Subject	Insect Taxonomy
Lect. No.	3
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Variation in Taxonomic and Systematic Characters

There are three major types of character variation within and between species that is typically observed in systematic and taxonomic studies. These include:

1. Geographic Variation

This type of variation occurs over geographic space. Usually researchers examine variation in demes, populations, species and look for any "geographic" correlation with any of this variation.

2. Sexual Variation

This is most often known as sexual dimorphism and the characteristics that do differ are often referred to as primary or secondary sexual features. Sexually dimorphic characters may not vary in larval and juvenile individuals; variation may be obtained only later in life. Adults may display these characters throughout the year or may only possess them during the breeding season. In the former case, usually the dimorphic characters are most extreme during the breeding season. Some species do not vary in secondary sexual features and sex is determined only by examination of gonadal tissue.

3. Individual Variation

A-Morphological Variation

I. Age variations

Common in many groups of organisms to have different looking juveniles or larvae from adults.

2-Algometric Variation

This type of variation is typically thought of as being under genetic control. Algometric growth or variation results when the size of some particular structure or number of structures are disproportionate relative to other structures or the rest of the body.

3-Seasonal Variation in Individuals

In some invertebrate groups, during a year may produce different types of offspring depending upon season. For example, in butterfly in spring are typically larger than those in the Fall.

B- Social Variation

In some social insects (bees and wasps, termites) certain castes are developed (reproductive, workers, soldiers). The individuals may be males, females or both. The different structural types that are observed may be the result of different larval food or may be due to hormonal or other controls. Obviously these different forms should not be considered different species.

C. Ecological Variation

1-Habitat Variation

Populations of a single species may occur in different habitats in the same region and are often visibly different depending upon the habitat that they are found in.

2-Temporary Climatic Conditions

Some species have different phenotype are produced in years of extreme conditions (drought, cold, warm weather) relative to those from other year classes under normal conditions.

3-Host-Determined Variation

Parasitic species may display different traits dependent upon the host on which they feed. Cocoons can vary in color depending upon wasp host. Some wasps may be winged or wingless, depending upon host.

4-Density-Dependent Variation

Crowding can influence morphological variations. This can be a result of reduced food supply or not. Under crowded conditions the phenotypes may vary from those reared under less crowded conditions: This phenomenon is particularly common with locusts.

E- Traumatic Variation

This type of variation occurs with varying frequency depending on the group. It is usually obvious, but in some cases may be subtle and misleading.

1-Parasite individual variation

Typical patterns discovered in a host individual will include swelling, distortion, and perhaps mechanical injury. With insect's parasites can alter head size, wing venation, and other structural features.

2-Post-mortem Changes

Common in some museum specimens that have been fixed or preserved or pinned. Colors are often lost or fade, preserved bodies may appear odd in some cases. In some instances, some color patterns do not appear until after specimens are fixed. Some insects that are yellow turn red in cyanide.

F-Genetic Variation

Before, the same individual is actually or potentially subject to change in appearance. This variation can be more or less arbitrarily divided into two such classes.

I. Sex-Associated Variation

Among the genetically determined variants within a population, there may be some that are sexually associated. They may be sex-linked (expressed in one sex only) or be otherwise associated with one or the other sex.

1-**Primary sex differences -** Those that involve primary sex organs used in reproduction (gonads, genitalia). Where the sexes are otherwise quite similar, these will rarely be a source of taxonomic confusion.

2-Secondary sex differences - Many groups display pronounced sexual dimorphism. These differences can be quite striking. Different sexes have frequently been described as different species until more work has been done on a group.

3-Alteration of Generations - In some groups there may be stage that looks quite different from a reproducing stage. 4-4-

4-**Intersexes -** exhibit a blending of male and female traits. Thought to result from upset in balance of male tendency and female tendency genes. Can be from irregularities in fertilization on mitosis or physiological disturbance due to parasitism. Occur most frequently in areas of interspecific hybrids.

II. Non-Sex Associated Individual Variation

1-**Continuous Variation -** Most common type of variation due to slight genetic differences which exist between individuals. No two individuals are exactly like in a population genetically or morphologically.

2-Discontinuous Variation - Differences between individuals in a population are, in general, slight and intergrading. In some species, however, can be grouped into different classes determined by some characters. This discontinuous variation is frequently termed polymorphism. Frequency such polymorphisms may be controlled by a single gene.

Isolate of the species (Segregation of the species):

Isolate the species based on

1.Reproductive isolated
2.Genetics isolated (Isolate the species based on genetics)
3.Morphological isolated Isolate the species based on Morphological characters)

4.Phsiological isolated (Isolate the species based on Physiological characters)

5. Ecological isolated (Isolate the species based on Ecology)

Taxonomic Keys:

A tabulation of diagnostic characters of Species (Or genera, Families, etc.)

Kinds of Keys:

1. Bracket Key

2.Idented Key

3.Serial key

4.Branched key.

5.Circular key

6.Pictorial key

7.Box key

Requirements of taxonomic key :

1. Definition: The characters may be clear and easy to distinguish.
2. Would be helpful if key contains several characters
3. The morphological differences: It is preferable that the key contains the different characters of both sex

International Rules of Zoological Nomenclature (IRZN)

1- The principles of priority: Means the name of the survival of the insect is always constant, but it may require changing in the original name for reasons dictated by the rules of Nomenclature such as:

A. Change the form name when you moved from genus to another.

B. Change the name completely in the case of Homonymes.

2-The official languages of publication (English, German, French, Italian , Latin)

3- Rejection of names

A. If the name proposed is not in line with international rules of zoological nomenclature, Nomen Nodum.

B. If the name is already proposed to launch on other taxonomic unit (the same species) In the same place, and knows this case as a Homonyme.

C. If it turns out that the unit proposed taxonomic name has already been called by another name, known name in this case called the synonym

4-The author name : Write the author's name next to the scientific name for the type e.g. *Apis mellifera* Linnaeus

5- Formation of Species Name.

Taken into account when you choose the species name that indicates of the adjective name.

6-Formation of Subspecies Name :When writing Subspecies , written immediately after Species

e.g. *Pediculus humanus capitis* , Human lic

7- Formation of Generic Name

Take into account that : the names of the genus , That not be a long, easy pronunciation .

8.Formation of Family Name

Ends with the last section of thE

family is idae e.g. Acrididae

Superfamily: oidea e.g. Elaterioidea

Subfamily: inae e.g. Staphylinae

Tribe: ini e.g . Meloini

Subtribe: ina

9.-Write the scientific name (The first is the genus and start writing with a capital letter, and the second is the species and starts writing a small letter . And require

written Italic *Musca domestica*, or a normal with a line under two names. e.g. Musca domestica

10.

sp. mean the scientific name for one type Anonymous (undiagnoses) e.g. ***Aphis* sp.**

spp. mean scientific name for several species of unknown (undiagnosed) e.g. ***Apis* spp**.