The Buzz on Bees

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Spring Collegium XLII

The Buzz on Bees

Our relationship with Apis mellifera through history

Time-Scale

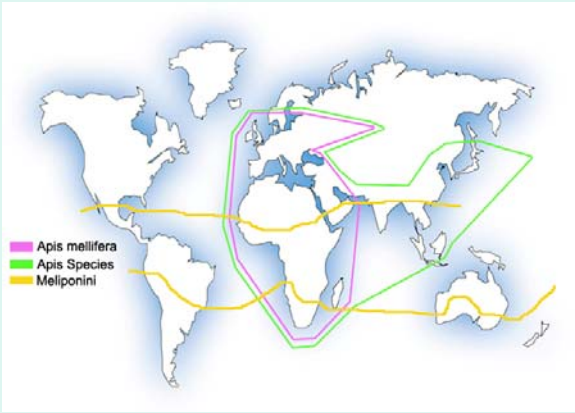
- 150-100 million years ago
  flowering plants, nectar & pollen
- 50-25 million years ago
  solitary bees & early primates
- 20-10 million years ago
  social bees & honeymaking
- A few million years ago
  mankind is eating honey
- Ten thousand years
  records of man, bees and honey

Melittosphex

100 million year old bee specimen discovered at a "mine in the Hukawng Valley of northern Burma, has been named *Melittosphex burmensis*. It has waspish features, such as narrow hind legs, but also branched body hair and other characteristics of bees."

news.bbc.co.uk: 10.25.06

30 Million Years Stingless bee, Columbian Amber



Apis cerana
Eastern Honeybee

Southern & Southeast Asia

Southern & Southeast Asia

Apis florea
Dwarf Honeybee

Apis mellifera
Western Honeybee

Africa, Middle East & Europe

Asia & India

Apis dorsata
Giant Honeybee

So, who lives in a hive?

Hive Inhabitants

	Queen	Drone	Worker
Size	Large	Medium	Small
#/Hive	1	0-200	20k-200k
Lifespan	~2 yrs	21-90 days	20-140 days
Sex	Female	Male	Sterile Female
Function	kill sisters/mother	mate	make comb
	mate		tend larvae
	lays eggs		tend young
	secrete pheromone		tend queen
			clean hive
			gather nectar
			gather pollen
			gather propolis
			evaporate nectar
			defend hive
			"undertaking" duties
			starve drones

From plantphys.info

Life Cycle of Worker Bee

1. 1-3 days: Clean cells
2. 3 days old: feeds the older larva; gathers pollen and honey from hive
3. 6 days old: Feeds younger larvae; begins to fly
4. 10 days old: packs pollen; feeds forager bees; creates wax; makes honey
5. 20 days old guard duties
6. 21 days-6 weeks (death)…nectar/pollen/propolis collection

Bee Fruitful and Multiply

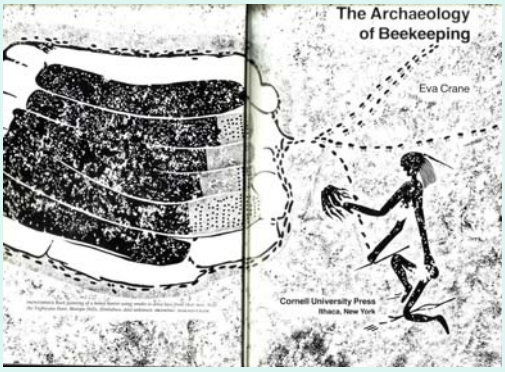
- Naturally: Virgin Queen mates at 15mph. 7-10 males a day, 2-3 days. Males fall off paralyzed and die
- "Instrumental Insemination"
- Of the 90 million sperm deposited, only 7 million are kept within the female for reproduction
- After each 20 eggs laid, the Queen is fed=
- Lays 1500 eggs/day or ~200k/year
- Brood temperature in hive must remain 93-95°F

Stages in Life Cycle

		Worker	*Queen*	*Drone*
Open Cell:	Egg	3 days	3 days	3 days
	Larva	5 days	5 days	7 days
Sealed Cell:				
	Larva/Pro-pupa	3 days	2 days	4 days
	Pupa	10 days	6 days	10 days
From egg to emergence:		21 days	16 days	24 days
After emergence:				
	Summer bee	6 weeks	~2 years	4 months
	Winter bee	6 months		

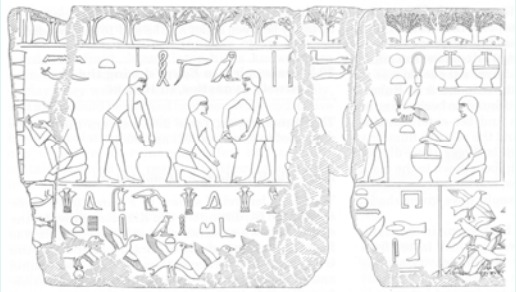
Rock Painting
6000 BC
"Cave of the Spider", Valencia, Spain

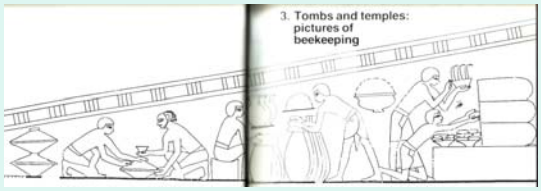
Rock Painting
4500-4000 BC
Castellón Province, Spain



Honey hunter using smoke. Toghwana Dam, Matopo Hills, Zimbabwe.

Egyptian Beekeeping





"The God Ra wept and his tears fell to the ground and were turned into bees. The bees began to build and were active on all flowers of every kind belonging to the vegetable kingdom. Thus wax came into being, thus was created honey from the tears of the God Ra."

~ 600BC Tomb of Pabasa.
"Chief Steward of the God's Wife Nitocris"

Egypt

- 2400-600 BC
- Used to cultivate crops in lower Egypt
- Symbol of lower Egypt was the bee
- Pharoah was called “Bee King”
- Ramses III gifted 21k jars of honey to Hapi God of the Nile
- Honey used in mummification
- Honey used in marriage ceremony
- Honey used in open wounds
- Wicker baskets overlaid with clay
- Lost Wax Method
- Smoke also used in beekeeping

India

- Earliest records -Vedic Period (1500-500 BC)
- 1400 BC Susruta (famous surgeon) recognized 8 honey varietals
- 1000 BC laws of Manu regulated that king could only take a sixth of honey production
- Believed hive was ruled by a “king” and many bee “wives”
- Hives were made of grasses/reeds/twigs, logs and pots.
- Used smoke to gather honey
- Beekeeping decreased after 200 AD

Greece

- Dionysus, god of wine, gave honey to mankind
- Aristaeus (minor deity) gave us bees through bugonia process
- Hippocrates discussed nutritional & pharmaceutical value of honey
- Aristotle discussed keeping bees as part of farming
- Plato believed they were the righteous reincarnate
- Hymettus Mountains produced the best honey – thyme, a varietal honey
- Virgil, book 4 of Georgics
- Aphrodite – Queen Bee; Mount Eryx

The Ancient Britons & Beyond

- Before Emperor Claudius (10BC-54AD) colonized the island seafaring Phonecians referred to Briton as “Isle of Honey”
- Druids sang of honey
- Pytheas, Greek Merchant travelled to Britain between 330-320 BC and spoke of their beekeeping and an “intoxicant” made of wheat and honey
- Under Roman rule, vast quantities of mead and honey consumed
- Columella described how to find forest honey
- “Leges forestarum” from 1100s lists hunting/grazing laws
- Scotland – no bees/honey mentioned.
- 500’s: St. Modomnoc was said to have brought bees to Ireland by boat.

- Medieval Christians believed bees rested for the 3 winter months, because Christ was in the tomb for three days
- 500's "Leges Barbarorum" – Frankish & Germanic Laws
- 500-1000 AD Decline in organized beekeeping due to raiding hordes
- 600's Irish law not much concerned with bees only 1 reference
- 800-814 Charlemagne, 1st Holy Roman Emperor created governing laws for beekeeping. Candles must be pure beeswax, Wittenberg required 35k lb/wax a year
  - Nurnberg Reichswald primary forest in Germany
  - Taxes: 2/3 of honey and 1/3 of beeswax
  - Post Charlemagne "bee dues" were a feudal right
- 1100's "Russkaya Pravda" Russian bee laws
- 1015 a fire in Meissen Germany was extinguished with Mead due to lack of water

- 1079 William Conqueror, New Forest established, beekeepers used banks of earth to protect their bees as fences were not allowed in royal hunting grounds
- 1086, William the Conquerer - Domesday Book – after milling, fishing, and mining, beekeeping was largest industry
- Norman kings created Royal Forests – bees/honey were their property
- 1100's Sweden had bee laws
- 1200's Welsh law had bee references
- 1350 Nurnberg had bee laws
- Common at Monasteries; Catholic Church required pure beeswax from "virgin bees"
- Catholics: Bees fled The Garden of Eden and were chaste and sinless

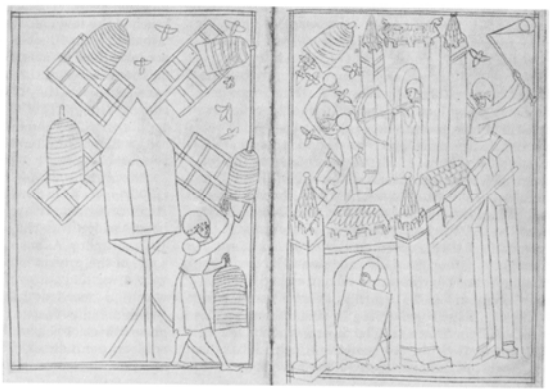
- Medieval Russia: forest beekeeping. Trees marked. 11th & 12th Century had laws against destruction or theft of bees/bee trees
- Medieval Germany and Eastern Europe also had forest beekeeping
- 1347 King Kazimierz I (Poland) in Wislica statues gave tree beekeepers self rule and jurisdiction
- Protestantism caused decline in beekeeping – not as much use for wax; sugar and molasses became more popular
- 1523 First printed English book to mention beekeeping was John Fitzherbert's Book of Husbandry
- Women became focal beekeepers in latter 16th Century
- 1568 Thomas Hill's A Profitable Instruction of the Perfect Ordering of Bees
- 1609 The Feminine Monarchie by Charles Butler

Bees in Warfare

- 390 BC Xenophon relates in "Anabasis" - Greek soldiers poisoned by eating honey near Trapezus; became violently ill
- 357BC Aeneas Tacticus, 1st military historian wrote in his treatise on defending fortified positions that releasing wasps and bees into tunnels was beneficial
- 3rd Mithridatic War (75-63BC) soldiers of Pontus put bears and bees into tunnels of the Roman general Lucullus
- ~67 BC Pompeii's 1000-man army advanced against King Mithridates VI and his allies, the Heptakometes. Used Rhododenron/Azalea honey
- 70-19 BC Roman Poet Virgil protected his belongings from looting soldiers by placing them in beehives
- 30-60 AD Romans use bees on catapaults, then Dacians do. By the end of the Roman empire they had catapaulted so many beehives there was a dearth of them in the kingdom
- 6th Century: Saint Gobnat of Ireland warded off cattle rustlers by shaking her bees into a frenzy
- 908 Ethelffleda of Mercia led the people of Chester to throw bee skeps down upon invading Danes who abandoned their seige

Illustration from Canterbury Psalter, 1100s.

- 940 Otto I, King of the Franks and Saxons - his stronghold was under seige by Geiselbert, Duke of Lorraine, defenders threw hives at horsemen disabling the cavalry
- 946 – 5000 Drevlians served mead, then slaughtered to avenge death of Olga of Kiev's (or St. Olga) husband, King Igor
- 997 – Belgorod (near Black Sea) sunk tubs of mead into ground to make enemies believe they drew unlimited supplies of food/drink from the earth – they could not be starved out
- 1099 Siege of Jerusalem (1st Crusade), Muslims threw incendiary devices at Christians which included beeswax
- 11th Century: Emperor Henry 1st of England's General Irnmo threw beehives from cliffs onto attacking troops of Geiselbert, Duke of Lorraine

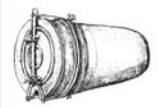


- 12th Century, Third Crusade, King Richard used beehives against the Saracens
- 1200s incendiary grenades or firepots were carried on lances, filled with mixtures of salt-petre, covered with beeswax
- 1289, Gussing, Hungary: citizens threw beehives, fire and hot water on troops of Albert, Duke of Austria.
- 1489 10,000 Tartar's defeated by Russians who left mead behind to intoxicate the army
- 1513 General Baruiga of Emmanuel the Fortunate, King of Portugal, was defeated by Moors in Xantiane who threw hives from citadel walls
- Mediterranean naval battles

Hives

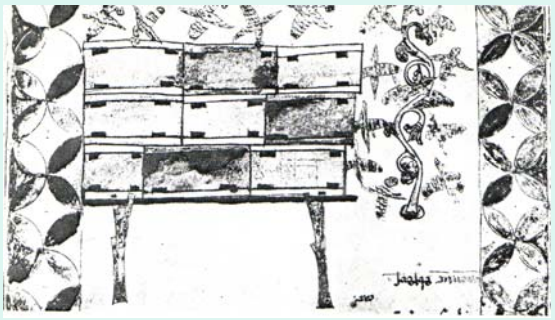
Sun dried mud → Baskets (weaved/coiled) → Pottery → Forest

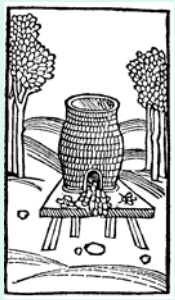
400 BC, Athens



500-600 BC, Trachones

1682





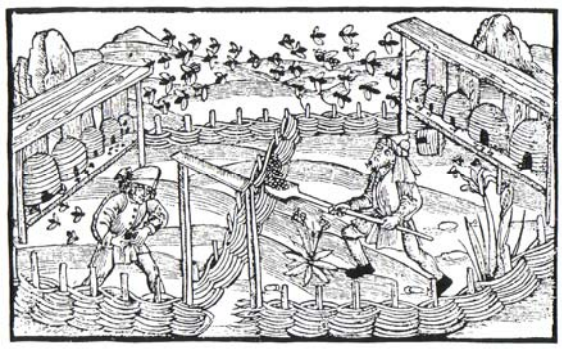
14th Century, Tacuinum Sanitatis.

Beekeeper with straw skeps. Woodcut from Sebastian Munster's Cosmographia (1545)

Cutting Comb: 1510 woodcut from an edition of a 1495 book by Petrus de Crescentiis.

Buckfast Abbey 1st in England

Tolquhon castle



Medieval German woodcut 1502. Based on Virgil's work regarding bee enemies. Grüninger.

Protective structures most commonly found in Cumbria, Lancashire, Yorkshire, Devon, Cornwall and north Kent

Pieter van der Borcht, Netherlands. copperplate engraving late 1500's

Forest beekeeping

Areas such as
Russia
Poland
Germany

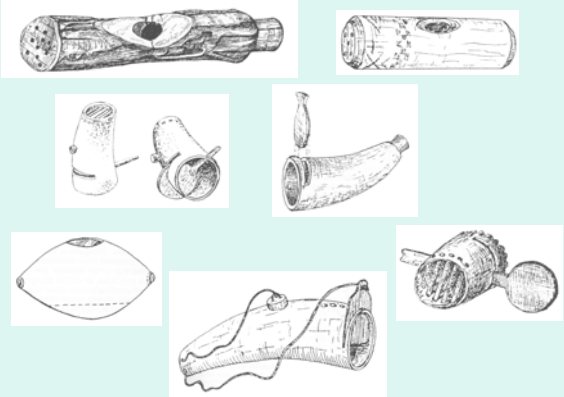
Bee walks

Marks used to identify ownership of trees that contained bee hives

Danish Woodcut, 1649, Hervigius.

Illustrates horizontal (Denmark) and upright (Sweden) hives.

Two types of smokers, four hives tools, and bees drinking at a water supply also shown. The two men are carrying a hive. The small square board is possibly for a swarm to settle on.



Comb Sweet Comb

Hive Facts

- Healthy colony = 50,000 bees; 25,000 will be foraging.
- Of the 25,000, 6000 – 9000 gather pollen.
- 1 bee averages 10 trips/day. Hive receives 60,000 – 90,000 loads of pollen/day.
- Bees have two stomachs, one is a honey stomach, this is not a digestive organ, but a collection chamber. The weight of the sac can equal more than 90% the weight of the bee.

Show Me The Honey!

- 1 bee visits 10-100 flowers for one load of pollen.
- Can fly up to 9 miles for one load.
- Ex: Hive gathers 75,000 loads of pollen, averaging 50 flowers/load, then in one day one hive can reach 3,750,000 flowers!
- A single pollen pellet averages 22 milligrams; 1 hive requires 80lbs of pollen in 1 season.
- 28,000 milligrams = 1oz therefore 1,273 loads make 1 oz and 20,363 loads make 1 lb. It would take 1,629,090 loads to produce 80 lbs.
- At 50 flowers/load the hive would visit 81,454,500 flowers to gather 80 lbs of pollen
- It takes 20lbs of honey, digested and transformed by the bees to make 1lb of wax. Secreted by special glands on belly of bee

Pollen colors!

The Waggle Dance

- ..\..\..\bees\bee_waggle.flv
- Older bees dances at slower tempos (longer flights)
- Honey stomach is a fuel tank. A five hundred meter flight takes 1.61 milligrams; one thousand meters requires 2.2 milligrams of honey. Fifteen hundred meters needs 4.13 milligrams.

From National Honey Board

	Average	Range	Standard Deviation
Fructose/Glucose Ratio	1.23	0.76 - 1.86	0.126
Fructose, %	38.38	30.91 - 44.26	1.77
Glucose, %	30.31	22.89 - 40.75	3.04
Minerals (Ash), %	0.169	0.020 - 1.028	0.15
Moisture, %	17.2	13.4 - 22.9	1.46
Reducing Sugars, %	76.75	61.39 - 83.72	2.76
Sucrose, %	1.31	0.25 - 7.57	0.87
pH	3.91	3.42 - 6.10	---
Total Acidity, meq/kg.	29.12	8.68 - 59.49	10.33
True Protein, mg/100g.	168.6	57.7 - 567	70.9

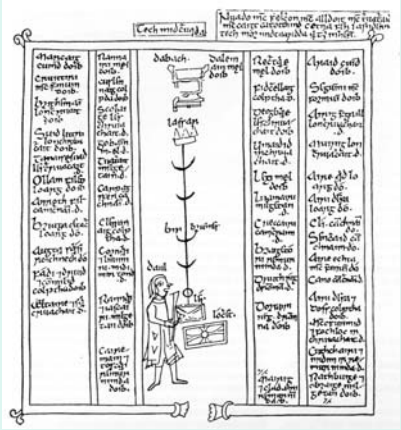
Toxic Honey

- Pontic Azalea
- Carolina Jasmine
- Horse Chestnut
- Loco weed
- Southern Leatherwood
- Rhododendron
- Jimson weed
- Tansy ragwort
- Mountain Laurel

- *If it's good for ancient Druids, runnin' nekkid through the wuids, Drinkin' strange fermented fluids, it's good enough for me! -* Pete Seeger

Bee My Honey!

- 1500BC, Bronze Age grave contained honey based drink in bucket
- 550BC, Bronze Age Tomb near Stuttgart Germany, a 500-litre cauldron with remnants of mead
- 300AD records indicate that Attila the Hun offered mead in his court.
- 996AD 5000 litres of mead drunk in Vasil'ev during a 7 day victory feast over the Turkish Peshenegs
- 1100's the second most important purchase (behind wheat) by Russian monasteries was honey specifically for mead



Africanized Honeybees

AFB on left
European on
Right

AFB's

- 1957 26 swarms of AHB's escaped in Brazil
- Queen lays ~4k eggs a day
- Larva develop faster than EHB
- Produces more drones
- Can swarm dozens of times in a season
- "Commando swarming"
- Cape bees

"He is not worthy of the honeycomb that shuns the hive because the bees have stings." Shakespeare

Latin bestiary, England, 1100's

French manuscript, 1400's. Dioscorides' Tractatus de herbis.

Ain't Mis-beehavin'

- Spring time. Populations low, honeyflow on
- Warm, sunny, calm days
- Bees gorged with food
- Between late morning and early afternoon (~10am to 1pm)

Bad Bee Moods

- Insecticides
- Poor honeyflow
- Autumn
- Impending thunderstorm; cool, wet, cloudy days
- Hot, sultry, humid days. Windy days.
- Reaction to hair oil, lotion, perfume
- Queenlessness
- AFB's

Treatments

- Ice packs or cold water
- Vinegar
- Raw onions rubbed on area
- Paste of aspirin tablets
- Honey
- Baking soda
- Ammonia
- Paste of meat tenderizer
- Mud
- ER

Bee genome mapped in 2006; others include fruit fly, mosquito and silk moth

To Bee or Not To Bee

European Honeybees

German "Dark" Bee

Italian Bee

Carniolan Bee

Caucasian Bee

Langstroth Hive

Outer Telescoping Cover
20" x 18 1/4" x 2"

Inner Cover
20" x 16 1/4" x 3/4"
Plywood with feeder hole or
Screened with #8 wire mesh

Section Comb Super

Shallow Super
20" x 16 1/4" x 5 11/16"
Frame size: 5 3/8"

Medium (Illinois) Super
20" x 16 1/4" x 6 5/8"
Frame size: 6 1/4"

Queen Excluder

Full Depth Hive Body
20" x 16 1/4" x 9 5/8"
Frame size: 9 1/8"

Bottom Board
Reversible solid wood, or
Screened with #8 wire mesh

Hive Stand (optional)
20" x 16 1/4" x 25 1/4"

Top Bar Hive

Osmia lignaria

Blue Orchard Bee

- Foraging done within 200 yards of nest
- 1 honeybee will visit 700 blooms/day and completely pollinate 30 (5% success). 1 female osmia will completely pollinate 1600 blooms (99% success)
- It only takes 200 female osmia to pollinate the same acre of apple trees that requires one hive of 40,000 bees.
- One of 3500 native species of wild bees
- Nest in holes 5/16 of an inch, approx 4" deep
- Used by Japan's apple growers.

Questions?

Don’t worry – bee happy!
Enjoy Collegium!

Table of Contents

Bee Glossary

(Excerpts from www. Beekeeping.com)

A

Absconding swarm
An entire colony of bees that abandons the hive because of disease, wax moth, or other maladies.

Afterswarm
Swarms which leave a colony with a virgin queen, after the first (or prime) swarm has departed in the same season; afterswarms are also referred to as secondary or tertiary swarms.

Africanized Bee (AHB)
A term used indiscriminately to describe the African honey bee *Apis mellifera scutellata* (formerly *A.m. adansonii*) or its hybrids; an African bee released in Brazil and known for its volatile nature, its aggressive behavior may cause concern to the non-beekeeping public.

Alarm odor
A chemical (iso-pentyl acetate) substance released near the worker bee's sting, which alerts other bees to danger; also called alarm pheromone.

American foulbrood
A brood disease of honey bees caused by the spore-forming bacterium, *Bacillus larvae* and characterized by a ropy or gummy condition of affected larvae. It is the most widespread and destructive of the brood diseases, afflicting queen, drone, and worker larvae alike. Adult bees, however, are not affected by AFB. *Bacillus larvae* occurs in two forms: vegetative (rod-shaped bacterial cells) and spores. Only the spore stage is infectious to honey bees. The spores germinate into the vegetative stage soon after they enter the larval gut and continue to multiply until larval death. American foulbrood spores are highly-resistant to desiccation, heat, and chemical disinfectants. These spores can remain virulent for more than forty years in combs and honey. Spores are easily transported by either infested bees or infected equipment. Beekeepers moving contaminated equipment are, by far, the greatest source of AFB spread. Considerable progress was made in the application of chemotherapeutic agents to control American foulbrood. Of the sulpha drugs, sulphathiazole and sulphadiazine showed greatest effectiveness as preventive agents, though it was important to point out that the application of such drugs required careful supervision and that indiscriminate use, with undue reliance on their effectiveness, could result in masking the disease and therefore aid in its dissemination . The effect of antibiotics was also examined under laboratory and field conditions. Terramycin, fed in honey or syrup, provided the most effective protection; however, the sulpha drugs retained their potency on storage much longer than the antibiotics tested. Visual signs of AFB begin to show up in the hive after young, susceptible larvae eat the spores that have been mixed in the brood food fed by nurse bees. If left untreated, infection spreads rapidly until the colony population is so weakened it dies during cold months by the ravages of the wax moth, or just by sheer lack of population, since all larvae die.

Apiary (pl-ies)
The location and total number of hives (and other equipment) at one site; also called bee yard.

Apiculture
The science and art of raising honey bees.

Apis mellifera
A native European bee that is kept for its honey and wax in most parts of the world, has developed into several races differing in size, color, disposition, and productivity, and has escaped to the wild wherever suitable conditions prevail; subspecies include: *a. m. ligustica* (Italian), the most common domesticated bee; *a.m. caucasia* (Caucasian); *a.m. carnica* (Carniolan) *a.m. mellifera* (German black); and *a.m. scutellata / a.m. adonsonii / a.m. intermissa* (African).

B

Bee bread
Pollen collected by bees and stored in wax cells, preserved with honey.

Bee space
A space big enough to permit free passage for a bee but too small to encourage comb building, and too large to induce propolizing activities; measures ¼ to 3/8 inch (9.5mm).

Beeswax
A substance that is secreted by bees by special glands on the underside of the abdomen, deposited as thin scales, and used after mastication and mixture with the secretion of the salivary glands for constructing the honeycomb. After the bee forms it into comb, beeswax is glossy and hard but plastic when warm, insoluble in water but partly soluble in boiling alcohol and in ether, and miscible with oils and fats. Beeswax is a mixture consisting of the palmitate of myricyl alcohol and other higher esters, free cerotic acid, and hydrocarbons. Its melting point is from 143.6 to 147.2 degrees F. **2.** a wax obtained as a yellow to brown solid by melting a honeycomb with boiling water, straining, and cooling and used especially in polishes, modeling, and making patterns -- called also *yellow wax* [Middle English *wax, wex,* from Old English *weax;* akin to Old High German *wahs* wax, Old Norse *vax,* Lithuanian *vakas* wax, and probably to Old High German *wiohha* lint, wick]

Brood
Immature stages of bees not yet emerged from their cells; the stages are egg, larvae, pupae.

C

Candy plug
A fondant type candy placed in one end of a queen cage to delay her release.

Carnolian bees
A grayish race of honey bee Apis mellifera carnica named for Carniola, Austria but originating in the Balkan region; while they are gentle and do not propolize, they tend to swarm more than other races.

Caucasian bees
A black race of honey bee A. mellifera caucasica, originating in the Caucasus mountains; gentle but tend to propolize excessively.

D

Dequeen
To remove a queen from a colony

Dividing
Separating a colony to form two or more units.

Drone
The male honeybee which comes from an unfertilized egg (and is therefore haploid) laid by a queen or less commonly, a laying worker.

Drone congregating area (DCA)
A specific area to which drones fly waiting for virgin queens to pass by; it is not known how or when they are formed, but drones return to the same spots year after year.

E

European foulbrood
An infectious brood dis ease of honey bees caused by *Streptococcus pluton*.

F

Fertile queen
A queen, inseminated instrumentally or mated with a drone, which can lay fertilized eggs

Field Bees
Worker bees which are usually 21 or more days old and work outside to collect nectar, pollen, water and propolis; also called foragers.

G

Guard Bees
Worker bees about three weeks old, which have their maximum amount of alarm pheromone and venom; they challenge all incoming bees and other intruders.

H

Hive
A manmade home for bees including a bottom board, hive bodies, frames enclosing honey combs, and covers.

Honey
A sweet viscid material produced by bees from the nectar of flowers, composed largely of a mixture of dextrose and levulose dissolved in about 17 percent water; contains small amounts of sucrose, mineral matter, vitamins, proteins, and enzymes.

Honeydew
An excreted material from insects in the order Homoptera (aphids) which feed on plant sap; since it contains almost 90% sugar, it is collected by bees and stored as honeydew honey.

Honeybee
The common name for Apis mellifera (Honey bearer), a highly social insect, Order Hymenoptera (membranous wings); correctly printed as two words.

Honey Flow
A time when enough nectar-bearing plants are blooming such that bees can store a surplus of honey.

Honey Sac
Also called honey stomach, an enlargement at the posterior (back) end of a bees' esophagus but lying in the front part of the abdomen, capable of expanding when full of liquid such as nectar or water.

Honey stomach
An organ in the abdomen of the honey bee used for carrying nectar, honey, or water.

I

Instrumental Insemination
The introduction of drone spermatozoa into the genital organs of a virgin queen by means of special instruments

Italian Bees
A common race of bees, Apis mellifera ligustica, with brown and yellow bands, from Italy; usually gentle and productive, but tend to rob.

L

Langstroth, L. L.
A Philadelphia native and minister (1810-95), he lived for a time in Ohio where he continued his studies and writing of bees; recognized the importance of the bee space, resulting in the development of the movable-frame hive.

Laying Workers
Worker bees which lay eggs in a colony hopelessly queenless; such eggs are infertile, since the workers cannot mate, and therefore become drones.

Leg Baskets
Also called pollen baskets, a flattened depression surrounded by curved spines located on the outside of the tibiae of the bees' hind legs and adapted for carrying flower pollen or other dusts.

M

Mating flight
The flight taken by a virgin queen while she mates in the air with several drones.

Mead
Honey wine

Midnight Hybrid
A combination of the Caucasian and Carniolan races.

Migratory Beekeeping
The moving of colonies of bees from one locality to another during a single season to take advantage of two or more honey flows.

Moisture Level
A major difference between nectar (20% to 40% water) and honey (less than 18% water).

N

Natural Honey
Unfiltered and unheated honey.

Nectar
A liquid rich in sugars, manufactured by plants and secreted by nectary glands in or near flowers; the raw material for honey.

Nectary Glands
Special nectar secreting glands usually found in flowers, whose function is to attract pollinating insects, such as honey bees for the purpose of cross pollination, by offering a carbohydrate-rich food.

Nurse bees
Young bees, three to ten days old, which feed and take care of developing brood.

O

Observation Hive
A hive made largely of glass or clear plastic to permit observation of bees at work

P

Package Bees
A quantity of adult bees (2 to 5 pounds), with or without a queen, contained in a screened shipping cage.

Poison Sac
Large oval sac containing venom and attached to the anterior (front) part of the sting; stores venom produced by the poison gland, and its primary ingredients are peptide and mellitin.

Pollen
The dust-like male reproductive cells (gametophytes) of flowers, formed in the anthers, and important as a protein source for bees; pollen is essential for bees to rear brood.

Pollen Basket
See Leg Basket.

Pollen Cakes or Pollen Pellets
The cakes of pollen packed in the leg baskets of bees and transported back to the colony.

Propolis
Plant resins collected and modified by bees; used to fill in small spaces inside the hive.

Q

Queen
A fully developed mated female bee responsible for all the egg laying of a colony; recognized by other bees by her special pheromones (odors).

Queen Cage
A special cage in which queens are shipped and/or introduced to a colony, usually with 5 or 6 young workers called attendants, and a candy plug.

Queen Cage Candy
Candy made by kneading powdered sugar with invert sugar syrup until it forms a stiff dough; used as food in queen cages.

Queen Cell
A special elongated cell resembling a peanut shell in which the queen is reared; usually over an inch in length, it hangs vertically from the comb.

Queen Substance
Pheromone material secreted from glands in the queen bee and transmitted throughout the colony by workers to alert other workers of the queen's presence.

Queenlessness
A colony has no queen.

R

Requeen
To introduce a new queen to a queenless hive.

Robbing
The act of bees stealing honey/nectar from the other colonies; also applied to bees cleaning out wet supers or cappings left uncovered by beekeepers.

Royal Jelly
A highly nutritious, milky white glandular secretion of young (nurse) bees; used to feed the queen and young larvae.

S

Sacbrood
A brood disease of bees caused by a filterable virus which interferes with the molting process; the dead larva resembles a bag of fluid.

Scout Bees
Worker bees searching for a new source of pollen, nectar, propolis, water, or a new home for a swarm of bees.

Skep
A beehive without moveable frames, usually made of twisted straw in the form of a basket; its use is illegal in the U.S.

Split
To divide a colony for the purpose of increasing the number of hives.

Sting
An organ belonging exclusively to female insects developed from egg laying mechanisms, used to defend the colony; modified into a piercing shaft through which venom is injected.

Sting Sac
See Poison Sac.

Surplus Honey
Any extra honey removed by the beekeeper, over and above what the bees require for their own use, such as winter food stores.

Swarm
A collection of bees, containing at least one queen that split apart from the mother colony to establish a new one; a natural method of propagation of honey bees.

Swarming
The natural method of propagation of the honey bee colony.

Swarming Season
The time of year, usually mid-summer, when swarms usually issue.

V

VIRGIN QUEEN
An unmated queen bee.

W

Wax Glands
The eight glands located on the last 4 visible, ventral abdominal segments of young worker bees; they secrete beeswax droplets.

Wax Moths
Usually refers to the Greater wax moth, Galleria mellonella whose larvae bore through and destroy honeycomb as they eat out its impurities.

Wax Scale
A drop of liquid beeswax that hardens into a scale upon contact with air; in this form it is shaped into comb.

Worker Bees
Infertile female bee whose reproductive organs are only partially developed, responsible for carrying out all the routine of the colony.

Common Types of European Honeybee

(from the Beekeeper's Handbook, 2nd Edition)

Italian honey bee (Apis mellifer ligustica Spin):

Introduced in the US ~1859.

Advantages:	Disadvantages:
Good brood rearing habits Hardy Lighter color makes queen easy to locate Moderate tendency to swarm Moderate propolizers Generally productive and gentle Common and easy to obtain	Poor orientation, drifting Not as gentle as other races Tendency to rob weaker hives Can be susceptible to many diseases

Caucasian honey bee (Apis mellifera caucasia Gorb):

Came from Russia to US ~1905

Advantages:	Disadvantages:
Builds strong populations Crossbreeding may produce desirable hybrids Gentle and hardy Has the longest tongue of the three races and can thus use more species of flowers Little tendency to swarm Forages at lower temperatures and earlier in the day Can overwinter well	Tends to drift and rob Can sting persistently when arouse Late starter in spring broodrearing Dark queen difficult to find

Carniolan honey bee (Apis mellifera carnica Pollmann):

Came from Yugoslavia to US ~1883

Advantages:	Disadvantages:
Population increases rapidly in early spring Gentlest of the three races Few brood diseases Economic honey consumer Little robbing instinct Very white wax and honey cappings Low propolizer Overwinters well	Tendency to swarm Hard to obtain Dark queen difficult to locate

Latin Bee Proverbs

Proverbia:

- **Ubi apes, ibi mel.** *Where there are bees, there is honey.*
- **Sola apis mel conficit.** *Only a bee makes honey.*
- **Apes debemus imitari.** *We should be like the bees.*
- **Tuba superat tibias, apes cicadae.** *The trumpet sounds louder than the pipe, just as crickets sound louder than bees.*
- **Cicadae apem comparas.** *You're comparing a bee to a cricket.*
- **Armat spina rosas, mella tegunt apes.** *The thorn arms the roses, and bees cover the honey.*
- **Primum apes abigendae.** *First the bees must be driven off.*
- **Aspera portet apum qui dulcia sugat earum.** *Let the person who sucks the sweets of bees put up with their stings.*
- **Neque mel mihi neque apes.** *Neither the honey for me nor the bees.*
- **In apes irruisti.** *You have rushed into the bees.*
- **Asinus inter apes.** *A donkey in the bees.*
- **Apis agrestis est.** *He's a wild bee.*
  This phrase was used to refer to a particularly dangerous character, since the wild bee was supposed to leave its stinger behind in the wound, making it far more painful than the sting inflicted by a domesticated bee.
- **Quam apes apum similes.** *As similar as bees are to bees.*

BEE SKEP

L. Ludes

Materials: Straw, or wild grasses, or herbals, water, spray bottle, towel, large needle, binder twine, raffia, waxed linen, twine. Horn, or guide, (Can be PVC, or piece of tubing) so the grasses can be kept at an equal coil width.

1. Dampen the straw with a spray bottle, and cover it in a towel to keep it moist. You may choose to use a piece of plastic PVC or like material to form a guide to regulate the thickness of your coils. The thickness is up to you. You may choose to use a binder reed or raffia, or waxed string, or binder of your choice. You may also use what is called a horn. Available from weaving supply sources.

2. Gather a hand full of straw, clip off the seed heads, tamp them down and clip off so the starting end is even. Insert the straw into your guide. Push the beginning coil into the guide until about three inches protrude. Now reach the needle already threaded with soaked binder reed, or doubled raffia, use twine or other materials straight from the spool. Anchor the end of the binder and wrap several times around the three inch length.

3. A skep is begun at the top and worked toward the bottom. Curve the three inch coil

around on itself as tightly as possible, keeping the binder tight. When the coil overlaps, it is sewn to the strand beneath it. This is accomplished by poking the needle through the top quarter of that strand, then looping the binder around the tip coil and poking the needle again through the lower one. This is the single stitch you will repeat again and again. If you want your skep to have a handle, a loop of straw should be sewn on at this point.

4. Skeps are generally dome-topped, so this must be taken into consideration from the very beginning. As the circle widens, make sure it takes on the shape of a shallow bowl. When the bowl has reached the diameter planned for the finished skep, start coiling the sides straight down.

5. Eventually, you will need to add more pieces of straw. Simply trim the heads off more straw and poke it into the horn (guide). Continue weaving and adding straw. When the binder runs out, tie on a new one and continue.

6. Keep coiling and stitching until the finished height has been reached. Some skeps have an entry and exit hole. Simply reverse your direction, go back and then reverse your direction again. This will form a hole, turning around and then back again a few times will leave a hole. Then continue to go all the way around at least two more times to form a secure base. Tie off the last binder and the skep is finished.

Beekeepers Calendar

(from organichomesteadinggardening on egroups.com)

JANUARY BEEKEEPING:
Make or order spare hives and other equipment required for the coming season. See that hive entrances are kept clear of dead bees. Note the amount of bee loss in your apiary note book. Order queens and package bees now to avoid the last minute rush.

FEBRUARY BEEKEEPING:
See that hive entrances are kept clear of dead bees. If you have not done so already, order your package bees or queens. Lift the hives from the front to determine an estimate of colony honey stores – you should be lifting 45 to 50 pounds. If they are light (or near starving), place two cups drivert sugar on the back end of the top bars above the bee cluster, or feed 2-4 quarts syrup in a four-hole top-feeder a using two parts sugar to one part water.

MARCH BEEKEEPING:
Register your hives with the Department of Agriculture or your State. March 1–15, open hive and check honey stores to be sure there are at least four combs of honey in the hive. Feed syrup if there is less than two combs. Clean the hive bottom board. Mouse guards may be removed about mid month. If colonies are 10 to 12 combs of bees, begin comb rotation, two or three combs with young brood and eggs to center of bottom box and empty combs to sides of brood (next to honey) in second box. If colony is 12 to 15 frames of bees with four to six combs of brood, add the first honey super over a queen excluder.

APRIL BEEKEEPING:
Put organic medicated patties over the brood rearing area, or between the two boxes if you have 12-14 frames of bees. Continue comb rotation. Make sure there are enough honey stores or feed your bees. Hives should have at least one full frame of pollen and several frames of honey. If hive is light, feed the bees a 1:1 sugar syrup mixture. Feed pollen supplement three weeks until June 1 (= 3 deeps or equivalent in westerns = 4-5 deeps of bees by June 1).

MAY BEEKEEPING:
If you need more drawn comb, give the bees full sheets of foundation to draw out. Add no more than two or three frames of foundation at a time to the center of the upper hive body. Never divide the brood nest with foundation, alternate foundation between combs of brood.
Queens should now be laying at full capacity. Honey yields will be greater if swarming is controlled by removing swarm cells that contain eggs or larvae on the bottom or any edges of the comb.

JUNE BEEKEEPING:
Blueberries are in bloom the first week; Blackberries in bloom the second week; Black Locust the last week. Remove the queen excluder when there is one box (deep or western) mostly full of honey over the brood nest. Continue to monitor brood nest crowding. Bees sometimes store honey close to and in the brood nest causing crowding. There should be one or two empty brood combs for the queen to lay in.

JULY BEEKEEPING:
If brood nest crowding occurs consider adding another brood nest (western). Only remove combs of honey when they are 2/3 capped (nectar won't shake from combs). Early morning or evenings are the best times for removing comb to discourage robbing.

Note: Do not use brood nest combs in the honey supers to prevent contaminating honey with miticide residues. Identify brood nest combs and boxes (westerns and deeps) with colored paint so that combs are not interchanged.

AUGUST BEEKEEPING:
In mid-August remove and store any surplus honey that is at least two thirds capped over in a warm bee-proof, ant-proof place. To do so, take off the honey supers early in the morning or in the evening so as to prevent robbing of the hive by other colonies of bees. Treat all hives for 45 days with Apistan strips and treated with medicated patties and Fumidil-B as needed. Or use your organic methods.

SEPTEMBER BEEKEEPING:
You may re-queen your colonies now if you did not do so in the spring. Unite weak colonies. To winter successfully, each colony must have the equivalent of ten fully capped frames of honey in the second hive body plus honey arches in the lower hive body, and two or more deep brood combs of pollen. If stores are insufficient, colonies should be fed a 2:1 sugar syrup mixture. Use top feeders to prevent robbing. Start feeding early in the month, because the bees will not store the syrup and cap the cells when the weather turns cool. Feed one gallon for each deep comb of needed stores. The last gallon should contain Fumidil-B. Feed pollen supplement as needed. Extract honey now and give the wet combs back to the bees to lick clean.

OCTOBER BEEKEEPING:
Continue to feed bees if necessary. Whether bees need food or not, give one gallon of one-to-one sugar/water syrup containing Fumidil-B.

NOVEMBER BEEKEEPING:
All appliances, supers, etc. should be cleaned and put in a dry place for next year Protect dark combs from wax moth damage.

DECEMBER BEEKEEPING:
Keep the entrances free of dead bees. This is a good time to go to beekeeper meetings and read all the beekeeping magazines that have been stacking up all year. Repair old equipment, assemble all the new frames and supers you will need next year. If you need apiary permits for outyards, apply for them now.

Excerpted from Beekeeper's Handbook 1998

Commercial Crops Benefiting from Honey Bee Pollinators

Many commercial crops benefit directly by insect pollination. Here is the list of plants grown commercially, which benefit from but do not require bee visitation:

- Asparagus
- Apricots
- Broadbeans
- Caraway
- Cherimoya
- Chestnut
- Chives
- Citrus
  - Grapefruit
  - Lemon
  - Mandarin
  - Orange
- Clove
- Clovers, minor
- Coconut
- Coffee
- Cotton
- Cowpeas
- Cut flower seeds
- Drug plants
- Feijoa
- Flax
- Guava
- Herbs (spices)
- Kapok
- Lespedeza
- Lima beans
- Loquat
- Mangosteen
- Nectarines
- Oil palm
- Okra
- Onion and Leek
- Opium poppy
- Papaya
- Pears
- Peppers
- Pyrethrum
- Safflower
- Scarlet runner beans
- Strawberry
- Tephrosia
- Tomatoes
- Vanilla
- Vegetable seeds
  - Anise
  - Chervil
  - Endive

–Commercial Crops *Requiring* Honey Bee Pollinators

Many crops grown commercially today REQUIRE insects to pollinate them and set the fruit. Here is a list of those plants that must have bee pollinators:

- Alfalfa
- Allspice
- Almonds
- Alsike clover
- Apples
- Avocado
- Berseem
- Blackberries
- Blueberries
- Buckwheat
- Cacao
- Carambolo
- Cardamom
- Cashew
- Celeriac
- Chayote
- Cherries
- Chinese gooseberry or kiwi
- Cicer milkvetch
- Cinnamon
- Citron
- Citrus
  - Pummelo
  - Tangelo
  - Tangerine
- Clovers, minor
- Cranberries
- Crimson clover
- Crownvetch
- Cucumbers
- Currants
- Cut flower seeds
- Dewberry
- Drug plants
- Eggplants
- Garlic
- Gooseberries
- Herbs (spices)
- Huckleberry
- Jujube
- Kenaf
- Kohlrabi
- Kola nut
- Lavender
- Litchi
- Longan
- Lotus
- Macadamia
- Mango
- Muskmelons
  - Cantaloupe
  - Casaba
  - Crenshaw
  - Honeyball
  - Honeydew
  - Persian melon
- Mustard
- Niger
- Nutmeg
- Parsley
- Parsnip
- Passion fruit
- Peaches & nectarines
- Pears
- Persimmon
- Pimenta
- Plums & prunes
- Pumpkin & squash
- Quinine
- Radish
- Rape
- Raspberries
- Red clover
- Rutabagas
- Sainfoin
- Sapote
- Sunflower
- Sweetclovers
- Sweetvetch
- Tea
- Trefoils
- Tung
- Turnips
- Vegetable seeds
  - Artichoke
  - Asparagus
  - Caraway
  - Carrots
  - Celery
  - Chicory
  - Chives
- Cole crops
  - Broccoli
  - Brussels sprouts
  - Cabbage
  - Cauliflower
  - Collards
  - Kale
  - Tendergreens
- Coriander
- Dill
- Fennel
- Leek
- Onion
- Vetch (hairy)
- Welsh onion
- Watermelon
- White clover

Honeybee Plants from OHG files (organichomesteadgardening on egroups.com) posted by Jon

Althea (Rose of Sharon)
Alfalfa
Almond
American Holly
Anise
Apple trees (Fruit trees in general-all)
Apricot
Apriums
Ash
Asparagus
Asters
Azolla-floating fern
Barberry
Basil
Beans, garden
Bee Balm
Beet
Birch
Bittersweet
Bladder Campion
Blackberry
Black Cherry
Black-eyed Susan
Black Medic
Blanket Flower
Bluebells
Blue-Eyed Grass
Bird's Foot Trefoil
Blueberry
Blue Weed
Borage
Buckeye
Buckthorn
Buckwheat
Buffalo Berry
Butter And Eggs
Buttercups
Butterfly bush
Butterfly Weed
Button Bush
Cabbage
Cardinal Flower
Cardinal Shrub
Carnations
Carrots
Catalpa tree
Catnip
Cedar
Chestnut
Cherry Tree
Chickweed
Chicory
Chinquapin
Chives
Cinnamon Basil
Cinquefoil
Chives
Choke Cherry
Cleome
Lambs Ear
Lantana
Larkspur
Lavander
Lemonbalm
Lespedeza
Lilac
Lima Bean
Locust tree
Loganberry
Loveage
Lupine
Magnolia
Mallow
Marjoram
Maple Trees
Marigold, french
Melons
Milkweed
Mimosa
Mints
Mistletoe
Mock Orange
Morning Glory
Mossy stonecrop
Motherwort
Mullein
Muscadines
Mustard
Nectarines
Nettle
Oak Trees (Pollen & honwydew)
Okra
Onion
Oregano (wild)Pansy
Parsley
Peach Trees
Pear
Peony
Pennyroyal
Penstemon
Pepper
Pepperbush
Peppermint
Perilla mint
Persimmon
Petunias
Phlox
Photina
Pigweed
Pineapple Sage
Pincushion Flower
Plantain, narrow leaf
Plucots
Plums
Pointillia
Poison Ivy
Poison Oak
Poison Sumac

Coleous
Clematis
Climbing nightshade
Clover, crimsonClover, SweetClover, White Dutch
Columbine
Comfrey
Cone Flower
Coreopsis
Coriander
Corn, tassels
Cosmos
Cotton
Cottonwood
Cowpeas
Cranberry Crocus
Crepe myrtle
Crysantheum
Cucumbers
Currant
Dandelion
Dahlia
Daylily
Dewberry
Dianthius
Dill
Dock
Dogbane
Dogwood
Echinacea
Elderberry
Fireweed
Elder
Fennel
Fennugreek
Fig
Flax
Fleabane
Forsythia
Four O'clocks
Foxglove
Garlic
Geranium (Wild)
Goat's Beard
Golden Raintree (Chaintree)
Goldenrod
Gooseberry
Gourds
Grape (pollen)
Hawkweed (yellow, orange)
Hawkweed, (mouse ear)
Hazelnut
Hibiscus
Hollyhock
Honeysuckle
Honeysuckle Shrub
Horhound
Huckleberry
Hyssop
Iron Weed
Joe Pye Weed
Johnson Grass
Kudzu
Pond lily
Poplar Trees
Privet Hedge
Pumpkins
Purple Loosestrife
Pussy Toes
Queen Anne's Lace
Quince
Radish
Ragweed
Rape
Raspberry(wild & tame)
Redbud
Rose, Wild
Rosemary
Sage
Salvia
Salvinia-a water plant
Sassafras
Sedums
Service Berry
Snapdragons
Snowball Bush
Sorghum
Sourwood
Soybean
Spearmint
Spice Shrub
Squash
Sumac
St. John's Wort
Stitchwort
Strawberry (tame)
Strawberry (wild)
Sunflower
Sweet Gum
Sweet Peas
Thistles
Thyme
Tickseed
Trumpet Vine
Tulip Tree (Poplar)
Tupelo
Valerian
Verbena
Veronica
Vetch
Violets
Vitex
Walnut
Willow Trees
Wood Sorrel, Yellow
Yarrow
Zinnia

Blue, violet, and pink are the flower colors most attractive to bees. Next are orange ones and yellows. Some flowers, such as roses and poppies, provide pollen but no nectar. And some plants, such as privet, red bud, and English ivy, lure honeybees but produce strong, unpleasant-tasting honey.
Jon

Suggested Plants for Native Bees

The following plants attract pollen bees. Native bees, unlike honeybees, do not fly great distances from their nests to forage. Plantings for native bees should be within 200 yards of the target crop. Some of these plants are also good for attracting beneficial insects.

Shrubs & Trees

Blackberry (*Rubus*)
Dogwood (*Cornus*)
Fruit trees (apple, cherry, plum)
Juneberry (*Amalanchier*)
Red maple (*Acer rubrum*)
Raspberry (*Rubus*)
Sumac (*Rhus*)
Willows (*Salix*)

Flowers & Herbs

Alfalfa (*Medicago sativa*)
Alsike clover (*Trifolium hybridum*)
Asters (*Aster*)
Beard tongue (*Penstemon*)
Bee balm (*Monarda*)
Birds-foot trefoil (*Lotus corniculatus*)
Borage (*Borago officianalis*)
Buttercup (*Ranunculus*)
Calendula (*Calendula*) (single varieties)
Coneflower (*Echinacea*)
Chrysanthemum (*Dendranthema*)
Crown-beard (*Verbesina*)
Daisies
Dandelion (*Taraxacum officinale*)
Evening primrose (*Oenothera*)
Forget-me-not (*Myosotis*)
Fuchsia (*Fuchsia*)
Gilia (*Gilia*)
Globe mallow (*Sphaeralcea*)
Goldenrod (*Solidago*)
Goldfields (*Lasthenia chrysostoma*)
Hollyhock (*Alcea rosea*) (single varieties)
Impatiens (*Impatiens*)
Milkvetch (*Astragalus*)
Milkweed (*Asclepias*)
Mints (*Mentha, Saliva*)
Marjoram (*Origanum*)
Nasturtiums (*Tropaeolum*)
Oilseed rape (*Brassica napus*)
Pincushion (*Chaenactis*)
Red clover (*Trifolium pratense*)
Scorpion weed (*Phacelia*)
Sunflowers (*Helianthus*)
Tickseed (*Coreopsis*)
Wild mustard (*Brassica*)
Vervain (*Verbena*)
Wild buckwheat (*Eriogonum*)

Who am I?

I am valuable to men, found far and wide,
brought from groves and mountain slopes,
from hills and dales. By day wings
carried me aloft, conveyed me skillfully
under a roof's cover. Afterwards men
bathed me in a vat. Now I am a binder
and a flogger, quickly throw a young
man to the ground and sometimes an old peasant.
He who grapples with me and contends
against my strength soon finds
that he must seek out the earth with his back
unless he first gives up his folly.
Robbed of strength yet strong in speech,
bereft of might, he has no control of his mind,
of his feet or hands. Find out what I'm called,
who thus binds foolish young men on the earth
after the fight by the light of day.

Riddle #25, Exeter Book, England, circa AD 950

Mead

Non-native pollinators

European honey bee

More than nine million European honey bees are imported into Alaska each year for honey production. These bees play a significant role in pollinating Alaska's crops and wild lands. Most European honey bees cannot survive through Alaska's cold winters and beekeepers destroy the imported hives at the end of each season. Some industrious Alaska beekeepers are attempting to over-winter bees by providing a climate controlled hive areas and food sources through the winter.

There are many races of the European honey bee. The ones most popular in modern beekeeping are the Italian (Apis mellifera), Carniolan (Apis mellifera carnica), and Caucasian (Apis mellifera causcasia).

About NRCS

The USDA's Natural Resources Conservation Service provides financial and technical assistance to support conservation efforts for pollinators and other wildlife on private land. Talk with your local field office about opporuntities to improve your pollinator habitat through these programs:

- Environmental Quality Incentives Program
- Wildlife Habitat Incentives Program
- Conservation Technical Assistance
- Wetlands Reserve Program
- Conservation Security Program

Contact NRCS

Anchorage
510 L St., Ste 270
Anchorage, AK 99501
907-271-2424 ext. 110

Bethel
311 Willow St, Bldg 3
PO Box 1869
Bethel, AK 99559
907-271-2424 ext. 110

Copper Center
HC 60 Box 52
Mile 93.3 Richardson Hwy
Copper Center, AK 99573
907-895-4241

Delta Junction
1420.5 Alaska Hwy, Jarvis
Office Ctr
PO Box 547
Delta Junction, AK 99737
907-895-4241

Dillingham
PO Box 1110
Dillingham, AK 99576
907-271-2424 ext. 108

Fairbanks
590 University Ave, Ste B
Fairbanks, AK 99709
907-479-3159

Homer
4014 Lake St, Ste 201
PO Box 400
Homer, AK 99603907-
235-8177

Juneau
Senate Bldg
175 S Franklin St, Ste 424
Juneau, AK 99801-1304
907-586-7220

Kenai
110 Trading Bay, Ste 160
PO Box 800
Kenai, AK 99611
907-283-8732

Kodiak
518 Marine Way, Ste 206
Kodiak, AK 99615
907-235-8177

Mat-Su
1700 E Bogard Rd, Ste 203
Wasilla, AK 99654
907-373-6492

Nome
240 Front St, Ste 107A
PO Box 1009
Nome, AK 99762
907-443-6096

Introduction to Alaska Insect Pollinators

Alaska's primary pollinators are native bumble bees, sweat bees Andrenid bees, wasps and moths. Imported European honey bees also play an important role in pollinating Alaska crops. This guide will help you recognize the characteristics of Alaska's pollinators their requirements for food and shelter.

Native Pollinators

Since most native bees do not fit the stereotypical image of a bee—the European honey bee, with black and brownish stripes, living in a hive with thousands of others, and apt to sting—native bees are easily overlooked.

The diversity of native bees is astonishing. About 4,000 species have been identified and catalogued in North America, ranging in length from less than one eighth of an inch to more than one inch. Native bees vary in color from dark brown or black to metallic green and blue and may have stripes of red, white, orange, or yellow.

Many common names reflect nest-building habits: plasterer bees, leafcutter bees, mason bees, carder bees, digger bees, and carpenter bees. Others are named after particular traits, such as cuckoo bees that lay eggs in the nests of other bee species (like the cuckoo bird), sweat bees that like to drink salty perspiration, or bumble bees, who got their name from the loud humming noise they make while flying.

Native Bumble Bees

There are 49 species of bumble bees in the United States with approximately 19 species (*Bombus sp* and four *Psithyrus* ssup (parasitic bumble bees)) found in Alaska.

Bumble bees (*Bombus frigidus, Bombus lucorum, Bombus occidentalis*) are excellent pollinators, especially of Alaska berry species. While bumble bees are generalist foragers, visiting a diversity of flowers, a few groups of flowers, such as lupines, are particularly important to them.

Bumble bees practice what is called "buzz pollination," where they grab onto the anthers of certain flowers and buzz their flight muscles to release the pollen. This behavior is especially important in pollinating some of Alaska's native berry species.

Bumble bees are social insects and build their nests in the ground, often in abandoned mouse burrows, empty bird nests, and even in other insulating materials such as discarded mattresses, manure piles and the walls of old buildings. The mated queen over-winters in the soil while the rest of the colony dies at the onset of cold weather.

In the early spring, she establishes a new nest and rears the first worker brood. These workers are small sterile females that enlarge the nest, forage and tend to the next generation of workers which, due to conditions within the nest such as increased temperature, cell size, and food availability, are also larger. In late summer, males (called drones) and fertile females, next year's queens, are produced. The sole function of the drones is to fertilize the queens before dying in the fall.

Sweat Bee

Sweat bee is the common name of the family of bees in the family *Halictidae*, are named so for their attraction to the salts in human perspiration. Most sweat bees are small to medium-sized, 3 to 10 mm (0.12 to 0.40 in) long. They are generally black or metallic colored, and some are brilliant green or brassy yellow.

Sweat bees are among the most common bees wherever bees are found, except in Australia where they are relatively uncommon. There are about 1000 species in the United States, Canada, and Central America.

All species nest in the ground. *Halictids* have a range of nesting habits, from dispersed solitary nests to densely situated ones with individual bees sharing common entranceways to primitive social arrangements. *Halictid* bees are common insects and good general pollinators.

Andrenid bees

Andrenid bees (*Andrena sp.*), commonly called mining or digger bees, are another common pollinator in Alaska. Andrenid bees resemble the typical honeybee in shape and size. Bodies are colored dark with fine light brown or yellow hairs.

Andrenid bees have chewing-lapping mouthparts used to manipulate and collect flower products such as nectar and pollen. The protruding 'lapping' mouthpart is shorter in mining bees than honeybees giving them the common name of short-tongued bees.

Mining bees are solitary and do not form large, socially organized nests. As their name suggests, mining bees dig single nests in the soil. They are important pollinators of wild blueberry both in number and pollination effectiveness.

Wasps

Yellowjackets and hornets all belong to the large insect order *Hymenoptera*. While these species are very beneficial to humans as pollinators of flowering plants, including fruits and vegetables, thousands of species of small wasps are parasites of other insect pests, particularly aphids and caterpillars in Alaska. Without beneficial parasitic wasps that limit the growth of insect populations, pests would overtake most crops.

Yellowjackets can be both beneficial and problematic wasps. They are important predators and scavengers, helping to control pests and recycle organic materials, but can also be a threat to humans due to their ability to sting repeatedly. Yellowjackets are relatively short and stout with and hold their legs close to their body compared with other wasps. Paper wasps, for example, are more slender and have long dangling legs. All yellowjackets are striped either black and white or black and yellow. They are rapid fliers, and are more aggressive than other types of wasps. Their nests are always enclosed with a papery envelope and can be found in the ground, hanging from eaves or tree branches, and occasionally in wall voids.

The Bald or White faced 'Hornet', (Dolichovespula maculata) is scientifically not considered to be a hornet but a large wasp. Its range is widespread, having been found in 46 states, Alaska and Canada. Its coloration is black and white. Their nests are found in trees or shrubs and they become very large by summer's end. The size of the nest, number of individuals in a wasp colony and the length of time activity continues after the summer depends on the species considered.

Other Pollinators:

Syrphid flies

Syrphid flies, also known as hover flies for their ability to hover in flight, are common predators of aphids and other soft bodied insects. Because Syrphid flies feed on pollen, nectar and aphid honeydew they can also act as pollinators in Alaska. Syrphid flies mimic the appearance of bees as a protective strategy. There are multiple species of syrphid flies in Alaska.

Butterflies

Butterflies can serve as pollinators. There are 75-80 species of butterflies in Alaska that are found at sea level, on mountaintops, and everywhere in between. Some range throughout North America or even other continents while others (e.g. *Phoebus Parnassian*) are unique to cooler climates. In warmer climates, most butterflies go through their life cycle in a few weeks. Alaskan butterflies can live over a year.

Pollinator Conservation Information

PNW Plants for Bees

Written by Matthew Shepherd, The Xerces Society

Native bees are a vital part of our environment. They ensure healthy wildflower communities and harvests of fruit and vegetables. Bees are suffering from the fragmentation and loss of their habitat and extensive use of pesticides.

Bees require two essential components in their habitat, somewhere to nest and flowers from which to gather nectar and pollen. Native plants are undoubtedly the best source of food for bees, because the plants and their pollinators have coevolved. There are also some garden plants that are great for pollinators.

In many landscapes, flowers have been pushed to the margins, surviving on roadsides and field edges, as well as in wild areas and gardens. Providing patches of flowers is something that we all can do to improve our environment for these important insects. One of the great things about creating foraging habitat is that not only will it help bees (and other pollinators) but it also makes a beautiful place for people.

Flower-rich areas provide good foraging for bees and other pollinator insects.

Choosing the Right Flowers

To help bees and other pollinator insects—like butterflies—you should provide a range of plants that will offer a succession of flowers, and thus pollen and nectar, through the whole growing season. Patches of foraging habitat can be created in many different locations, from backyards and school grounds to golf courses and city parks. Even a small area planted with good flowers will be beneficial for local bees, because each patch will add to the mosaic of habitat available to bees and other pollinators.

Native plants are usually best for native bees, and can be used in both wild areas and gardens. There are also many garden plants—particularly older, heirloom varieties of perennials and herbs—that are good sources of nectar or pollen. Together with native plants, these will make a garden attractive to both pollinators and people.

In such a short information sheet it is not possible to give detailed lists of suitable plants for all areas. On the back are two lists of good bee plants, the first of native plants and the second of garden plants. These lists, combined

For complete information on bee-friendly plants, buy the *Pollinator Conservation Handbook* from the Xerces Society. The *Handbook* also has details of nesting sites and pupation and overwintering sites for bees, butterflies, flies, and beetles, and some education ideas. Contact us at the address on the back or via our website www.xerces.org.

with the notes below, will help you choose the right plants for your area. A field guide will tell you which species from these lists are local to you. Your local chapter of the Native Plant Society and native plant nurseries are worthwhile contacts for advice on choosing, obtaining, and caring for local plant species.

Use local native plants. Research suggests native plants are four times more attractive to native bees than exotic flowers. They are also usually well adapted to your growing conditions and can thrive with minimum attention. In gardens, heirloom varieties of herbs and perennials can also provide good foraging.

Chose several colors of flowers. Bees have good color vision to help them find flowers and the nectar and pollen they offer. Flower colors that particularly attract bees are blue, purple, violet, white, and yellow.

Plant flowers in clumps. Flowers clustered into clumps of one species will attract more pollinators than individual plants scattered through the habitat patch. Where space allows, make the clumps four feet or more in diameter.

Include flowers of different shapes. There are nearly one thousand different species of bees in the Pacific Northwest, and they are all different sizes, have different tongue lengths, and will feed on different shaped flowers. Consequently, providing a range of flower shapes means more bees can benefit.

Have a diversity of plants flowering all season. Most bee species are generalists, feeding on a range of plants through their life cycle. By having several plant species flowering at once, and a sequence of plants flowering through spring, summer, and fall, you can support a range of bee species that fly at different times of the season.

Native plants for bees

Native plants should be your first choice to help our native bees. Listed below are some plants that are good sources of nectar or pollen for bees. Both the common and Latin names of the plant genus are given.

This list is not exhaustive; there are many other plants good for bees. Individual species have not been included because we hope the list will be useful across the region. Not all of these genera will have species in your local area, but they do represent plants that will grow in a variety of environments. Use a wildflower guide or contact local nurseries to find your local species.

Aster	*Aster*
Currant	*Ribes*
Elder	*Sambucus*
Fireweed	*Chamerion*
Goldenrod	*Solidago*
Huckleberry	*Vaccinium*
Larkspur	*Delphinum*
Lupine	*Lupinus*
Madrone	*Arbutus*
Mint	*Mentha*
Oregon grape	*Berberis*
Pacific waterleaf	*Hydrophyllum*
Penstemon	*Penstemon*
Rabbit-brush	*Chrysothamnus*
Rhododendron	*Rhododendron*
Salmonberry	*Rubus*
Saskatoon	*Amalanchier*
Scorpion-weed	*Phacelia*
Snowberry	*Symphoricarpos*
Stonecrop	*Sedum*
Wild buckwheat	*Eriogonum*
Willow	*Salix*
Yarrow	*Achillea*

Lupines are favorite flowers of some bumble bees.
(Photograph by Jeff Owens)

Garden plants for bees

Flower beds in gardens, business campuses, and parks are great places to have bee-friendly plants. Native plants will create a beautiful garden but some people prefer "garden" plants. Many garden plants are varieties of native plants, so this list only includes plants from other countries—"exotic" plants—and should be used as a supplement to the native plant list. As with the native plants, this list is not exhaustive.

Black-eyed Susan	*Rudbeckia*
California lilac	*Ceanothus*
Tickseed	*Coreopsis*
English lavender	*Lavandula*
Purple toadflax	*Linaria*
Marjoram	*Origanum*
Hyssop	*Hyssopus*
Basil	*Ocimum*
Globe thistle	*Echinops*
Rosemary	*Rosmarinus*

The Xerces Society, 4828 SE Hawthorne Blvd, Portland, OR 97215. Tel: 503-232 6639.

A Survey of American Honeys
Gleanings in Bee Culture – December 1960

2. Characterization of Individual Floral Types of Honey 1/

JONATHAN W. WHITE, JR.
Eastern Regional Research Laboratory
Eastern Utilization Research and Development Division
Agricultural Research Service, United States Department of Agriculture
Philadelphia 18, Pennsylvania

Number two in a series of ten articles on the different honeys of America.

As a result of our comprehensive analytical survey of honeys from the United States, we have complete data on 504 samples of honey and honeydew from 47 of the 50 States. These are from 83 floral types and 93 blends of known composition, as well as other blends characterized by area of production and time of harvest. By examination of the values found for the individual samples, we have obtained information on how the many different kinds of honey compare with each other.

It is well known that various honeys have certain characteristics - tupelo and sage honey are non-granulating, tulip tree honey is dark, cotton honey granulates quickly, and so on. In the table are shown the characteristics of 74 floral types of honey and 4 honeydew types, compared with the average composition of honey, which was given in the first article in this series. In this table a plus sign means that the honey is higher than the average in that particular characteristic. A minus sign means that it is lower than the average. If no mark is given, the honey is near the average for that particular characteristic. In the case of diastase, an "n" means that not enough data were available to give an estimate. We have not included moisture content in this table because we do not feel that it is a characteristic of the floral type of honey, but rather depends on other factors. No honey type was listed as minus for granulating tendency unless it was substantially non-granulating in our test. Those marked plus are particularly prone to granulate. Honeys not marked are average in granulating tendency under the conditions we used - in six months storage after heating to liquefy, they would deposit thin layers (to 1/4") or clumps of crystals in a jar.

Where a plus is marked for pH it indicates a honey type showing less active acidity than the average. As an example of reading the table, alfalfa honey granulates more, is higher in dextrose, sucrose and lactone/free acid ratio than the average honey. It is lower than the average honey in its content of higher sugars, undetermined material, ash, and nitrogen. It is near the average values in all of the other characteristics.

For the more important and more common honey types, this table uses the average of many samples. For many of the other more unusual or locally-produced floral sources, there may have been only one or two samples analyzed.

This table provides a quick way to compare many of the more important honey types one with another and to find floral types of honey with the desired physical and chemical characteristics for any particular purpose.

	Color	Granulation	Levulose	Dextrose	Sucrose	Maltose	Higher Sugars	Undetermined	pH	Free Acidity	Lactone	Total Acidity	Lactone/Free Acid	Ash	Nitrogen	Diastase
Alfalfa		+		+	+		-	-					+	-	-	
Aster	+	-			-	+			+		-		-	+		n[1/]
Athel Tree	+	+	+	+			-							+	+	n
Bamboo, Japanese			-			+										n
Basswood														-	-	
Bergamot	+		+								+	+				n
Blackberry	+	-		-		+	+		+				-	+		-
Blueberry	+					+			+							n
Blue Curls		+	-	+					-		+					n
Bluevine			-	-												n
Boneset	+		+	-								+			+	
Buckwheat	+		-		+					+		+				+
Canteloupe		+		+							+	+			-	-
Cape vine			-				-								-	
Chinquapin	+	-	-	-		+	+	+	+		-		-			
Clover, crimson	-								-					-	-	
Clover, hubam	-			+			-							-	-	n
Clover, sweet yellow	-		+		+					-		-	+	-	-	n
Coralvine	+	-	-	-			+	+	+	+		+		+	+	n
Cotton		+		+		-	-		+					+		
Cranberry	+	-	-	-			+	+	+					+		
Gallberry		-	+						+						-	
Goldenrod				+	-		-		+		-		-			+
Grape	+	-	-	-		+						+			+	n
Holly	+	-		-		+	+		+							n
Horsemint				+			-		-		+	+	+			
Locust		-	+	-						-		-		-	-	-
Manzanita		+	-	+						-		-			-	n
Marigold				+			-		-		+		+	-		+
Mesquite		+	+	+			-				-				-	n
Mexican clover	+	-								+		+				+
Mint	-			+	+			-							-	

FAQ & Cooking Tips
(AmericanHoneyProducers.org)

Frequently Asked Questions

- **Is honey sweeter than sugar?**
  One the average honey is 1 to 1.5 times sweeter than sugar. Liquid honey is approximately as sweet as sugar, yet contains only 82.4g carbohydraytes/100g (vs. 100g for sucrose) and provides only 304 Kcal/100g (vs. 400 Kcal for sucrose).

- **How much sugar does a tablespoon of honey contain?**
  One tablespoon of honey weighs 21 grams, approximately 17 grams of that are carbohydrates.

- **What is the caloric value of honey?**
  One tablespoon of honey contains 17 grams of carbohydrates and 60 calories (Kcal).

- **Does honey contain complex carbohydrates?**
  Honey does contain small amounts of oligosaccharides, but no "complex" carbohydrates such as fiber.

- **Does the color of honey vary?**
  The color and flavor of honeys differ depending on the blossoms visited by the honeybees. The color ranges from water white to dark amber and the flavor varies from delectably mild to distinctively bold. The color of fresh honey is related to its mineral content and is characteristics of its floral source.

  When purchasing honey for use in cooking, select mildly flavored honeys, such as clover where delicate flavors predominate. Use strongly flavored honeys in spreads or other recipes where a distinct honey flavor is desired.

- **What is the typical color of honey?**
  Honey is classified by the U.S. Department of Agriculture into seven color categories: water white, extra white, white, extra light amber, light amber, amber and dark amber.
- **Does the color of honey change over time?**
  Honey usually becomes darker as a result of storage. This depends upon the composition of the honey and its initial color. Generally, the darkening of honey is temperature sensitive and occurs more rapidly when honey is stored at high temperatures.
- **What is the shell life of honey?**
  Honey stored in sealed containers can remain stable for decades and even centuries! But for practical purposes, a shelf life of two years is often stated. Properly processed, packaged and stored honey retains its quality for a long time.

Cooking Tips

- For best results, use recipes developedfor using honey.

- When you substitute honey for granulated sugar in recipes:

- Substitute honey for up to one-half of the sugar. With experimentation, honey can be substituted for all the sugar in some recipes.
- Reduce the amount of liquid in the recipe by 1/4 cup for each cup of honey used in baked goods.
- Add about 1/2 teaspoon baking soda for each cup of honey used in baked goods.
- Reduce oven teperatures by 25 degrees to prevent over browning of baked goods.

- For easy removal, spray measuring cup with vegetable cooking spray before adding honey.

- Honey adds a sweet, smooth and distinctive taste to recipes. Honey also absorbs and retains moisture. These qualities retard drying out and staling of baked goods.

- A 12 ounce jar of honey equals a standard measuring cup.

Because of its high fructose content, honey shas a higher sweetening power than sugar.

The Chemistry of Honey

(From National Honey Board)

	Average	Range	Standard Deviation
Fructose/Glucose Ratio	1.23	0.76 - 1.86	0.126
Fructose, %	38.38	30.91 - 44.26	1.77
Glucose, %	30.31	22.89 - 40.75	3.04
Minerals (Ash), %	0.169	0.020 - 1.028	0.15
Moisture, %	17.2	13.4 - 22.9	1.46
Reducing Sugars, %	76.75	61.39 - 83.72	2.76
Sucrose, %	1.31	0.25 - 7.57	0.87
pH	3.91	3.42 - 6.10	---
Total Acidity, meq/kg.	29.12	8.68 - 59.49	10.33
True Protein, mg/100g.	168.6	57.7 - 567	70.9

GOOD HEALTH AND LONG LIFE

Meanderings Of A Mead Maker

A Czar once wanted to discover the secret of long life, so he held an inquiry to find out which section of his population lived longest. He found it was the beekeepers and immediately presumed that honey was the life-giving food. A more detailed inquiry to find out how much honey it was necessary to eat revealed the alarming fact that all the beekeepers were far too poor to eat any honey at all, and they lived on the refuse that was left over from the harvest. Perhaps it was the mead that kept them going.

Kenneth K. Clark in *Beekeeping.*

Mead is probably the oldest alcoholic drink known. The word for mead occurs in nearly all Indo-European languages. There is good reason to believe that mead was known some 12,000 years ago. It was certainly very popular in Anglo-Saxon times and in 'polite society' right up to the end of the 17th century.

The extraordinary long life of the ancient Britons has frequently provoked comment and speculation on the part of historians. Among the early Romans, Plutarch once observed "The Britons only begin to grow old at the age of 120" and when Pliny visited the British Isles he reported "These islanders consume great quantities of honey brew". Pollio Romulus wrote to Julius Ceasar, when over 100 years old, that he enjoyed a full sex life, which he attributed to drinking copiously of Welsh Mead.

Virgil and Homer wrote about mead in glowing terms. The Greeks had a definite mead-making session. The mead was matured and kept for an orgy called a *Dionysia.* What they did on these occasions, under the influence of mead, must be left to the imagination. Hippocleides, for example, having drunk too much mead on his wedding night, stood on his head on the dining table, stark naked, waving his legs in the air while he sang a merry song. His father refused to let him take his bride!

Scandinavians expected to quaff mead in heaven out of the skulls of their enemies. On earth, the Vikings were wont to consume at least half a dozen *horns* of mead during a meal.

In more recent times, Samuel Pepys wrote in his diary for 1666 "Dined with two or three of the King's servants ... I ... had methyglin ... which did please me mightily". Methyglin, or spiced mead, was much liked by Queen Elizabeth I and she gave very detailed instructions as to which herbs should be used as flavourings - her recipe has survived to this day..

In the same century, Sir Kenelm Digby wrote: "The Meathe (mead) is singularly good for a consumption, stone, gravel, weak-sight and many more things. A chief burgomaster of Antwerp used for many years to drink no other drink than this and though he were an old man, he was of extraordinary vigour, had always a great appetite, good digestion and had every year a child.".

The "*birds and the bees"* would seem to be involved in the history of mead! The Moors wedding celebrations were sex-orgies where

the guests were made drunk on mead because they believed honey to be a love stimulant.
Indeed, in this country the word *honeymoon* comes from the practice of drinking mead during the month long celebrations which followed better-class weddings. In some parts it was the custom to send the bride to bed and then fill the bridegroom with mead until he could no longer stand. He was then carried to bed alongside his wife and it was believed he would then sire a son that night. If successful the maker of the mead was complimented on its quality. Is it possible that mead is the youth elixir of antiquity?

In most inns mead was sold along with ale and cider. The Anglo-Saxon word for mead was *alu* (cf. *ale).* Much mead was beer strength and made with hops. There was trouble in the British Army during the Napoleonic Wars when the strength of the troops' mead was reduced from 6% to 4%. The slow decline of mead as the national drink can be traced back to the Norman conquest for in the wake of the invasion came the first wine traders. Imports of grape wine rocketed when Henry II married Queen Eleanor of Aquitane, whose possessions included Bordeaux. The dissolution of the monasteries by Henry VIII put an end to monastic brewing. In the 18th century sugar replaced honey. The importation of cheap spirits and the Industrial Revolution, which involved the loss of rural skills such as home wine making, completed the decline.

The claims made for mead are almost as many and as widespread as those for honey. One would imagine that a daily dose of honey would cure a wooden leg! While there may be some truth in the therapeutic value, they would seem to be very much exaggerated. The chemical analysis of honey indicates nothing that substantiates such claims, although 181 substances have been found in it to date. Scientific proof is sadly lacking - *evidence* is subjective and really comes down to *If you believe it does you good, then it probably will!* The same cause and effect argument is seen when claiming that beekeepers rarely suffer rheumatism because they are stung by bees. The syllogism is:

- Beekeepers get stung.
- Beekeepers don't suffer from rheumatism.
- Therefore, bee stings prevent/cure rheumatism.

It is more likely that the regular exercise involved in moving heavy supers etc. in the sun and fresh air keeps the body free of *the rheumatics.* Still if you are paying someone a lot of money to apply bees to your skin in order to cure pain, you would *want* to believe it was doing you good. The same sort of argument occurs in the first quote - the *refuse* undoubtedly refers to the cappings which the peasant Russian beekeepers ate or turned into mead. It may or may not have been this which led to the longevity. However, I digress from the main topic - mead.

The latest fossil evidence suggests that bees existed and were producing honey *50 million years ago.* Homo sapiens' mere *5 million years* of evolution explains, perhaps, why bees have such a well organized society and why we are still fighting each other. I digress again ...

Early man *hunted* for honey as he did for many other foods (and as some people do today). A painting made in a rock shelter in the mountains of eastern Spain in Mesolithic times, probably about 7,000 B.C., survives to show how this was done. The combs were broken off from the nest and eaten - a balanced diet of wax, honey, pollen, brood and probably a few dead bees as well. Presumably little attempt was made to store honey. Gradually there occurred a shift from hunting for honey to keeping bees in purpose made hives made from local materials - in this country, bees were kept in straw baskets or *skeps.* The earliest known record of keeping bees in hives and harvesting their honey dates from 2,400 B.C. in Egypt. The practice of selecting the skeps with most honey - the heaviest ones - at the end of the year and killing the bees by placing the skep over a pit containing burning sulphur was developed. The honey would have been strained and stored in various containers, perhaps not completely sealed, thus allowing the stored honey to absorb moisture. Some of the honey is likely to have been *unripe* i.e. containing an excessive amount of water, and would have been fermented by wild yeasts which abound in the air. So by his attempts to preserve honey to use over a period, man probably introduced himself to a fermented alcoholic drink and found it to his liking! In this way, mead production is believed to have begun - the making of alcoholic beverages for man's comfort and pleasure, before the grape took over.

How then can we make some mead? Most books on wine making and beekeeping contain recipes for mead. Like most hobbies (including beekeeping), the process may be as simple or as complicated as you like - with all the associated apparatus you can afford. In recent years, there has been a resurgence of interest in home brewing and wine making. There has developed an industry to provide equipment and materials. No longer do we have to follow out-of-date recipes and rely on 'natural fermentation' or float rafts of baker's yeast on toast in open buckets or brew *'tonic ale'*. And, so long as you don't sell your results, it is perfectly legal. For this article we need not get too complicated, but we can make use of modern knowledge and the ease with which we can now obtain equipment.

I am surprised by the few beekeepers of my acquaintance who make mead and those who say they don't like the taste, considering the range of *tastes* that can be produced. Some of them, I suspect, have made mead in the past and produced something unpleasant - or even vinegar (= sour wine)! Or they may have purchased commercial mead which, in my experience, is always sickly sweet and strongly flavoured. Many years ago I bought a bottle of mead from a large wine shop in Soho, London. What was I doing there? Mind your own business - I did say **many** years ago! I asked the assistant if it was sweet. "Of course it is", he replied, "it is made from honey." I did not point out that *dry* wines are made from *sweet* grape juice. Why **are** commercial meads usually so sweet?

The type of honey used determines the flavour and bouquet of the finished product. Light coloured honey is best for making dry light meads with subtle flavours. Use dark honeys for strong flavoured sweet meads. Most beekeepers will use their own honey but if you use bought honey avoid eucalyptus honey from Australia - it makes

a mead with a most unpleasant flavour. Flavours in honey masked by the sweetness become more noticeable when the sugar is fermented. The quantity of the honey determines the alcoholic strength and final sweetness.

When making mead, yeast is added to the honey dissolved in water. During fermentation the yeast feeds on the sugar in the honey and splits it into carbon dioxide and alcohol. The carbon dioxide gas bubbles away leaving the alcohol behind (fortunately!). Yeast also needs nutrients and acid to keep it growing and working. These are lacking in honey and must be added. Tannin is also needed to give the mead astringency and to assist clarification. During fermentation the liquor is susceptible to spoilage by micro-organisms, ever present in the air, the most important of which are the vinegar bacteria which convert alcohol into acetic acid (vinegar). To avoid competing with *Sarsons Vinegar*, utensils must be sterilised and air must be excluded during fermentation using an air-lock.

Let's make some mead!

INGREDIENTS:

3 - 3 1/2 lb. honey
1/2 oz. citric acid.
1/2 tsp. tannin (or 1/2 cup black strong tea).
2 tsp. yeast nutrient.
Wine yeast (Maury yeast has been specially selected for mead but a General Purpose Yeast will be suitable).
2 tsp. yeast nutrient & 1/4 tsp. yeast extract (e.g. 'Marmite') to provide vitamin B.
Water to 1 gal.
(S.G. approx. 1.100 = potential alcohol 13.4%)

METHOD:

You can obtain your equipment and ingredients from any wine making supplier.

Warm the honey in three times its own volume of water, stir to dissolve (avoid burning the honey), bring just to the boil and simmer for a couple of minutes. Remove the scum. Do not boil fast as

many desirable substances will be evaporated, causing loss of flavour and bouquet.

When cool, transfer to a 1 gal. glass jar (demijohn) previously well rinsed with hot water. Bring the remaining water to the boil and when cool add to the dissolved honey. Add the yeast, nutrient, tannin and acid. Fit an air lock (or plug the neck of the jar with cotton wool) and leave in a warm place. When fermentation is complete (when there are no more bubbles and it has begun to clear), siphon using a length of plastic tubing (or carefully decant) the mead into a clean jar leaving the sediment behind. When another deposit has formed, siphon again. When it no longer throws a sediment and is clear, bottle. If necessary, filter or add wine finings.

The above recipe should produce a *dry mead* containing about 13% alcohol. If the finished mead tastes rather sweet, delay bottling until you are sure fermentation has finished to avoid burst bottles. A *medium mead* would need about 4 lb. honey and a *sweet (or sack) mead* 4 1/2 lb.

Sultanas give extra flavour, body and smoothness to mead and nourish the yeast. Rinse 12 oz. sultanas in warm water and chop or mince. Ferment on the pulp, stir daily, and strain after 10 days.

Your mead will probably be drinkable after a year. Having made mead, don't be impatient to drink it - there is no comparison between young mead and the matured article. Brother Adam of Buckfast Abbey recommended maturing mead in sound oak casks for a full seven years before bottling. I have never achieved such perfection. At least hide a couple of bottles to mature and make some more. ***5 gallons lasts almost twice as long as 1 gallon!*** And of course, if you are a beekeeper, you will enter a bottle of mead in the *National Honey Show* and your local Association Show. Having entered a bottle of mead at a local show, I approached the judge and told him that the mead he had awarded First Prize was *awful*. He looked rather surprised until I explained that the mead was mine! His reply was "You should have tasted the others"!

If you are a beekeeper and wish to use the honey remaining in cappings, you need to measure the amount of honey dissolved in your liquor. The old method was to float a new laid egg in the dissolved honey and when only a piece of shell the size of an old sixpence was showing, the amount of honey was correct. Nowadays, one can purchase an instrument called a hydrometer which is easy to use and much more reliable.

Place the cappings in a suitable container and add cold water. Stir to dissolve the honey, allow to stand a while and then strain. Take a hydrometer reading and adjust with honey or water to give the required starting gravity. More honey will increase the specific gravity, more water will lower it. Proceed as in the recipe above.

2 lb. honey *in* 1 gal. gives S.G. 1.060, potential alcohol 7.8%.
3 lb. honey *in* 1 gal. gives S.G. 1.090, potential alcohol 12%.
4 lb. honey *in* 1 gal. gives S.G. 1.120, potential alcohol 16.3%.

4 lb., honey added *to* 1 gal. = 3 lb. *in 1 gal.*

Dry Mead:	Starting S.G. 1.085-1.105.	Finish S.G. 0.990-1.000.
Medium Mead:	Starting S.G. 1.105-1.120.	Finish S.G. 1.000-1.005.
Sweet Mead:	Starting S.G. 1.120-1.130.	Finish S.G. 1.005-1.015.

If you add one equal quantity of water the *gravity* (not the Specific Gravity) will be reduced by half e.g. from 180 to 90 (or from S.G. 1.180 to 1.090).

When making a sweet mead it is a good plan to add half the total honey at the outset, and the remainder in 4 oz. lots each time the S.G. approaches 1.000

Mead is fermented honey and water. By adding other ingredients you may produce interesting variations. Originally, of course, herbs were added for medicinal purposes - so they say! Spices were added, I suspect, to mask the taint of vinegar etc. A famous drink of the well-to-do was known as *pyment* or *piment*. This was a mixture of grape juice (sometimes already fermented) and honey. Very often spices were added and the brew was then called *hippocras*. This had a great many variations with names associated with the Church such as *Pope, Cardinal* and *Bishop* and was, sometimes served hot in cold weather. Clerics were often criticised for their excessive taste for them. In 817 a local synod at Aix la Chapelle tried to ban the clergy from drinking spiced wines. *Mulsom* was wine made into a long sweet drink with honey and water, its name being given to *mulled wine*. Stone bottles were filled with mulled mead to warm the occupants of the bed - and then the contents were drunk! *Braggot, Braggon* or *Bracket* was a mixture of ale or beer and honey and often spices. *Braggon* is mentioned favourably by Chaucer and was very popular in the 13th century. Mothering Sunday was known as Bracket Sunday in Lancashire, when this drink was served to the men and women *in service* visiting home.

However, here are the traditional variations:

Pyment: grape juice and honey.
Hippocras: pyment and herbs.
Cyser: apple juice and honey.
Morat: mulberry juice and honey.
Melomel: fruit juice (other than apple, grape or mulberry) and honey.
Metheglin: dry mead with herbs and spices.
Sack mead: sweet mead.

Hippocras is named after Hippocrates, the Greek physician and ‘father of medicine’. The cloth bag that held the herbs was called the *hippocratic sleeve.*

Wales and Cornwall are famed for their honey and mead. Metheglin (or metheglyn) means medicine in both languages. The Welsh *meddyglyn* and the Cornish *medheklyn* derive

from the Latin *medicus* and the Old English *hlynn* meaning liquor. Sack *(seco, sec, siccus)* simply means dry. Oddly, *Sack Mead* is a very ***sweet*** mead in contrast with dry mead.

Thus Water boils, parboils, and mundifies,
Clears, cleanses, clarifies and purifies.
But as it purgeth us from filth and stink,
We must remember that it makes us drink,
Metheglin, Bragget, Beer and headstrong Ale,
(That can put colour in a visage pale) ...

John Taylor ('Water Poet) 1580-1653.

Clara Furness in *Honey Wines and Beers (Northern Bee Books)* also gives the following:

Clarre: pyment.
Alicante wine: morat.
Myritis: bilberries and honey.
Rhodomel: rose petals and honey.
Miodomel: hops and honey.

These variations ferment more readily and mature more quickly. However the addition of spices may cause hazes which will have to be removed by filtration or fining with proprietary finings. If you already make wine, replace the sugar in the recipe with honey using 1 lb. for 3/4 lb. sugar to allow for the water content of the honey.

Metheglin I - Queen Elizabeth's Recipe

Take of sweet briar leaves and thyme each one bushel, rosemary half a bushel, bay leaves one peck. Seethe these ingredients in a furnace full of water (probably not less than 120 gallons) boil for half an hour, pour the whole into a vat and then when cooled to a proper temperature (approx. 75 deg. F.) strain. Add to every 6 gals. of the strained liquor a gallon of fine honey and work the mixture together for half an hour. Repeat the stirring occasionally for two days, then boil the liquor afresh, skim it till it becomes clear and return it to the vat to cool, when reduced to a proper temperature (approx. 80 deg. F.) pour it into a vessel from which fresh ale or beer has just been emptied, work it for three days and tun. When fit to be stopped down, tie up a bag of beaten cloves and mace (about half an ounce of each) and suspend it in the liquor from the bung hole. When it has stood for half a year it will be fit for use.

Modern Version

Make a gallon of mead as described above. Suspend in the finished mead a muslin bag containing 1/2 oz. rosemary, 1/2 oz. bay leaves, 1/2 oz. thyme and 1/4 oz. sweet briar. Taste the mead daily until the flavour is to your liking and remove the herbs.

Metheglin II

4 1/2 lb. dark honey.
1 oz. each of mace, cloves, cinnamon, bruised ginger, **thin** rinds of 1 lemon & 1 orange.
Simmer together, strain, cool.
Add yeast, nutrient, acid, tannin. Ferment. Needs long maturation.

Pyment

1 pint white grape concentrate.
2 lb. heather honey.
1/4 oz. citric acid.
Yeast, nutrient, tannin.

Combine ingredients and ferment.

To make *Hippocras:*

1 Add 1/4 oz. cinnamon at start of fermentation.

2 Add 1 knob of bruised root ginger and the juice and peel (no pith) of 1 small orange, boiled in a pint of water for 20 minutes and strained over the honey etc.

3. Add **one** of the herbs or flowers from the following:

Parsley, Marjoram, Cowslip (4 oz. fresh, 1 tsp. dried).

Mint, Sage, Caraway seeds, Meadowsweet, Lemon thyme, Elderflowers, Balm (2 oz. fresh, 1/2 tsp. dried).

Mace (1 oz. fresh, 1/4 tsp. dried).

A mixture of any of the above herbs can be used - do not exceed 2 - 4 oz. Ferment on the pulp for 4 days, stir daily, strain, etc.

Sachets of herbs are available for making mulls and herbal teas. Experiment with these and whole and powdered spices from the kitchen (nutmeg, peppercorns, coriander, citrus peel, etc.). Infuse the herbs in the mead and remove when the strength of flavour is sufficient. Powdered herbs should be placed in a muslin bag.

Sprigs of thyme, rosemary or fennel standing in a bottle of brilliantly clear mead makes an unusual gift.

Cheat's Melomel or Cyser

Supermarkets stock a wide range of inexpensive fruit juices. A range of melomels can easily be made using 1 litre of juice (plus yeast, nutrient, tannin and 1 tsp. citric acid) and 3 lb. honey. Cyser can be produced using 1 - 3 litres of apple juice with 3 lb. honey and

a little less acid and tannin (1/4 tsp. acid and a pinch of grape tannin). Added *body* can be achieved by boiling two bananas in sufficient water to cover & adding the strained infusion.

A hybrid between cyser and pyment can be made using 1 lb. honey, 1 pint of white grape concentrate and 4 pints of apple juice. 2 lb. of raisins could be substituted for the grape concentrate.

Many concentrates are available from wine making shops. Follow the instructions for making a wine but substitute honey for the sugar.

Recipes show variation in acid and tannin content, depending to some extent on the ingredients. I have not, you will notice, tried to convert recipes to metric quantities. I have tried to be consistent, but recipes are always a guide - experiment. You *can* measure the acid content, but taste is usually sufficient. Our ancestors may have had their fair share of failures - but the long history of mead suggests they had their successes - without scientific knowledge or equipment. If you like the end result - drink it and make some more! I once made a wine that I thought was undrinkable. I donated it to a friend's party! The party was to entertain some French visitors - they thought the wine excellent and a great aperitif!!

Internet Recipes

If you *surf the Internet* you will find a wealth of information about mead and mead making. There seems to be much interest in America.

Just remember that mead is reputed to be an aphrodisiac. I Have murly finshed thiss Artackel aNd aaaaa Bootle orf Me oWn MEED - CHAIRS!

Brian ('Pollio Romulus') Dennis.

Brian P. Dennis started keeping bees in 1976 as an antidote to the stress of teaching! The stress increased as did his interest in bees. He holds the BBKA Certificate in Apiculture and operates about 30 colonies.

He has served on the committees of the Bee Improvement & Bee Breeders Association, British Beekeepers Association and the Northamptonshire Beekeepers Association. Several articles of his have been published in the bee press as well as letters to 'officials' concerning beekeeping issues.

Wine making and beer brewing have been hobbies for more years than he has kept bees - a failed ambition is to achieve more production than consumption! However, the two interests, wine making and beekeeping became combined in the making of mead. He has entered mead at local and national shows and gained numerous awards.

Having retired from full-time teaching, he hopes to have more time to improve the quality of both his beekeeping and his mead making - and more time to enjoy both.

Bibliography

Wassail! in Mazers of Mead by G.R. Gayre (1948: Phillimore & Co.). Reprinted *Brewing Mead - Wassail! in Mazers of Mead* by G.R. Gayre and C. Papazion (1986. Boulder, CO, USA: Brewers Publications).

The Closet of the Eminently Learned Sir Kenelme Digbie, Kt, Opened (1669). Transcript of 128 pp. containing receipts for mead, etc. (1983. London: IBRA).

Making Mead by Bryan Acton & Peter Duncan (1965. *Amateur Winemaker Publication).*

All About Mead by S.W. Andrews (1971. Mills & Boon Ltd.).

Honey Wines and Beers by Clara Furness (*Northern Bee Books.* ISBN 0-907908-39-X).

Mead - Making, Exhibiting & Judging by Dr. H.R.C. Riches (1997. *Bee Books New & Old.* ISBN 0-905652-41-X).

MEAD

by

Brian P. Dennis

A brief history of mead making containing recipes for making mead including cyser, hippocras, melomel, metheglin, pyment, etc.

(This article has been severely "snipped" go to http://www.solorb.com/mead/danspaper.html for full document)

An Analysis of Mead, Mead Making and the Role of its Primary Constituents

Daniel S. McConnell and Kenneth D. Schramm* Technical Director, G.W.Kent and President, The Yeast Culture Kit Company

*Director, The Mazer Cup Mead Competition.

PART 1: AN ANALYSIS OF HONEY

VARIATION OF COMPOSITION BY FLORAL VARIETY

The variable composition factors which affect honey and fermentation are: Moisture content (lower moisture means higher percentage of sugar content), Percent dextrose (lower dextrose means lower crystallization), Complexity of sugar blend (higher concentrations of maltose and other sugars make for more complex flavor and aroma variations. This usually also corresponds to lower dextrose levels), pH (affects fermentation and flavor profile), Total Acid content (flavor), Ash (mineral content - affects aroma, flavor and fermentation) and nitrogen content (fermentation). This data is presented on Table 1.

Total acids are expressed as millequivalent/kilogram; it reflects amount of cationic charge produced by the acids in the solution. The average for the 490 samples was 29.12; we have weighted our assessment of each honey's acidity against that value.

Table 1. Honey constituents by variety expressed as a percentage[1]

	Citrus	Clover	Fireweed	Mesquite	Rasp.	Tupelo	Sage	T.Pop
Moisture	16.5	17.7	16.0	15.5	17.4	16.0	17.6	18.2
Levulose	30.9	37.9	39.3	40.4	34.5	40.4	34.6	43.3
Dextrose	32.0	31.0	30.7	36.9	28.5	20.2	25.9	26.0
Sucrose	2.8	1.4	1.3	0.95	0.5	1.1	0.7	1.2
Maltose	7.2	7.7	7.1	5.4	5.7	7.4	11.6	0.0
High.Sug.	1.4	1.4	2.1	0.35	3.6	2.4	3.0	1.1
pH	3.84	3.77	3.03	4.20	4.04	3.51	4.45	3.87
Total acid	30.34	26.53	26.77	16.33	39.19	29.10	42.99	36.59
Ash	0.073	0.071	0.108	0.129	0.471	0.108	0.460	0.128
Nitrogen	0.014	0.039	0.032	0.012	0.07	0.037	0.076	0.046

Citrus: By analysis of the numbers, citrus honey appears to be an excellent candidate for brewing. While the dextrose level is a bit high, moisture is low, pH is in the middle, and ash content is very low. The low nitrogen content might dictate higher than normal yeast nutrient use. Citrus honey of any blend is marketed as "Orange Blossom," and is light in flavor and very aromatic. Micah Millspaw has made some excellent mead from orange blossom honey.

Clover: The values shown here are for sweet clover honey, and the U.S.D.A. has several dozen specimens profiled in their bulletin. Moisture levels tend to run on the high side, making clover honey a candidate for quick use. As with most of the lighter flavored honeys, ash content is low, as is total acid content, which would contribute to a softer flavor profile. It looks like a great case honey for flavored meads.

Fireweed: Other than slightly lower than normal total acids and ash, fireweed honey looks like a very average honey. Fireweed honey did not express a dramatic nose or flavor, and doesn't seem to create much of a stir as a mead.

Mesquite: Not one of our experimental honeys, but a good candidate by the numbers. High pH is due to lack of total acid, not high ash buffering. This honey should ferment well with a healthy dose of nitrogen and no pH adjustment. Low moisture and acid content make for higher sugar content by weight. Low ash should mean light color and minimal offensive odor or flavor. Might require some acid before bottling for balance, especially in sweeter meads.

Raspberry: Very high ash content may make this honey somewhat suspect, although it expresses a dynamite nose and flavor out of the jar. Very interesting sugar blend should create complexity, and high nitrogen should benefit fermentation.

Sage: Another low ash, middle-of-the-road sugar blend honey. Known to be light in flavor with a delicate and inviting aroma. One to be explored.

Tulip Poplar: Tulip Poplar honey is a very distinctive honey in aroma, and although one of the darker honeys, has a mild and appealing flavor. Tulip poplar honey has a high maltose content, lending to its complexity, and, like other dark honeys, is high in ash content. Tulip poplar honey is widely available from the north to the south throughout the midwest.

Tupelo: White tupelo is the primary source for the light unblended honey sold as tupelo honey. It has a very high levulose content, low dextrose and high maltose count, which make it attractive to brewers. Low ash, high Acids and moderate pH.

Wildflower: The range of honeys sold as "Wildflower" is too great to he characterized by one broad brush statement. The U.S.D.A. included 57 "blend of floral source" honeys in its study, with pH values from 3.67 to 5.30, ash contents from .054 to .615, and other swings in other categories. Our experience with the wildflower honey in our batch was not particularly favorable, and I suspect too much mineral content, but some of the honeys had values which looked very conducive to good mead. Caveat Emptor.

Commercially Blended Honey: The drawback to much commercially blended honey is that it has been heat pasteurized, albeit at temps in the 145 F range. The upside is that the honey is generally buffered through blending to a pH around 3.9, is light amber in color and therefore free of excessive mineral content, and has been blended to have a neutral palate and nose. It makes a good base honey, frequently providing quality grading which assures low moisture content, and color grading for ease of use and good record keeping.

Other Interesting honeys Several other honeys stood out in the study as having interesting characteristics.

Japanese Bamboo: High Maltose, higher pH, low to medium ash, high nitrogen.

Alfalfa: high dextrose, low ash, low nitrogen.

Blackberry: High pH (5.0), high Maltose (11.3%), high ash, high nitrogen.

Blueberry: High Maltose, low acid, higher pH, high nitrogen.

Chinquapin: Low moisture, low dextrose, high maltose, very high other sugars, very high ash (.761%).

Gallberry: Low acid, higher pH (4.2).

Black Locust: High maltose, very low acid (15.54), very low ash (.052%), low nitrogen.

Peppermint: High pH (4.7), high acid, very high ash (.473)

Prune: High moisture, high maltose, pH 6.0!, acids very low (11.80), ash .694%

Sourwood: dextrose low, maltose very high, pH 4.53, acids 16.95, ash slightly high. Very interesting candidate. Highly respected among honey authorities.

Vetch, hairy: Average sugar values, low pH, low total acids, very low ash, low nitrogen.

Alaska & Nevada Beekeeping Clubs

Alaska

Southcentral Alaska Beekeepers Association
Dr. Joe Carson, President
Box 110828
Anchorage, AK 99511
Tel: 907-336-7779
Cell: 907-727-8200

Meetings: SABA meets the fourth Monday of the month
(except for August and December)
at the VFW Post 9785
10527 VFW Rd. in Eagle River, Alaska
6:30 - 8:30 pm

From Anchorage: take the S.Eagle River Exit
right at the light,
The VFW is the 6th building on the right (log building)
the meeting is in the downstairs

email: saba@alaskabees.com
for more info

Alaskan Beekeeper egroup: akbeekeepers

Nevada

Northern Nevada Apiculture Society
350 Capitol Hill Blvd.
Reno, NV 89502-2923
Tel: 775-688-1180 or 775-851-1888

Meetings: Second Monday of the month at 7:30 pm.
350 Capitol Hill Blvd., Reno NV.
Dept of Agriculture building. Meetings are held in the Board Room.

California Beekeeping Clubs
June - 2006

Alameda County Beekeepers Association

When: 2nd Tuesday of the month
7:30 PM
Where: Rotary Nature Center
552 Bellevue Avenue
Oakland, CA 94610
Contact: Stan Umlauft
(925) 458-5560
stan@honeybee .com
Club Activities: Observation Hive at Rotary Nature Center
Annual "Swarm List" to 150 public agencies
Newsletter

Beekeepers' Association of Southern California

When: 4th Tuesday of the month
7:30 PM
Where: Kling Center
12900 Blue Field Avenue
La Mirada, CA 90638
Contact: Mark Hoppe
(562) 841-9754
mhpower@quixnet.net
Club Activities: Los Angeles County Fair
Plant Fair – Fullerton Arboretum
Newsletter

Beekeepers' Guild of San Mateo

When: 1st Thursday of the month
7:30 PM
Where: 1st Congregational Church of Belmont
751 Alameda de las Pulgas
Belmont, CA 94002
Contact: Tom Vercoutere, President
info@sanmateobee.org
www.sanmateobee.org
newsletter
swarm pick up list
Club Activities: San Mateo County Fair
Newsletter
Beginning Beekeeping Class – free, one day class in spring
Assistance with Public Educational Programs at Coyote Point Museum

California Bee Breeders' Association, Ltd.

When: January and October
10:00 AM
Where: Ord Bend Community Hall
Highway 45
Ord Bend, CA 95943

Contact: Joan Seifert
(530) 633-4789
seifert-brhc@prodigy.net

California State Beekeepers' Association

When: November
8:30 AM
Where: Convention Hotel
Rotates – North, central, south in state
Contact: Patti Johnson
(209) 667-4590
csba1@juno.com
www.californiastatebeekeepers.com
Club Activities: California Bee Times – quarterly publication

Central Valley Beekeepers' Club

When: 3rd Thursday of the month
6:30 PM meal; 7:30 PM meeting
Where: Lindsay Community Center
Lindsay, CA
Contact: Les Beshears
(559) 298-2430
bobfelker@yahoo.com
Club Activities: Fresno County Fair
School visits upon request

Delta Bee Club

When: 1st Tuesday of the month
6:30 PM meal; 7:00 PM meeting
Where: Restaurant – Hilmar, Turlock, Modesto, Los Banos
Contact: Alan Henninger, Secretary/Treasurer
(408) 251-9214
alanhenninger@yahoo.com

Gilroy Beekeepers' Association

When: 2nd Tuesday (Oct. to May)
7:00 PM
Where: Gilroy Grange Hall
8191 Swanston Lane
Gilroy, CA
Local bee yards (June to Sept.)
Contact: Michael Reddell
(408) 930-2325
mwr@hotcity.com

Humboldt County Beekeepers' Association

When: 1st Thursday of the month
7:00 PM
Where: Adorni Center
1011 Waterfront Drive
Eureka, CA 95501

Contact: Dick LaForge
(707) 443-2626
Club Activities: Humboldt County Fair
July Annual Potluck
12 week beginning beekeeping course
School visits and service club lectures
Newsletter

Kern County Beekeepers' Association

When: "As Needed"
Where: To be announced
Contact: Jim Tiffany
(805) 589-6080
Club Activities: Kern County Fair

Los Angeles County Beekeepers' Association

When: 1st Monday on the month
Jan. – dinner in Hollywood
Oct. – picnic
7:00 PM
Where: Mount Olive Lutheran Church
3561 Foothill Boulevard
La Cresenta, CA
Contact: Matt Reese
(626) 794-5626
Matt_Reese@ispwest.com
Club Activities: Los Angeles County Fair
Plant Fair – Fullerton Arboretum

Marin County Beekeepers Association

When: 1st Wednesday of the month (except July and August)
7:30 PM
Where: Draper Farm
11 Sacramento Avenue
San Anselmo, CA 94960
Contact: Mea McNeil Draper
mea@onthefarm.com
www.marincountybeekeepers.org
Club Activities: Swarm and colony removal list
Marin County Fair
Apitherapy Information

Mount Diablo Beekeepers' Association

When: 2nd Thursday of the month (except Nov. & Dec.)
7:30 PM
Where: Heather Farms Garden Center
1540 Marchbanks Drive
Walnut Creek, CA
Contact: Stan Thomas, President
garynjoan@comcast.net
www.diablobees.org
swarm pick up list

Club Activities: Contra Costa County Fair
School and civic visits upon request

Nevada County Beekeepers' Association

When: 1st Monday of the month
7:00 PM
Where: Grass Valley Veterans Memorial Building (rear)
255 South Auburn Street
Grass Valley, CA
Contact: Shane Mathias, President
(530) 308-1376
lawdawg911@earthlink.net
Club Activities: Beginner class each spring
School and civic visits upon request
"Honey Bee Hotline" for swarms
Nevada County Fair – permanent booth
Newsletter

Orange County Beekeepers' Association

When: 1st Tuesday of the month (except July)
6:30 PM
Where: Centennial Farm Silo Building
Orange County Fair Grounds
Contact: Jean Angel, President
(949) 458-6532
AngelsHoneyFarms@hotmail.com
www.ocba.homestead.com
Club Activities: Orange County Fair
School visits upon request
Swarm and colony removal
Sell honey at malls upon request
Newsletter

Sacramento Area Beekeepers' Association

When: 3rd Tuesday, except Jan., Jul., and Aug.
7:30 PM
Where: Belle Cooledge Community Center
5699 S. Land Park Drive
Sacramento, CA
Contact: Nancy Stewart
(916) 451-2337
nstewart@cwnet.com
Club Activities: California State Fair
Sacramento County Fair
School visits upon request
Swarm collection
Newsletter

San Diego County Beekeepers' Association

When: Usually Tuesdays
To be announced
Where: San Diego County Farm Bureau

2670 E. Valley Parkway
Escondido, CA
Contact: Chuck Nickels
(760) 749-6739
josgbbs@cs.com
Club Activities: Spring field day
Annual fall picnic
Christmas potluck dinner

San Francisco Hobby Beekeepers

When: 2nd Wednesday of the month
7:30 PM
Where: Josephine Randal Jr. Museum
199 Museum Way
San Francisco, CA 94114
Contact: Philip Gerrie, President
glassgerrie@earthlink.net
www.sfbees.org
Club Activities: San Francisco Flower & Garden Show
"City Beekeeping" for SPCA summer program
School and civic visits upon request

San Mateo County Beekeepers

When: 1st Thursday of the month
7:00 PM
Where: 1st Congregational Church
751 Alamed de las Pulgas
Belmont, CA
Contact: Tom Vercoutere
info@sanmateobee.org
www.sanmateobee.org
Club Activities: Free beginner class each spring

Santa Clara Valley Beekeepers' Guild

When: 1st Monday of the month
7:00 PM
Where: Santa Clara City (Central Park) Library
2635 Homestead Road
Santa Clara, CA 95051
Contact: Bob Ricer
(408) 358-2571
ricer2@aol.com
www.beeguild.org
Club Activities: Santa Clara County Fair
Swarm referral list
School visits upon request
Access to "Beekeeping in California"

Santa Maria Beekeepers

When: 2nd Monday of the month

Where: International House of Pancakes

Santa Maria, CA

Contact: Dean Davidge (805) 688-9696
688-7477
Club Activities: Santa Barbara County Fair

Shasta Beekeepers' Association

When: Variable in Jan, or Feb., May, Aug. and Oct.
7:30 PM
Where: Beekeeper's property or Palo Cedro Pizza
Contact: Glenda Wooten
(530) 549-3555
Club Activities: Shasta District Fair
Palo Cedro Bee Festival
Mt. Shasta Mall – Ag Day exhibit

Sonoma County Beekeepers' Association

When: 2nd Monday of the month
7:00 PM
Where: New College
99 6th Street (6th and Wilson)
Santa Rosa, CA 95401
Contact: Kathy Cox, President
(707) 823-2804
president@sonomabees.org
www.sonomabees.org
On-line newsletter
On-line swarm collectors list
List of very large library and video tape holdings
List of area trees and flowers visited by honey bees
Club Activities: Ag Day for school children in March
Day Under the Oaks – Santa Rosa Junior College – 1st Sunday in May
Sonoma County Farm Trails - Gravenstein Apple Fair – 2nd weekend in August
Harvest Fair – 1st weekend in October
Annual gourmet honey potluck dinner and elections - November
Newsletter- Ettamarie Peterson: editor@sonomabees.org

Helpful Links & Egroups

Links

http://www.beekeeping.com/articles/us/small_beekeeping/homepage.htm
Peace corp ezine on how to build top bar hives

http://www.honeylocator.com/
Honey Locator for varietals

www.honeybeeworld.com

http://homegarden.expertvillage.com/interviews/beekeeping.htm
Video how-to's on beekeeping

www.beekind.com
Has a beginner's beekeeping class in Sebastopol September 29 for $25.00

www.gobeekeeping.com
Free online classes

http://www.honey.com/consumers/honeyfeast.asp
Enewsletter subscription of honey recipes sent once every three weeks.

http://zeidlerguild.awardspace.com/
sca beekeepers guild: Zeilder Guild

Egroups

Backyard_Beekeeping
Organicbeekeepers
Organichomesteadinggardening
sca_beekeeping

Upcoming "Local" Events

California State Beekeepers Association 2007 Convention
will be held
November 13-15 at Harrah's in South Lake Tahoe.

Download registration form at:
http://www.adobe.com/products/acrobat/readstep2.html

Make Plans Now For the
Joint Convention of the
American Honey Producers Association & American Bee Federation
January 8-12, 2008
to be held in Sacromento, CA.
at the Double Tree Hotel.
www.americanhoneyproducers.org

References

Avitabile, A. & Sammataro, D (1986) *The Beekeeper's Handbook* Foreward by E.C. Martin. New York: Collier Books, Macmillan Publishing Company

Berube, C.A (1997) *War and Bees* first published in Dromore Buzzette, reprinted to Montgomery Beekeepers Association Newsletter, Jan. 2005 courtesy BEES

Bishop, H. (2005) *Robbing the Bees, A Biography of Honey*. New York: Free Press

Buchmann, S. & Repplier, B. (2005) Letters from the Hive An Intimate History of Bees, Honey and Humankind. New York: Bantam Dell

Crane, E. (1975) Honey A Comprehensive Survey. London: Heinemann

Crane, E. (1983) *The Archaeology of Beekeeping*. New York: Cornell University Press

Crane, E. (1999) *The World History of Beekeeping and Honey Hunting.* Routledge

Crane, E. & Walker, P. (2000) *The History of Beekeeping in English Gardens* . Garden History Vol. 28, No. 2. (Winter 2000), pp. 231-261

Flottum, K. (2005) *The Backyard Beekeeper*. Singapore: Quarry Books.

Griffin, B. L. (1999) *The Orchard Mason Bee* 2nd Edition. Bellingham: Knox Cellars Publishing

Mech, D. (1994) *Joy with Honey*. New York: St. Martin's Press

Morse, R.A. (1994) *The New Complete Guide to Beekeeping.* The Countryman Press

Pachyderm, Journal of the African Elephant, African Rhino and Asian Rhino Specialist Groups, (July-December 2005) #39, ISSN 1026 2881

Ransome, H.M. (2004) *The Sacred Bee*. Mineola: Dover Publications, Inc.

Vivian, J. (1986) *Keeping Bees*. Charlotte: Williamson Publishing Company

Whynot, D. (2004) *Following the Bloom, Across America with the Migratory Beekeepers*. New York: Penguin Books

Winston, M.L. (1998) *From Where I Sit, Essays on Bees, Beekeeping, and Science.* Comstock Publishing Associates

The burden of bee-ing an undertaker (1997) Science News, September 27, 1997, Vol. 152 #13, p.200