Floral Formula Discontinuity Systematics for Angiosperm Holobaramin Delineation

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Abstract

The goal is producing a testable hypothesis regarding the taxonomic relationships of Angiosperm plants based on the core concept of limited ancestry in accordance to the Genesis account of creation.

Preliminary to research was further development of the Floral Formula as a mathematical representation of the reproductive structures of Angiosperm anatomy and morphology including major and minor variations.

Phase I research focused on collecting Base Floral Formulae for existing Angiosperm Families which further necessitated moderately detailed Formula at the Genera level.

Next was reconfiguration of current Family classifications to produce the Floral Formula Taxonomy according to the Floral Formula Model to represent probable and potential Angiosperm holobaramin and predict limits of expected hybridization.

Final comparison and correlation of the Floral Formula Taxonomy against actual known hybridization records for testing in Phase I.

Results have shown a basic Formula delineates 70% and a moderately detailed Formula delineates 90% of plant Families / Kinds. Predictions on hybridization limits are matching with the Plant Kind averaging near the Family level. The expected list of possible Formula combinations is growing with no troubling repeats or overlaps.

Current results of Phase I studies support the Floral Formula model and merit continued Phase I research and beginning Phase II research for probable holobaramin delineation.

Introduction

A central point within the Creation and Evolution debate is the concept of limited ancestry or universal common ancestry. Expectations and predictions from these central premises allow for many approaches to testing and evidence. Therefore, if limited ancestry and discontinuity can be shown in plants, it would provide further support for Creation and another blow to evolution.

In general, Baraminology uses the tools of progressive approximation and discontinuity sytematics to estimate the limits of a Created Kind. The majority of past Baraminology research has focused on animals referred to as the Ark Kinds. Relatively little research has been done for Plant Kinds. Roger Sanders did a project determining Plant Kinds, but this was limited to focusing on the continuous lineages in the fossil record.[1] He also did extensive research on one Family, the Verbanaceae. Todd Wood tested statistical baraminology concepts with plants and found a tentative 12 Holobaramin and several monobaramin.[2]

The Floral Formula would bring a morphology based method of determining extant Angiosperm Kinds. The use of the Floral Formula is limited in the fossil record as flowers are generally too delicate to survive and needed details tend to be lacking.

In this paper, the definition and expectations of a Plant Kind follow Elder's model.[3]

Morphology:

When the created kinds originally appeared, they were separate and unique and fully functional. Any similarity in design was due to similarity in function and not by common ancestry. A Created kind has a recognizable shape that does not change significantly through time even if the surface features such as size, fur length, and coloration do change.

While many parts of a plant can be

used to aid in identification, within Angiosperm plants the most unique feature is the flowers themselves. By simple cognitum, the flowers show a clear and distinct pattern of shape and form with gaps between flower types. As such, this seems the place for discontinuity systematics to be applied.

Phenotype:

Environmental Acclimation is a selection of traits favorable for a given environment and is the primary process of natural breeding and speciation and it results in reduced genetic variability.. The habitat or environment where an individual or population lives is considered to be one of the strongest influences on breeding, genetic activation, and speciation. The environmental pressures created by heat or cold, dry or wet, and rocky or fine soils all help to determine what characteristics will do best in that environment.

Heritage Mating is the expected preference that a member of a species will mate with another member of the same species, even if other members of the same kind are available. It is the preferential mating selection of individuals with the same surface characteristics as oneself caused by having the same heritage genetically, culturally, and environmentally. Heritage Mating explains why hybridization and mixing of less common individuals is not the norm and why species continue with the same surface characteristics that define the species.

Within plants, Heritage Mating has further complications because plants are immobile and do not have an active choice in mate. Instead, they depend on wind and insect pollination (or rarely water or animal transport); none of which are quick for moving long distances. This accounts for the quick acclimation to local conditions. Bio-geographically, longer distances should have greater variation even though the same Kind is present all over the globe. Examples are the similar habitats and species found in Northeast United States and Asia or with the Western United States and Europe.

Extinction of a species occurs when that species is no longer able to acclimate to changing environments due to limited genetic variation. If all species within a kind go extinct, the entire kind is then lost. Extinction is not a driving force or cause for change. Instead, it is a result of an inability of the individual to mate with others of its breed or go back and hybridize with others of its kind. It typically comes from the inability to acclimate to changing environments which in turn challenges its survival. This is primarily caused by a lack of genetic variation or over-specialization of that breed. When extinction occurs due to environmental changes, other species or kinds with traits favorable for that new environment will likely be ready to move in and fill that environment.

Genotype:

It is generally acknowledged that the original kinds had a wide range of genetic potential. This allows for broad speciation to occur but still limits the amount of change by the base form. It is also recognized that the genetic code is deteriorating due to mutational load or simply building up an increasing number of problems.

The pre-zygotic (mating recognition) and post-zygotic (genetic compatibility) barriers, along with epigenetic changes, become strong factors in speciation and are the hidden changes occurring in Environmental Acclimation. They are also the cause of the reduction of genetic potential and diversity caused by speciation.

A member of a kind with broad genetic potential will be able to enter multiple environments and speciate readily and quickly. A member that has already speciated and is acclimated to one environment will not be able to readily speciate nor acclimate to another environment as quickly. This explains the rapid speciation that occurred after Creation and after the Flood and why speciation has slowed down dramatically today.

Timeline:

Many species of modern plants and animals are found in large sizes in the fossil record. These likely existed before the flood and show how conditions have changed.

Some typical examples of these changes within plants include the horsetail rush which typically grows 2-3 feet tall today but in the fossil record can be found taller than telephone poles. Cattails, which stand about 6 feet tall today have fossil equivalents 60 feet tall. A raspberry plant, which typically has leaves in bunches of three, was grown in 100% humidity and had only single leaves demonstrating how much impact the environment can have.

During the extinction event, a limited amount of the kind survived. Afterwords, speciation began again in the newly formed habitats and has continued until today.

As mentioned earlier, rapid diversification or speciation within the kinds would be expected after this event because the entire world was now a large landscape of new environments. The emerging animals would migrate and acclimate. It would happen rapidly as every generation would see breeds forming within their kinds and the genetic reaction was able to use already existing genes rather than developing new ones.

According to a scriptural timeline, about 4,300 years have passed since the time of the flood. This probably included an ice age shortly after the period of the flood. During this time, rapid diversification would have occurred within the animal kinds as they spread out and moved into new habitats. Unlike evolution, which requires new genetic information to form, this diversification is simply based on breeding out the genetic characteristics that already existed within the animals.

There was a much greater diversity of species among the kinds before the flood. It is not an exaggeration to say that this diversity was decimated (literally reduced to 1/10 of their numbers) and more during this violent destruction. Much has been lost and the fossil record is our glimpse into what had been part of His creation.

Hypothesis:

The primary hypothesis maintains that each Plant Kind will have:

) a recognizable and unique base form and structure defining the kind and producing the Floral Formula

) limited variation in surface features that do change over time producing speciation which do not effect Floral Formula

) a reproductive continuity within each of the Floral Formula groups

) a reproductive discontinuity outside each of the Floral Formula group

A secondary hypothesis, representing Complexity and Design is:

) the expectation of a progressive or sequential series of usable combinations of Floral Formula with no overlaps or repeats.

) a simple Floral Formula (consisting of whorl numbers) sufficiently recognizes the Kind level without the need for moderate detail (including fusion and placentation).

Methods

Development of Floral Formula

The Floral Formula depicts the morphological structure of the flower whorls including the number, fusion, and location of each part of the flower.

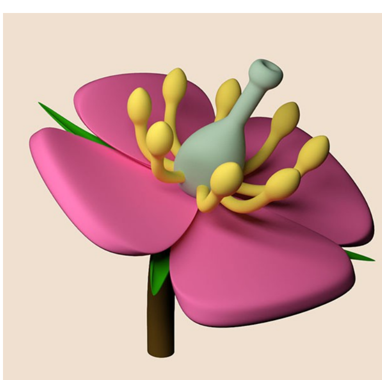
While there are multiple ways to convey the various forms and features in these parts, I have chosen the floral formula because it is a concise mathematical representation of the flower parts and it can quickly and easily be compared in a long list of proposed kinds.

The floral formula has existed for over a century, but it has never been popular even with botanists. As such, a standardized form of notation has not been established nor has it been well developed. In my research, I have had to add new symbols and notation to fill in the details that might be needed to distinguish created Kinds.

The floral formula can be made quite detailed to describe many nuances of different flowers or generalized to cover entire families. The amount of detail given by different authors depends on the goal of what they were representing. Sometimes formulas are made which do not clearly represent which features are common or rare within a given taxa.

Plantae Computer Font

Great limitations were encountered while typing formulas into the computer. Most important were the lines and circles denoting fusion of the plant parts. My response to adding the Floral Formula to computer typing was to make the Plantae Font which is capable of producing the symbols used in the Floral Formula. I am making this font freely available for download on my website.



Basic Sample Flower

Calyx Symbols

The calyx is the outer whorl of a flower, composed of sepals which enclose the flower bud during development, and often green and leaf-like.

It is represented by the letter K and in this example they are 4 in number.

Most flowers are actinomorphic which means they are symmetrical around the central axis and can be bisected by a line going through the center of the flower. Some flowers are zygomorphic and can only be bisected into symmetrical halves along a single line (bilateral symmetry) such as a snapdragon.

K	calyx base
K^{3}	calyx with three sepals
$K^{⑤}$	calyx with five fused sepals
$\underline{K}$	tepals (calyx side)
$\underset{\smile}{K}$	calyx adnate with Corolla

Corolla Symbols

The corolla is the second whorl of the flower, composed of petals which are often conspicuously colored, and enclose the reproductive organs.

The calyx is represented by the letter C and this example has 4 petals. The most common feature to pay attention to is whether the flower has an actinomorphic (or radial symmetry) represented by a subscript 'a' or zygomorphic bilateral symmetry represented by a subscript 'z'.

C	corolla base
C^{4}	corolla with four petals
$C^{⑤}$	corolla with five fused petals
$\underline{C}$	tepals (corolla side)
$\underset{\smile}{C}$	corolla adnate with calyx

$\underbrace{C}$ corolla adnate with androecium

C_z corolla with zygomorphic petals

$C^{(4-5)}$ corolla with four or five petals (typical of mixed kinds in Family)

Androecium Symbols

The androecium is the third whorl of a flower, composed of stamen (the male reproductive organs of the flower), and where spores are produced. The stamen contains a stalk called a filament and the anther where the spores are produced.

It is represented by the letter A and this example flower has 8 of them. These will sometimes appear in layers which are represented by separate numbers such as two layers of 3. There can can also be large numbers where an infinity symbol has historically been used for anything higher than 12.

A androecium

$\underbrace{A}$ adnate with corolla

$\underbrace{A}$ adnate with gynoecium

A^{2+3} two sets: one with two, other three

$A^{5\langle 10 \rangle}$ usually five stamen, rarely 10

A^{∞} more than 12 stamen

Gynoecium Symbols

The gynoecium is the innermost whorl of the flower, composed of carpels (the female reproductive organs of the flower), and where the eggs are stored. A carpel contains the stigma, style, and ovary.

It is represented with the letter G. Typically, one must cut the pistil open to check the number of carpels and the symmetry inside. So for this example I will just state that there are 3 fused ovules inside the example. In reference to the other floral parts, the gynoecium can have a hypogenous (superior), epigynous (inferior) or perigynous (middle) placement which are represented by lines below, above, and both above and below respectively.

It typically forms a pistil made of a stigma, style, and ovary which may be separate (simple pistils) or united (compound pistils).

G gynoecium base

$\underline{G}$ hypogynous ovary position

$\overline{G}$ epigynous ovary position

$\overline{\underline{G}}$ perigynous ovary position

$\underbrace{\underline{G}}$ hypogynous fused with androecium

Other Symbols

The connation (fusion within a single flower layer) and the adnation (fusion between two layers) can come in various forms and is represented by circles and curved lines.

B bract

P Perianth

$A : G$ monoecious plant

$A :: G$ dioecious plants

^{x} layer non-existant

$\underbrace{3}$ three inferior connate fusion

$\overbrace{4}$ four superior connate fusion

Sample Formula and Description

$$K^{(5)}\underbrace{C'^{(5)}A^{4}}\underline{G}^{(2)}$$

`Bignonibar - Bignonia`

Description: somewhat zygomorphic : 5 united sepals, campanulate, 5-toothed : 5 united petals, 2 lips : 4 stamen, epipetalous, didynamous fifth stamen often staminode :

compound 2 united carpels, marginal :

Phase I Research

The first phase of research is simply collecting the Floral Formula for all of the existing Families of flowering plants. The Floral Formula has 625 total possible base combinations. However, going through all combinations would produce multiple counts in families that have separate male and female plants as well as counting all of the combinations that have ##00 which would be an infertile and useless flower as it has no pollen nor seeds. When sorted, there is a maximum potential of 384 Kinds and a more probable combination of 288 Kinds. This is in comparison to the roughly 316 Families in evolutionary classification.

Nothing does a better job of building a Floral Formula than examining a live specimen. Therefore, the best research will require considerable travel to encounter and investigate the many plant Families. This stage of research will require minimal equipment including a low power microscope and plant dissection tools. This will allow for detailing of the flower anatomy.

Gynoecium cross section

Alternatively, Botanical museums, agricultural research centers, and detailed textual summaries can be used to construct formulas.

Phase I will also include comparing these formula with known hybridization records as a simple test of accurate discontinuity. toward this end, a large plant hybrid database must be built. However, this may be limited in scope as 80% of the world's food comes from only 18 Families, relatively few Families form the ornamentals, and many families are poisonous and therefore not typically hybridized or recorded.

Phase II Research

The second phase of research will involve conducting hybridization tests in greenhouse / laboratory conditions, and further refinement of information required in the formula to accurately reflect a recognized Kind. Each phase II test will typically require require three growing seasons in a controlled environment.

Results

Required Formula Detail

Thus far, a basic formula using just the number of flower parts delineates about 75% of plant Families (Kinds) and detailed formulas with fusion notes delineate about 90% of Families within the 100 Families examined so far.

Holobaraminic Families

Most Families contained straightforward forumlae and suggest a defined holobaramin.

Polybaraminic Families

There are numerous Family units containing overly complex Floral Formulae. Fourteen Families have the combination $K^{4-5}C^{4-5}$ which is capable of producing four separate kind patterns. These require more detailed analysis into the Floral Formula of each Genera and / or more detailed comparisons of hybridization records.

Monobaraminic Families

Instances of multiple Families containing the same base Floral Formula has occurred twice.

The first is the combination 5552. Initially were two Families (with strong probability of being the same Kind). Then, three more Families with increasingly diverse fusion morphologies and chemical characteristics were found. A second set was found at 3363 and contains three Families.

Within the first combination, there are clearly two major groups which can be delineated by reflexed or united petals. Therefore, this either represents a kind with unusually large variation in shape, or multiple kinds that need a more detailed formula for separation. Either way, these are both prime candidates for Phase II testing procedures.

Discussion

Allowable Variation Within Formula

Just as we know there can be much variation within a dog or horse kind, there can be variation within a plant kind. For example, a wild rose will have a base of 5 petals, but ornamental roses will have many petals (in multiples of 5) due to mutation and duplication of the whorl of petals. Or there can be somewhat smooth to rather ornately curved petals.

Required Formula Detail

Is the number of parts in the flower enough or does it require additional information on fusion or symmetry? While the accurate portrayal of a flower requires these additional elements, it may be possible to determine and list the Kinds with only the numbers.

Common Design Elements.

The largest Families of plants each have a unique feature such as the receptacle in the Asteracea or the spathe and spadix in the Araceae. Within each of these large Families are many tribes with minor variations from the base form. Are these large Families a single Kind with a unique feature or are these multiple kinds with a common design element? For example, is the unusual petal arrangement of the orchids something unique to one kind or is it a common design element belong to possibly three (or even as many as five) kinds based on minor variations? Similarly, all the flowers with a spathe and spadix are lumped together by evolutionary taxonomy despite having significant differences. For example, there is a common Jack-in-the-pulpit and the rather different skunk cabbage (which is one of the rare endothermic plants able to stay a little warmer than its environment).

Complex Family Formulas

For example, $K^{4-5}C^{4-5}A^{8}G^{2}$ contains a mixture with some plants having 4 or 5 sepals and some plants have 4 or 5 petals. This is somewhat common as evolutionary biology has mixed many genera or species together based on thinking it is the closest relative or sometimes just because they do not know where else to place it. The simple response is that further detailing of the Floral formula by Genera should clarify how they need separated.

Identical Family Formulas

The simple response is that these two families should be the same Kind. I have encountered this only once so far. Interestingly, the plants in both families have a unique alkaloid chemistry not found in most plants. This additionally suggests they are in the same Kind. The search for hybrids between these two families is currently underway.

Comparison to APGIV Taxonomy

How does this method compare with the modern changes to taxonomy being made by DNA comparisons? This comes up because DNA sequencing has been used to heavily redesign plant relationships - sometimes mixing and matching unusual items while separating seemingly very similar items. The initial response is that the Floral Formula works on morphology (the structure and form of the plant) and it therefore aligns with traditional (non-DNA) taxonomy. But the more interesting part , in phase two of studies, will be to determine DNA based taxonomy is splitting a recognized Kind (that would include known hybridization) or lumping things together that clearly are separate kinds. An example of this would be the Maple Family (loosely based on seeds that have a membrane forming a "helicopter", "whirlygig", or other floating shape), which is already complex enough to possibly be multiple Kinds, but which has recently been absorbed into the Soapberry Family which has many different characteristics.

Conclusion

Thus far, over 100 Floral Formula have been developed alongside a growing plant hybrid database. The simple version of the results is that nothing has falsified my hypothesis so far and it's predictions seem to be working. Furthermore, the average for a Plant Kind is averaging near the Family level of classification as it has been for Animals Kinds. The expected list of possible combinations is filling up with no troubling repeats or overlaps. Much research remains to be done, but so far the results are encouraging.

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$B^{\infty} K^{x} \underbrace{C^{(5)} A^{(5)}} \overline{G}^{(2)}$

Asteribar - Aster

Description: : involucrate head, receptacle surrounded by phyllaries : calyx absent : corolla united and 5-lobed : stamens 5 cylinder around style : ovary 2 style branches and uniloculate

Genera: Over 1100 genera: *Helianthot, Rudbeckot, Calendulot, Eupatoriot, Cirsiot, Chicoriot, Taraxacot*

$K^{0} C^{0} A^{1-3} : \underline{G}^{(2-3)}$

Cyperibar - Sedge

Description: inconspicuous : Perianth absent or bristles : Androecium of 1-3(6) stamen : compound pistil of 2-3 united carpels, 1 locule, ovule solitary

Genera: ~70 genera: *Dichromenot, Cyperot, Eleocharot, Eriophorot*

$K^{x} C^{\infty} A^{\infty} \overline{G}^{2-\infty}$

Cactibar - Cactus

Description: Periant numerous gradual sepals to petals : calyx petaloid, epigynous series : androecium numerous epipetalous or inserted : compound pistil 4 united carpels 1 locul, placentation parietal ovary inferior :

Genera: variable # genera: *Opuntot, Echinocactot, Lemaireocerot, Carnegot, Zygocactot*

$K^{0} C^{0} A^{1} : \underline{G}^{(3)}$

Euphorbibar - Spurge

Description: unisexual : 0 or 5 sepals : 0 or 5 petals : 1 to many stamen : compound pistil 3 united carpels, axial

Genera: ~300 genera : *Euphorbot, Manihot, Pedilanthot, Acalyphot, Aleuritot*

Note: Mixed Euphorbia and Non-Euphorbia

Extra: Carribean Slipper Spurge considered possibility of ring species:

$K^0 C^0 A^{1-10} \underline{G}^{(2-4)}$

Piperibar
Pepper

Description:

Genera:

$K^0 C^0 A^{4\langle 2-16 \rangle} : \underline{G}^{(2)}$

Myricibar
Wax-myrtle

Description:

Genera:

$B^2 K^0 C^0 A^{\langle 1 \rangle 3 \langle 6 \rangle} \underline{G}^{(2-3)}$

Gramibar - Grass

Description: internodes hollow : usually bisexual : floret bracts : perianth reduced to 2 or 3 lodicules or absent : 1,3,6 stamens : coumpound pistil united carpels 1,2,3 styles

Genera: ~500 genera : ~23 tribes : *Poaot, Triticot, Panicot, Saccharot, Oryzot, Andropogot, Phragmitot*

Note: Possibly Polybaraminic

$K^0 C^0 A^{6 \text{ or}} \underline{G}^{2 \text{ or } 3}$

Aracibar - Arum

Description: spathe / spadix : Perianth absent or 4-6 part scalelike : 6 or fewer stamen oppposite perianth segments staminodes : coupound pistil(1)2 to 3(9) united carrpels parietal, axile, basal, apical

Genera: ~110 : *Arisaemot, Symplocarpot, Anthurot, Philodendrot, Lysichitot*

Note: Polybaraminic test : common design hybrid search :

$K^{0} C^{0} A^{1\ 2} G^{0} / P^{2-6} A^{0} \underline{G}^{1}$

Leitneribar

Corkwood

Description:

Genera:

$K^{2-3} C^{4-\infty} A^{\infty} \underline{G}^{2<\infty}$

Papaveribar

Poppy

Description:

Genera:

$K^{2} C^{2+2} A^{6} \underline{G}^{\textcircled{2}}$

Fumaribar

Dutchman's Breeches

Description:

Genera:

$K^{\boxed{2-5}} C^{0} A^{2-5} \overline{\underline{G}}^{\boxed{2-3}}$

Chenopodibar

Goosefoot

Description:

Genera:

$K^{2-6} C^{(3-6)} A^{6-1\ 2} \underline{G}^{(4-6)}$

Monotropibar - Indian Pipe

Description: 2-6 sepals : 3-6 petals free or united : 6-12 stamens reee or united : compound pistil 4-6 carpels, parietal, stigma capitate

Genera: ~10 : *Monotopot, Sarcodot, Pterosporot, Allotropot*

$K^{3} C_{z}^{2+1} A^{1-2} \overline{G}^{(3)}$

Orchidibar - Orchid

Description: usually bisexual : zygomorphic : 3 sepals green or colored : 2 lateral petals plus labellum : 1 or 2 stamen uniquely joined to style : coupound pistil 3 carpels, parietal rarely 3--locular axile :

Genera: ~1000 : *Orchot, Cypripediot, Spiranthot, Epidendrot, Tipularot, Vanillot*

Note: possibly polybaraminic : common design hybrid test

$K^{2-6} C^{4-\infty} A^{1\ 5-\infty} \underline{G}^{1-\infty \text{ or } (1-\infty)}$

Winteribar
Winter's Bark

Description:

Genera:

$K^{3} C^{3} A^{3} \overline{G}^{(3)}$

Iridibar - Iris

Description: 3 petaloid sepals : 3 petals : Perianth united in tube below : 3 stamen opposit sepals : compound pistil 3 parietal placentas, 3-lobed style

Genera: ~80 : *Irisot, Gladiolot, Tigridot, Freesot, Tritonot, Sisyrinchot*

$K^{3} C^{3} A^{6} : \underline{G}^{3 \text{ or } \textcircled{3}}$

Arecibar - Palm

Description: unisexual or bisexual : 3 sepals small : 3 petals small separate or united : 6 stamen in 2 series : compound pistil 3 united carpels, rudimentary in staminate flowers

Genera: ~200 : *Pheonot, Copernicot, Sabalot, Cocot, Elaeisot, Washingtonot, Roystonot*

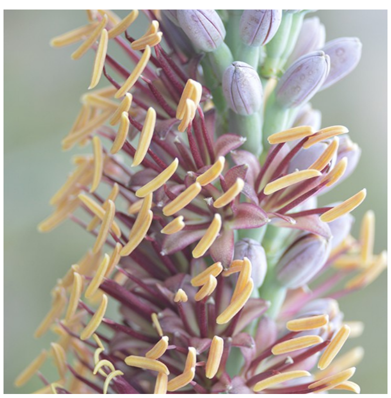
Note: Possibly polybaraminic : common design hybrid test :

$K^{3} C^{3} A^{6} \underline{G}^{\textcircled{3}}$

Commelinibar - Spiderwort

Description: 3 green sepals : 3 petals, sometimes unequal, 6 stamens, some reduced to staminodes : 3 united carpels, axile, simple terminal style

Genera: ~50 : *Zebrinot, Commelinot, Tradescanto, Rhoeot*



$K^{3} \underbrace{C^{3} A^{3+3}} \overline{G}^{\textcircled{3}}$

Agavibar - Agave

Description:

Genera: ~18 : *Agavot, Dracaenot, Sansevierot, Yuccot, Cordylinot*

$K^{3} C^{3} A^{6} \overline{G}^{\textcircled{3}} \text{ or } \underline{G}^{\textcircled{3}}$

Bromilibar - Pineapple

Description: rarely unisexiual : Perianth in 2 series : outer 3 calyxlike, inner 3 corollalike : 6 stamens, inserted at base : compount pistil 3 united carples, axile :

Genera: ~45 : *Navot, Pitcairnot, Tillandsot, Bromelot, Ananot*

Note: Almost entirely New World and West Indies.

$K^{3+3} C^{3+3} A^{6} \underline{G}^{1}$

Berberidibar - Barberry

Description: 3-6 sepals, free : 3-6 petals, free : 6 stamen, distinct with flaps : simple pistil 1 carpel, marginal :

Genera: ~13 : *Podophyllot, Berberot, Mahonot, Nandinot*

Note: disjucnt easter North America dn eastern Asia ranges.

$K^{3-5} C^{0} A^{5} \underline{G}^{(2-3)}$

Amaranthibar
Pigweed

Description:

Genera:

$K^{3\langle 4\rangle} C^{0\langle 3\rangle} A^{6-36} \overline{G}^{(4-6)}$

Aristolochibar
Birthwort

Description:

Genera:

$K^{3-5} \underbrace{C^{5} A^{\infty}} \underline{G}^{(1-\infty)}$

Malvibar - Mallow

Description: often subtended by bracteoles : 3-5 sepals partially united : 5 petals, free : numerous stamens, filaments united as column : compound pistil 5(1 to many) capels, axile :

Genera: ~75 : Hibiscot, Gossypot, Althoth, Sidot, Abutilot

$K^{3-6} C^{0} A^{3-\infty} G^{0} \,/\, K^{4} C^{0} A^{0} \overline{G}^{(2-3)}$

Juglandibar
Walnut

Description:

Genera:

$K^{3-\infty} C^{3-\infty} K^{\infty} \underline{G}^{\infty}$

Nymphibar - Water Lily

Description: 3 to many sepals : numerous petals grading into stamens : numerous stamens : simple pistil 1 carpel, marginal, ovary superior to inferior :

Genera: ~5 : Nymphot, Nuphot, Ondinot, Euryalot, Victorot, Nelumbot

Note: Nelumbot (lotus) has sometiems been Nelumbonaceae, APG addss to Platanaceae

$K^{3-8} C^{3-8} A^{3-8} \underline{G}^{6-9 \langle 3 \rangle}$

Plantanibar
Sycamore

Description:

Genera:

$K^{3-\infty} C^{5-\infty} A^{\infty} \underline{G}^{3-\infty \langle 1-3 \rangle}$

Ranunculibar
Buttercup

Description:

Genera:

$K^{4\langle 0\rangle} C^{0} A^{2-4} : \overline{G}^{\textcircled{2}}$

Betulibar

Birch

Description:

Genera:

$K^{4-5} C^{2-5} K^{2+2\langle 5\rangle} \underline{G}^{2}$

Acanthibar

Acanthus

Description:

Genera:

$K^{4} C^{0} A^{4} : \underline{\overline{G}}^{\textcircled{2}}$

Moribar

Mulberry

Description:

Genera:

$K^{4-5} C^{0} A^{4-5} : \underline{G}^{1}$

Urticibar

Nettle

Description:

Genera:

$K^{(4-5)} C^{0} A^{4-8} \underline{G}^{(2)}$

Ulmibar
Elm

Description:

Genera:

$K^{(4-5)} C^{(4-5)\langle 0 \rangle} A^{4-5\langle 10 \rangle} \overline{\underline{G}}^{(2)}$

Hamamelidibar
Sweet Gum

Description:

Genera:

$K^{\underline{4-5}} \underline{C}^{(4-5)} \underline{A}^{4-5} \overline{G}^{(2)}$

Rubibar - Coffee

Description: 4-5 sepals, fused to ovary : 4-5(10) united petals, tubular : 4-5(10) stamens, epipetalous : compount pistil (1)2 united carpels, axile apical or basal :

Genera: ~450 : *Hedyotot, Cinchonot, Gardenot, Galiumot, Mitchellot*

$K^{4-5} C^{4-5} A^{\infty} \underline{G}^{(3)(5)}$

Clusibar - Mangosteen

Description: or unisecual : 4-5 sepals free : 4-5 petals free : numerous stamens, fascicled : compound pistil 3-5 united carpels, axile

Genera: ~50 : *Hypericot, Garcinot, Clusot*

Note: two subfamilies - unisexual vs bisexual

$K^{4-7}C^{0}A^{4-40}G^{0}$ / $K^{4-6}C^{0}A^{0}\overline{G}^{(3-6)}$

Fagibar

Oak

Description:

Genera:

$K^{5\langle 4-8 \rangle}C^{0}A^{\infty}G^{2-5-\infty}$

Alzibar

Carpetweed

Description:

Genera:

$K^{5}C^{0}A^{5} : \underline{G}^{1}$

Cannabibar

Hemp

Description:

Genera:

$K^{(5)}\underbrace{C_{z}^{(5)}A^{2 \text{ or } 4}}\underline{G}^{(2)}$

Lamibar - Mint

Description: zygomorphic : 5 united sepals, ribbed : 5 united petals, 2 lipped : 2-4 stamen, didynamous, epipetalous : compound pistil 2 carpels, basal :

Genera: ~200 : *Ajugot, Nepetot, Salvot, Monardot, Menthot, Rosmarinot*

Note: why is Gmelina here?

$K^{(5)}C'^{(5)}A^{4}\underline{G}^{(2)}$

Bignonibar - Bignonia

Description: somewhat zygomorphic : 5 united sepals, campanulate, 5-toothed : 5 united petals, 2 lips : 4 stamen, epipetalous, didynamous fitfh stamen often staminode : compoun 2 united carpels, marginal :

Genera: ~100 : Spathodot, Bignonot, Jacarandot, Catalpot,

$K^{(5)}C^{(5)}A^{5}\underline{G}^{(2)}$

Solanibar - Nightshade

Description: 5 united sepals : 5 united petals, tubular : androecium 5 stamens, inserte on tube alternat with obes : compound 2 carpels, axile style terminal :

Genera: ~85 : *Solanot, Daturot, Nicotianot, Capsicot, petunot, Lycopersicot*

$B\,K^{5}C^{(5)}A^{5}\underline{G}^{(2)}$

Convolvulibar - Morning Glory

Description: bracts showy, involucre : 5 sepals, free : 5 united petals : 5 stamen, epipetalous : compound 2 united carpels, axile, style terminal :

Genera: ~50 : *Ipomot, Convolvulot, Dichondrot, Calystegot, Evolvulot*

$K^{(5)}C^{(5)}A^{5}\underline{G}^{\widehat{2}}$

Apocynibar - Dogbane

Description: (4)5 sepals united, glandular : 5 petals, tube : (4)5 stamens inserted in tube, filments free : compound 2 apically united carpels, marginal :

Genera: ~200 : *Neriot, Vincot, Amsonot, Allamandot, Catharanthot*

Note: lack corona, pollinia, and corpusculum of ascelpidaceae

$K^{\underset{\smile}{5}} C^{\underset{\smile}{5}} A^{5} \overline{G}^{\textcircled{2}}$

Apibar - Parsley

Description:

Genera:

$^{5}C^{\textcircled{5}} \text{ or } \underline{C'^{5} A}^{5} \text{ or } \underline{A}^{\underset{\smile}{5}} \text{ or } \underline{A}^{\overset{\frown}{5}} G^{\textcircled{2}\textcircled{3}\textcircled{5}}$

Campanulibar - Bluebell

Description:

Genera:

$K^{5} \underline{C^{\textcircled{5}} \overset{\frown}{A}^{5}} \underline{G}'^{\overset{\frown}{2}}$

Asclepiadibar - Milkweed

Description: elaborate corona (paracorolla) : 5 sepals, short tube : 5 united petals : 5 stamen, waxy pollinia : compount 2apically united carpels, marginal 2 styles united at apices :

Genera: ~250 : *Asclepot, Ceropegot, Stapelot, Dischidot, Matelot*

Note: APG places as subfamily of Apocynaceae.

$K^{5 \text{ or } \underset{\smile}{5}} C^{5 \text{ or } \underset{\smile}{5}} A^{5} \underline{G}^{(3\text{–}5)}$

Passifloribar - Passion Flower

Description:

Genera:

$K^{\underset{\smile}{5}} C^{5}_{z} A^{10 \text{ or } '} \underline{G}^{1}$

Fabibar
Bean

Description:
Genera:

$K^{5} C^{5} A^{10} \underline{G}^{③}$

Anacardibar
Cashew

Description:
Genera:

$K^{5} C^{5} A^{5-\infty} \underline{G}^{1}$

Mimosibar
Mimosa

Description:
Genera:

$K^{3+3} C^{0} A^{3+3+3+3} \underline{G}^{1}$

Lauribar
Laurel

Description:
Genera:

$P^{6-18}A^{\infty}\underline{G}^{\infty}$

Magnolibar
Magnolia

Description:

Genera:

$P^{\infty}A^{5-30}\underline{G}^{\infty}$

Calycanthibar
Strawberry-shrub

Description:

Genera:

$P^{3+3+3}A^{\infty}\underline{G}^{\infty}$

Annonibar
Custard Apple

Description:

Genera:

K

Cochlospermibar
N

Description:

Genera: Cochlospermum in Bixibar after APGIII

K

Bombacibar

C

Description:

Genera: Ochroma now in Malvaceae

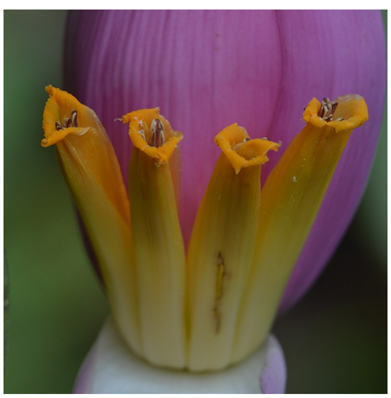
K

Zingiberibar

Ginger

Description:

Genera:



K

Musibar

Banana

Description:

Genera:

K

Punicibar

C

Description:

Genera: Punica has been lumped into Lythraceae (loosestrife)

K

Ochnibar

C

Description:

Genera: APG made broad with addding medusagyne and quiinaceae