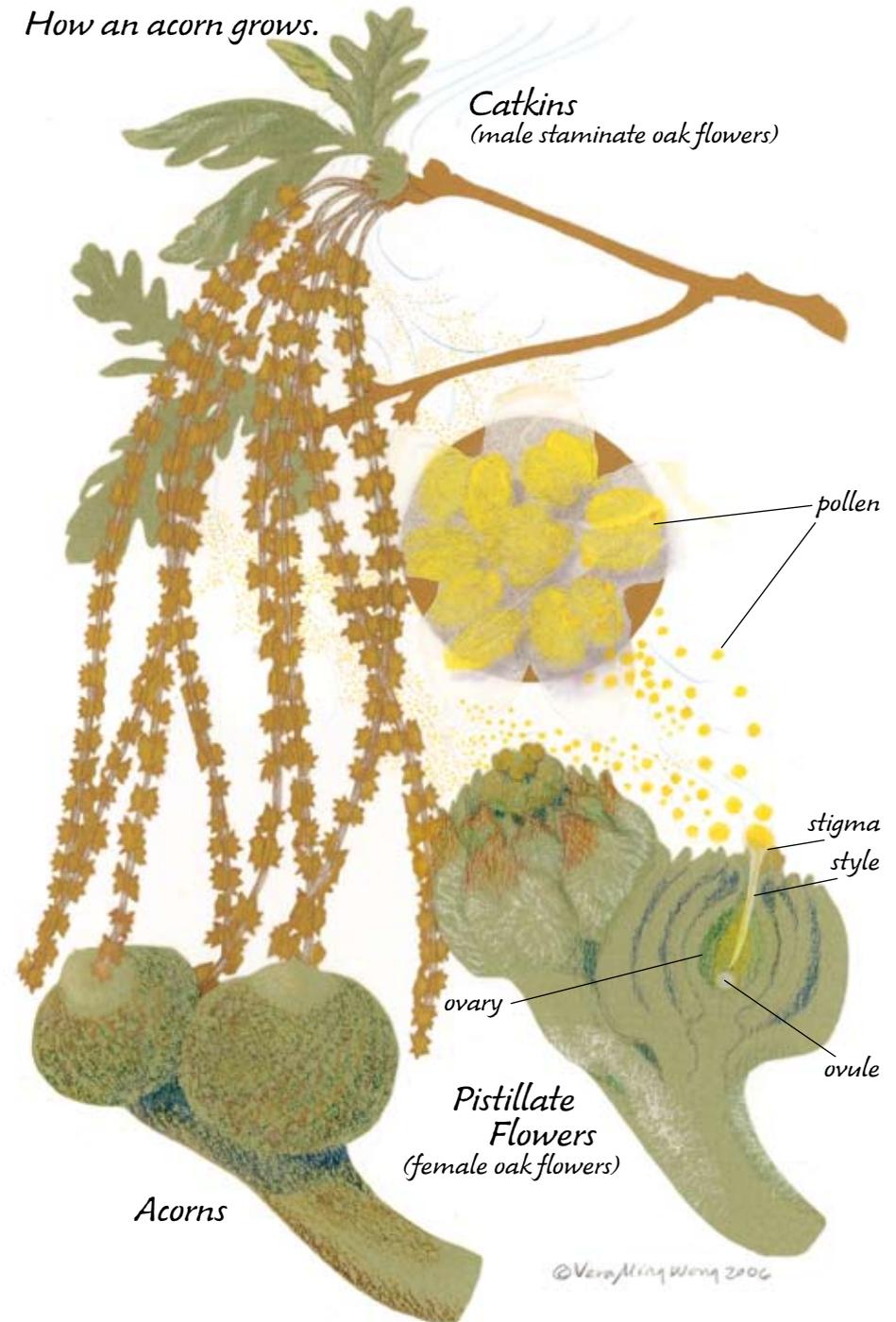
Next, the pollen grain released two sperm into the tube. One sperm combined with the ovule, or egg, in the ovary. The fertilized egg cell divided to make an embryo.

What happened to the other sperm? It combined with parts of the female flower to make *endosperm*—food for the tiny new oak.

The ovary formed the round part of the acorn. Other flower parts formed the cap. All summer the acorn grew. At first it was green, then it turned brown and tumbled from the oak.

If a squirrel doesn’t eat it, the acorn could sprout, put down roots, and grow into a new oak tree. After 50 years or so, that oak will grow acorns. Perhaps your grandchildren will see some of those new acorns.

How an acorn grows.



What Is a Seed?

Shut your eyes and picture a seed. What did you see? A tiny black dot? A fat bean? A kernel of corn?

Given the right conditions, any seed can give rise to a new plant.

Seeds have some basic parts in common. Every seed has a protective coat, some stored food, and an embryo that is the beginning of a new plant. Most seed embryos have a tiny root (*radicle*), a stem (*plumule*), and one or more leaflike parts called *cotyledons*.

Energy pack

Most seed-making plants pack energy into seeds in the form of starch, sugar, and fat. When you eat bread (made with flour ground from seeds of grains such as wheat and rye), oatmeal (made from processed oat seeds), or nuts, you are using energy stored inside seeds. Many animals eat seeds and the structures such as berries that surround them. Bears, squirrels, deer, grouse, insects, and other forest animals eat nuts and berries. Ducks and geese eat seeds from aquatic

(water) plants such as wild rice and water-lilies.

Where do seeds form?

Seed-making plants belong to one of two basic groups—*angiosperms* or *gymnosperms*—that tell where the seeds form.

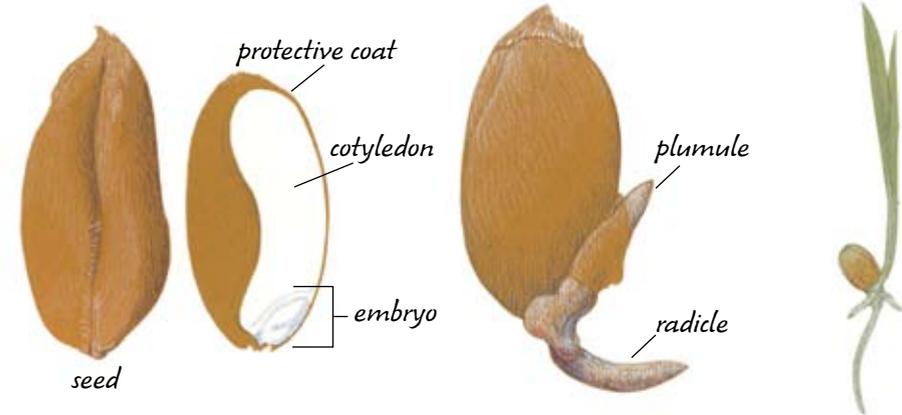
Angiosperms develop in sacs called *ovaries*. Some angiosperms sprout a single leaf. Scientists call these *monocots*. For example, a single blade of grass shoots straight up when the seed sprouts. Orchids, big bluestem grass, and other monocots also sprout one leaf. Angiosperms that sprout two leaves are called *dicots*. Raspberries and milkweeds are dicots.

Gymnosperms form seeds in cones or cups. Pines, junipers, spruces, and firs are all gymnosperms. In most, the seeds develop between the cone's individual scales. In a yew, the seeds develop in berrylike cups instead.

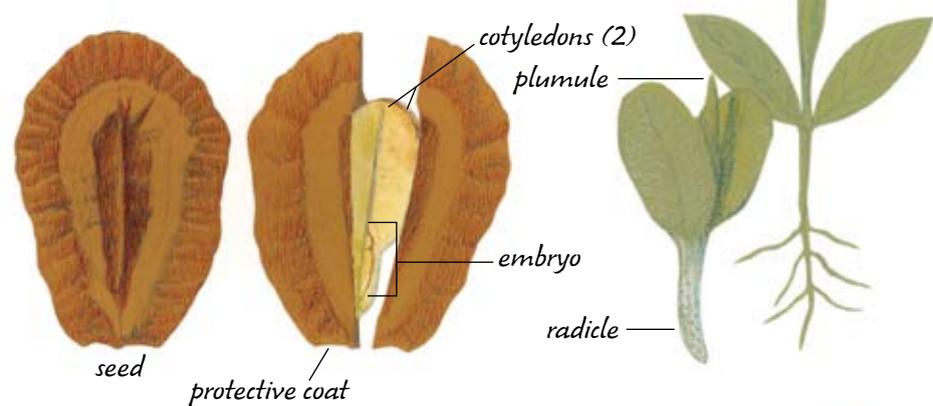
Small or large, a seed is packed with everything for a new life.

Angiosperms

Grass monocot

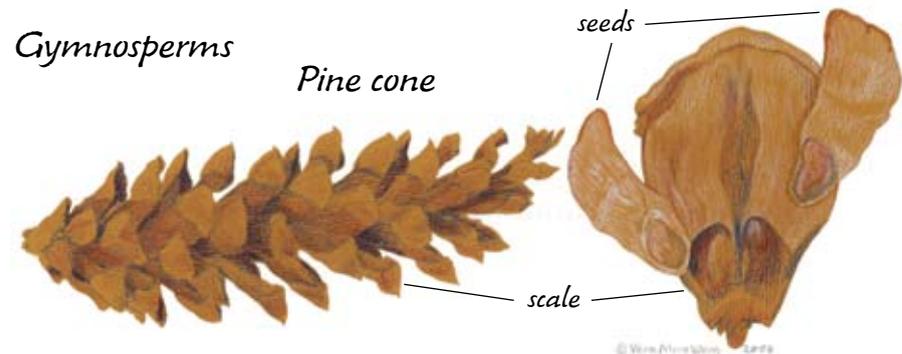


Milkweed dicot



Gymnosperms

Pine cone



Getting Around

The ground would get crowded if all of a plant's seeds sprouted beneath it. But that rarely happens. Plants have wonderful ways of moving their seeds to new places.

Wind. Some seeds soar through the air to a new home. Maple and pine seeds have flat, winglike blades. Seeds of dandelions, milkweeds, cottonwood trees, and many other plants have white fluff that catches on the wind.

Water. American elm seeds can float for miles after falling into a stream.

Carriers and buriers. Squirrels are famous for squirreling away acorns and other nuts in the fall for food later on. The nuts that last through the winter might sprout and become trees instead.

Plant power. In warm weather the seed pods of witch hazel, a forest shrub, burst open



and fling seeds far from the parent plant.

Dwarf mistletoe, which grows on evergreens, can shoot its seeds 20 feet at almost 60 miles per hour.

Animal insides. When birds, bears, or other animals eat fruit, they unknowingly move the seeds inside their bodies. The seeds end up in a pile of the animal's droppings in a new place. The droppings fertilize the new plant.

Animal outsides. Did you ever walk in a field or forest and

come back with seeds stuck to your socks? Some seeds have claws, spines, hooks, or other parts that cause them to cling to animals passing by. After falling off or being pulled off the animal, the seeds can sprout in a new place.

People power. We move seeds when we buy and plant them. Sometimes seeds get stuck in mud in our shoes or in bike tires, then end up in a new spot. If these seeds are from fast-spreading plants such as dandelions or garlic mustard that aren't native to Minnesota, they can crowd out native plants.



How many ways do seeds get carried away?

Sprouting Time

When ready to sprout, or *germinate*, a seed starts to absorb water. It swells up. The embryo sends hormones (called *gibberellins*) to the seed coat to signal proteins to start making other molecules that the new plant will need to live and grow.

The stored food begins to break down, providing energy to the embryo for growing. Soon a tiny root peeks through one end of the seed. A shoot rises through the other.

Just as Sleeping Beauty needed a kiss from a prince before she could wake up, some seeds need a cue from the outside world so they sprout when the world is good for growing, rather than in midwinter or during drought.

Hot and cold. Some seeds must be exposed to cold before they germinate. Wild rice seeds, for example, usually need time

in cold water. Seeds of false rue anemone, a woodland wildflower, need summer's heat to sprout.

All wet. Chemicals called *inhibitors* send the embryo of some seeds a message *not* to grow. When exposed to water, the inhibitors leach away (the way flavor disappears from bubble gum after you've been chewing it awhile) so the seed can sprout.

Right light. Some seeds need a period of darkness. Others need light to sprout.



Heat from fire pops open jack pine cones so they can release seeds to grow.

Rough stuff. Seeds with tough coverings might need roughing up—such as tumbling downstream and bumping into rocks, or freezing and thawing, to crack.

Fungus helpers. To sprout and grow, orchid seeds need certain fungi to supply water and nutrients.

Hot stuff. Jack pine cones need heat to open. Heat of a hot summer day can cause some cones to release seeds. But others can only open when a forest fire blazes. ●

A NOTE TO TEACHERS

Find teachers guides to this and other Young Naturalists stories online at www.dnr.state.mn.us/young_naturalists.

Fire can be a seed-helper.