

WALDORF
100

LEARN
TO CHANGE
THE WORLD

Bees & Trees

A handout for schools
and kindergartens





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The Project – Basics and Overview

by Norbert Poeplau (Master Beekeeper Mellifera e.V.)

The 100th birthday of the Waldorf School movement is celebrated in 2019. Looking ahead, it is worth recalling the impulses that have given rise to this worldwide educational movement, the particular path it has taken so far, and what point on the horizon can help us to orientate our journey forwards.¹ The founding of the Free Waldorf School Stuttgart in 1919 happened during an abyss of Central European history, and it gave the first glimmer of dawn for a completely new path,” recalls one of the founding teachers. Where do we see this morning glimmer today? How far do we have to look around and move ourselves in order to grasp the right direction?

As a former Waldorf teacher who has been caring for the bee colonies in the education and research apiary at Fischermühle (Mellifera e.V.) for many years now, I am very happy that bees will be one of the anniversary projects for the festival year 2019, and that attention will be given to bees by the Waldorf school movement which is growing so lively itself. I would like to explain some reasons why young people and their teachers should turn to bees and learn from them. “Learn to Change the World” is the motto of Waldorf 100. Bees have been involved in “changing the world” for at least 60,000,000 years! Accordingly, bees are experts in this respect. With their quiet humming between the flowers of the world they have played a decisive role in shaping evolution over these unimaginable periods of time, gaining a “wealth of experience”. I would like to emphasize an insight about

the nature of bees gained from many years of beekeeping: a colony of bees works mainly for the bees who will come, who are not there yet - that is, for the future.

In the dawn of the first Waldorf School in 1919, the entrepreneur Emil Molt decided, driven by social impulses, to found his own school for the children of the workers in “his” cigarette factory. He commissioned Rudolf Steiner to implement this project. In 1928 Emil Molt received an honorary doctorate from the Eberhard Karls University in Tübingen: “The Faculty of Law and Economics [...] awards Emil Molt a doctorate in political science in honor of his services to industrial peace and the industrial community.”²

When I observe bee colonies, my bee states today, I experience the same mood I feel when reading Emil Molt’s tribute. But there is no “Emil-Molt bee” to be found there. Not a single individual sets the tone; the cooperation is controlled by grassroots democracy. Bees who want to stimulate something try to inspire other bees to do this task with extraordinary success. The proverbial bee diligence has become a symbol. The queen bee does not control the colony in this context either. She ensures cohesion and is otherwise a servant in all her duties. This quality has been deeply anchored into the essence of the entire colony for millions of years. That is precisely why we consider honeybees to be social insects. In popular language, they are called superorganisms.³

At all ages there are many secrets of nature to discover in observing beehives. And even if we have

recognized the ingenious social togetherness of the “sparks of wonders”, as Tom Seeley, one of the most renowned bee scientists calls bees, it is of little use to us humans at first. We can only bring this wisdom to fruition if we connect individually with a larger context, i.e. the renunciation of personal advantages. An ever-widening gap between rich and poor, or food shortages due to grain speculation will never be found among bees.

I would be very pleased if bees could become the “object” of amazement and learning at as many schools and kindergartens as possible in the jubilee year of the Waldorf School movement.



Kindergarten

The amazement, the mystery in the life contexts and products of bees can be experienced already at **kindergarten age** ⁴.

Many children have seen bees fly into the colored calyxes of various flowers. If you take a little more time and observe the bees on different flowers, you can see that the bees approach the flower and move about in a plant-specific way. They seem to know “their” flowers. Sometimes they move calmly, sometimes excitedly. Another awe-inspiring experience for children of kindergarten age is to lay hands on a bee hive. When the cover layers are removed except for a thin beeswax cloth over the honeycombs on which the bees live, the children can feel the warmth the bees produce from spring to autumn. It is as warm as the hand of somebody we embrace. Then, as we slowly pull the drape over the honeycomb to the side, a warm stream of air with an incomparable bee scent flows from underneath. Such an experience will be remembered by children for a long time.

→ Wild bees in Kindergarten, see page 28

Lower grades

In the **first years of school** children can discover the secrets of bees through fairy tales and stories that convey true images of the bee colony. As a teacher and beekeeper, Jakob Streit has written the beautiful children’s books “Little Bee Sunbeam”⁵, where he lets the bees speak for themselves, and “The Bee Book”⁶, in which he tells the story of the eternally inquisitive boy and his beekeeper grandfather.

It is wonderful to stand next to the entrance hole with children who carry these images in their hearts. In summer the bees land with their colorful pollen panties on their hind legs and quickly disappear into the hive darkness. Whereas other bees come out and fly away.

The bees know exactly where they want to go and what to do. Quickly the pictures of bees living together in the beehive reappear from the stories the children know, and it is like light falling into the deep darkness.

Practical tip:

Observe bees; 1st school year: candle making, kneading with beeswax; 2nd school year: laying out a bee pasture, painting bees and flowers



As they get older children want to hear more from people who have a particular craft as their life's work. Beekeeping is one of the oldest crafts and is still alive today. On a beautiful spring or summer day in the Practical Arts Block you can visit a beekeeper who opens a bee hive to show the children the hustle and bustle of bees on the honeycomb. What at first appears to be a great number of bees scurrying around at random becomes orderly upon the beekeeper's expert clarification, and soon some children begin to recognize individual activities of the bees that were just explained on other combs. Some information is expressed by the bees in their own dance language. This dance is called "round or waggle dance". The bees' dances are meant to encourage other bees from the hive to follow them and visit the flowers they have found.

It is something very special when the bee queen shows up while visiting the hive with the beekeeper. The queen never visits a flower in her life and among the three bee creatures (worker, drone, queen), she has the longest life span, almost always in the dark of the hive except during her 'wedding flight' and when swarming.



Practical tip:

Visit to a beekeeper in the Practical Arts Block. Honey can be harvested before the summer holidays if the weather is suitable. The honey stores covered by the bees are opened, i.e. "uncovered". Then the honey is centrifuged and -- very important! -- sampled and tasted. These are memorable events.

In the fourth school year after the Humanities and Zoology Block, the observation of bees can continue. While the butterfly lives through the caterpillar and pupal stage alone, the bees have a nursery, the brood nest in which brood and queen tending bees, and "heater bees" incessantly take care of the hive's offspring. In some

schools there are projects with a bee showcase in the classroom. The bees can fly out of a hole in the window into the open air and do their work there without disturbing the lessons. The children can observe the bees only a few inches away from their nose tip, protected by a wooden shutter and a glass pane.⁷ An incredible number of questions arise from the children's own observations, and they often cannot wait to see the next steps of the colony's development.

Practical tip:

Small bee working groups, still with the emphasis on "nature experience"; in addition acquisition of phenomenological insect knowledge by observation of the metamorphosis of butterflies from the caterpillar over pupation up to the fully developed adult, the "flying blossom".



Middle school

Starting with **5th grade**, the children want to engage themselves more actively. Teachers must awaken the joy for work in the children after the playful and learning processes of early childhood. The wisdom inherent in one's own activity is deeply rooted in our language: we speak of grasping or understanding, although today we predominantly mean intellectual understanding. Therefore artistic and practical craft lessons are now starting at school. Woodworking, horticulture... and maybe a bee working group. The beekeeping trade offers numerous handicraft activities. It starts with the harvest of honeycombs, followed by honey extraction and filling into jars, candle making with beeswax, and perhaps ending in winter with the construction and maintenance of the wooden beehives and honeycomb frames.

Practical tip:

Bee working group now with a down-to-earth emphasis: honey harvest, candle production, hive construction. In botany the relationship of insects and flowers can be examined.

Swarming, the reproduction of bee colonies is an overwhelming event. Thousands of bees tumble out of the entrance hole like a waterfall. The biology of the swarming process is not easy to understand. But it is no problem to let it be an open question for a longer period of time. Furthermore, the nutritional basis of bees can be discussed. Where do these little insects go during foraging? A colony's flight range is an incredibly large area of many square miles. Here too, there are countless possibilities to explore the nearby landscape with children from the perspective of the bees and to become active in a meaningful way on a small scale, perhaps in the school garden by creating bee forage areas⁸. There are countless possibilities which can be accomplished in the context of a bee working group, in class lessons or individual school projects about bees.

Practical tip:

6th school year: In the Geometry Block, the construction of hexagons with compass and ruler and the subsequent rediscovery of these forms in the honeycombs can lead from amazement to knowledge.

7th school year: Gardening and main lessons are coordinated: substances from the bee colony -- chemistry, repair work on beehives and other beehive material.

8th year: Production of unguent from beeswax. In the context of an annual student project with technical support pupils can also care for their own bee colony and process the products.



Upper grades

In the upper grades, for example, the anatomy of the bee can be examined under the microscope. Let's take a look at all parts of the body involved in pollen collection. The bees comb the small pollen packets out of their coats while collecting pollen with their legs during the flight from blossom to blossom. They mix them with glue (nectar or honey) and pack them in a special "basket" on their hind legs. When they return to their beehives, they give these "pollen panties" to their associates, who turn the pollen into "bee bread" and store it in the combs. There are complex processes that serve to supply the bees with protein. If we look at individual pollen grains under the microscope, the pollen of every plant in the world has an individually different, round shape, which specialists working in laboratories use to determine the honey variety. The composition of the pollen spectrum cannot only distinguish the honey variety, but also for instance whether it comes from Bavaria or Baden-Württemberg. Other fascinating questions for high school students to pursue concern the coordination behavior of a colony of bees.

How does a swarm of bees manage to choose the best housing from various new hives in the surrounding area, and then move in all together as a swarm?⁹ Bees solve a common task in unimaginable wisdom by a "delegation and quorum principle". Today, even economists study bees in order to understand their behavior and coordination processes. In the preface to Peter

Miller's book "The Intelligence of the Swarm"¹⁰ one finds: "Many thinkers are concerned with the question of what the latest findings from research into crowds, mass cooperation, corporate ecologies and networks can contribute to making our organizations more effective and better. Personally, I am convinced that organizations today are facing a major structural, architectural and operational revolution. Amazingly, we can learn a lot from nature." In his book a whole chapter is dedicated to bees, and he elaborates why a large group of non-specialists make better decisions than a single specialist in a particular field.

But there are also areas in which the coexistence of humans with bee colonies appears as if bee colonies are only a disturbance. For example, major ecological problems are caused by the fact that bees do not adhere to the legal distance regulations of a few 100 meters between an ecological area with open pollination variety and a conventional area where genetically modified (gm) crops are grown.

In addition, since bees forage in a radius of about 2 miles and pollinate plants with pollen from genetically modified plants and vice versa, as a consequence, crops from organic farmers risk to be contaminated. It is worth illuminating these questions with high school students in various directions in order to help pupils to develop their personal judgement. A further contextual challenge for upper school

Practical tip:

9th school year: Planting flowering trees inside and outside the school grounds is a good opportunity to do something for bees. "Guerilla gardening" for bees on fallow land, building ruins or other unused areas is fun and helps the bees. The farming internship can also be pursued at an organic apiary.

10th school year: In handicraft lessons beehives can be repaired or remade respecting the colonies' needs. Information about bees displayed on market squares or in pedestrian zones, establishment of wild bee nesting sites in the school's surroundings. Introduction of younger classmates to the care of bees.

11th school year: If there is a class block in which light microscopy is used the anatomy of the bee can be examined in detail. Examples are the facet eyes or the leg structures allowing for transport of pollen. In biology lessons, genetic

engineering is taken up in the course of cell theory. Here it is important to discuss the issue of genetically modified crop plants. They may be a risk factor for bee health and have compelled beekeepers to destroy honey.

12th school year: Which behaviors of the bee are inherited and thus attributed to instinct? What do bees learn, and how? These can be central questions in the 12th school year. Another interesting research topic with possibly great impact is whether the whole of the bee colony is more than the sum of its parts. Sociologically interesting is the question how a colony of bees is making decisions and what these processes have to do with humans. To what extent can we possibly learn something from bee behavior?



teaching is the topic of reproduction in the bee colony. According to classical laws of heredity, haploid and diploid chromosome sets appear in the bee colony. The former result in drones, the latter in worker bees. This explains why, in special situations, worker bees can lay eggs, but only drones (male bees) hatch from them. Only the queen is able to lay fertilized eggs that become (female) worker bees. But the relationships become even more complicated, because just as with all farm animals, intensive breeding is also carried out on bees. This results in breeding goals for certain characteristics. As with other farm animals, this aim includes artificial insemination of benumbed queen bees. In addition to honey production, Europe pays particular attention to the docility of bee colonies. Further criteria are winter resistance, good development in spring and a low tendency to swarm. Varroa mites have also been on the program for about a decade, as they cause the death of many thousands of colonies every year worldwide. There are a few colonies of varroa-resistant bees living in Europe, but their properties cannot be exported to other areas.

Research in the field of epigenetics now shows that genetic alterations are also caused by environmental factors or by newly learned behaviors. It is therefore contradictory to breed a certain line which is then sold to beekeepers as a “cure” for the Varroa mite. For serious scientists, it is clear to include aspects of biodiversity, local conditions and the specific factors that distinguish bee colonies in their research. These are exciting challenges that Goethe already recognized when he wrote:

Epirrhema

You must, when contemplating nature,
Attend to this, in each and every feature:
There's nought outside and nought within,
For she is inside out and outside in.
Thus will you grasp, with no delay,
The holy secret, clear as day.

Joy in true semblance take, in any
Earnest play:
No living thing is One, I say,
But always Many.

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Once a beekeeper, always a beekeeper

by Rebecca Schmitz (Bienen machen Schule, Mellifera e.V.)

There are many possibilities of integrating the complex life form of the honey bee both in the natural and social sciences as well as in an interdisciplinary manner. In beekeeping, the seasons can be experienced directly in nature. By observing and working with bees, children and young people can discover connections between bees, humans and nature for themselves and directly learn the importance of bees for the conservation of biological diversity. This is education for sustainable development (ESD) in the best sense.

Work on the bee colony with children and young people is characterized above all by the active participation of the children themselves. This way they learn how to deal with bees and lose their shyness towards animals. Once they have “caught fire” and are enthusiastic, they often remain faithful to the bee project until they finish school.

How to start:

1. Read a good book about natural beekeeping
 - a. Lehnherr, Matthias (2017): Imkerbuch. Aristaios Verlag, Basel.
 - b. Friedmann, Günter (2016): Bienengemäß imkern: Das Praxis-Handbuch, BLV Buchverlag.
 - c. Bentzien, Claudia (2006): Ökologisch imkern, KOSMOS Verlag.
2. Attend a beekeeping course about natural, species-appropriate and respectful beekeeping.
3. Find a beekeeper to supervise you as a beekeeper tutor.
4. Acquire a colony of bees e.g. from a local beekeeper association (e.g. www.schwarmboerse.de), a hive that is as adapted as possible for the colony and the necessary beekeeping tools.

5. Find a beautiful, bee-friendly location and furnish it with bee-friendly plants.
6. If you have some experience in beekeeping, clarify any organizational and legal issues with your colleagues.
7. Present the project to the parents and get the necessary permission from those students who want to work with the school beehive.
8. Inspire the students and get them started.
9. Work with the students to develop a form of organization for school beekeeping in which the pupils take as much responsibility as possible for the individual topics and work.
10. Once you have bees, the bees have you forever!

Tip:

Courses, contacts, further practical tips will be published at www.waldorf-100.org/en/project/bees-trees/



Additional Information:

- “Bienen machen Schule” (Bees in schools) an initiative of Mellifera e.V.: www.bienen-schule.de The initiative is committed to enabling children and young people to learn from and with bees. We bring together educators and beekeepers who want to create an awareness for the fascinating world of bees in kindergarten or school, in environmental centers, youth work or in beekeepers’ associations. Are you a teacher, educator or beekeeper? Then join our initiative and help to get children and young people interested in bees!
- German-language manual available here: www.mellifera.de/shop/handbuch-bienen-machen-schule
- Beekeeping courses and other events (in Germany) at: www.mellifera.de/veranstaltungen



Ideas for Kindergarten on the topic of wild bees

by Irmgard Kutsch (author, Waldorf educator, beekeeper)

“Who lives behind the front-door sign,” asks 6-year-old Franz, who is visiting the nature children’s garden workshop with his pre-school group. His interest in what he discovers there is so obvious that other children from the group also turn immediately to the wooden wall with the wooden door sign. Tense silence and waiting with wide open mouths, eyes and ears. It takes a while until something finally moves: a small animal comes crawling out of the gap. “Like a peanut with fur and wings,” exclaims one of the young nature explorers. But this creature is in a hurry and flies away humming and with determination, to the regret of the young observers. Franz asks his followers to remain calm and “prepared”. He’s sure the little animal will come back.

The group naturally follows his clear instructions, because they have often experienced that patient waiting is worthwhile if one wants to get to the bottom of nature’s secrets with Franz. The children’s interest in this little animal, which flies in and out again and again, lasts for over half an hour. They discover that it transports something, that it sometimes flies in and out forwards and sometimes backwards. They assume that it has something important to do in this invisible place and possibly lives there, perhaps even with family.

During another visit, the children will find “their” insect on a card thistle blossom in the species-rich sea of flowers of a natural garden, and can finally take a closer look. They marvel at the amber-colored “fur vest” and give the insect the name “Bernhardine”. They recognize six nimble crawling legs, some with gray-yellowish grains (pollen), and discover the sharp black proboscis that dips deep into the flowers, as well as the large dark eyes, which are so differently shaped than their own.



How easy it is to explain as an adult: “The animal is a solitary bumblebee, living individually without a colony, and belongs to the family of bees. It creates a linear breeding colony in a wooden gap between the facade and sign, by introducing mineral building materials from the surrounding area to produce individual breeding cells. If it crawls forward into the hatchery, it is building it or carrying in food; if it crawls backwards into the crack, it is laying an egg. Then another wall is built, an egg laid, food substance added, the cell closed, and so on.”





The brood cells are clearly visible in the glass incubators of the showcase.

It is important that educators acquire this knowledge in order to feed the children's interest about the world. To present it too early to the children, however, would mean to take away their tense joy of discovery and to cap their inexhaustible childish imagination. On the other hand, knowledge of nature leads to respectful, appreciative and appropriate action of adults in nature, which serve as an orientation for children in everyday life as a matter of course by example and imitation.

Naturally, children like Franz need answers to their questions, but appropriate to their individuality and development. In Waldorf education one builds knowledge up gradually from kindergarten to high school and the child's intellect should not be overfed too early at any age. In the present day, **doing things for animals and plants** plays an important role. The book *Mit Kindern im Bienengarten* (With children in the bee garden) contains more detailed information than is possible to relate here in this brochure. The aim is to implement simple nature conservation activities in everyday life with children. Bee-friendly biodiversity is the order of the day outdoors, from flowers on window sills, in plant pots on terraces, in garden design. In addition, it is becoming increasingly important for kindergartens to do activities with children using various hand tools and materials that the children can learn to handle in an imitative and liberating way; they often no longer find such opportunities in their own living environment. It is advisable to look out for people with manual skills and time, such as grandparents, and invite them to kindergarten if you don't feel fit enough as an educator for the task. Hatcheries for wild bees, bumblebees and the like can be set up easily and with little expertise. It is important for everyone that they acquire a sunny place protected from wind and rain on window sills, on house walls, under roofs or in stable, well-roofed wild-bee hotels.

You can use hollow plant stems at least 10 cm long with openings 2-10 mm in diameter. Bundle and tie them together very tightly in a ring at least at two points. Hang the stalk bundles horizontally in protected places or lay them out or install them into larger wild-bee hotels.

Original nesting aids can be formed from clay or loam. They must have a secure base and can also be provided with deep drill holes. The holes should remain closed in the rear to prevent ventilation.

If one takes natural hardwood sections of birch, beech, oak, ash, fruit trees etc., one can also drill deep breeding tunnels with different diameters. Softwood such as spruce and pine is not suitable because the breeding tunnels deform so much when moist that the insects are trapped inside.

Such activities make it clear to the children that everyone can take care of the bizarre fellow creatures from the multifarious insect world with simple means. Humans have brought bees into existential distress through our way of life. Bees have been responsible for the fertility of flowering plants on earth with thousands of species for about 60 million years.

Learn to change the world – with your mind, heart and hands!



Wild bees

by Markus Menke (Freie Waldorfschule Sankt Augustin)

When we hear the word “bee”, we usually think of the honey bee - in our case the only species of bees kept by humans alongside about 570 wild species, the “wild, solitary bees”. They are all bees - the honey bee as well as wild bees.

Wild bees are very important as pollinators of wild and cultivated plants. Although they do not produce honey, they often pollinate much more efficiently than the honey bee. Many plants depend on them and without wild bees meadows would be less flowery and less colorful. The smallest animals are 3 mm, the largest 3 cm long; there are furry, almost bare, stout, slender, colorful and wasp-like yellow-black patterned wild bees. In addition, males and females differ within a species. Although some - among them the bumblebees - live in small social communities (“states”), the majority live solitary. A mated female takes care of her offspring herself and collects food for her self-built nest, lays eggs, and closes off the nest at the rear. The hatching larvae in the next year develop into bees without ever having met their mother. Whether social or solitary, only the female bees take over the task of feeding the offspring. Many bees e.g. sand bees and bumblebees have collecting hair on their hind legs, wall and leaf cutter bees have a “belly brush”, and mask bees swallow the pollen into their goiter.

Wild bees need:

- **Flowers:** The sugary nectar mainly for self-sufficiency, the protein-rich pollen as the main food for the larvae.
- **Nesting possibilities:** To build a nest, some species need **building materials** (e.g. clay, stones, tree resin, leaves, plant wool, petals).

If only one resource is missing, reproduction is not possible!

Fewer flowers and long distances between resources also mean less healthy offspring. Humankind’s far-reaching changes to landscapes made in recent decades have led to a dramatic shortage of these resources, so that **more than half of Germany’s wild bees are now on the red list.**

Pollen specialists and species whose nesting possibilities have become scarce have been particularly hard hit. **Therefore, protective measures must pay particular attention to these groups.**

Pollen specialists only collect pollen from selected plants for their offspring. If they are missing, the bees cannot change to flowers of other plant species and therefore they disappear locally.



Andrena fuscipes
Heather Mining-Bee



Anthophora furcata
Fork-tailed Flower-Bee



Melitta haemorrhoidalis
Bellflower Melitta



Megachile ericetorum
Banded Mud-Bee

Most bees dig nests in the ground. Sunny areas with little vegetation are particularly suitable, e.g. on embankments, ravines, steep walls, on ruderal surfaces (lands disturbed by natural or human-caused activity), extensively used pastures, field paths, etc. Other species need dead stalks (e.g. mullein) which they themselves hollow out, others need dead wood exposed to sun, which they gnaw out, some nest in abandoned snail shells and others in existing cavities. The latter also include species that like to move into “insect hotels”, although such ready-made structures on the market often do not sufficiently consider the needs of bees!

The lack of nesting places in empty cleared landscapes makes it all the more important to promote **areas of open ground**, to leave **old marrow-containing stems** (e.g. mullein), and to **refrain from clearing away dead wood in sunny places**.

Often each resource is located in a different area. Because many bees do not fly further than a few hundred yards and long flights consume energy and are associated with dangers, these areas should be close together and not cut up by barriers or (heavily trafficked) roads.



Eucera nigricans
Long-horned bee



Andrena labiata
Red-Girdled Mining-Bee

Protecting wild bees means preserving and creating their resources! This also includes:

- Tolerate and allow wild plants and well-kept “disorder”
- Where necessary, network landscapes (with hedges, dry-stone walls, etc.)
- Abstain from fertilization
- Mow meadows in mosaic-like way in order to create a high number of possible habitats which meet the nutritional needs of wild bees
- Abstain from using herbicides and pesticides

Schoolyards and kindergartens rich in flowering wild plants are not only beautiful for us. With a large offering of suitable pollen sources, we very effectively help wild bees who live in settlements, and we can make fascinating observations. In addition, the promotion of wild bees is worthwhile because wild bees create their habitats themselves once the living conditions are correct. It is important to preserve the habitats created, otherwise successfully established populations can quickly collapse again.

Tip:

This is another way to alternatively or additionally participate in our Waldorf 100 project Bees & Trees. The promotion of wild bees is a particularly suitable activity for schools where keeping honey bees seems to be a difficult task. The wild bees sustain themselves and flourish only if the correct living conditions are present. In addition to honeybee husbandry, the promotion of wild bees is also especially important since they belong in a species-rich landscape. When selecting plants, attention should be paid to the needs of wild bees. Honey bees will benefit as well.

Good forage sources are not only found in flowers and small shrubs, but also in larger woody plants (including several trees). – see first Internet link.

Links

- gaiabees.com
- themelissagarden.com
- honeybeesuite.com/
- <https://www.naturalbeekeepingtrust.org>
- rudolfsteinercollege.edu/beekeeping
- waldorf-resources.org: The international internet portal of the Pedagogical Section at the Goetheanum offers Waldorf teachers a rich selection of ideas and material. Further teaching material about bees will be continually added to the Lessons area until 2019.
- spikenardfarm.org: Excerpt: “Our mission is to promote sustainable and biodynamic beekeeping through education, experience-based research and a honeybee sanctuary and to help restore the health and vitality of the honeybee worldwide.”
- **wildbienen.info** (Dr. Paul Westrich)
Comprehensive, easy-to-understand and clearly presented information with high practical value from a leading expert in the German-speaking region, including many protective measures (e.g. with regard to food plants, the correct construction of nesting aids) and two seed mixtures. The contents mentioned in the article are dealt with in more detail.
- naturgartenfreude.de (Werner David)
Entertainingly written treasure trove on right and wrong nesting aids, good sources, suppliers of wild perennials for balcony and garden and much more
- wildbienen.de (Hans-Jürgen Martin)
Species portraits, many brilliant photos to help you determine your species, information, literature, book reviews and more

- **wildbiene.com** (Volker Fockenberg)
Species encyclopedia, wild bee forum on questions and exchange, “bee shop” (e.g. with nesting aids and plants), training courses, etc.
- **wildbienen.info/eucera** (Dr. Paul Westrich)
Trade journal “Eucera – Contributions to Apidology” (available free)
- Publikationen des BUND Niedersachsen
on the internet (PDF): Brochure Wildbienen und ihre Lebensräume in Niedersachsen (“Wild bees and their habitats in Lower Saxony”) (33 pages)
Poster (double-sided) Wildbienen in Niedersachsen (“Wild bees in Lower Saxony”) - Herb lore and species portraits
Brochure Wildbienen ein Zuhause geben (Giving wild bees a home) (26 pages)
Poster/Building instructions (double-sided) Wildbienen – Bauanleitung und Artenporträts (Wild bees - Building instructions and species portraits)

References (also the reference sources of the text)

- **Wildbienen – die anderen Bienen** (Wild bees – the other bees) by Paul Westrich, Munich 2011
- **Wildbienenenschutz – von der Wissenschaft zur Praxis** (Wild bee protection - from science to practice) by Antonia Zurbuchen and Andreas Müller, Zürich, Bern, Stuttgart, Vienna 2012
- **Taschenlexikon der Wildbienen Mitteleuropas** (Pocket encyclopedia of wild bees of Central Europe) by Erwin Scheuchl and Wolfgang Willner, Wiebelsheim 2016
- **Bienen Mitteleuropas** (The bees of middle Europe) by Felix Amiet and Albert Krebs, Bern 2012



Eucera nigricans
Long-horned bee



Hylaeus hyalinatus
Hairy Yellow-Face



Andrena bucephala
Big-headed mining bee

Trees

by Norbert Poeplau (Master beekeeper at Mellifera e.V.)

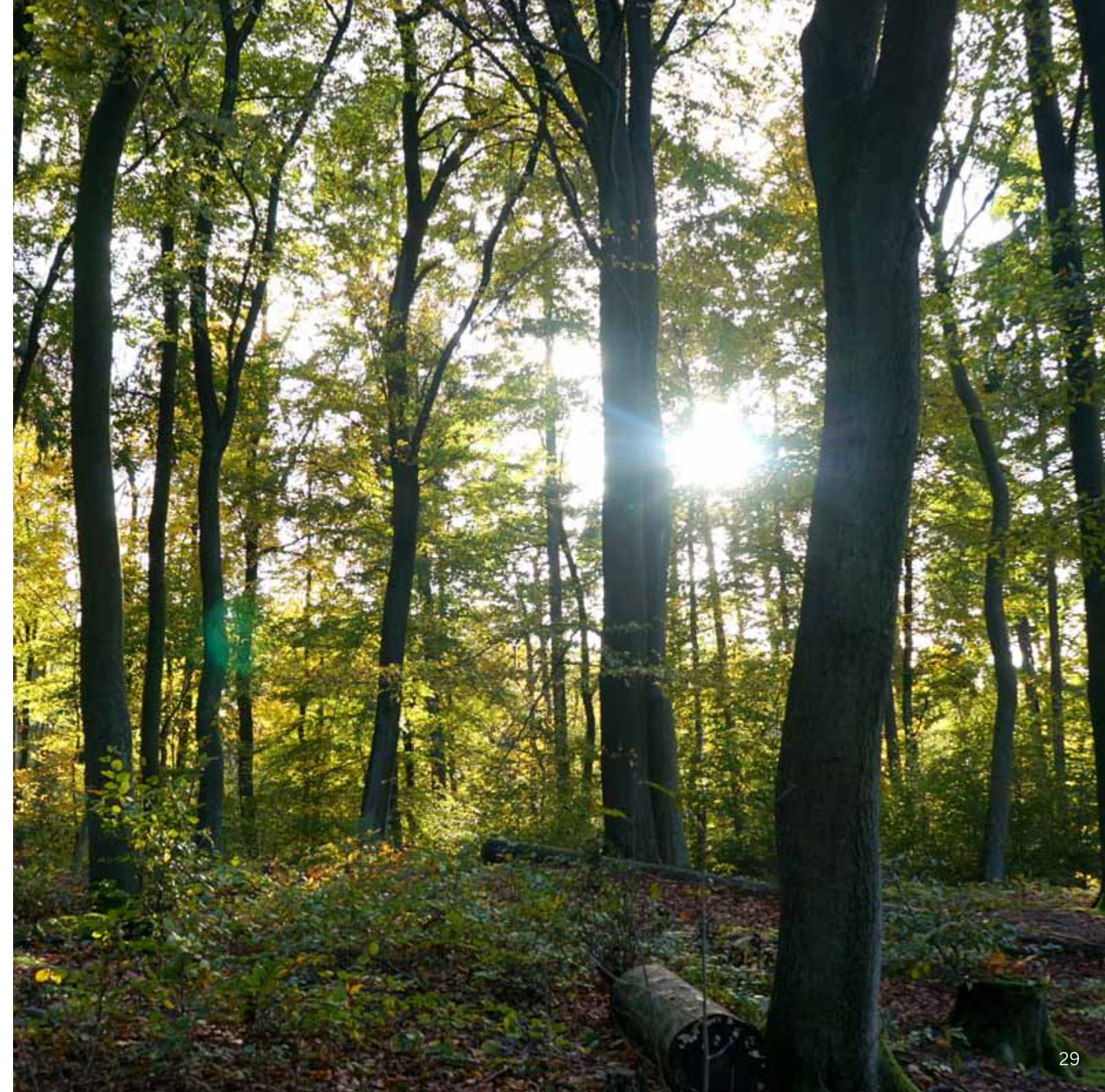
They grow towards the sky.

It was probably a coincidence that the huge tree was still freshly felled next to its root stump when I went for a walk in the forest with my father more than 50 years ago. Here I learned how to find out the age of a tree by counting the annual rings in the trunk. Because the tree was more than 100 years old, the counting only worked the second time. I was fascinated by the age, but also by the simple method of its determination. How clearly each year of life had inscribed itself in the wood. With a completely different view I then looked at the remaining trees and asked myself what they may have experienced, perhaps seen in their long life in this place? Do they realize that one of them is missing now? The relationships between humans and trees are very different in nature. As quiet, large creatures in the forest, trees can get a little scary. Pictures like the dark forest, with wind and storm, when the branches bend and crack, can quickly appear in our imagination. But we can also connect with trees in a completely different way by imagining their welcome shade on hot summer days, where after a hike we can recline under a wide cool canopy and maybe even take a short nap. Or we enjoy moments of lightness when the sun's round lights dance between the shadows of the moving leaves on the ground at our feet.

In some villages, central trees on a village square are still the linchpin of our life together

as a community, sometimes even a center for common parties and celebrations. These trees can connect us humans. They stand immovably in the same place all their lives, and in some cases become a landmark of the village over several generations. Often it is the silhouette of a tree that establishes its character deeply within us and allows us to recognize its species in completely different places, regardless of the time of year.

We find numerous inhabitants of the animal kingdom living on several "floors" of a single tree. Mammals such as the dormouse live in trees, birds build their nests there, and various insects live on the branches and bark. Exactly at blossoming time there are still more day guests. The pleasant, bustling hum of a lime tree in full bloom is the pure melodious sound of an insect choir in our ears. Bee colonies also occasionally find a long-standing home in hollow trees, without any beekeeper support. It has been discovered that these populations act out their own survival mechanisms to protect themselves from diseases and parasites, strategies which are suppressed in a beekeeper's care and the human objective of the largest possible honey harvest. A few hundred years ago, hollow trees were still the main dwellings of honeybee colonies. This connection has been preserved in German in the beautiful name "Bienenstock" (literally "bee trunk") for the beehive's consistently rectangular shape.



Current scientific work is also opening up to an approach that takes larger contexts into account in many areas. The term “ecosystem” attempts to bring together an almost infinite network of actors. Popular forest literature sheds light on how trees communicate with each other via soil mycorrhiza (fungi) and the benefit of this communication. Other studies show that the forest ecosystem has a positive, lasting influence on human stress symptoms. We can easily check the latter by trusting in our own feelings during a walk in the forest after a long session in front of a PC screen or similar concentrated indoor activity.

Consciousness of nature around us is changing rapidly. And it affects not only a small group of conservationists, but the civil society as well. The view of overall land management is awakened and we distrust the claims of the “experts” that monocultures, be it in the forest or in the field, are the best and only way the world can be saved from starvation.

This is even more so if these monocultures after destruction of the local diversity “automatically” trigger a chain of events like the use of chemical herbicides and pesticides. In some places we long for the diversity that has been sacrificed. And we do so for forest management that puts top priority on recreational value instead of economic profit.



With the Waldorf 100 project “Bees & Trees” I see the potential to turn the power of trees into an experience for Waldorf students all over the world. In every region of the world we can certainly draw upon different traditions in the relationship between humans and trees. After all, we humans have spent eons together with trees on our earth. This enormous potential can be built up, revitalized, further developed and brought to blossom, in particular outside the classroom walls. Then the bees will be happy with us.





Melitta haemorrhoidalis
Bellflower Melitta

Literature tips

- **The bee-friendly beekeeper. A sustainable approach.** by David Heaf (2010): Northern Bee Books
- **Natural beekeeping with the Warré hive - a manual.** by David Heaf (2013): Northern Bee Books
- **Global Hive: Bee Crisis and Compassionate Ecology.** by Horst Kornberger (2012): This book was published by the author himself
- **Honeybee democracy** by Thomas D. Seeley (2012): Princeton Univers. Press
- **The buzz about bees. Biology of a superorganism.** by Jürgen Tautz (2009): Springer
- **Die Biene im Lehrplan der Freien Waldorfschulen** (Bees in the curriculum of Free Waldorf schools) - will be published by 2019, the project's book with suggestions for teaching at all ages, concrete examples, recipes etc.

Links

- waldorf-100.org/en/project/bees-trees/ Project page Waldorf-100 Bees & Trees
- waldorf-resources.org: The international internet portal of the Pedagogical Section at the Goetheanum offers Waldorf teachers a rich selection of ideas and material. Further teaching material about bees will be continually added to the Lessons area until 2019.
- www.spikenardfarm.org: Excerpt: "Our mission is to promote sustainable and biodynamic beekeeping through education, experience-based research and a honeybee sanctuary and to help restore the health and vitality of the honeybee worldwide."
- bee-friendly.co.uk/
- gaiabees.com
- honeybeesuite.com
- naturalbeekeepingtrust.org
- rudolfsteinercollege.edu/beekeeping

Films

- **"More than Honey"**, a German documentary by Markus Imhoof (2012), Senator Film Verleih. There are accompanying materials that provide ideas on how "More than Honey" can be used in school lessons. Educational material to accompany the film is also available: bienenschule.de/fix/doc/MoreThanHoneybegleitmaterial1%20Schule.pdf
- **Queen of the sun: What Are the Bees Telling Us?** When the award-winning documentary filmmaker Taggart Siegel set out to find out something about the death of bees, he came across Rudolf Steiner's predictions of what would happen to bees in industrialized agriculture. He then visited beekeepers around the world to find out how to keep bees properly. A moving and serious film that gives hope to the portraits of the often very original beekeepers. Trailer: queenofthesun.com/about/trailer/

For children

- **100 Plants to Feed the Bees: Provide a Healthy Habitat to Help Pollinators Thrive.** by The Xerces Society (2016): Storey Publishing, LLC
- **Busy, Buzzy Bee.** by Karen Wallace (1999): DK Readers
- **Bumble Bees: buzzing, beautiful, beneficial, big bees.** by Carol Ann Kearns (2017): Northern Bee Books
- **Das Bienenbuch** (The Bee Book) (Age: from 9 years) by Jakob Streit, Verlag Freies Geistesleben, Stuttgart, 2012
- **Kleine Biene Sonnenstrahl. Ein Bienenmärchen** (Little bee sunshine. A bee fairy tale) (Age: from 5 years) by Jakob Streit, Verlag Freies Geistesleben, Stuttgart, 2014
- Streit, Jakob (2014): **Kleine Biene Sonnenstrahl. Ein Bienenmärchen.** Verlag Freies Geistesleben, Stuttgart. (Alter: ab 5 Jahre)



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Joie de vivre, responsibility and creation

Who can resist a piece of good bread spread with delicious, golden-yellow honey at breakfast? Honey sweetness lies in the air and with each spoonful of honey we can perceive the collected “sunbeams” with all our senses. What could be more obvious than supporting the Bees & Trees project with Sedulus? The activities were initiated by Waldorf 100 together with Mellifera e.V. for the centenary of the founding of Waldorf Schools in 2019 in the sense of our responsibility for the environment.



The bridge between honey obtained from beekeeping and the manual production of block booklets in Sedulus paper workshops lies in the added social value for the common good of our society and in our understanding of the sustainable use of our paper resources. In concrete terms, this is reflected in the respectful treatment of honeybees and people in need of assistance in our workshops.

The translation of “sedulus” from the Latin literally stands for industriousness and diligence. You are welcome to convince yourself of our work in our affiliated workshops, and produce your own block and project booklet yourself, for example with a honey-yellow cover or other options.

More information at: www.sedulus.de

Sedulus - A network of six social therapy paper workshops

