

IV SEMESTER MSC BOTANY
ENVIRONMENTAL BIOLOGY AND
BIODIVERSITY CONSERVATION

TOPIC: INTERACTIONS IN A COMMUNITY-
ANTIPREDATOR MECHANISMS

PREPARED BY:

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DEPT OF BOTANY, LF COLLEGE

ANTIPREDATOR MECHANISM



CHEMICAL DEFENCE

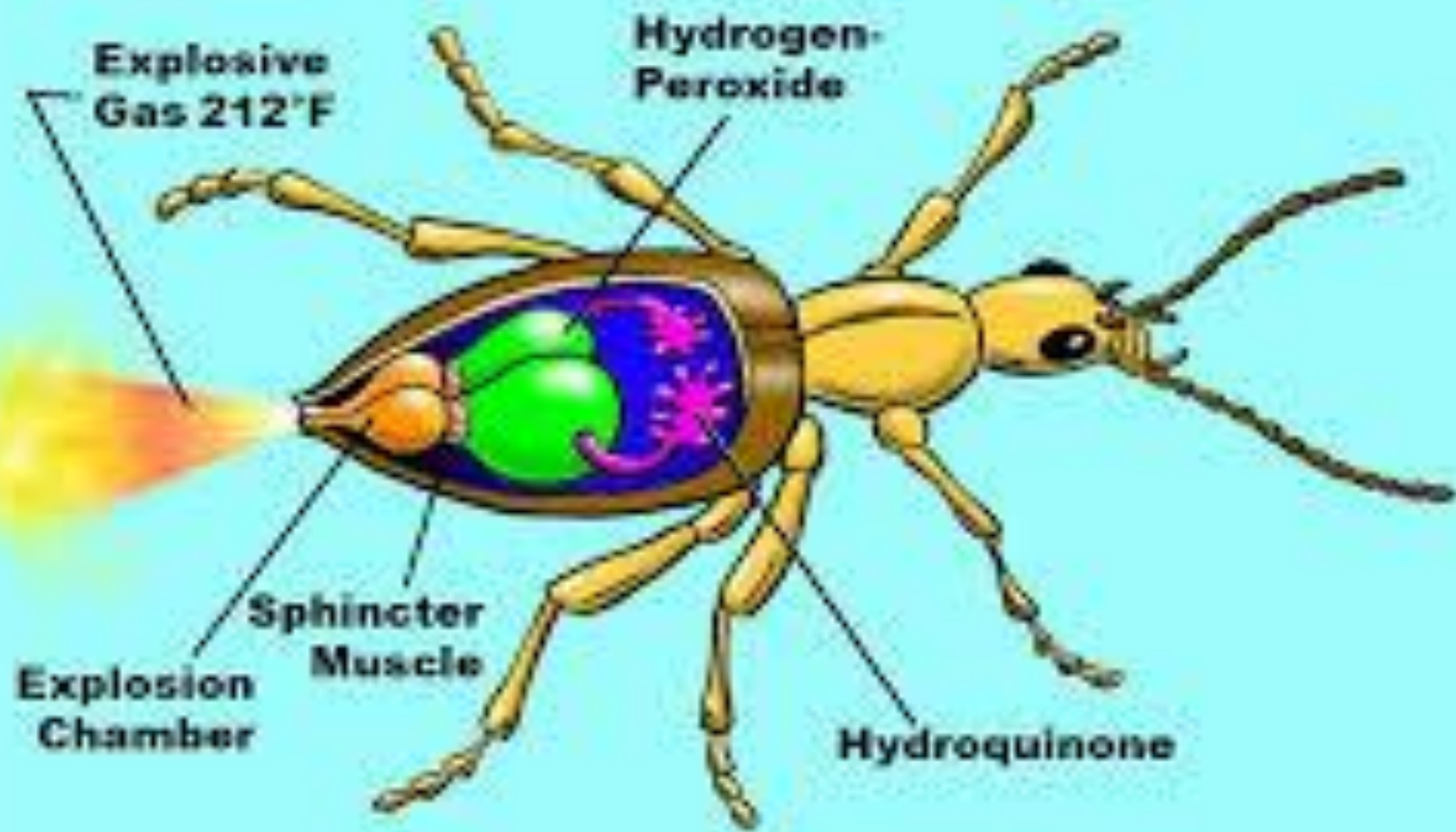
Chemical defenses: Formed by chemical compounds stored, like phenolics, terpenoids, and alkaloids, and released under attack. Antinutritive defenses include chemical, toxins, defensive proteins, enzymes, and resin deposits that can flow to repel or physically trap small organisms.



bombardier beetle



Bombardier Beetle



Aposematic colouration

- meaning a warning coloration in animals and signaling to a potential predator “leave me alone, I might be poisonous to eat.”




Lady bug

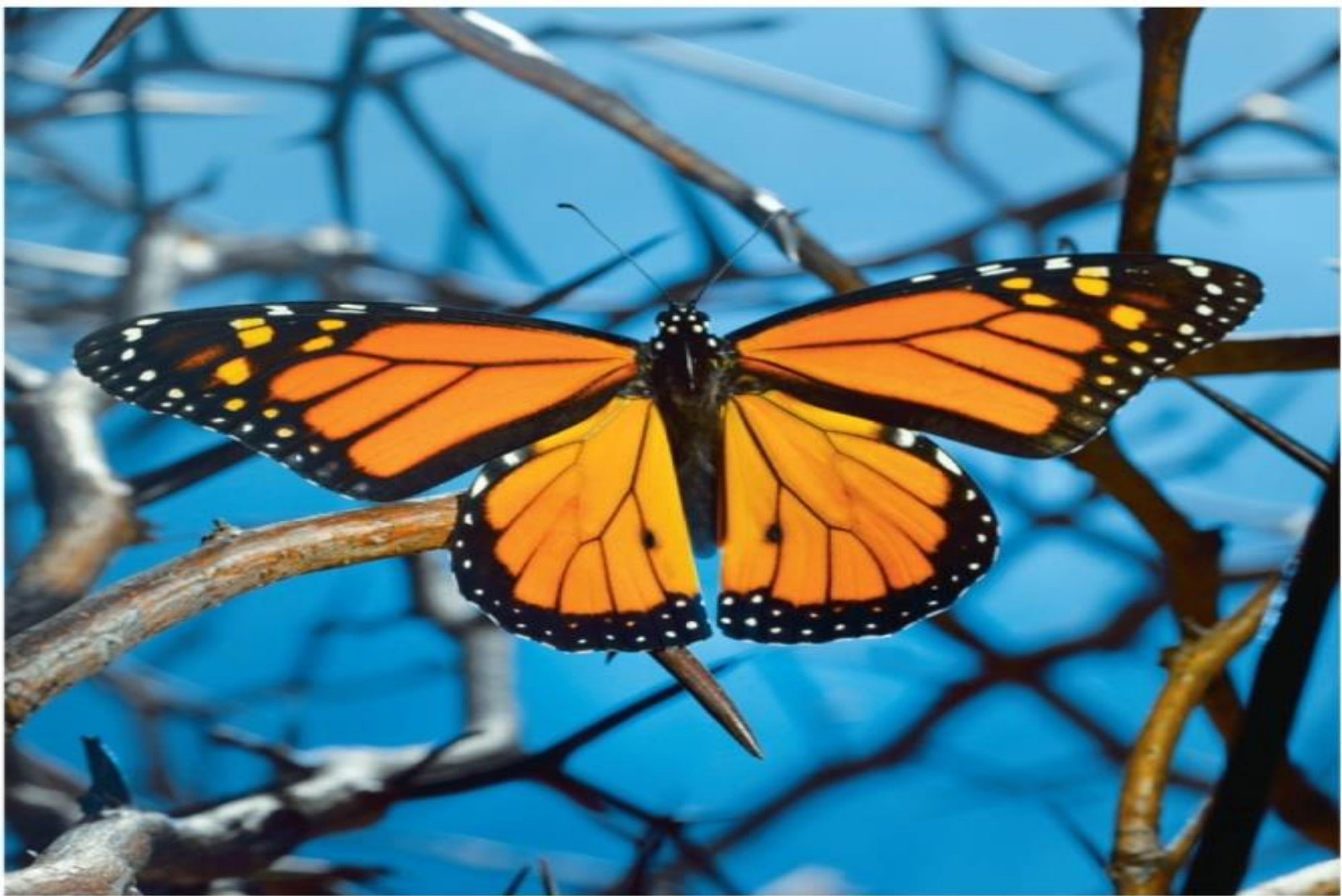
- **Spots Are a Warning to Predators**
- **A ladybug's spots are a warning to predators. This color combination—black and red or orange—is known as aposematic coloration.**



Ladybugs aren't the only insects that use aposematic coloration to discourage predators. Just about any black and red/orange insect you can find is signaling the same thing to predators: "Stay away! I taste terrible!"







(b) Warning coloration


- Ladybugs produce alkaloids, toxic chemicals that make them unpalatable to hungry spiders, ants, or other predators.
- The monarch butterfly is probably the best-known example of an insect using aposematic coloration. The spots are just part of the ladybug's clever color scheme.

***When threatened, ladybugs exude small droplets of hemolymph from their leg joints, an unusual response known as "reflex bleeding." The alkaloids in the blood produce a foul odor, another warning to the predator.**

***Research shows that a ladybug's colors are an indication of how toxic it is. Brighter ladybugs have higher levels of toxins than paler beetles do. Ladybugs with richer colors were also found to have better quality diets early in their lives.**


OTHER EXAMPLES:

Monarch butterflies, most bees and wasps including the female wasp without wings called velvet ant (photo), and many other brightly colored insects. The Large Milkweed Bug (photo of adult and larvae) who feeds exclusively on milkweeds where nymphs accumulate toxic cardiac glycosides from its host plant, milkweeds, is another good example.



Commonly seen on Chico Basin Ranch is the brightly colored barber pole grasshopper (photo), the colors warning predators it might be unpleasant to eat.

. In the tropics there are a group of brightly colored tree frogs (photo) that are mildly to extremely poisonous. One native South American tribe wipes the poisonous inside of the frog's skin on their arrow tips, the poison quickly killing the animal that is pierced by this treated arrow..









Benjamin
Cummings





Cryptic colouration



cryptic coloration

Camouflage, also called cryptic coloration, is a defense or tactic that organisms use to disguise their appearance, usually to blend in with their surroundings. Organisms use camouflage to mask their location, identity, and movement. This allows prey to avoid predators, and for predators to sneak up on prey.





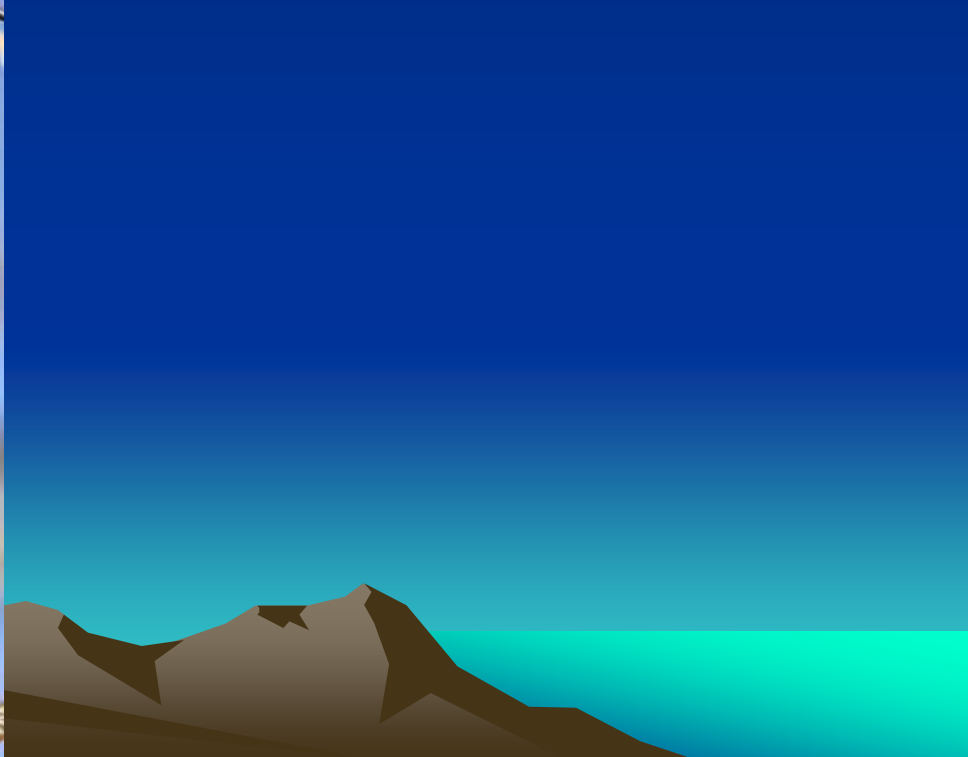


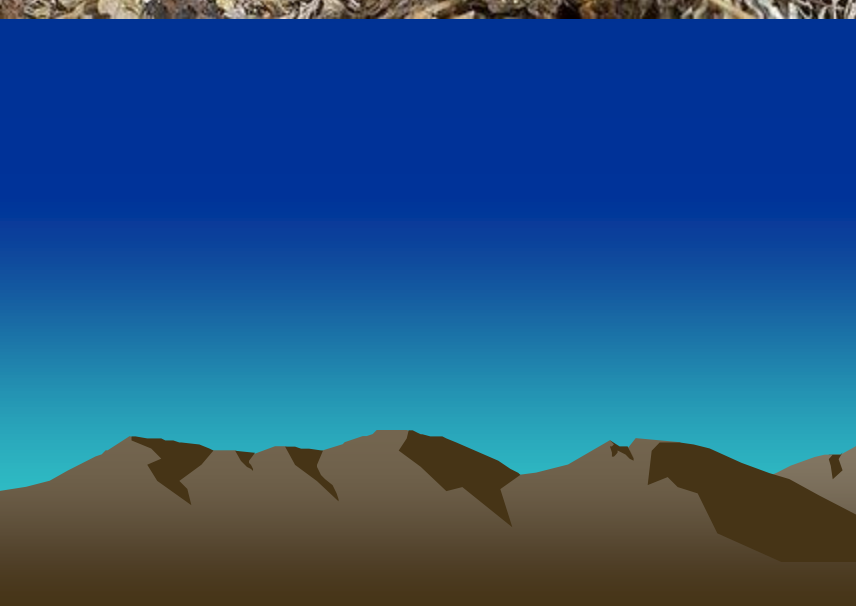
(a) Cryptic coloration





UGA2106059





Mimicry

The resemblance of a species (the mimic) to another species(the model) also secures protection from the predators

There are two major types of mimicry

1. Mullerian mimicry
2. Batesian mimicry



MULLERIAN MIMICRY

Müllerian Mimicry



PREDATORS

□ is a natural phenomenon in which two or more poisonous species, that may or may not be closely related and share one or more common predators, have come to mimic each other's warning signals.

Mullerian mimicry

Mullerian mimicry is a type of mimicry whereby one or more species develop a similar appearance. Each of the species is either poisonous, dangerous or unpalatable to predators. Predators may only encounter one specific species but protection is conferred to the other others due to their similar appearance.



Batesian mimicry

Batesian mimicry is a form of mimicry where a harmless species has evolved to imitate the warning signals of a harmful species directed at a predator of them both. It is named after the English naturalist Henry Walter Bates, after his work on butterflies in the rainforests of Brazil.



MIMICRY- BATESIAN

(Conant 1958)



Eastern Coral Snake
(venomous)

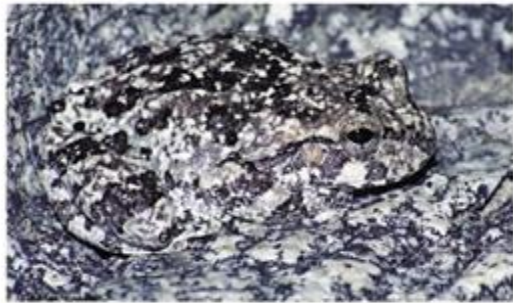


Scarlet King Snake
(non-venomous)

The harmless Philippines
cockroach mimics
the noxious
Ladybug beetle.



- (a) **Cryptic coloration**
▶ Canyon tree frog



- (b) **Aposematic coloration**
▶ Poison dart frog



(c) **Batesian mimicry**: A harmless species mimics a harmful one.



◀ Hawkmoth larva

▼ Green parrot snake



(d) **Müllerian mimicry**: Two “yuck” unpalatable species mimic each other.



◀ Cuckoo bee
▼ Yellow jacket



Batesian Mimicry

- It is form of protective mimicry in which a species that is edible or harmless closely resembles an inedible or harmful species and therefore is avoided by predators.
- Example- Monarch butterfly and Viceroy butterfly. The Monarch butterfly is inedible and viceroy butterfly is edible.



Viceroy Butterfly (mimic)



Monarch Butterfly



(a) Cuckoo bee

(b) Yellow jacket wasp



- Batesian Mimicry - *harmless species resembles dangerous species*
- Mullerian Mimicry - *dangerous species resembling each other*

Example: **bees** and **wasps**

**Batesian
Mimic
(parasitic benefit)**

**Müllerian
Mimics
(mutual benefit)**



**Deceptive signal
Hoverfly harmless**

**Honest signal
Wasp can sting**

**Honest signal
Bee can sting**

PHYSICAL DEFENCE





INTIMIDATION



FRIZILLED LIZARD





e. Predator satiation:

- ▣ The periodical cicadas (*Magicicada*) make use of predator satiation.
- ▣ They emerge, all at once.
- ▣ Since the number of cicadas in any given area **exceeds the amount predators can eat**, all available predators are satiated, and the remaining cicadas can breed in peace.



AGGRESSIVE MIMICRY



Shown by predator not by prey

Predators have evolved

adaptation to help them catch

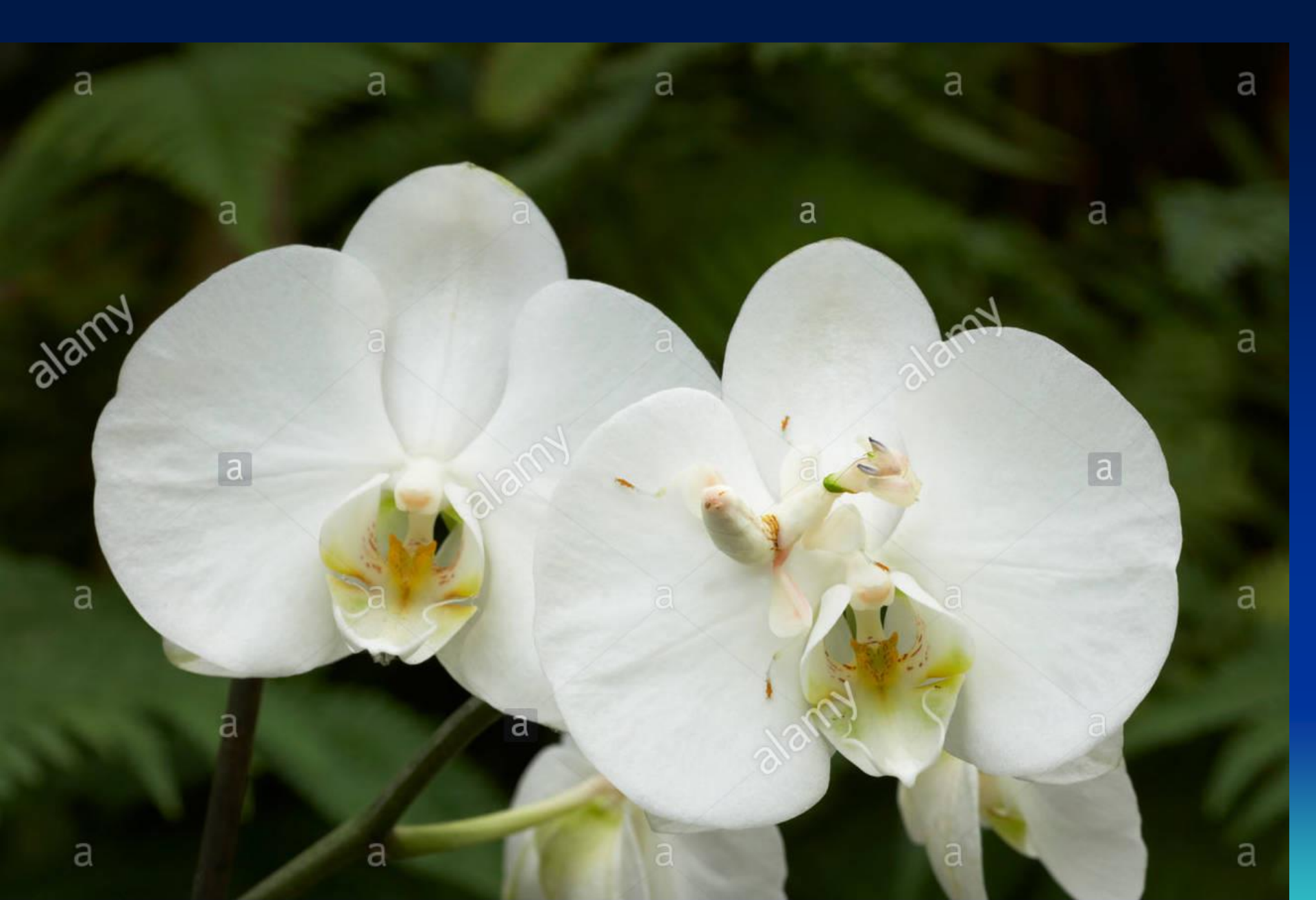
prey .

Predator mimics harmless model











Thank you