**Sources of evidences**

Or the relationship between systematic and other sciences such as:

* Morphological evidence.
* Anatomical evidences.
* Chemical evidences.
* Cytological evidences.
* Genetical evidences.
* Palynological evidences.
* Embryological evidences.
* Phylogentic evidences.
* Ecological evidences.
* Geographical evidences.
* Paleobotanical evidences.
* Physiological evidences.
* Molecular Biology evidences.

1. **Morphological characters**

The study of each vegetative and floral parts, the feature of floral morphology are considered as the most important characters in the classification of following plants.

The morphological characters with some taxa are of little taxonomic value, but in other taxa they can be of major taxonomic feature. But the difficulties of morphological characters the determination which one is primitive and which one is advanced.

The morphological feature considered as an importamt features as a result of:

1. These features are easily observed.
2. And are practical for use in keys and descriptions .
3. Morphological currently provides most of the characters used in constructing taxonomic systems.
4. **Anatomical characters**

The application of anatomical data to the solution of taxonomic problems. For ex:

1. The similar leaves of *Acer* and *Plantanus* have different anatomical features.
2. the absence of conducting tissues in water plants and the presence of bicollateral vascular bundle in climbing plants.
3. valuable taxonomic evidences has been attained from the study of wood structure, leaves epidermis and stomata etc.
4. Also other example some taxa have similar anatomical feature as in *Euphorbia* genus which has many species characterized by the present of latex-vessels, whether the plant be cactus-like , thorny, shrubs or leafy herbs.

**3-Cytological characters**

Is the study of chromosomal information which is known as **cytotaxonomy.** Which Is the integration of cytology and taxonomy in the effort better to understand and to resolve problems of plant relationships and cytogenetic is the combining of cytological and genetical techniques in the effort ti arrive at solution of a problem .

And its consist of three major lines:

1. Chromosome number . 2-Chromosome structure . 3-Chromosome behavior .
   1. **chromosomes number** in each cell of all individuals of a single species is constant with some exception of that number, species more related, are to have the same chromosome number, and the more distantly related these species they are to have a different number. For example : in the genus of *Festuca* are the species of it with 2n=14

;28;42;56 and 70 such species known as diploids, tetraploieds, hexaploids ,octaploids and respectively these numbers are based upon 7. All species of this genus to have the same basic number.

* 1. **Chromosome structure** The most commonly utilized aspect of chromosome structure is the position of centromeres so that the arm lenth ratio of each chromosome in the genome, sometime it is sufficient only to recognize the distinction between position of centromeres of the chromosome in the middle or near the one end.

According to the position it is called centric, metacentric and telocentric respectively .

Centric position Metacentric Telocentric

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1. **Chromosome behavior** : The pairing behavior and the subsequent separation of chromosomes at meiosis.
2. **Palynology**

Is the study of pollen and spore morphologically and anatomically in addition to its relation with taxonomy.

**Pollen morphology**

Is highly significant for the taxonomist . The taxonomt characters provided by pollen grain included :

* 1. Pollen shape
  2. pollen aperture (number, kind, position)
  3. pollen wall sculpture. Is studies by using LM (Light microscope and SEM ( Scanning electron microscope)
  4. pollen type, etc.

**Pollen anatomy** is the study of Pollen wall structure by using TEM (Transmission electron microscope). Which is done by Studies of thin sections of pollen grain wall that can yield reliable taxonomic information of certain groups.

1. **Paleobotany**

The best source of evidence is actual data from the fossil record

.Paleobotanists attempt:

1. To elucidate the composition and the evolution of floras of the past.
2. To trace these evolutionary development through stratigraphic sequences .
3. To determine past ecological condition.

paleobotany could provide little evidence on the origin and diversification of the flowering plant and the origin of these plants are from one source or different source. If one source is termed Monophyletic origin or from more than one source it is called Polyphyletic origin.

1. **Chemical compounds (Chemosystematics)**

**Plant chemosystematics**

Is the application of chemical data to systematic problem . This filed concerned with using chemical constituents for explaining relationships between plants and inferring phylogeny.

Chemosystematics divided these compounds into two

* termed micromolecules.
* Compound of high molecular weight, such as proteins

.DNA, RNA, cytochrome C, ferrodoxin, and complex polysaccharides, are referred to as macromolecular .

In general there are three very broad groups of compounds can be recognized :

1- Primary metabolites. such as citric acid , Aconite acid etc. 2- Secondary matabolites. such as alkaloids, phenolics,

terpinoides, glucosinolate etc.

3- Semantids. are the information carrying molecules DNA is primary semantids and proteins is tertiary semantids.