

What's the Buzz About Bees?

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Outline

- What are bees?
- Bee-evolution
- Bee-odiversity
- Bee-ology
- Bee-threats
- Bee-action
- Bee-happy!

What are bees?

- Arthropods
 - Exoskeleton
 - Major body regions
 - Paired jointed appendages
 - Internal features.

What are bees?

- Insects
 - 3 main body regions
 - Head (nerve, feeding)
 - Thorax (locomotion)
 - Abdomen (digest, repro)
 - 6 legs (thorax)
 - Wings: 0, 2, 4 (thorax).

Bee-evolution

- Evolved from wasps
- Share a recent common ancestor with Sphecidae
 - Mud daubers
 - Mud wasps
 - Sand wasps.

Bee-odiversity

- World 20,000
- North America 4,000
- California 1,600
- So Calif ? 1,000
- OC ? 600

Western Honey Bee

- Western Honey bee, *Apis mellifera*, on Telegraph Weed, *Heterotheca grandiflora* (p. 123), and on dove weed, *Croton setiger* (p. 234) in Riley Wilderness Park
- Native to Europe & Africa, the Western Honey Bee, *Apis mellifera*, is now worldwide
- Several local forms of *Apis mellifera*, especially in Europe
 - Northern Europe, *Apis mellifera mellifera*
 - Southern Europe, *Apis mellifera ligustica*
 - South Africa, *Apis mellifera scutellata*

Bee-ology

- Holometabolous
- Complete metamorphosis
- Life cycle models made by Insect Lore, US Toy, Safari Ltd.

Where do they nest?

- Nearly all bee species are solitary
 - ~70% in the ground
 - ~30% under bark, in holes & cracks
 - Few make their own holes: carpenter
- Very few species are social
 - Small nests: bumble bees
 - Only 1 species nests in little white boxes! *Apis mellifera*
- Leafcutter bee, *Osmia* spp., make linear nests in hollow stems
- Leafcutter bees cut circular holes in soft-leaved plants
- Leafcutter bee, *Megachile* spp., make branched nests in wood tunnels made by beetles
- Western digger bee, *Anthophora occidentalis*, makes nests in soil, makes a mud chimney
- Longhorn bees, *Melissodes* spp., makes nests in soil, unadorned opening
- Life cycle: pollen gathering, pollen ball, egg, larva, pre-pupa, pupa, adult

Bee-threats

- Some decline in diversity & abundance of native bees. Causes?
 - pesticide use, habitat destruction and fragmentation, global climate change, reduction of host plants, invasive species...

Bee-threats

- Colony Collapse Disorder (CCD)
 - Workers can lose their way home
 - Workers & drones leave the colony
 - Young and the queen die
 - Colony collapses.

Bee-threats

- Closeup of a hive killed by CCD. Note that brood is present, but all adult bees have disappeared.

Bee-threats

- CCD only affects western honey bee, *Apis mellifera*. Cause(s) still unknown
 - Mites? Mutation? Pesticides?
 - Western Honey Bee with attached Varroa Mites (*Varroa destructor*)
 - http://entnemdept.ufl.edu/creatures/misc/bees/varroa_mite.htm

Poisoning

- Imidacloprid (IMD)
 - Relatively new, widely used
 - Neonicotinoid “neo-nic”
- Annual die-off rate WHB 30%
- Even trace amounts of IMD make WHB lose their desire to feed
- Quickly leads to colony collapse.
- “We found that worker foraging performance, particularly pollen collecting efficiency, was significantly reduced with observed knock-on effects for forager recruitment, worker losses and overall worker productivity. Moreover, we provide evidence that combinatorial exposure to pesticides increases the propensity of colonies to fail.”
- “A honey bee, *Apis mellifera*, is headed toward an almond blossom. Massive losses of these managed honey bees are occurring every year, and pesticide poisoning is part of the problem.”
- “Soil contamination puts ground-nesting bumble bees, *Bombus* sp., at risk.”

- “Foraging of bumble bees, *Bombus* sp., can be impaired by neonicotinoids.”
- “Commercial hives can be heavily contaminated with pesticides.”
- “Honey bees can be killed by acute exposure to aerially dispersed seed coatings containing neonicotinoids. Chronic exposure can cause foragers to lose their way.”
- Salon article: “More than half of the purportedly “bee-friendly” plants sold at Home Depot, Lowe’s and Wal-Mart garden centers across the U.S. and Canada actually contain neonicotinoids — meaning gardens planted to save the bees, or even just planted under the assumption that they aren’t contributing to the die-offs, instead may be killing the pollinators.”
- Green Retail Decisions article: “Home Depot, BJ’s Collaborate to ban bee-killing pesticides.”

Bee-action

- Promote health & numbers of bees
- Establish gardens, restoration sites
- Eliminate/reduce pesticides.
- *General pesticides kill everything!*

Bee-action

- UC Berkeley Urban Bee Lab: observations at Leaning Pine Arboretum, Cal Poly SLO
- Plants from S. Africa, Australia, Central/South America are largely ignored by California native bees

Bee-action

- California’s native bees evolved with native flowering plants
- Plant it and they will come...

Lawns

- Used mostly by your neighbor’s dog
- Support nearly no wildlife
- 70-90% of your water bill!

Bee-action

- Use California native plants!
- Tree of Life Nursery, SJC
- Fullerton Arboretum, Fullerton
- Golden West College, Huntington Beach
- Rancho Santa Ana Botanic Garden, Claremont
- Theodore Payne Foundation, Sunland.

Take inspiration from nature...

- Beardtongues, *Penstemon* spp. - perennial
- Golden yarrow, *Eriophyllum confertiflorum* - perennial
- California buckwheat, *Eriogonum fasciculatum* - perennial
- *Phacelia* spp.: Several species, Seasonality, Annuals & perennials
 - Desert canterbury bells, *Phacelia campanularia* - annual
 - Tansy phacelia, *Phacelia tanacetifolia* - annual
 - Branching phacelia, *Phacelia ramosissima* - perennial
- Western sunflower, *Helianthus annuus* - annual
- Coastal goldenbush, *Isocoma menziesii* - perennial
- California poppy, *Eschscholzia californica* - annual or short-lived perennial

Bee-action

- Provide nesting sites
- Open ground, bee holes, bee boxes

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What is the foraging range of bees? How far will they fly to gather nectar and pollen, and thus pollinate our food crops. Why Do Bees Buzz? Ever wondered why bees buzz, or how they make that buzzing sound? Find out more here about how these wonderful insects make one of our favourite sounds of summer. How do bees differ? Are bees more or less the same? Information about bees focusing on some of the key differences between bumblebees, honey bees and solitary bees. How long do bees live? This is a question I am often asked during my talks.