



4-H Beekeeping

Division I

Understanding the Honey Bee

Year in Project: _____

Date Started in Beekeeping I: _____

Name: _____

Club: _____

County: _____



4-H Beekeeping, Division I: Understanding the Honey Bee

Note to Parents and Volunteer Leaders:

The 4-H Beekeeping Project helps youth learn about bees and how to be a beekeeper.

Beekeeping offers many hands-on educational experiences, from learning about bees and nectar to learning to raise bees and produce honey.

The 4-H Beekeeping Project is divided into three divisions. *Division I, Understanding the Honey Bee*, covers information on the basic facts of beekeeping: the types of bees, the honey and wax they produce, the plants that attract bees, and the equipment a beekeeper needs. In the first year, youth are not required to have any bees, but prepare to take care of a honey bee colony of their own. In *Division II, Working with Honey Bees*, youth acquire a colony of bees and learn how to care for their beehive throughout the year. This will include basic beekeeping operations that result in the production of extracted, chunk, or cut comb honey. When the youth are experienced and knowledgeable in the basic care of a beehive, they should move on to *Division III, Advanced Beekeeping Methods*. The advanced topics include: increasing the number of your honey bee colonies, increasing honey production, producing special kinds of honey, learning more about the bee societies, and how to manage honey bee diseases and parasites.

The learning experiences have been planned as “experience-centered” activities. Youth are encouraged to take responsibility for their beekeeping projects. They can enhance their learning by consulting resources on the Internet, at school, and at the library, or by talking to someone who raises bees. Youth are encouraged to have an experienced beekeeper as a mentor.



Experiential learning distinguishes 4-H youth development education from many formal educational methods. Activities are designed so youth experience a learning activity, reflect on what they did (explore the meaning of the activity), generalize what they learned (to test comprehension and appreciation of the activity), and then think about how they can apply what they learned to other situations (generalize). You can help guide youth as they explore each activity by discussing each section.

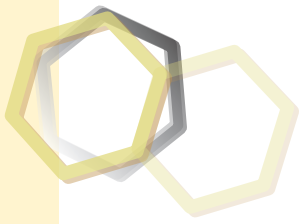
Purpose

Division I Beekeeping is intended to help youth learn:

- about the types of bees, honey, and wax they produce;
- about the plants that attract bees;
- about the equipment that a beekeeper needs;
- how to compile beekeeping records;
- how to present the results of their work to others;
- how to develop inquiring minds—the habit of asking questions and searching for answers.

Purdue University staff who contributed to this publication:

- Natalie Carroll and Greg Hunt.
- Reviewers Tom Turpin and Larry Segerlind



Understanding the Honey Bee

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Beginning Beekeeping

A master beekeeper who worked with honey bees for more than 50 years often said, “Every time I look into a beehive, I learn something new about the bees, and I see another reason why I like the bees so much.” This 4-H Beekeeping Project will help you learn about bees and how to be a beekeeper. It will not turn you into a “master” beekeeper, but it will help you get started.

Selecting an Advisor

The only experience most people have had with bees is stepping on one when running barefoot through the grass. You know, of course, that there is much more to bees than stings, or you would not be taking this project. However, the “bee in the grass” experience should have taught you a fact about honey bees: they will sting if they think they are in danger.

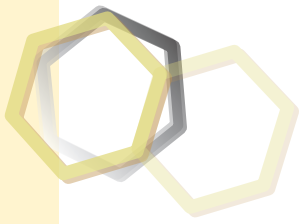
Actual experience is the best way to learn about bees. An experienced beekeeper is your best source of information about honey bees. In fact, it is almost impossible to start working with honey bees without the advice of a helpful beekeeper. Plan to watch and study a beekeeper (job shadowing) taking care of his or her hives. The more you see, the more you will understand. Ask questions. Do not be worried if the amount you have to learn seems overwhelming. There is a lot to learn, but you have time to learn it all. Beekeeping can be a lifetime vocation and hobby. You may find it helpful to purchase a journal to keep notes about what you are learning. Then you can refer back to the journal when you are not with the beekeeper and in future years. You can also use your journal to write questions that you think of so you will remember to ask them the next time you are working with the beekeeper. You can help repay the beekeeper for sharing their time and expertise with you by offering your help with the many tasks involved in beekeeping.

If you don’t already know a beekeeper, your county Extension educator may know beekeepers who live in your county or nearby and who are interested in helping you with this project. The Purdue Extension bee specialist and the Indiana beekeeping associations are also interested in helping young people get started in beekeeping. See the Resources section of this manual for contacts.

It is a good idea to learn what you can about bees before you meet your beekeeping advisor. This will help you know what questions to begin asking. You need a basic understanding of bees and their activities so you will know what your advisor is talking about and showing you.

Try to read this manual (*Understanding the Honey Bee*) and complete the questions before you meet with your advisor. The 4-H manuals give you a little information about bees and beekeeping, but you will need other resources to answer the questions in the manuals. Most of the answers to these questions are in the book *The New Starting Right with Bees* (21st Edition). This book is an excellent investment for the beginning beekeeper. You will use it in all divisions of your 4-H Beekeeping Project, and it will be useful as long as you are a beekeeper. (Ordering information for this book is in the References section at the end of this manual.) Find information about beekeeping from beekeeping journals, at your local library, or on the Internet. If you are interested in learning more about beekeeping we recommend that you take a subscription to either the *American Bee Journal* (<http://www.dadant.com/journal/> - **phone**: 217-847-3324) or *Bee Culture* (www.beeculture.com). Both are excellent journals that will teach you a lot about beekeeping.

Some of the questions in this manual are more difficult than others. You may not be able to answer all of them until you have more experience in beekeeping. Try to answer the questions, then discuss the more difficult ones with your advisor.



History of Beekeeping

The Native Americans who lived in America prior to 1500 had never tasted honey. This was because only people in Europe, Asia, and Africa had honey bees. There were no honey bees in this country until they were brought here by boat in the sixteenth century, about 50 years after Columbus first sighted America.

Throughout history, there has always been a close relationship between honey bees and people. Drawings on rocks found in Spain that date back 9,000 years show women taking honey from wild bee colonies. Early people took honey from hollow trees full of bees that they found in the forests. In the autumn, these early “bee-hunters” would kill or chase the bees away from their log homes so they could take all of the honey. Honey was very important, because at that time people had no other source of concentrated sugar. As humans learned more about bees, they built beehives of clay pots, straw baskets, and wooden boxes. They wanted to find ways of controlling their bees so that the colonies could survive from year to year and still produce enough honey for the needs of the beekeepers.

In the sixteenth century, scientists began studying the habits of honey bees, hoping to find new ways to control them.

However, it was not until 1851 that beekeeping became a modern science. In that year, an American minister, Lorenzo Lorraine Langstroth, discovered the importance of “bee space.” Bee space is an open space of about $\frac{3}{8}$ inch that the bees leave between their honeycombs so that they have room to move and work. Based on the “bee space” idea, Langstroth built the first modern beehive with frames of combs that could be easily removed from a wooden box. His invention led to many improvements in beekeeping equipment. Today, beekeeping is more successful than it was before Langstroth’s movable-frame hive, because the entire hive can be inspected and manipulated.



The Value of Honey Bees

Honey bees are valuable. They contribute to the success of American agriculture and industry. You probably already know one use of honey: as a delicious sweetener on biscuits, bread, and rolls. Honey also has several other uses that make it a very important product of American agriculture. It is a main ingredient used in the baking and candy industries. Athletes may use honey for quick energy. In the medical profession, honey has been used for its antiseptic qualities in burn ointments and in the preparation of medicines. Throughout history, honey has been used in the production of wines. Honey wine—meade—is still a very popular drink in many parts of the world.

Beeswax, another product of the honey bee, also has many important uses. The cosmetic industry uses beeswax in the preparation of products such as cold creams, lotions, rouges, and lipsticks. Beeswax is a basic ingredient in many candles. Manufacturers of pharmaceuticals include beeswax in many preparations of salves and ointments. Dentists use it for impression wax. Foundries need it for molds in precision casting. Beeswax is an ingredient in many types of polishes for floors, furniture, and shoes. Other uses include adhesives, crayons, chewing gum, inks, basketball moldings, ski wax, thread wax, ironing wax, and archer's bow wax.

If there were no honey bees in this country, American farmers could not produce nearly enough of some of your favorite foods, such as apples, peaches, almonds, and watermelons. This is because many plants must be pollinated to produce fruit. Pollen grains must be transferred from the male parts of the flowers to the female parts to make a seed. Honey bees do this by pollinating flowers. In fact, honey bees do 80 percent of all crop pollination.

There are several reasons why honey bees are such excellent pollinators. First, they are very hard workers. An individual bee may visit as many as a thousand flowers in one day. During these flower visits, the large, hairy bodies of the bees easily pick up and hold many tiny pollen grains. Second, bees visit only one type of flower on a particular trip. Third, beehives can be moved easily into areas where flowers need to be pollinated. Because of these special bee qualities, American crop producers rent millions of colonies honey bees each year to pollinate their crops.



Read Chapter I, “Suddenly You’re a Beekeeper” in *The New Starting Right with Bees*. Then answer these questions:

What basic steps should you follow to keep an unexpected swarm?

Briefly describe the nine “Directions for Hiving Your Package.”

1. _____

2. _____

3. _____

4. _____

5. _____

6. _____

7. _____

8. _____

9. _____

These crops must be pollinated by bees to produce food yields:

- | | |
|-------------------|-------------------|
| Almonds | Blackberry |
| Apple | Cantaloupe |
| Blueberry | Clover |
| Cherry | Pear |
| Cucumber | Plum |
| Peach | Raspberry |
| Persimmon | Squash |
| Pumpkin | |
| Watermelon | |

These crops have higher yields if the honeybee visits them:

- | | |
|-------------------|----------------|
| Eggplant | Grape |
| Lima Bean | Okra |
| Pepper | Soybean |
| Strawberry | |



Bee Stings

A basic part of beekeeping is understanding and accepting the fact that you are going to be stung from time to time. No matter how good a beekeeper you become, occasionally you will accidentally crush a bee. You may visit the hives when the bees are disturbed by a change in the weather, by hunger, or by something else beyond your control. As a result, you may be stung.

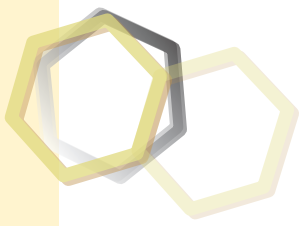
A few people have serious reactions to bee stings. They may have difficulty breathing after being stung or have some other very dangerous reaction. If you are ever with a person who is severely allergic to a sting, take them to a doctor immediately. It is very unusual for a person to have such a bad reaction to stings. For most people, the sting of the bee is a momentary discomfort that says to slow down, be more careful, or in some way, show greater respect for those honey bees. Do not open a hive alone until you know your reactions to bee stings. If you are highly allergic to stings, you should be particularly careful when working with bees and you should go see an allergist before you consider continuing with this project.

The experienced beekeeper knows what to expect when they get stung and what to do to reduce the bad effects of the sting. You don't need to be afraid of the honey bee sting. A sting always hurts. Whether it is a first sting or the thousandth, it will hurt, but not too much. A bee sting is like getting a shot from the doctor; it will hurt for 20 seconds or so, then the pain fades away.

The beekeeper knows that only the worker bee stings. Her stinger is barbed, like a fish hook. When she pushes her stinger into your skin, it catches and pulls out of her body as she flies quickly away, causing her to die soon after. What she leaves in your skin is the barbed stinger attached to a poison sac. Often part of the bee's intestine is still attached to the stinger in your skin.

You can scrape the stinger off the skin using a fingernail or hive tool. Then puff smoke from a smoker or rub dirt on the area of the sting. This covers the smell of the sting so other bees won't be disturbed.

The experienced beekeeper also knows that swelling will probably develop around the spot where the sting was and may last a day or so. Although an ice treatment may reduce the swelling, there is really not much to do for it, except to get stung again! It seems that the more a beekeeper is stung, the less of a swelling reaction will result. So, there is some good in being stung; it will not be so bad when you are stung again.

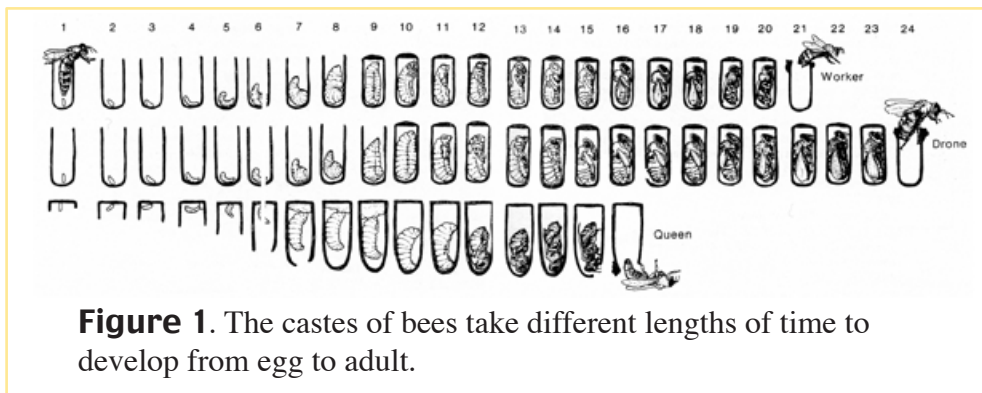


The Castes of Honey Bees

There are three types (castes) of honey bees in every colony:

- Worker bees
- Drone bees
- A queen bee

These bees each take a different length of time to develop from the egg to the adult stage (see Figure 1).

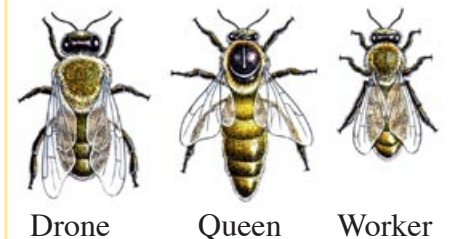


The drone bee is the largest and the worker bee is the smallest (Figure 2).

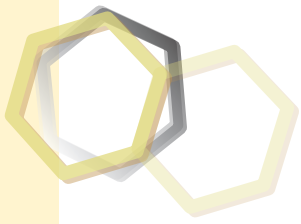
Read Chapter IV, “Getting to Know Your Bees,” in *The New Starting Right with Bees* to learn about the kinds of honey bees.

Describe the queen and tell how her body shape, wing size, and stinger are important to her work. What do you find most interesting about the queen bee?

Figure 2. Three kinds of bees in a hive (drone, queen, worker).



It usually takes _____ days to develop a queen from the egg to the adult stage. She will remain a virgin queen for about _____ days. Within _____ or _____ days after mating, the queen begins to lay eggs. Unfertilized eggs become drones. Fertilized eggs become worker bees.



What is a drone and what does it do?

List the duties of the worker bees.

Why do some worker bees live to be six months old, and others die after only six weeks?

What are foragers and what do they do?

How is honey made from nectar? (Explain briefly.)
