

## THE GALAPAGOS CARPENTER BEE, JUST HOW IMPORTANT IS IT?

By: Conley K. McMullen

The presence of the endemic Galápagos carpenter bee (later to be called *Xylocopa darwini* Cockerell) was first reported by Fredrick Smith in 1887 (Linsley et al. 1966). By the early 1900s, this bee was known to be well represented among the Islands of the Archipelago, especially in what would now be considered the littoral and arid vegetation zones. Williams (1926) noted that it used the wood of

*Hibiscus tiliaceus* (Malvaceae), *Croton scouleri* (Euphorbiaceae), *Bursera graveolens* (Burseraceae), and *Erythrina velutina* (Fabaceae) for nesting purposes. Because of this habit of nesting in wood, it was hypothesized that the carpenter bee may have initially reached the Archipelago in a drifting log (Cockerell 1935).

Since these early reports, only a few studies have been conducted to determine the carpenter bee's distribution and role in the Galápagos. However, by 1981 it had been recorded on the Islands of Baltra, Daphne, Española, Floreana, Gardner (near Española), Isabela, Pinzón, San Cristóbal, Santa Cruz, Santa Fé, and Santiago (Linsley 1966, Linsley et al. 1966, Grant and Grant 1981). It was found to nest in *Scalesia affinis* (Asteraceae), *Maytenus octogona* (recorded as *M. obovata*; Celastraceae), and *Castela galapageia* (Simaroubaceae) (Linsley et al. 1966) as well as those species already mentioned by Williams. Studies by Linsley (1966), Linsley et al. (1966), Rick (1966), and McMullen (1985, 1986, 1987) have also suggested that this bee is undoubtedly responsible for the vast majority of insect pollination that takes place in the Archipelago.

Additional support for the role of *X. darwini* as



A Galápagos carpenter bee visiting a hibiscus (*Hibiscus tiliaceus*) flower. *Una abeja carpentera visitando el flor de peregrina* (*Hibiscus tiliaceus*).

primary pollinator was obtained during a trip to Galápagos in August of 1988. I observed the carpenter bee visiting the flowers of several plants on Santa Cruz, but few other insect pollinators were seen. In fact, only *Phoebis sennae* (Pieridae), the Galápagos sulfur butterfly, and *Leptotes parrhasioides* (Lycaenidae), the Galápagos blue butterfly, were observed, and these only rarely. The list of

plants visited by the Galápagos carpenter bee, along with the resident status of each, is in Table 1. The majority of these observations took place along the road from the Darwin Station to Bella Vista in the arid and transition vegetation zones. However, the *Hibiscus tiliaceus* was located in the littoral zone at the Darwin Station; and the members of *Acacia insulae-iacobi* (Mimosaceae), *Cassia picta* (Caesalpinaceae), and *Lycopersicon cheesmanii* var. *cheesmanii* (Solanaceae) that were seen being visited by this bee were located along the road in the arid zone on the north side of Santa Cruz. The carpenter bee was seen pollinating flowers of *Parkinsonia aculeata* (Caesalpinaceae) and *Waltheria ovata* (Sterculiaceae) in the arid zones on both the south and north sides of Santa Cruz.

Since most of these were casual observations, a comment on the usual level of visitation activity would be difficult to make. However, there were two species that *X. darwini* appeared especially attracted to and visited daily. These were *Parkinsonia aculeata* and *Hibiscus tiliaceus*. Pollen from these plants was clearly visible on the abdomen of bees that visited them. When visiting *H. tiliaceus*, each bee would enter a flower and work its way around the staminal

**Table 1.** Summary of flowers visited by the Galápagos carpenter bee (*Xylocopa darwini*) on Isla Santa Cruz, 11-28 August 1988.

Family	Species	Status <sup>1</sup>
Asteraceae	<i>Sonchus oleraceus</i>	IW
Boraginaceae	<i>Cordia lutea</i>	N
Caesalpiniaceae	<i>Cassia picta</i>	N
Caesalpiniaceae	<i>Parkinsonia aculeata</i>	N
Convolvulaceae	<i>Ipomoea linearifolia</i>	E
Malvaceae	<i>Bastardia viscosa</i>	N
Malvaceae	<i>Hibiscus tiliaceus</i>	N
Mimosaceae	<i>Acacia insulae-iacobi</i>	N
Nyctaginaceae	<i>Commicarpus tuberosus</i>	N
Passifloraceae	<i>Passiflora foetida</i> var. <i>galapagensis</i>	E
Solanaceae	<i>Lycopersicon cheesmanii</i> var. <i>cheesmanii</i>	E
Solanaceae	<i>Solanum americanum</i>	N
Sterculiaceae	<i>Waltheria ovata</i>	N
Verbenaceae	<i>Clerodendrum molle</i> var. <i>glabrescens</i>	E
Verbenaceae	<i>Clerodendrum molle</i> var. <i>molle</i>	N
Verbenaceae	<i>Lantana peduncularis</i> var. <i>peduncularis</i>	E

<sup>1</sup> Status is coded as follows: IW = Introduced Weed, N = Native, and E = Endemic.

column, dusting itself thoroughly with pollen before moving on to the next flower (see photograph).

Most of the species listed in Table 1 have previously been reported as visited by *X. darwini* (Linsley et al. 1966, Rick 1966, McMullen 1985). However, four species represent new records for the Archipelago. These are *Cassia picta*, *Ipomoea linearifolia* (Convolvulaceae), *Solanum americanum* (Solanaceae), and *Sonchus oleraceus* (Asteraceae).

All of the bees observed were female, except for one male seen visiting *Acacia insulae-iacobi* and another visiting *Waltheria ovata*. Both of these sightings occurred on the north side of Santa Cruz.

The adult carpenter bee was thought not to have any natural enemies in Galápagos (Linsley 1966). While observing the male at *W. ovata*, an event took

place that was quite unexpected. A mockingbird, perched on a nearby tree, flew down and without stopping snatched the bee from the inflorescence. It then landed, and began to shake the bee and beat it on the ground. The bee escaped twice but both times was recaptured before being killed, and I assume it was eaten although I did not actually see it being swallowed. It would be interesting to know if the carpenter bee is important to the mockingbird as a regular food source. Linsley et al. (1966) mentioned that attempts to establish honeybees in Galápagos failed, probably as a result of predation by mockingbirds. Perhaps this might also help explain the absence of the carpenter bee on some of the Islands in the Archipelago.

As mentioned earlier, the Galápagos carpenter bee is thought to be the major pollinator in the Archipelago. However, it has been hypothesized that many of the endemic members of the Galápagos flora were present before the carpenter bee arrived; and because of this lack of insect pollen vectors, these plants are primarily automatic self-pollinators and have nonshowy flowers (Linsley et al. 1966, Rick 1966, McMullen 1987).

I hope to test this hypothesized relationship between pollinator presence and plant reproductive biology by comparing the results of my earlier work on Santa Cruz angiosperm breeding systems (McMullen 1987) with future studies of the same plant species on another island where the carpenter bee is not present. These studies will indicate whether or not the carpenter bee has influenced the breeding systems and flower characteristics of endemic plants on the islands that it inhabits and will add to our understanding of its overall importance in the Galápagos.

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## ISLA SAN CRISTOBAL

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**Superficie.**—Tiene de superficie 558 km<sup>2</sup>, aproximadamente la mitad del area de la Isla Santa Cruz. Solamente tres de las islas del Archipiélago son mayores en superficie.

**Altura.**—Su mayor altura es de 735 m.s.n.m. en la cumbre de Cerro San Joaquín, pero la área alrededor de este cerro consiste de un volcán grande de 660 m.s.n.m. promedio por arriba. Para la mitad de la Isla al Este, las alturas no pasan 160 m.s.n.m.

**Características de Geografía y Geología.**—La Isla San Cristóbal (previamente conocido como Isla Chatham), como las demás, es de origen volcánico y una de las más viejas de Galápagos. Es la Isla mas al Este del Archipiélago. Su constitución externa, revestida en partes de lava fluente de carácter extrusivo y en partes de material intrusivo, nos hace pensar en varias etapas de formación. De Cerro Brujo hacía el Noreste es más nueva que la del Suroeste, donde justamente tiene su asiento la población humana.

**Ecología.**—Como otras islas, San Cristóbal tiene áreas altas con vegetación densa y climas húmidas y áreas bajas muy secas. Por influencia de los vientos y la forma de la Isla, el Noreste es la más seca; además

es aislado de las zonas colonizadas.

**Población Humana.**—La Isla San Cristóbal, a pesar de contrarse en el extremo Este del Archipiélago, por tanto más cercana al Ecuador continental, no fue la primera en ser colonizada por el hombre, pese a que es una Isla más grande y de mayores recursos naturales. Fue ocupada con prioridad la Isla Floreana en 1832; pero al fallar los reiterados intentos de ocupación agrícola en la mencionada Isla, San Cristóbal empezó a servir de refugio a ciertos hombres que abandonaban Floreana.

Muy poco se sabe sobre fechas y nombres de los primeros inmigrantes; solamente a partir de 1866, conocemos con certeza el ingreso del señor Manuel Julián Cobos que vino con José Monroy, con el propósito de explotar el orchilla (*Rochella abintonii*). Ver folleto "Manuel J. Cobos - Historia de un Pionero," por Jacinto Gordillo en Galápagos (1987). Además desarrollaron una industria de azúcar con su propia refinería.

Al terminarse el intento de colonización en la Isla Floreana y comenzar la ocupación permanente de la Isla San Cristóbal, pasaron también a esta sus derechos