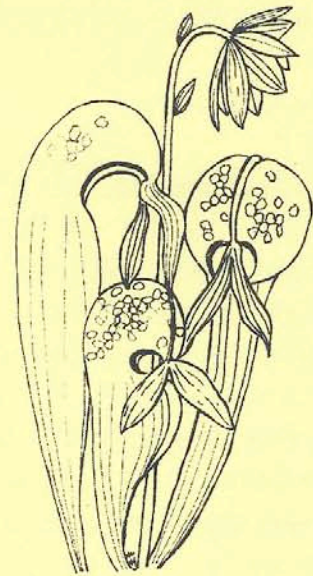
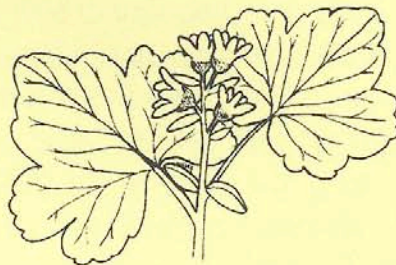
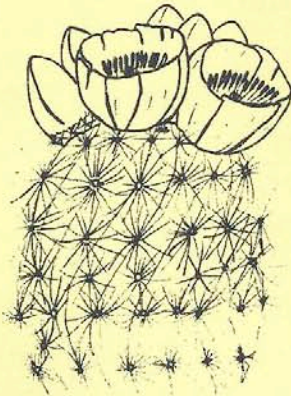
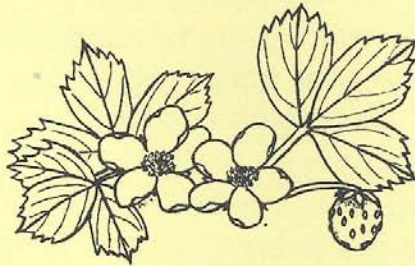
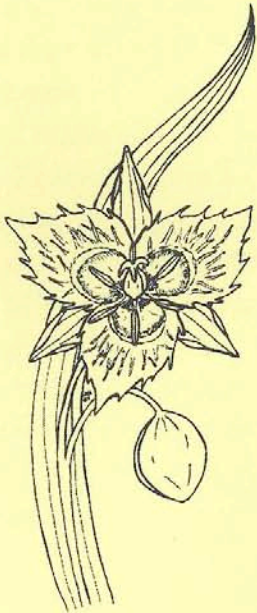


Celebrating Wildflowers



Plants and Pollinators Coloring Book



Plants and Pollinators Coloring Book

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Plight of the Pollinators

Bees, butterflies, bats, moths, beetles, hummingbirds. These are just a few of the animals that provide the essential services of pollination. Insects and plants evolved together and in many cases they are dependent upon each other. The animals receive food and nutrition from pollen and nectar of the plants, while the insects pollinate the plants. Pollination is a critical step for plants to produce fruits and seeds. The seeds will become the next generation of plants. Pollinators are declining around the world due to habitat destruction, pesticide use, and the introduction of non-native species. These factors affect the intricate relationship between plants and their pollinators. In some cases the decline of the insect pollinator can cause a decline in the plant population because the plant is not able to produce viable seed. The reverse is also possible if the insect depends solely on a plant whose population is declining. To conserve native plants it is crucial that we understand the complex relationship between plants and pollinators.

What is a Native Wildflower?

Over 3,000 species of plants are native to Colorado. They are an important part of the healthy, balanced ecosystems that developed over millions of years. They produce oxygen and filter the air we breathe and provide food and shelter for animals. In general, we consider a plant to be native if it occurs naturally in an ecosystem and is not there as the result of human activity. About 500 other plants in the Colorado **flora** were brought here for agriculture, gardening, or by accident. Plants that were introduced to Colorado are called non-natives or introduced species. Some of these plants invade native plant communities and harm the ecosystem. These plants are called weeds, exotics, or invasive species. Dandelions are a common weed in many lawns. If the dandelions are not controlled they could eventually ruin the whole lawn. Weeds can have the same effect on native plant communities; this is why it is important to stop weeds from spreading. Both native and introduced species can be considered “wildflowers”; this only means that the plant has showy flowers, fruits, or leaves. The goal of this coloring book is to focus on native wildflowers and the birds or insects that pollinate them. Without pollinators, many plants could not produce seeds and plant populations could dwindle and possibly become extinct. Pollination is a critical step in the survival of native plant communities and the survival of the many species that rely on the plants for food and shelter.

What Pollinates our Native Plants?

Most flowers rely on insects, birds, or the wind to help with the pollination of flowers. Pollination is the transfer of pollen from the male reproductive organs (**anthers**) to the female reproductive organ (**ovary**) of another flower. Plants cannot move, therefore they usually rely on pollinators or the wind to transport pollen between flowers. After a flower has been pollinated it can begin to produce fruits and seeds. Many flowers use color, shapes or patterns, strong fragrances, or nectar to attract specific pollinators to the flower, for example:

Moths are attracted to flowers with:

- white or pale coloration
- strong fragrances
- no landing platforms
- long, narrow tubes that contain nectar

Butterflies generally visit flowers with:

- vivid colors (pastels or bright reds)
- long, thin tubular flowers (butterflies have long tongues to reach inside such flowers)
- flowers that hang upside-down
- flowers clustered together

Beetles are attracted to flowers with:

- large bowl-shaped flowers (good resting places)
- no nectar (beetles eat pollen or the flower)
- strong scent (attracts the beetle to the flower)

Bees visit flowers with:

- blue or yellow colors
- patterns of lines, ridges, or contrasting colors which lead the bee to the nectar
- landing platforms
- sweet scents

Hummingbirds prefer flowers with the following characteristics:

- bright colors (red, orange, green)
- deep tubes that contain abundant nectar (hummingbirds have long beaks)
- no landing platform (hummingbirds hover)
- flowers that dangle (easy access while hovering near the flower)

Wind usually pollinates plants with:

- small, greenish flowers
- lacking petals and sepals
- stigmas that capture pollen from the wind

Parts of a Flower

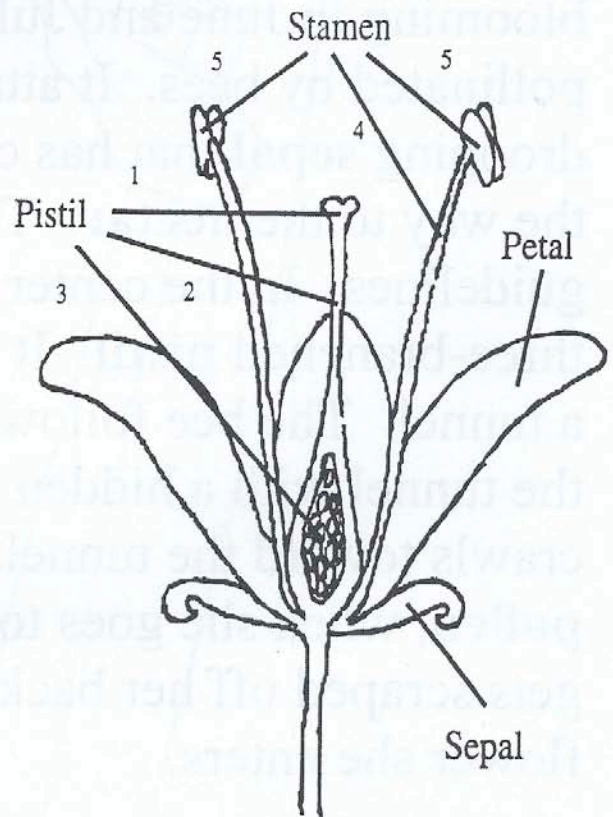
When you look at a plant, what do you see? Most plants have many different parts including roots, stems, leaves, flowers, and sometimes fruit. Being able to identify wildflowers is lots of fun and can teach you about the ecosystem. Have you ever wondered how to identify plants? Have you ever noticed how different a dandelion and a tulip are? To identify plants it is important to look closely at the flowers and know the different parts of a flower.

Did you know that nearly all flowers have the same parts, even though the shape and colors are different. The basic parts of a flower are: **sepals**, **petals**, **pistil**, and **stamens**. They are illustrated and described below.

Sepals are the outer most part of a flower. Usually they are greenish colored and look a little bit like a leaf, but some are colored and look like petals. They are a kind of modified leaf found on a flower and not on the stem. Sepals protect the petals, stamens, and pistil which are located inside them. All of the sepals together are called the **calyx**.

Petals are another type of modified leaf, but they are brightly colored and often very fragile. They are not a reproductive part of the flower, but they do help to protect the inner parts of the flower. The bright colors often attract pollinators. All of the petals on a flower are collectively called the **corolla**.

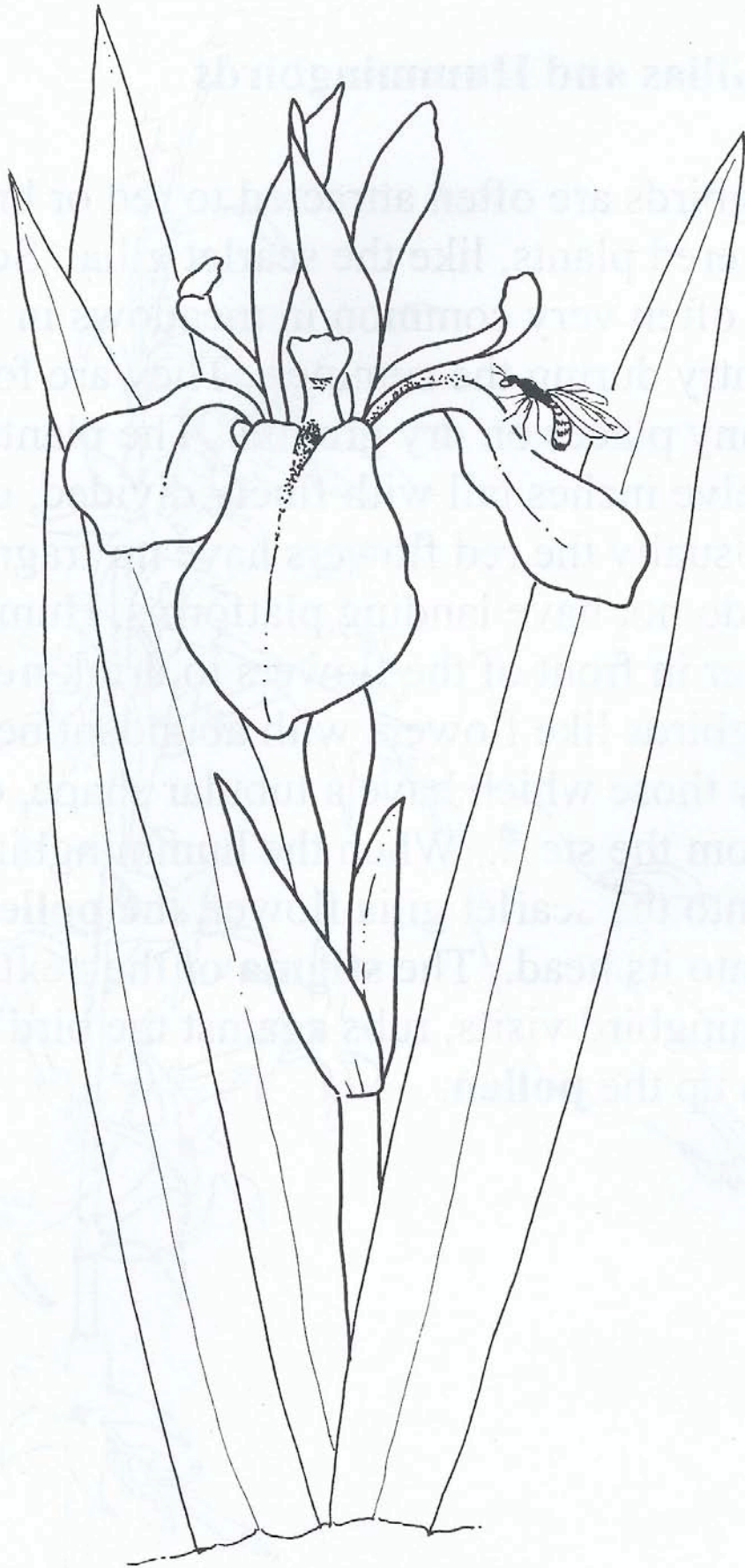
The **pistil** is the female reproductive part of the flower. It has three sections: stigma, style, and ovary. The stigma (1) is a sticky knob at the top of the pistil. The stigma catches pollen and connects to a stalk called the style (2). The lower, broad portion of the pistil is the ovary (3). It is where the ovules or future seeds develop.



Stamens are the male reproductive parts of the flower. A stamen consists of a long slender filament (4) that supports the anther (5). The anther contains the pollen and is often two lobed. The pollen in plants that are pollinated by insects is usually very sticky. Therefore, the pollen sticks to the insect until it is transported to another flower. Wind pollinated plants have light, smooth pollen that can be easily transported by the wind. These plants usually produce large quantities of pollen to increase the chances of the pollen reaching another flower.

Irises and Bees

Western Blue Flag is the wild iris that grows in Colorado. It is similar to the iris grown in gardens, but is usually smaller. It is common along stream banks and water sources in mountain meadows, blooming in June and July. Western blue flag is pollinated by bees. It attracts a bee with its large drooping **sepal** that has clear lines—a path leading the way to the **nectar**. These lines are called **nectar** guidelines. In the center of an iris flower is a large three-branched **pistil**. It curves over a **sepal** forming a tunnel. The bee follows the nectar guide through the tunnel with a hidden **stamen** on the roof. As she crawls toward the tunnel, her back gets covered with **pollen**, when she goes to another flower the **pollen** gets scraped off her back by the **stigma** of the next flower she enters.



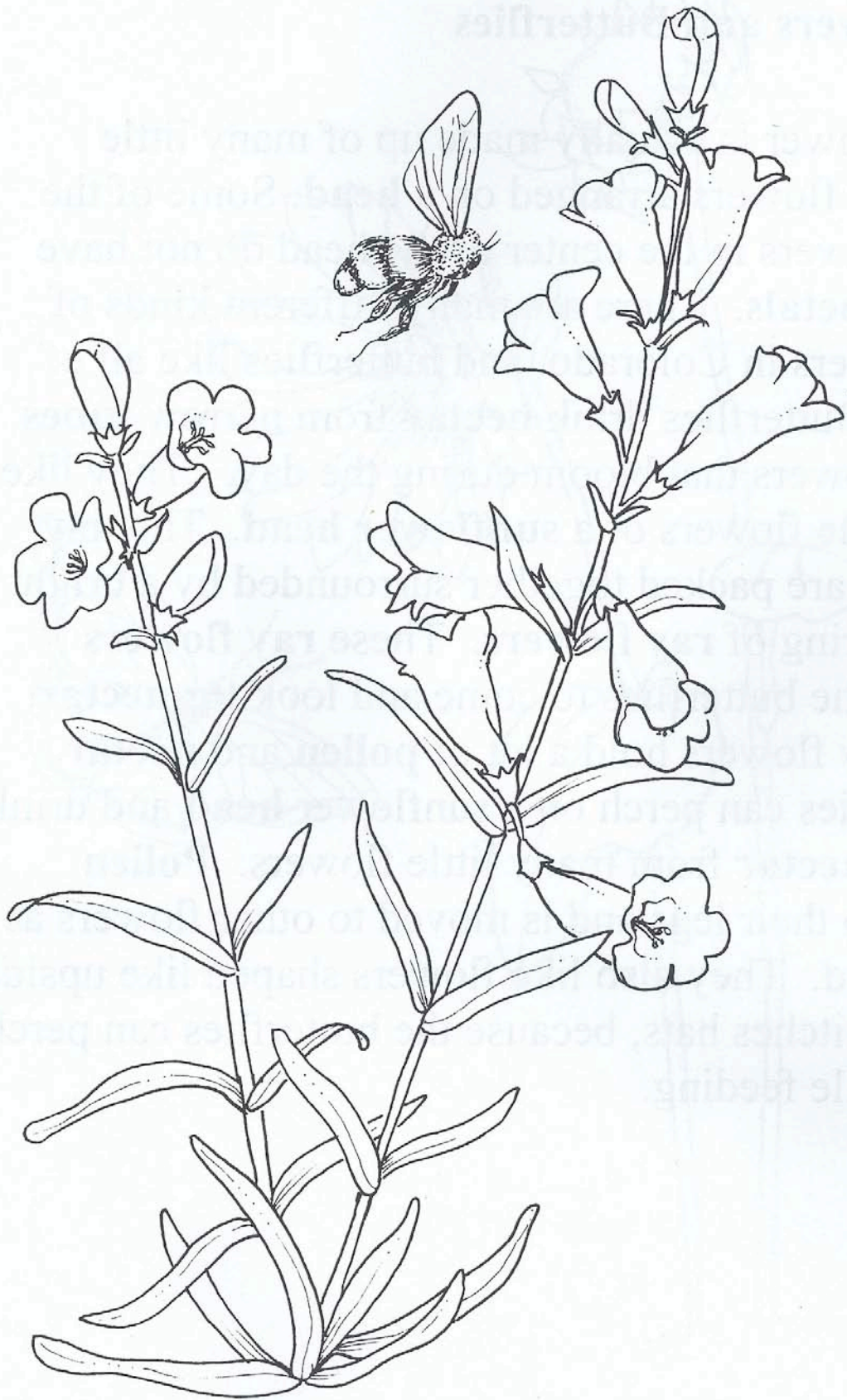
Scarlet Gilias and Hummingbirds

Hummingbirds are often attracted to red or bright pink flowered plants, like the scarlet gilia. Scarlet gilies are often very common in meadows in the high country during the summer. They are found in open, sunny places on dry ground. The plants are about twelve inches tall with finely divided, delicate, leaves. Usually the red flowers have no fragrance and they do not have landing platforms. Hummingbirds hover in front of the flowers to drink **nectar**. Hummingbirds like flowers with abundant nectar, especially those which have a tubular shape, or dangle from the stem. When the hummingbird puts its beak into the scarlet gilia flower, the **pollen** is rubbed onto its head. The **stigma** of the next flower the hummingbird visits, rubs against the bird's head and picks up the **pollen**.



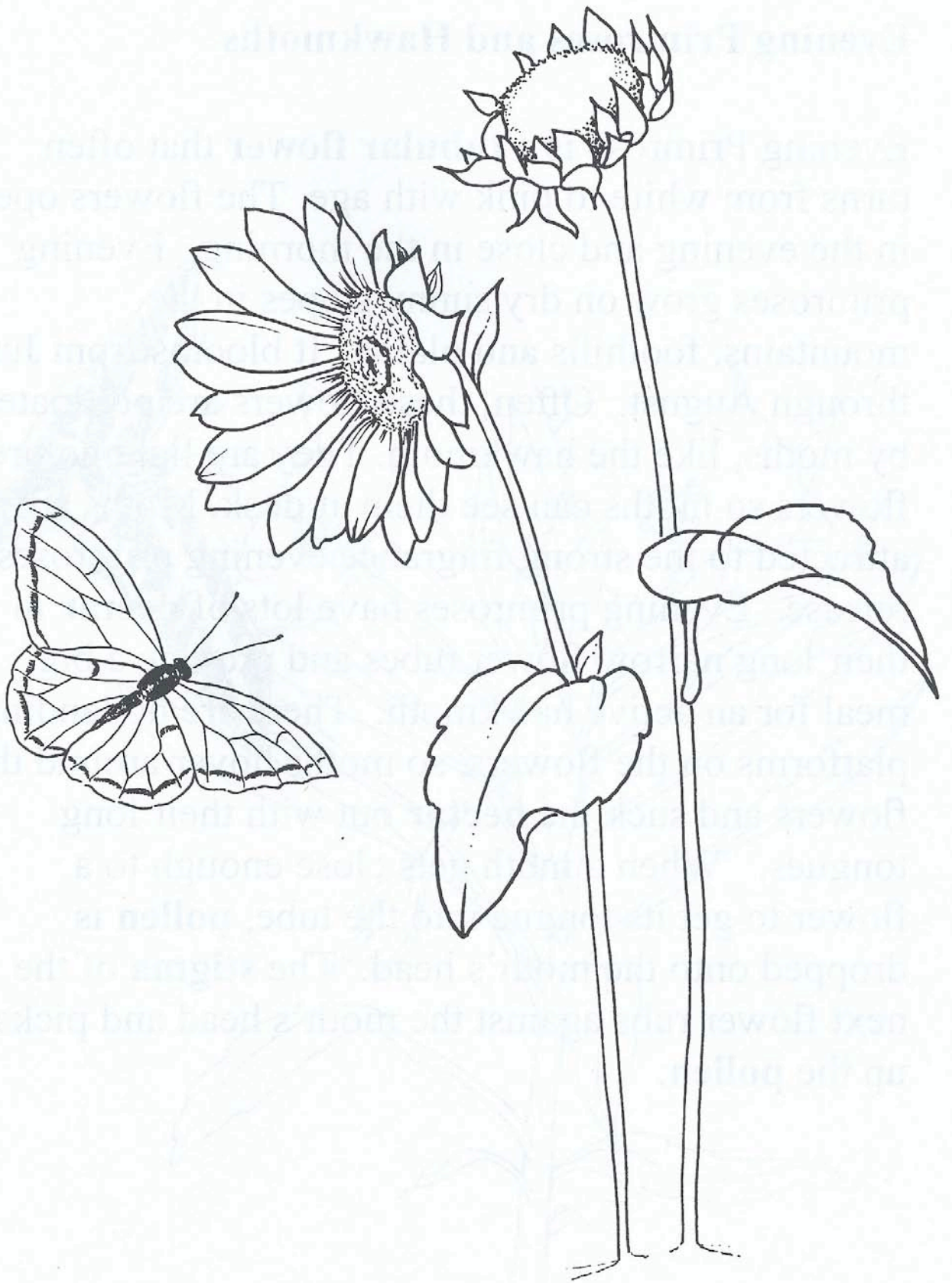
Bumblebees and Penstemons

There are many different penstemons in Colorado. Some are very common and can be found in large patches. A few are very rare. One of our Colorado penstemons is listed under the Endangered Species Act and is protected by the Bureau of Land Management on its public land in the Kremmling area. Penstemons usually have beautiful blue flowers that bumble bees frequent. Bumble bees like flowers with blue or yellow colors and they like a landing platform with patterns of lines, colors, or ridges that lead them to the **nectar**. Some penstemons have both blue color and nectar guides. Bumble bees also like a sweet fragrance. Bumble bees drink **nectar** and carry **pollen** on their legs like honey bees. Bumble bees can push their bodies into tightly closed flowers and their tongues can go deep into the flowers. This helps the pollen to be transferred to another flower and pollination to occur.



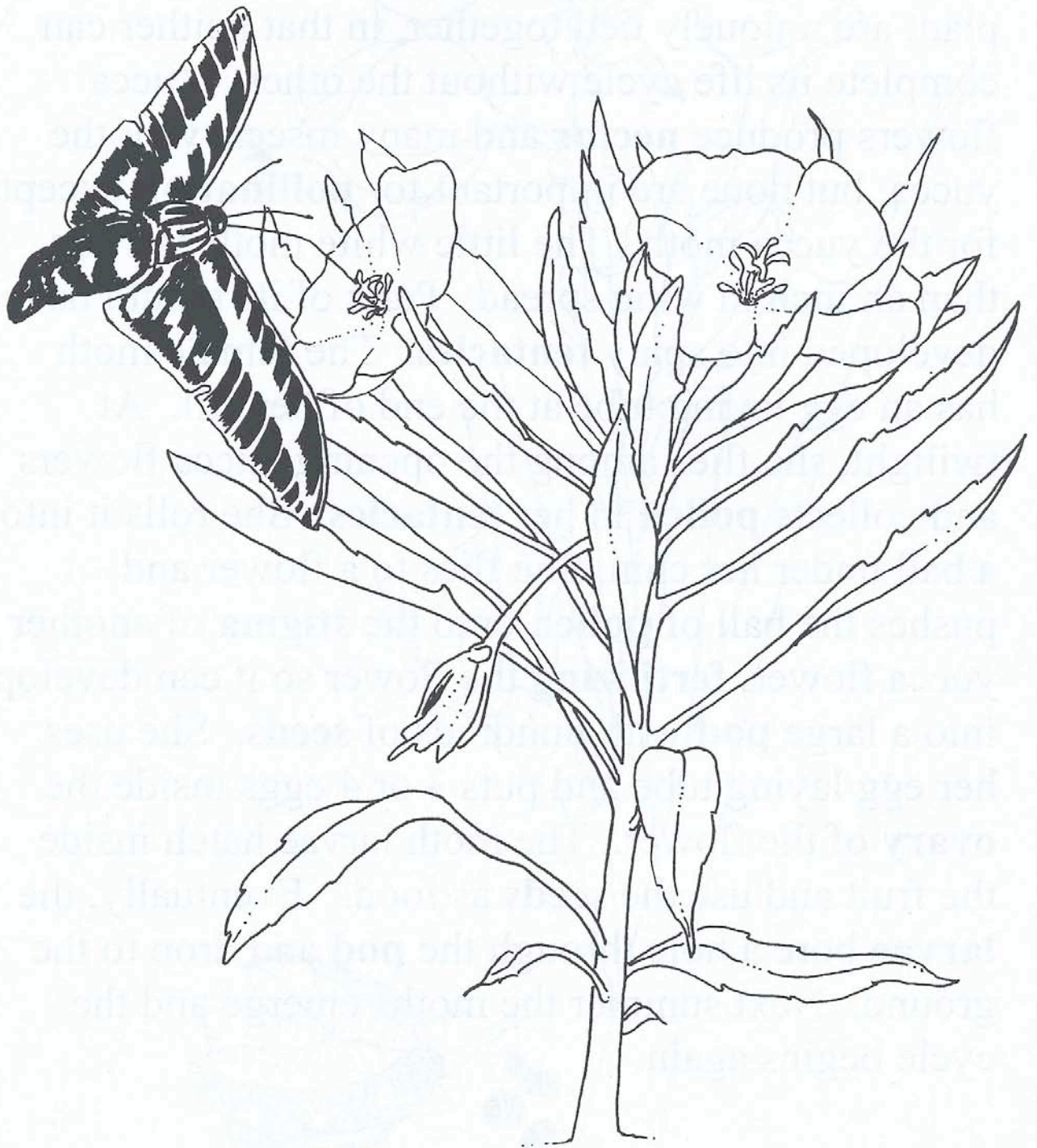
Sunflowers and Butterflies

A sunflower is actually made up of many little **tubular** flowers arranged on a **head**. Some of the little flowers in the center of the head do not have showy **petals**. There are many different kinds of sunflowers in Colorado, and butterflies like all of them! Butterflies drink **nectar** from narrow **tubes** from flowers that bloom during the day. They like the single flowers of a **sunflower head**. The tiny flowers are packed together surrounded by a bright yellow ring of **ray flowers**. These **ray flowers** attract the butterflies to come and look for **nectar**. The tiny flowers hold a lot of **pollen** and **nectar**. Butterflies can perch on a sunflower **head** and drink lots of **nectar** from many little flowers. **Pollen** sticks to their legs and is moved to other flowers as they feed. They also like flowers shaped like upside down witches hats, because the butterflies can perch and while feeding.



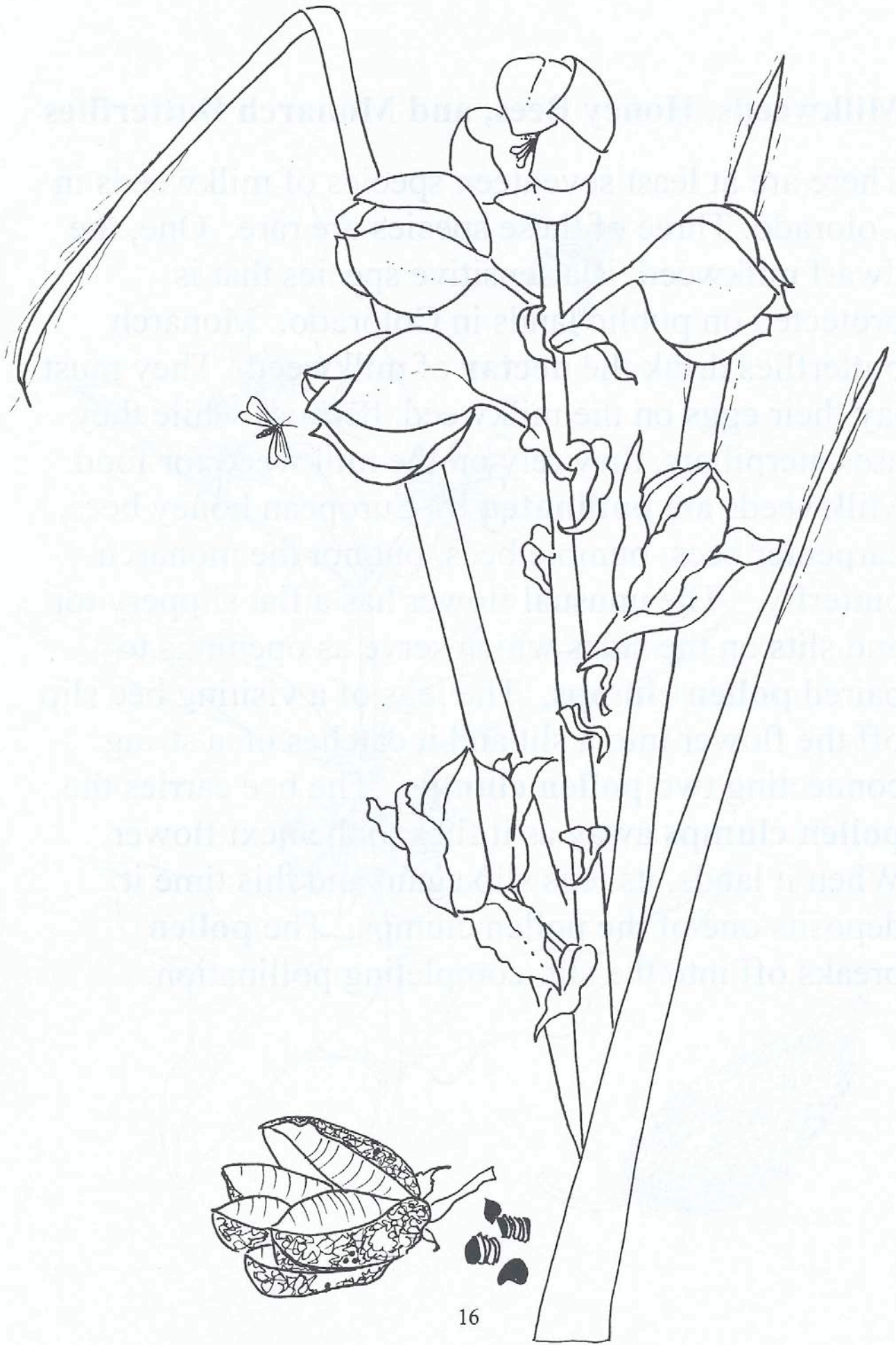
Evening Primroses and Hawkmoths

Evening Primrose is a **tubular flower** that often turns from white to pink with age. The flowers open in the evening and close in the morning. Evening primroses grow on dry sunny slopes in the mountains, foothills and plains. It blooms from June through August. Often, these flowers are pollinated by moths, like the hawkmoth. They are light colored flowers so moths can see them at dusk. Moths are attracted to the strong fragrance evening primroses release. Evening primroses have lots of **nectar** in their long narrow flower tubes and provide a big meal for an active hawkmoth. There are no landing platforms on the flowers, so moths hover around the flowers and suck the **nectar** out with their long tongues. When a moth gets close enough to a flower to get its tongue into the tube, **pollen** is dropped onto the moth's head. The **stigma** of the next flower rubs against the moth's head and picks up the **pollen**.



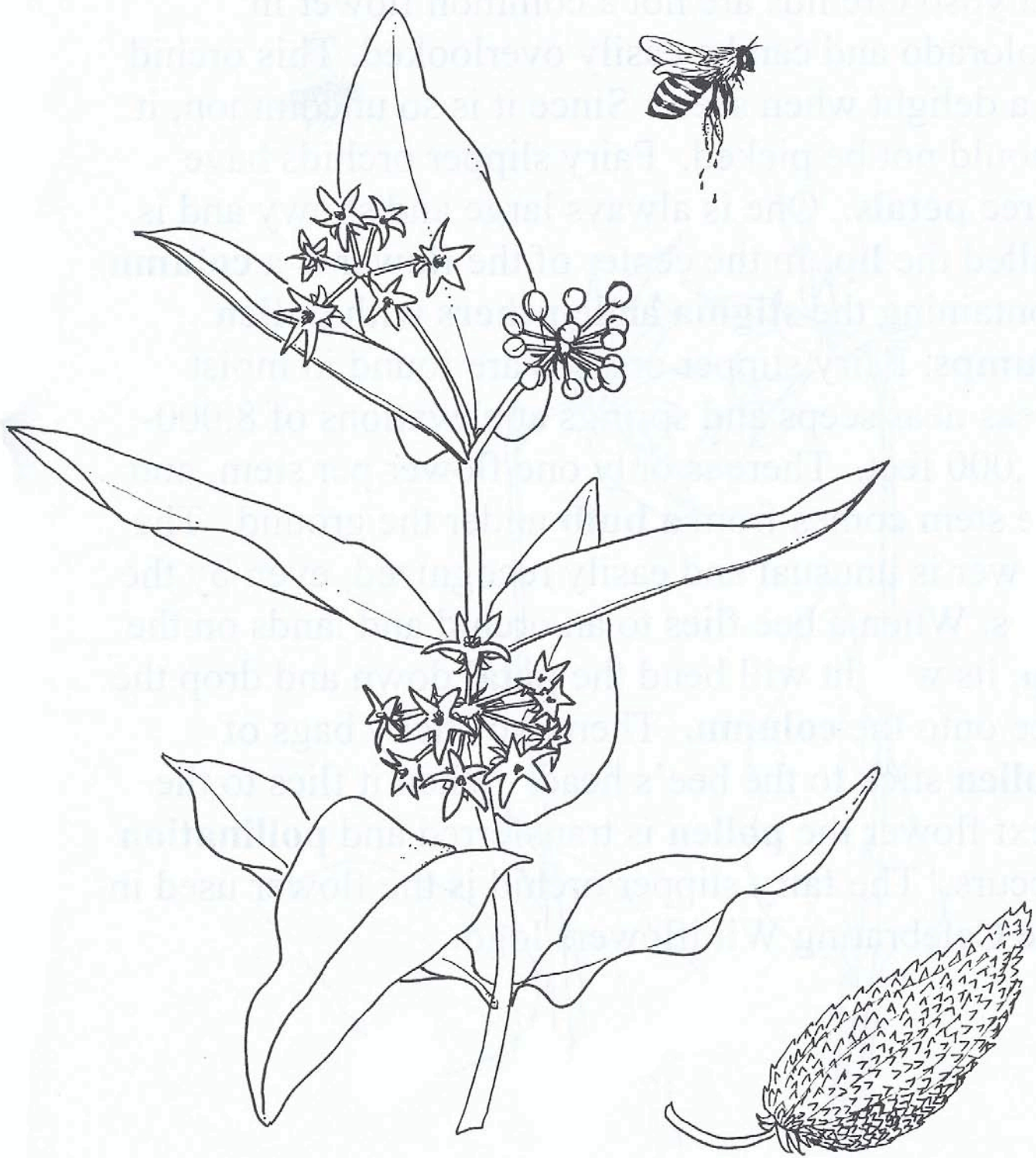
Yuccas and Yucca Moths

Yucca plants are found throughout the west. Native Americans used yucca leaves to make baskets and the roots to make soap. The yucca moth and yucca plant are uniquely tied together, in that neither can complete its life cycle without the other. Yucca flowers produce **nectar** and many insects visit the yucca, but none are important for **pollination** except for the yucca moth. The little white moth has less than an inch in wing spread. Parts of its mouth have developed into spiny **tentacles**. The female moth has an egg laying tube at the end of her tail. At twilight, she flies among the opening yucca flowers and collects **pollen** in her **tentacles**. She rolls it into a ball under her chin. She flies to a flower and pushes the ball of **pollen** onto the **stigma** of another yucca flower, **fertilizing** the flower so it can develop into a large **pod** with hundreds of **seeds**. She uses her egg laying tube and puts 3 or 4 eggs inside the **ovary** of the flower. The moth larvae hatch inside the fruit and use the **seeds** as food. Eventually, the **larvae** bore a hole through the **pod** and drop to the ground. Next summer the moths emerge and the cycle begins again.



Milkweeds, Honey Bees, and Monarch Butterflies

There are at least seventeen species of milkweeds in Colorado. Three of these species are rare. One, the dwarf milkweed, is a sensitive species that is protected on public lands in Colorado. Monarch butterflies drink the **nectar** of milkweed. They must lay their **eggs** on the milkweed, because while they are caterpillars, they rely on the milkweed for food. Milkweeds are **pollinated** by European honey bees, carpenter bees, bumble bees, but not the monarch butterfly. The unusual flower has a flat slippery top and slits on the sides which serve as openings to paired **pollen clumps**. The legs of a visiting bee slip off the flower into a slit and it catches on a string connecting two **pollen clumps**. The bee carries the **pollen clumps** away as it flies to the next flower. When it lands, its legs slip again and this time it deposits one of the pollen clumps. The **pollen** breaks off into the slit, completing pollination.



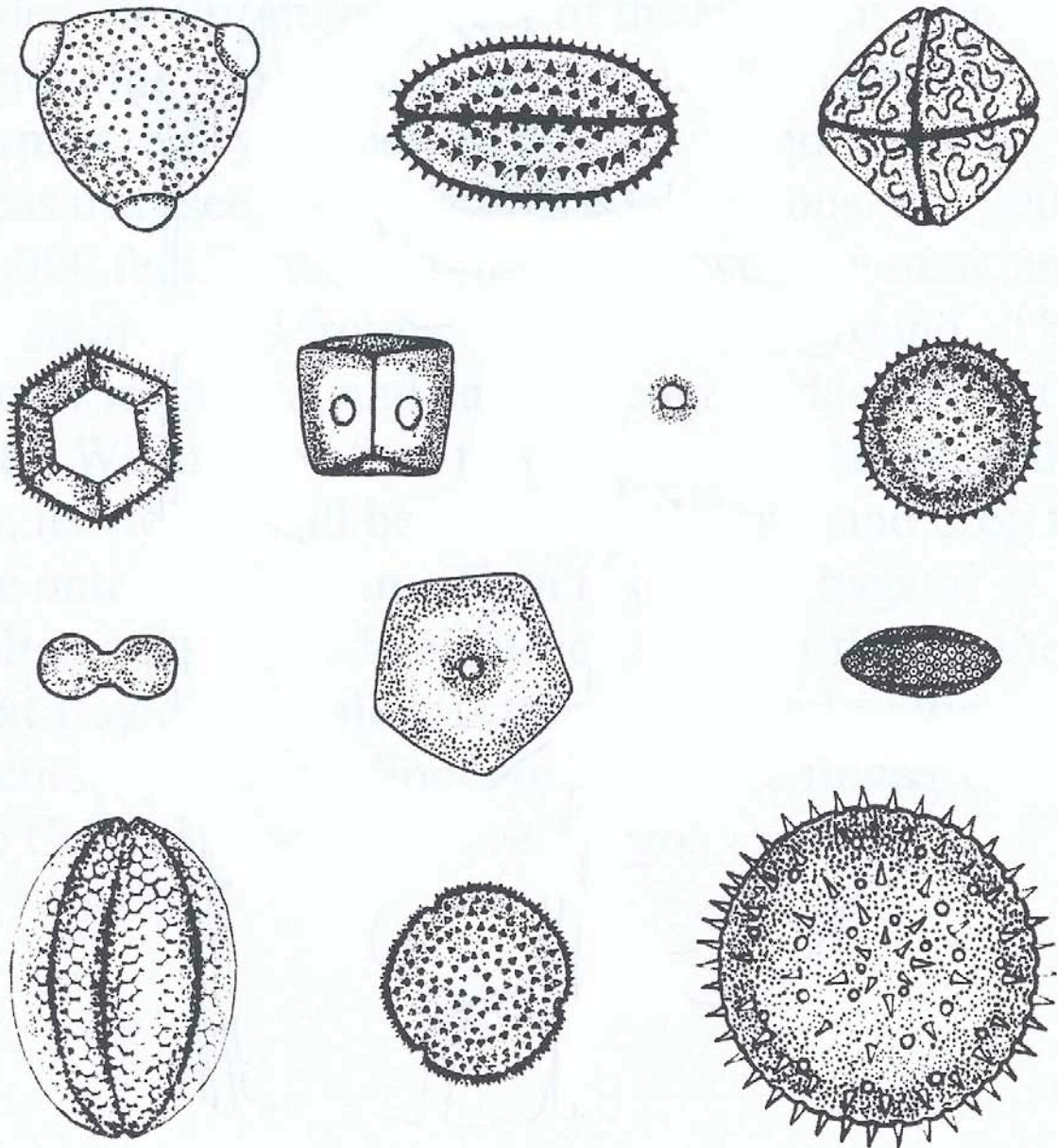
Calypso Orchids and Bees

Calypso Orchids are not a common flower in Colorado and can be easily overlooked. This orchid is a delight when seen! Since it is so uncommon, it should not be picked. Fairy slipper orchids have three **petals**. One is always large and showy and is called the **lip**. In the center of the flower is a **column** containing the **stigma** and **anthers** with **pollen clumps**. Fairy slipper orchids are found in moist areas near seeps and springs at elevations of 8,000-10,000 feet. There is only one flower per stem, and the stem comes from a **bulb** under the ground. The flower is unusual and easily recognized, even by the bees. When a bee flies to an orchid and lands on the **lip**, its weight will bend the **petal** down and drop the bee onto the **column**. Then two sticky bags of **pollen** stick to the bee's head. When it flies to the next flower the **pollen** is transferred and **pollination** occurs. The fairy slipper orchid is the flower used in the Celebrating Wildflowers logo.



What Does Pollen Look Like?

Pollen grains are diverse in form and size. The illustrations below show some of the exotic shapes that pollen comes in. A tiny pinch of pollen will contain millions and millions of pollen grains. Pollen is tiny reproductive cells that are released from the **anthers** of a flower. They transport the male reproductive cells to the female part of the flower (**ovary**), this allows the flower to be **fertilized** and produce **seeds**. Some **pollinators** use pollen as a food source, while others move the pollen between plants accidentally. Wind often transports the tiny pollen grains between flowers, especially in grasses.



Celebrating Wildflowers

The third week of May is National Wildflower Week. It is the kickoff for a year-long season of celebrating wildflowers and native plants. National Wildflower Week is an annual event sponsored by many federal agencies and the partners in the Plant Conservation Alliance. This event promotes the importance of conserving and managing native plants and plant communities in America. More than 630 million acres of public lands managed by the Bureau of Land Management, the U.S. Forest Service, the National Park Service and the U.S. Fish and Wildlife Service are habitat for America's wildflowers. We encourage you to explore these lands, delight in the native flora and help to protect our wildflowers.

To find out more about Celebrating Wildflowers, call the National Wildflower hotline (1-800-354-4595) anytime from April through August. The hotline is updated weekly with current events and locations with spectacular blooming wildflowers. Please visit Celebrating Wildflowers on the Plant Conservation Alliance web page (www.nps.gov/plants/cw) or the Colorado Bureau of Land Management (www.co.blm.gov/botany/botanyhome.htm). These sites have information concerning wildflower events, native plants, noxious weeds, and links to conservation organizations throughout the country.

The 2000 Wildflower Coloring Book
is presented by:

Carol Dawson – Denver Botanic Gardens
Carol Spurrier – Bureau of Land Management
Andrew Kratz – U.S. Forest Service
Thomas Grant – Denver Botanic Gardens

Drawings by:

Susan Elmblad Rubin

Dedication:

This coloring book is dedicated to the tireless work of millions and millions of insects that make pollination possible for so many plants!!!!

Celebrating Wildflowers
www.nps.gov/plants/cw