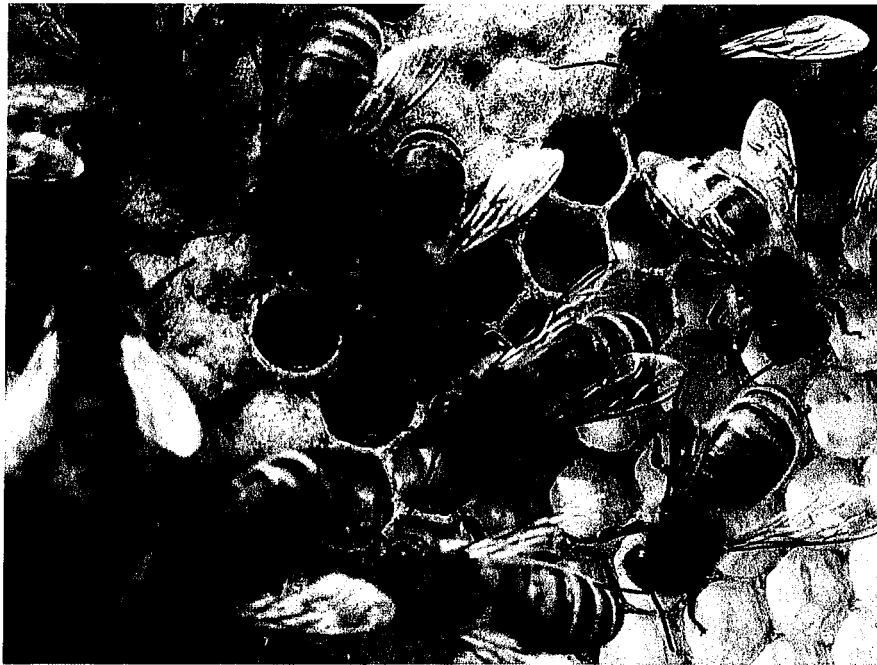


UC
CE

Beekeeping



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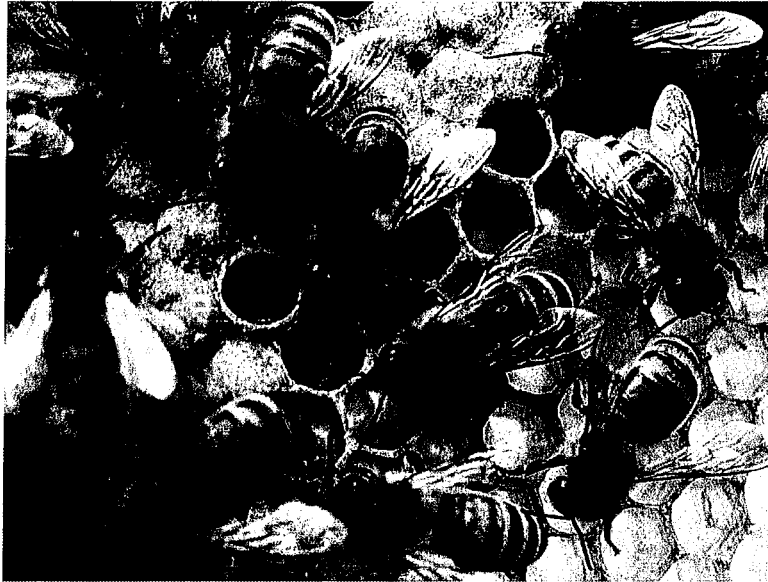
BEEKEEPING

BINGO

Find someone who can sign a square acknowledging that they have done that or know the answer

Can name what a brood frame is	Has ever built a bee hive	Has built a frame using a jig	Has made a candle using bees wax
Can name two types of bees in the hive	Can name two of the beekeepers main tools	Can name two types of honey	Is allergic to bees and or bee stings
Knows what a worker bee does	Has ever collected honey from a bee	Knows the benefits of honey	Has ever purchased locally produced honey
Has ever visited an apiary	Can name three things a honeybee provides	Participated in National Honey Bee Day	Has ever collected bees for a hive

Depending on the size of group, limit the number of times a person can sign on the same sheet



This We Believe:

- The boy and girl are more important than the projects.
- The member should be their own best product.
- No award is worth sacrificing the reputation of a member or leader.
- Competition is a natural human trait and should be recognized as such. It should be given no more emphasis than other fundamentals.
- Learning how to do the project is more important than the project itself.
- Many things are caught rather than taught.
- A blue ribbon member with a red ribbon project is more desirable than a red ribbon member with a blue ribbon project.
- To learn by doing is fundamental in any sound educational program.
- Generally speaking, there is more than one good way of doing most things.
- Every member needs to be noticed, to feel important, to win, and to be praised.
- Our job is to teach members *how* to think, not what to think.



Learn More

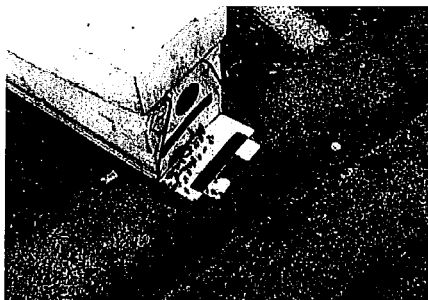
Home
Bee Facts
Activities
Record Keeping
Honey Harvest
More Sites
Crafts
Queen Rearing
Observation Hives
Recipes
Wax Moths
Rescuing a Colony
Top Bar Hives
Save the Bees

Children are naturally curious about bees and ask lots of questions. I hope these questions and answers are helpful and lead to even more curiosity about our wonderful honey bees.

Just for fun Jessie and I measured a worker bee by putting a bit of honey on the ruler. You can do this easily.



How did I get my bees?



The above photo shows how I got some bees that had landed on a curb. I used a special swarm catching box with old comb in it so the bees were attracted to the familiar smell of a hive. You can see the bees actually marched right in!



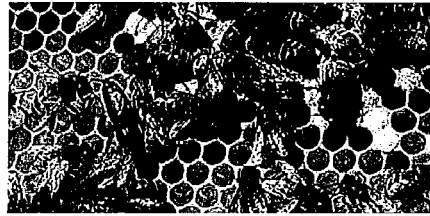
Sometimes swarms land on strange places. This swarm landed on a dress form that was on a sidewalk in downtown Petaluma. Then I remembered the title of the book *Beekeeping for Dummies* so I just had to dress the "dummy" in my beesuit after I got the bees in the swarm catching box!



In the photo on the left you can see how the bees in the small box are transferred to a full sized hive. This swarm became a good working colony for Griffin by the following spring of 2005.

What jobs do the bees have?

The answer to that depends on what kind of bee it is and how old it is.



This is what we call a brood frame. If you look carefully, you will see one special bee that has a red dot painted on her thorax. She is the queen.

Her only job is to lay the eggs in the cells. Most of the other bees in this picture are her daughters who are called workers. That's right! The girls do all the work in the hive starting with housekeeping minutes after they are born! The first three weeks of their lives they are assigned indoor jobs such as feeding the larvae. The next three weeks they are foraging bees that go out to the flowers to bring back nectar and pollen. In the Spring and Summer the workers last only about six weeks. The fattest bees with the biggest eyes are the drones which are boys. They do no work at all. Their only purpose in life is to mate with a queen so she can have daughters and then the drone dies. Drones have no stingers so they do not defend the hive. The girls remove the left over drones when food is scarce.

[Return to top.](#)

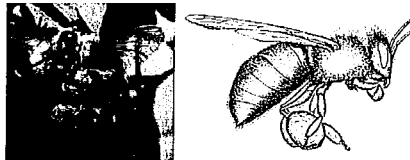


This is a picture of six colors of pollen. When you are a beekeeper, you will start looking at flowers differently than before. You will notice not all pollen is yellow. When a bee is out foraging, it collects only one type of pollen each trip so the excess pollen it drops will go to a plant in the same family. For example a bee may go from apple blossom to apple blossom. She doesn't care if they are not the same varieties of apples as long as they are apples.

In the photo below on the left the bee is collecting pollen from white clover.

The photo of the bees carrying many different colors of pollen was taken by Ron van Mierlo in Sweden.

How do the bees carry the pollen?



In the photo on the left you can see the back legs are used to carry pollen. Only the worker bees have these special back legs. The bee moistens the pollen and uses the middle legs to pack the pollen in the pollen baskets.

The drawing on the right showing this action as a bee is flying is from 1919 edition of The ABC and XYZ of Bee Culture published by the A.I. Root Company, Medina, Ohio. The newest edition of the book is a good reference book. Look for it in your public library. It is organized like an encyclopedia so you can look up all kinds of information. The older editions are interesting and can be found in many used bookstores.

Pollen that is not packed on the back legs stays on the other hairy parts of the bee until it falls off onto the stigma of the next flower the bee lands on. That pollinates it so it will produce seeds for the next generation of that plant. About one-third of the total human diet comes directly or indirectly from insect-pollinated plants (fruits, legumes and vegetables). Honey bees' pollination is very important.

What do the bees do with the honey and pollen they collect?

They eat the honey to give themselves energy. The pollen is mixed with honey and fed to the larvae. Nurse bees eat honey and pollen so they can produce royal jelly. The larvae are like little caterpillars only they can't go out to find food for themselves so the nurse bees feed them for six days after they hatched and before they spin cocoons. We call the eggs, larvae and pupae "brood." After 21 days the worker pupae emerges as an adult bee. She has to chew her way out through the special wax cappings the nurse bees put over the pupae. The picture below shows adult bees hatching. You can see that the other bees don't help them into the world. Soon after these bees hatch, they will be cleaning the brood area.



How do bees "talk" to each other?



In this photo you can see the bees touching each other's antennae. They are communicating information. They also are known to have special dances on the honey comb called "waggle dances" where one bee will tell the others where the flowers are that have nectar and pollen.



In this picture you can see how the bees store honey and pollen in an arch over the brood area. The honey is capped with almost white wax to keep it fresh. The pollen mixed with honey is just below the honey close to where the queen lays the eggs. This is so it is handy for the nurse bees to take it to the larvae. The pupae are capped with a light brown wax to protect them until they hatch out.

What can hurt the bees?



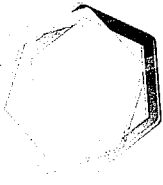
One thing that hurts bees is varroa mites. You can see one on the left top wing of the bee on the left. The varroa mites spend part of their life cycle living off the brood. If there are enough of them, the hive will die. The mites also carry a disease called deformed wing virus which cripples the bees. You can see the bee in the middle has deformed wings. This deformed bee was carried out of the hive when it was still alive.

The colony did not want it. Compare its wings to the one on the right.

Other bee predators are a tracheal mite that bores a hole in the bee's wind pipe, dragonflies, ants, yellowjackets, some birds, skunks and bears. People think bears are after the honey when they rob hives. Actually they eat the bees and the larvae which are a source of protein for the bears. They enjoy the honey, too. Mice, rats and wax moths will destroy the wax combs and the wooden hives.

A few suggested books you will find helpful:

The Magic School Bus Inside a Beehive by Joanne Cole, Scholastic 1996- very basic book for younger children, also available as a video (published in Spanish also)
Beekeeping for Dummies by Howland Blackiston, Hungry Minds, Inc 2002- an excellent reference book with good up-to-date information, easy to find at bookstores
How to Keep Bees and Sell Honey by Walter T. Kelley, Walter T. Kelley Co. 1993 a classic, with good pictures and lots of well tested information
Honey Bee Hobbyist, The Care and Keeping of Bees by Norman Gary, PhD published 2010 by Bow Tie Press. Very good illustrations and easy to understand. Lots of good, practical tips by the author who has worked with bees and taught at U.C. Davis for many years.
Life of the Honey Bee by Heiderose and Andreas Fischer-Nagel, Carolrhoda Books, Inc. 1986 This is for children and has great pictures and good information.
Are You a Bee? By Judy Allen and Tudor Humphries, Backyard Books, Kingfisher, 2001 An excellent book for children with good clear drawings and information. It was recommended to me by a first grade teacher who uses it with his class.
Letters from the Hive, An Intimate History of Bees, Honey and Humankind By Stephen Buchmann with Banning Repplier, Bantam Books, 2005 A brand new book packed with information and lots of history of bees and honey. More for adult beekeepers but older children can learn from it, too.
When the Bees Fly Home By Andrea Cheng, illustrated by Joline McFadden, Tilbury House Publishers, 2002 A touching, realistic story of a boy who finds a way to help his beekeeper father. The illustrations are great! Bee facts are on every page.
The Bee by Paul Starosta, Charlesbridge Publishing 2005 translated from French by Elizabeth Uhlig This is one of the most complete factual books on honey bees every written for children. It even includes some information about yellow jackets, and other bee cousins. The photography is stunning!
The Backyard Beekeeper, An Absolute Beginner's Guide to keeping Bees in Your Yard and Garden by Kim Flottum, Quarry Books 2005 This is the most up-to-date comprehensive book every beekeeper should own.



What is a drone and what does it do?

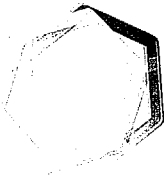
List the duties of the worker bees.

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.)





Observing the Hive Entrance

The hive entrance of a honey bee colony is very much like the front door of your house. Just as you go through it on your way to and from school, the field bees must exit and enter through the hive entrance on their trips to visit flowers. By watching a hive's entrance, beekeepers can learn a great deal about the levels of activity of their bees. Observing the hive entrance not only tells about the honey plants in bloom that are attracting the field bees, but it also tells about the work going on inside the hive. The more nectar and other supplies the field bees bring in, the busier the house bees will be, storing away and using supplies to build new comb and to care for the young bees.

What is happening at the hive's entrance can also tell beekeepers about the health of their bees. For example:

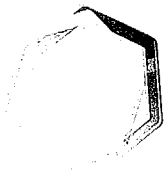
- If you are too hot in your house, you may sit outside your front door. Bees do the same thing.
- When you are cold, you close the front door. Although the bees cannot close their hive entrance, they will remain inside, away from the entrance, when they are cold.
- When you do not feel well, you stay inside to rest. Sick bees do not leave their hives, either. However, if they are very sick they will crawl out of the hive and die.

Observe the entrance to a hive, watching closely for at least 15 minutes at least once every three weeks. Do this at different times of the day. Sit as close to the entrance as possible so that you have a clear view of the activities taking place. **Do not** sit in front of the entrance! The bees will become confused if they see you in front and won't know where to go. For each observation period, write a report of what you saw. Describe what they were doing there and what, if anything, they were carrying in or out of the hive. Make certain to include the information listed below in your reports:

- the date and time of day of your observation
- the weather conditions while you were watching
- a summary of the activities you observed at the hive entrance
- the types and approximate number of bees you saw

Staple your completed report to the back of this manual.





Beeswax and Honeycomb

The honeycomb is the inner house of honey bees. It is where young bees are raised and where the hive's food is stored. Comb is built out of beeswax, which is produced only by young worker bees. Glands on the undersides of the bodies of these young bees can produce tiny pieces of wax. Worker bees chew these small flakes of wax and work them to form the comb. Generally, the newly constructed comb is beautifully white in color. It may be light yellow when bees are getting nectar from goldenrod or other similar flowers. The comb becomes darker over time, because as each new bee is born, it sheds its skin and this becomes part of the cell. Also, bees collect propolis, which can make the comb darker.

The comb (Figure 5) consists of many small, six-sided tubes (cells) built side by side. The floor of the cells slopes slightly downward to the bottom and is shaped like a three-sided pyramid pointing away from the cell opening. This small slope is necessary so that the substances put into the cell do not slide out of it.

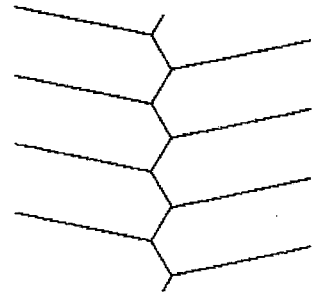
There are three different cell sizes. The large drone bee is hatched from an egg and grows to adulthood in the larger of the two cells (drone cell). The smaller, worker bee grows in the slightly smaller worker cell. Worker cells that are full of eggs, developing larvae, and pupae are usually found in the central part of the comb (brood area). The third cell size is the queen cell.

Bordering the brood area is a narrow strip of worker cells where pollen is stored. Pollen is an important food for the larva growing in the brood area cells, because it is the source of the bees' protein and because it is rich in fat. The field bees collect pollen in the form of tiny pellets from flowers and carry it back to the hive by putting it in small, basketlike pouches on their back legs. This pollen varies in color, depending on the type of flower from which it came.

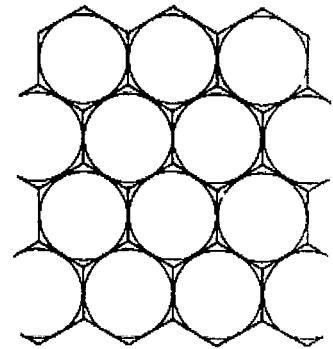
A cell is never completely filled with pollen (Figure 6). Bees generally pack the pollen in a cell until it is about $\frac{3}{4}$ full. Sometimes they add a little honey to the pollen to preserve it. This makes the pollen look wet. This storage method maintains the freshness of the pollen for a long time. The outer edges of comb beyond the narrow pollen storage area are used for ripening and storing honey.

Between each comb, the bees leave a space about $\frac{3}{8}$ -inch wide. If the space between combs is much wider or narrower, the bees will close it up with wax and bee glue.

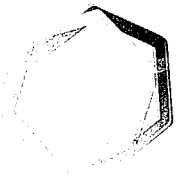
Figure 5.



Slope of cells from front to middle of comb.



The economy of the hexagonal shape for making honeycomb cells.



Observing a Beekeeper

As you read at the beginning of this manual, your best source of information about beekeeping is the experienced beekeeper. Having almost completed Beekeeping I, you now understand enough about the honey bee and the equipment of the beekeeper to know what questions to ask your advisor.

Carefully observe your beekeeper advisor as they check a beehive. Write a description of each step in the process of “going through” a beehive, beginning with the preparation of the necessary equipment—lighting the smoker, putting on the veil, etc.—and ending with the clean-up procedures that follow such work.

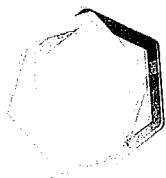
Beekeeping Inventory

Date Obtained	Item	Number	Cost
Total			

What is meant by the term “movable-frame hive”?

What is meant by the term “crossed comb”?





Why is it necessary to have a hive stand, bricks, or something similar to keep the bottom board off the ground?

Explain how the frames are built to maintain the “bee space.”

What are the advantages of using comb foundation in your hive?

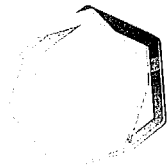
What is the function of a smoker? Name some materials that would make good smoker fuel by burning slowly with much smoke.

What is the function of the hive tool?

How does a queen excluder work, and what is its purpose?

Explain the various types of clothing a beekeeper must wear when working with hives.





Demonstrations and Talks

Now that you have begun learning about bees, you might want to share your knowledge with others at a 4-H club meeting or county or state fair. An action demonstration is an excellent way to teach others about bees.

Action Demonstration Guidelines

What is an action demonstration or action demo?

An action demo is a fun way to share with others what you have learned in your 4-H project. It's a kind of "show and tell," but with more action. An action demo is not like a regular demonstration, where the audience sits and listens to a prepared talk. An action demo lets the audience get involved.

Action demonstrations can be given anywhere there are a lot of people, such as a county or state fair, shopping mall, street fair, or any 4-H event. Your job as a demonstrator is to interest the audience in your topic so that they stop and learn something new or try their hand at what you are doing.

How do you choose a topic for your action demo?

An action demo can be on almost any subject. The topic should be something that you enjoy and are knowledgeable about. Consider the following questions when choosing a topic:

- Can you complete the action demonstration in 3-5 minutes?
- Can it easily be repeated over and over again to fill the assigned time?
- Is your action demo showing something that would interest the general public?
- Is there a good way to involve your audience in your action demo ("hands-on" or answering questions)?
- Can the supplies for the "hands-on" section be used over and over again, or will they need to be replaced? (Remember, if the materials must be replaced, it will cost more to do the demonstration.)

How can you get the audience involved?

The first thing you need to do is be enthusiastic and attract people's attention as they walk by your table. You might have a colorful tablecloth or poster to spark their interest. You might ask them a question, such as: "Would you like to play this game?" or "Have you ever made pretzels? Would you like to try?" The best way to attract their attention is to have people around your table doing something. People love to do hands-on activities, so once you get a few people at your table, they will attract others. For more information on action demonstrations, see V-4-H-28.

Involve your audience by having them:

- do what you are doing
- do a "hands-on" section
- judge the quality of various items
- play a game
- answer questions

Remember, the key to a good action demo is getting your audience involved.

I'm a 4-H Project Leader: Now What Do I Do?

How do I know who is in my project?

- Your club organizational leader will provide you with the names, addresses and phone numbers of the members enrolled in the project for which you are the leader.
- If you are working on the county level, contact the UCCE for the list of project members.
- The organizational leader may indicate to you if any of the youth have special needs. At your first project meeting, note any other youth that may have special needs.
- You may wish to consult with the parent or your 4-H Youth Development Agent as to how to work with a special needs child.

How often should I hold project meetings?

It is recommended you hold 4-6 meetings that each last 1½ to 2 hours in length. Some projects require more meetings or a longer meeting time to accomplish your goals. Some projects, such as leathercraft, may lend themselves to individual project work as members progress on their projects. In this case, you should hold several introductory meetings for all members and then set up a schedule of time for them to sign up for individual help.

When do I start?

Get started as soon as possible! Members' interest in a project is most keen when they are signing up for a project and when they get their project books.

How do I cover the cost of project meetings?

- There is a wide variety of means for covering the cost of project meetings. Some methods used include:
- Each member pays for their share of the expenses or provides a portion of the supplies.
- The club agrees to cover expenses using funds from their treasury. Approval in advance is needed for this.
- Members and leaders can solicit donations/supplies from area businesses.
- Sometimes funds from sources outside your club may be available to cover your project meeting costs.

How do I establish a project meeting schedule?

First, determine when you are available to work with project members. Then determine an initial project meeting date by consulting with your project members.

Publicize the date using one of the following means:

- County and/or club newsletter
- Club meeting or leader association meetings
- Postcards or phone calls to project members

You may not be able to schedule an initial meeting that everyone can attend. Establish a time to meet with those unable to attend before you hold your second project meeting.

Where do I hold project meetings?

Typically project meetings are held at project leader homes, schools, or community buildings. For more information on facility adaptability and liability concerns contact your 4-H Youth Development Agent.

What safety precautions do we need to consider?

Consider the type of safety issues your particular project involves. Request and secure necessary safety items such as ear protection, eye protection and head protection.

How do I let others in my club or other clubs know I am a project leader?

Prior to enrollment ask for time on your club's meeting agenda to let families in your club know you're a project leader and to share some things the kids could do in the project if they enrolled in it. When the project materials are handed out, take the opportunity to inform or remind members that you are their project leader and set an initial meeting date with the group. If no one in your club is in your project, you may wish to offer your services to a neighboring club. Talk to your club organizational leader or county 4-H Youth Development agent about this opportunity.

How do I prepare for the first meeting?

You may want to establish a 4-H resource box where you keep your project materials and any additional resources you will be using. Take time to become familiar with your project literature and talk to others who were project leaders for this project to find out what activities the members enjoyed.

What should I do at the initial project meeting?

- At the initial project meeting, here are some ideas of what you might want to cover:
- Find out what the members want to learn and accomplish in the project. The project literature is an excellent source of ideas.
- Review the safety practices that members will need to follow.

- Do an introductory activity related to the project so the members get to know one another
- Have a small project the members can complete and take home
- Talk about how the project meeting supplies will be paid for. Experienced leaders have found it easiest to charge a small fee to cover the cost of the expenses.
- Assess when members are available for additional meetings. You may wish to ask the parents or members to bring along their calendars of family activities.
- Encourage parents to participate in project meetings, especially the initial meeting.

What does a typical project meeting look like after the initial orientation?

Use the experiential learning model (found in the introductory pages of your Helper's Guide) to plan your project meeting. The project helper's guide will provide suggestions for designing a project meeting. Here are some suggestions for each section of the model:

Do

- Plan an activity to focus the project members on what they'll be doing today. Work on the project for that meeting.

Reflect

- Review the process completed
- Discuss what worked and didn't work.
- Talk about how any problems that arose were solved.
- Assist members in documenting their project work for inclusion in their record books/portfolios.

Apply

- Ask the project member the following questions:
- What else have you seen that is similar to this?
- How can you apply what you learned today to other situations?

What resources are available to help me?

- 4-H Project Literature – You will receive project literature through your 4-H club or the UW-Extension office. Typically there is a helper's guide and member literature for three to four levels.
- Other People in my Club & County – There are a number of people in your county who would be willing to share project ideas and tips with you.

These include:

- Project leaders in other clubs
 - County Staff
 - Older youth who have been involved in the project
-
- **Media Collection & Public Libraries** – Additional resources can be obtained from the Cooperative Extension Media Collection. They have videos, skillathons, displays and resource packages available to support a variety of projects. There is a user fee per item you or your club will be responsible for. You can view their catalog at their website <http://www.uwex.edu/ces/media/>. Check with your local public library to find out what resources they may have or that you can obtain through inter-library loan.
 - **4-H Website** – Wisconsin 4-H is continually adding more information and activities to their website. Visit this site at www.uwex.edu/ces/4h/onlinepro/. You may wish to check out websites from other state 4-H programs also.
 - **Volunteer Leaders Conferences** – Review each issue of your county's newsletter to learn about training sessions for project leaders offered by your county, district or at statewide events. Sessions focusing on new project literature are typically offered at the State 4-H Volunteer Leader Conference held every other year. Periodically statewide conferences focusing on specific project areas are offered in addition to sessions at the volunteer conferences. You can also exchange ideas with other leaders at statewide Field Day.
 - **Field Trips** – Youth always enjoy the opportunity to see firsthand how things are done and how they work. Consider taking your project group on a field trip or tour of a local business or company to enhance their project experience. An example would be taking your dairy members to a cheese factory or your foods group to a local bakery.
 - **Local Experts** – Bring in a local "expert" to share their ideas and experiences with your group. One example would be asking a Master Gardener to share information on choosing perennial or trimming shrubs at one of your project meetings.
 - **Magazines** – Many leaders have found creative ideas to supplement those in the project literature in magazines they have or those at the public library.

How can I incorporate activities not included in the project guide?

We encourage you to use the ideas in the project literature as they have been successfully used with youth. If you have some additional activities you would like to incorporate, consider the following criteria:

- Of interest to kids
- Developmentally appropriate
- Incorporate the experiential learning model
- Youth and adults are involved in determining what will be done
- Enhances the development of member life and project skills
- Research based source of content utilized

What is the relationship between project work and the county fair?

The County Fair is an opportunity for an independent evaluation of life and project skills a member learned through completing a project. County fair entries typically match the activities included in the project literature and may include other activities that are being emphasized in your county. One of your roles is to help maintain the focus of members and parents on the goal of 4-H, which is to develop blue ribbon kids. Talk with members about what they learned about each of their fair entries from the judging process. Help members celebrate their accomplishments regardless of the color of ribbon each project member received at the fair. This may be done through individual encouragement or at a meeting following the fair. While entering and displaying a project at the County Fair is the traditional method of public affirmation, there may be other means of exhibition such as a club tour, open house, community celebrations or others.

Who can I go to if I need someone to help me during the project meetings?

If you are leading beginning level project meetings, ask older members in the project to help you. This is a great leadership experience for them! Parents are another excellent source of help. Don't hesitate to ask them to stay for the meeting and be actively involved in their child's project work.