

FLOAT LIKE A BUTTERFLY

Unless you're a beekeeper you may notice bees only as potential stingers. Yet as Stephan Bachmann and Gary Nabham say in *The Forgotten Pollinators*, (312 pp, Island Press, 1997), one "of every three mouthfuls of food we eat, and of the beverages we drink, are delivered to us by a flying bestiary of pollinators."

Pollination not only keeps us fed and clothed, but feeds our domesticated animals and their wild cousins as well.

Yet they're in trouble -- European honeybees are crashing, and though wind pollinates wheat, rice, maize, rye, barley and oats, circumpolar pine, fir and spruce, we cannot live by bread alone, much less pine cones; we must protect wild pollinators.

Seven crops worth 1.25 billion annually in the United States are pollinated primarily by wild insects – as well as onions, carrots, kapok, sunflowers, strawberries, cinnamon, clovers, figs, and coconuts. At least 800 species depend on wild bees and other insects for pollination – between 73 and 100% of animal pollinated foodstuffs.

If honeybee losses continue, encouraging natives to replace them could save \$4.1 billion a year. Or there could be bee wars as intense as the 19th century's cattle wars.

We see perhaps our most obvious debt to pollination when we fill our gas tanks: enough wind-pollinated plants thrived 280 million years ago to create the coal, crude oil, petroleum, peat and natural gas that keep us running.

Pollinators' history contains some surprises and a mystery. Beetles were the earliest and remain the most numerous worldwide (88.3% vs. 16.6% for bees). The

mystery? Flowering plants appeared 110-120 million years ago, and bees perhaps 200 million years ago: since bees depend on nectar and pollen, how did they live without these for 80 or 90 million years?

Wind pollination insured a few species, but with animals, plant species exploded, and the complicated dance between them began.

The U.S. alone has 4,000-5,000 species of ground nesting wild bees. Worldwide there are perhaps 40,000 bee and wasp species (1600 in California) and over 1500 bird species that pollinate.

Pollinators include tiny thrips, mosquitoes, beetles, moths and butterflies, bats, opossums, rats, lemurs, flying foxes and geckos.

Between them, pollinators and plants have created elaborate adaptations. Flowers, for instance, have taken so many forms because floral architecture must protect the sexual organs and allow seeds to develop, at the same time permitting pollen to come and go – a complex of invitation and defense that evolved more than 100 million years ago. Then there are mutualists, cheaters and robbers – animals which get nectar but don't pollinate. Mutualists tend to be keystone species, so when a plant species or family goes extinct, its pollinators may also perish.

And plants vary bloom time, to accommodate pollinators and avoid overlap and competition. Bats migrate along “nectar corridors,” to find flowers blooming sequentially. The perils include flowers opening too soon or too late, or animals arriving at the wrong time.

The honeybee, imported by 1620, has until recently been successful. Natives, including birds, are often better

pollinators, but honeybees, because they can store honey and give precise directions through dances, out compete them.

So, protection, protection! -- avoiding habitat destruction, pesticide misuse, alien species competition, genetic engineering and deforestation. Worldwide, 2600 plants are threatened with extinction and likely to take their pollinators with them.

Hence the value of butterfly and bee gardens. We must begin to see the world through the eyes of a bee or butterfly, to smell out a flower's fragrance as a moth would do, and to taste the mix of sugars there as a hummingbird might taste them.