

# Category IV Notes for Natural Selection Examples

## Representing Ideas Effectively

### Evolution Module, pp. 21st

Represents key idea that “Natural selection provides the following mechanism for evolution: Some variation in heritable characteristics exists within every species, some of these characteristics give individuals an advantage over others in surviving and reproducing, and the advantaged offspring, in turn, are more likely than others to survive and reproduce. The proportion of individuals that have advantageous characteristics will increase” (idea c).

Evolution of Pesticides Resistance in InsectsNatural Selection

Generation #1

Insecticide - death of  
susceptible individuals

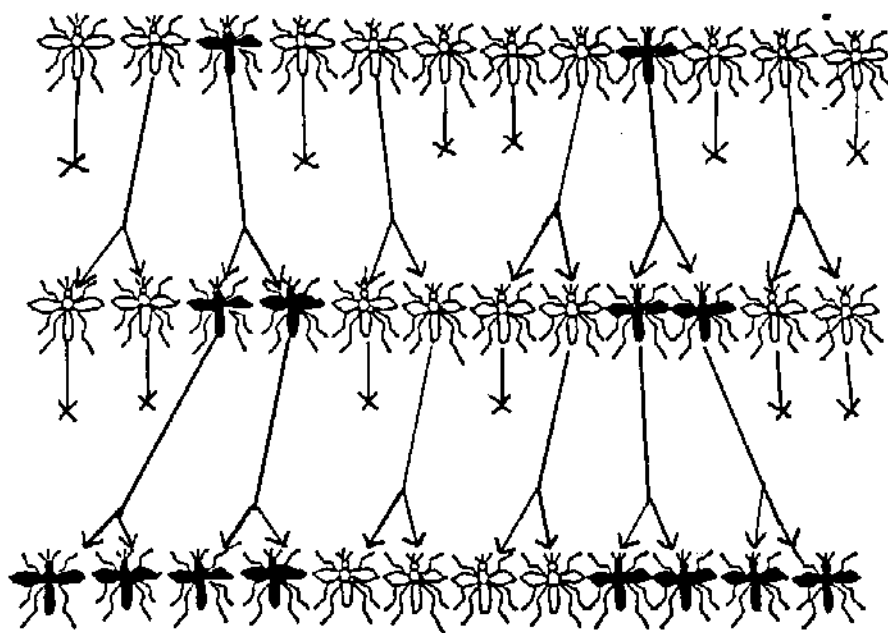
reproduction

Generation #2

Insecticide - death of  
susceptible individuals

reproduction

Generation #3

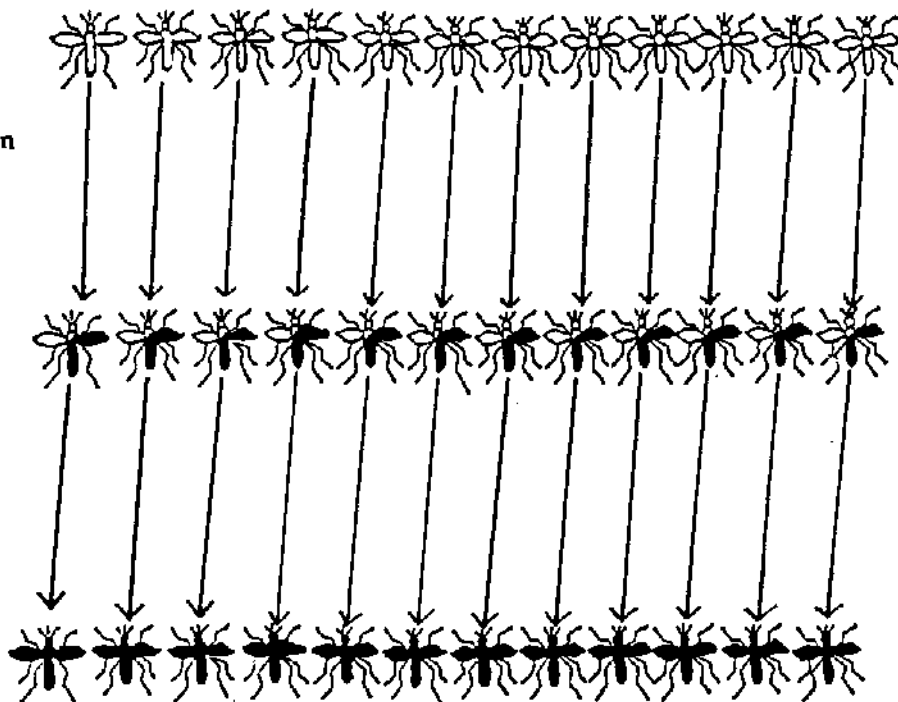
Inheritance of Acquired Traits

Generation #1

Insecticide &amp; Reproduction

Immunity built up &  
passed to offspring

Generation #2

Immunity built up in  
parents & passed to  
offspringInsecticide &  
Reproduction  
Generation #3

### Commentary

In this lecture overhead, the scientific conception of evolution by natural selection is directly contrasted with the student naive conception. The contrast is done by applying the ideas of each conception to a familiar example: Evolution of resistance in insects.

The overhead illustrates the difference between the two conceptions with respect to two of the three key issues ("the role of variation" and "the process of evolution"). Although this sheet does not present fully the issue of "the origin of new traits" directly, students are able to see the *lack* of the naive conception with respect to this issue in the scientific explanation at the top of the sheet (i.e., insecticide does not affect the *appearance* of the trait of resistance).

The value of presenting both explanations to students simultaneously is twofold. First, students' naive conceptions often lack details. Exposing the implications of their belief to them (i.e., acquired traits being passed to offspring) often aids in rejection of that belief.

Second, because of the relative complexity of the scientific conceptions, students may not understand how these processes produce evolutionary change. This overhead illustrates that the two explanations result in identical results (i.e., a population of insects resistant to insecticides), thus making the acceptance of the scientific conception easier for students.

We suggest that instructors "work" through each explanation and point out to students exactly where the naive conception falls short of reality (i.e., the acquiring of resistance and passing this acquired trait to offspring). Instructors may also need to point out the difference between acquired "immunity" and evolved "resistance" since these terms are often used interchangeably by students.