Bio 81A: Ecology of San Francisco
Professor Crima Pogge

Green Hairstreak Butterfly

C. dumetorum

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Physiology

The green hairstreak is a small (up to 2cm), delicate, butterfly with shiny green underwings, mostly dull gray upper wings (Scott 1986) with males slightly darker than females (Tilden 1986) and a white fuzzy body.

Though most other members of the Lycaenidae family have false tails on the backs of their wings which may look like antennae as well as ocelli and even in some cases a false head (Baran 2007, Glassberg 2001) for attracting the attention of predators away from the actual head, the hairstreaks are unique in that they lack all of these features (Tilden 1986). They do however slowly move their hind wings while feeding to the same effect as the false heads (Baran 2007, Glassberg 2001, Tilden 1986).

Besides the different coloration of the upper wings in the between males and females, the two may be differentiated by the small undeveloped fore legs on the male which contrast with the fully functional sets of legs on the female (Howe 1975).

The flight of the green hairstreak has been described as fast and erratic (Brock nd.) or swift and darting (Kolts 1972). Upon landing they generally keep their wings closed (Glassberg 2001).

Feeding

The adult green hairstreak is heavily dependent on the coast buckwheat (er*iogonum latifolium)* throughout its range (Tilden 1985) but in San Francisco it is known to feed on deer vetch (*lotus scoparius*) (Brock nd., Scott 1986). As is typical with nearly all butterflies, the green hairstreak feeds with by drawing nectar from flowers up its long proboscis, which, when not in use is kept coiled up tightly under its head (Resh 2003), while the larvae feed on the leaves, flowers and fruit of its host (Big Sky Institute nd.).

Habitat

Because the green hairstreak is so dependent on the coast buckwheat its habitat and range are maximally limited to that of this host:

The coast buckwheat is a small herbaceous plant with steams up to one or two feet tall with a single inflorescence (Chambers 2006) which is 1.5 - 3 cm wide (Kozloff 1994) and composed of small (3-3.5mm(Hickman 1993)) bristly, light pink flowers.

The coast buckwheat is a hardy plant that lives in harsh conditions where competition is limited, it requires dry, well drained soils (Kodloff 1994), prefers the wet, salty air of the marine climate

(Barbour 2007), can live on steep and even vertical faces with unstable substrates (Barbour 2007) at elevations up to 150m (Hickman 1993).

The coast buckwheat is the characteristic species on the rear dune crest (Barbour 2007) and lives on coastal bluffs, scrub (Hickman 1993) and sea cliffs (Tilden 1986), and may be found from southern Oregon, south to Monterrey county (Tilden 1986).

Despite the larger range of the buckwheat, the green hairstreak may be found only from Mendocino to Monterrey counties (Scott 1986) in the immediately coastal areas only (Brock ND, Tilden 1986) and is further restricted in its range because it is very selective of micro-climates (O'Toole 1986).

For the populations of green hairstreaks in San Francisco the suitable habitats are limited to a couple undeveloped hills between Rocky Outcrop and Grand View Park in the inner Sunset (Nature in the City 2011).

Reproduction and Lifecycle

Upon emerging from the chrysalis (eclosion) the green hairstreak is sexually mature (Resh 2003). The males will wait near the coast buckwheat to court females (Scott 1986). The courtship dance involves the male chasing and fluttering behind the female, which will land, he will flutter behind her once more and finally they will mate (Scott 1986).

The mating is done by means of the highly specialized genitalia of the male (Shapiro 2007) manually depositing a sperm packet in the female's genital cavity where the eggs are fertilized and finally deposited (Resh 2003). Unlike some insect species, the female cannot choose which sperm packet to use for fertilizing a brood, she may only use the most recently acquired (Resh 2003). When she is ready to deposit the eggs she may find a suitable flower by scent in the air (Price 1997) and then test the plant she landed on with receptors on her feet to insure it is the correct type (O'Toole 1986, Resh 2003).

The small pale green eggs (Scott 1986) are laid individually on flowers (as opposed to under leaves, on or in the stem, in nests, etc.) (Tilden 1986) and then not guarded by the parents (Resh 2003). By laying the eggs individually and avoiding flowers which already have the eggs of other butterflies she is reducing the competition for her brood (O'Toole 1986).

While some butterfly larvae are laid in pods and end up working together to get into woody fibrous plants (Wilson 1971), the green hairstreak eggs are deposited individually leaving them to hatch

alone and thus they are unable to rely on teamwork to aid in feeding. This isolation may explain why the why the eggs are usually laid on the flowers.

After hatching the green hairstreak will pass through several life stages: caterpillar/larval, chrysalis/pupa, imago/adult butterfly (O'Toole 1986). There are usually 4 or 5 instars during the caterpillar stage, where the caterpillar molts then grows quickly before its skin hardens again. During the chrysalis stage the caterpillar completes its metamorphosis into an adult butterfly and may hibernate beneath the duff on the ground under the coast buckwheat (Big Sky Institute nd.). Within the chrysalis the tissues of the caterpillar are broken down to feed previously dormant groups of cells called imaginal buds (O'Toole 1986).

Human Interactions

The available habitat for the green hairstreak has always been limited, additionally it is rare and individuals are local where it throughout its range (Tilden 1985) making it very sensitive to habitat loss. Its habitats were reduced in the past to some extent by grazing farm animals and continue to be lost at a much greater rate by the destruction of the hind dunes from urbanization, particularly in San Francisco (Barbour 2007).

Fortunately for the green hairstreak as a species, many habitats remain intact outside of San Francisco such as those near Tomolas bay (Barbour) and are not under the stresses of those systems within the city.

For the populations with very limited habitats in San Francisco, all is not bleak. The conservation group Nature in the City has, among other projects, a campaign to build a corridor connecting the populations of green hairstreaks to avoid local genetic bottlenecks (Nature in the City 2011). They are doing this by encouraging people living in the corridor to plant coast buckwheat in their gardens. According to one source the coast buckwheat is an "excellent subjects for gardens devoted to native plants" (Kozloff 1994), and they are meeting with some success in the construction of the corridor.

Conclusion

Because the green harstreak is a very local and very rare butterfly in its limited habitat and because they do not travel long distances in search of food, mates or oviposition sites, they are at serious risk of local genetic bottle necks and local extinction. Fortunately their habitat requirements are

reasonably simple to recreate within San Francisco as they require little more than the existence of the coast buckwheat; the couple isolated habitats in San Francisco are being reconnected by dedicated volunteers and home owners and the green hairstreak no longer appears to be headed straight for extinction within San Francisco. None the less the green hairstreak should be protected and its habitats should contiue to be restored and expanded.

Getting involved

Habitat restoration projects within San Francisco occur monthly and are open to all, email elanie@natureinthecity.org for more information.

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