

The Supercalifragilisticexpialidocious (nonfloccinaucinihilipilificatious)

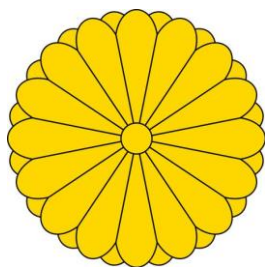
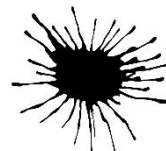


WESTERN AUSTRALIAN

CHRYSANTHEMUM

“the golden flower and queen of the autumn”

SOCIETY



March - April 2023

President's Notes

'Tis fast approaching the season of splendiferous floral delights and I am sure that, like me, you just cannot wait. There are still several weeks before our favourite flowers show their true colours, so we still have the pleasure some good honest character building toil to look forward to as well. AS Chrysanthemums originate in the Far East it is important to balance the Yang of toil with some Yin of rest, to sleep, perchance to dream of five extraordinary, magnificent, spherical, untarnished, refulgent blooms of staggering immensity glorified by brilliant art shades. If you feed yourself and your plants enough bulls..t your dreams may even come true. Do not forget to check out the cultural notes.

Chrysanthemums have been associated with health and vigour in old age as they reach their peak at the very end of the growing season when other plants are dying away. They also teach us that every year there is the opportunity for rejuvenation. There must be something profound in that as well. It is claimed that dogs can teach us mindfulness. I grow chrysanthemums and I have a dog so what else do I need? Apparently having too many choices causes anxiety. Lucky then that people often tell us where to go and what we can do with ourselves.

Even a cursory inspection of the “Forthcoming Events” section of this newsletter indicates that “it is all happening” for the next three months. The first event is a home open in March at my home. Hopefully, reading this newsletter will not put you off attending. I have planted around twice as many chrysies as in previous years as I had a large number of left over plants and I do not like waste. They have been put into garden beds all around the house. I was hoping that this would beautify the garden but it has had the opposite effect as I have been so busy with them (so lazy, more likely) that I have not had time to repair the reticulation system and so a lot of the lawn has died. It is important to prioritise.

The second home open is at our Secretary, Michael Drake-Brockman's, home in April. There will be some decent colour in the blooms by then and with the charming bushland setting of his home his garden should be a real picture. Unfortunately a friend recently drove their car into the side of his house, so that may look a little sad. However, the show must go on and I have it confirmed that it will.

There is a General Meeting squeezed in between these visits. As it is on the Tuesday following Easter there should be a bumper crowd in attendance.

Speaking of the show, that is in the second week of May and the dates are the latest possible. It is an Australian Championship year in Perth again and so I am hoping for an extravaganza. This year we are restricted to the southern, or Woolworth's, half of Hawaiian's Forrestfield shopping centre due to substantial renovations occurring in the other half. We may have a few less tables to stage our entries on but as the tables will all be in the one area the show should look even more spectacular than usual. Time will tell; the best laid plans of mice and men; etc; etc; etc.

After that is the Presentation Luncheon and if you make enough entries in the show it will be well worth attending. Even if you do not it will still be worth attending as the cost of the meal and refreshments is subsidised by the society and all potential attendees are known to be great persons (personalities?). It may well prove to be the social event of the year bar none for many members. If there is a mass petition in favour of a public broadcast of the Editor's musical suggestions I can bring along a boom box and printed translations of any Spanish lyrics so that we can have a real hoedown and hootenanny. No need to panic, the chance of such a petition being made is vanishingly small and even if it were the Committee would never vote in favour.

Cultural Notes

I have found that a number of my plants have been running to early crown buds. With a very late show this is not ideal and so I decided to run them on to obtain a later bud. Whether or not this was a good idea I will find out soon enough. I am unsure why this has happened. Any buds appearing from the start of March I will keep. If they are crown buds they will need to be "secured" by removing the new growths from around them before they overrun the bud, causing it to abort. Once the later terminal buds start to appear select the central bud, usually the largest one, from the cluster of buds at the end of the stem and remove the others. If the central bud is not plump and round then selecting one of the others is likely to produce a better bloom. Thereafter buds and shoots will appear anywhere and everywhere down the stem and they should be removed as well. Trim back any new growths coming from the soil but do not rip them out as they are needed to produce the new shoots for next season.

That is enough from me. Here are the Cultural Notes from the March - April 2012 WACS Newsletter written by the late George Tomlinson.

March is a very busy month with Chrysanthemums especially if you're showing them. All laterals should be separately staked and ties kept up with new growth as it is near impossible to stage a specimen bloom with a crooked stem. It makes your task so much easier if you take the time to attend to these tasks at the right time giving a nice long straight stem enabling easy staging at the right height. Having a good length stem also gives you the opportunity to review the height of the flowers on the display bench and cut the length of your stem to match the aesthetic appeal generally. If everyone stages in accordance with the guidelines the display looks so much better. February is the time the buds begin to form and it is important that you keep the stem growing straight up the stake with the bud square on top. I find turning the pots every 4 or 5 days helps as it will counter the natural pull of the sun as its traverse moves closer to the horizon at this time of the year. Make sure your plants are well fed as this is the real growing period for them. Remember also that this is the time to switch to a feed higher in potash with less but still adequate supply of nitrogen and an adequate supply of phosphate. Most of the proprietary brands have trace elements so this should not be a major concern. Keep up your spraying program to take care of the nasties. It is always important but from now on it becomes the more so if you want nice clean undamaged specimens on the show bench.



George's notes were accompanied by these two photos. Elaine Johnson is no longer grown and Garnet King was also lost but it has recently been reintroduced. Our members are doing their best to preserve as many cultivars as possible but it is proving difficult due to finding more old ones and the continuing introduction of new cultivars. All things considered this is not a bad problem to have.



The following was also featured in the same newsletter and was contributed by Ian Blackwell.

Ian Blackwell: *This article entitled 'Soil pH - The Key to Successful Gardening' was written by Allan Ralph and appeared in the 'Honeysuckle Times', the quarterly newsletter published by the Cottage Gardeners Circle Inc., back in November 2001. So many gardeners struggle with this issue so I thought I would run it past you even though it focused mainly on general gardening. The basic principles outlined by Allan can be applied to our chrysanthemum culture to help us understand how to manage the pH in pots.*

Allan Ralph: *I believe that soil pH is the 'key' to successful gardening. However, I also believe that soil pH is the most misunderstood element of gardening and because of this, it unknowingly causes many problems including extreme unthriftiness and even species failure in many gardens. Soil acidity and alkalinity are measured in pH units. The term pH refers to the amount of positively charged hydrogen ions in the soil, or 'percentage hydrogen'. The pH scale ranges from 1 to 14, with 1 being extremely acid and 14 being extremely alkaline. A pH of 7 is neutral, neither acid nor alkaline. Soils range in pH from about 3 (peat bogs) to around 11 (arid alkaline soils). Acid soils used to be commonly termed 'sour', after the sour taste of acids, while alkaline soils were referred to as 'sweet'. Most soils used for agriculture, horticulture and gardening are in the range of pH 4.5 to 9.5. The soils of the Perth coastal plain mainly tend to be on the alkaline side and this alkalinity steadily increases as you get closer to the coast. When you get into the wheat-belt of W.A., the situation is quite different. Most of the wheat-belt soils are naturally acid and have become more acid due to decades of applications of agricultural fertilisers. It is also worth mentioning that the Eastern States of Australia generally also have acid soils. This means that when the Eastern States gardening shows tell you that you must add lime to the soil, if you live in Perth, don't, until you know what the pH of your soil is. The pH of ground water must also be considered if you are one of the many people in Perth who water their gardens from a bore. The reason for this is if you happen to live in an area that has neutral or slightly alkaline soils and put down a bore that is drawing through limestone, then the pH of the bore water may well be alkaline, which in time will increase the soil alkalinity to problem levels. Plants vary widely in their soil pH preference. This preference can usually be traced back to the soil type in their place of origin. Plants can tolerate a certain soil pH range, for example 6.0 to 8.0. It must be understood that even a one pH point increase can be quite significant. A one point increase from 7.0 to 8.0 is actually 10 times more alkaline than the soil at 7.0.*

To complicate the issue further, the pH scale is actually logarithmic and so this means that soil, if tested to be 9.0, is actually around 100 times more alkaline than a neutral (pH 7.0) soil. This explains why a plant that grows happily in a soil with a pH of 7.0 can actually do very poorly in a soil with a pH of 8.5. I am sure you have all experienced the extreme yellowing of leaves, particularly in citrus, in coastal gardens. This is an example of what is called 'lime induced chlorosis' and is the result of high soil alkalinity due to the limestone based soil. Conversely, stunted growth, poor flowering and even dieing back of new shoots can be the result of untreated, acid soils. To understand what is happening we need to look at the nutrient uptake at the various pH levels. Even though the nutrients essential for healthy growth may be in the soil, these nutrients may not be available to plants growing in extremely acid or alkaline conditions. In the case of the citrus on the coast with yellow leaves, some 'experts' would tell you that it is a deficiency of iron and manganese, but in fact iron, manganese, boron, copper and zinc are not available to the plants because of high soil pH. Another good example is the extreme yellowing of Cocos palms near the coast. This has been given the nickname 'fizzy top' and is often treated with iron and manganese when in fact it is again an alkaline soil problem or 'lime induced chlorosis'.

So, we know the problem, we know it is caused by acid or alkaline soils, how do we rectify it? The answer is to modify the soil pH to bring it closer to neutral. Firstly I'll deal with modifying alkaline soils (i.e. High pH), because the majority of Perth soils are alkaline to some extent. If you are having problems in your garden due to alkaline soils, it is wise to consider the following points:

- *Don't use animal manures - most animal manures are alkaline and can make the problem worse, particularly poultry manure.*
- *If you are watering from a bore, get the water pH tested, this could be compounding the problem.*
- *All organic matter, as it breaks down, will help to acidify the soil. Mulching and digging compost in to garden beds will also help. Digging peat into new garden beds is very beneficial, because it is naturally acid, with a pH around 4.0 to 5.5.*
- *Use compound fertilisers where possible.*
- *Pine bark, particularly pine needles, are an excellent mulch for alkaline soils. Pine needles have the additional advantage of imparting some nitrogen to the soil as they break down, not unlike pea and lucerne hay. Pine needles are an absolute tonic for acid lovers such as azaleas and camellias.*
- *Apply 5 grams of sulphur (one level teaspoon) per square metre of soil. This will depress the pH by one point. This can be done up to twice a year, preferably during the winter months. Very few gardeners in the Perth metropolitan area would have soils acid enough to require modification. Some suburbs that were originally paperbark swamps, such as Bullcreek and parts of Willetton, have a neutral pH of around 6.0 to 6.5 but this is not acid enough to require modification. In fact, probably the optimum soil pH for gardening is slightly acid at around 6.5. If you are in an area that is extremely acid and therefore need to increase the pH, remember the following points:*
 - *Regular applications of animal manure will increase the pH marginally.*
 - *To increase the alkalinity by one point, apply dolomite lime from 100 gms/sqm on sand, up to 250 gms/sqm on clay. Pulverised limestone can also be used. If you need to test the pH of your soil, most nurseries will do it free of charge, or alternatively you can test it yourself with a small test kit. I do not recommend the small cheap electronic meters as they are notoriously inaccurate. When collecting soil for a test, try and avoid excessive organic material and also avoid areas that have been fertilised in the past four weeks.*

To this, Ian added the following advice.

- Work on a pH of around 6.5 for chrysie culture in pots.
- It is unlikely you will need to decrease the pH as fertilisers do this for you.
- Use a test kit to measure the pH of the soil in the pot.
- To increase the pH apply finely ground dolomite (Calmag or equivalent is good). To adjust quickly use Calmag and Hydrated lime 50:50 by volume and apply 1 tablespoon per 250mm pot.



I am trialling nearly all my Singles as Cuts and Sprays this season as I have many spares in an uncovered garden bed and so I thought that I would grow them as they did in the good old days. A vase of Cuts is a very attractive exhibit for the show or for home decoration. This is another article from the same newsletter. The advice was written by the late Roy Shilling with another introduction by Ian Blackwell. In the good not so old days Sprays were grown under cover and some of the show exhibits were splendid. Roy won Grand Champion of the 2009 show with a Cut of Charmaine, which is still the pre-eminent cultivar for growing as a Cut.

Ian Blackwell: *Some years ago now the late Bill Pearson had the almost sole role of sponsoring and maintaining growing singles as cuts for the show bench. At that time our now judge Jan Blackwell took up the challenge of learning how to grow cuts of singles to give Bill some competition - he was getting lonely out there by himself. Members won't remember this as strongly as Jan does as she spent many hours attending to her plants and successfully producing some really lovely cuts of singles. So what happened to them you might ask? Well, like 2010, they simply weren't out for the show. Our current circumstances are not much different, only now it is Roy holding up the end, but he's lonely out there. To encourage you to join him he has prepared some notes on 'how to grow cuts of singles'. Thankyou Roy Shilling.*

Roy Shilling: *What is a cut? It is one stem with at least 4 flowers evenly spaced so that they are not touching one another. According to the WAHC Standards and Classifications the length of the lateral stem (pedicel) being approximately twice the diameter of the bloom. Each bloom should be on the same plain but this does not always happen. Those who have grown and exhibited cuts will have found that on a good cut the lateral stems are more like three times the width of the bloom. Not all singles make a good cut. Two that don't but are very good flowers are Peter Robinson and Stoakes Freesia. There is no mystery to growing them, just a little bit of fiddling. After you have taken the second stop you want 3 stems growing and treated the same as the rest of your plants until the 10th March when you stop them again only taking out the bud or tight group of buds at the end of the stem then let 4 or 5 laterals grow. You will need to spread them so that the flowers go where you want them to be. I use pop sticks cut in half at first then when they get longer I use full size sticks. Before you use them cut a V in each end adjusting their placement as the laterals grow. If you break a lateral off say a few nice words and be more careful next time. Don't forget to take the sticks out before you put them on the show bench. When putting them in a vase don't just bung them in and hope for the best. If you look at them they will suggest to you the way they need to go in. Have a go and good luck.*

Buds (Yes, another article on buds.)

Early March is a good time to start looking at your buds. With late flowering chrysanthemums in Perth (which is pretty much the only type we grow in our gardens), full bloom occurs in early May. Initiation of flowering due to shortening days (actually lengthening nights) occurs about ten weeks prior to full bloom which is around the end of February and the beginning of March. It takes two or three weeks for a bud to be seen in the growing tip after it is induced which will be around mid-March. At that time we will see a cluster of buds forming at the tip of the stem and shortly after that other buds will be seen coming from the leaf axils, starting with the upper ones and working their way down the stem. As every small branchlet, "pedicel", ends in a bud these are called terminal buds. Unless they are removed all of these buds will go on to flower. After that the plant will go into dormancy before growing back at the start of the new season.

Any buds seen prior to mid-March are usually "break buds". Break buds are single buds at the top of a stem with a few small strap like leaves below them and are produced right through the growing season. They cause the stem to branch, after which they wither away. If a break buds forms close to the normal time of induction of flowering it can be "secured" by removing all the branches that are forming around it and then it will not wither away and will go on to flower. However, progression to flowering does not occur normally because the bud has formed before the plant has been induced to flower. As there are no branches to take vitality away from the bud it slowly enlarges by developing more petals on the capitulum and it tends to develop a long neck. Once flower induction occurs the bud will then develop more rapidly and proceed on to flower normally. Due to the longer period of development break bud flowers will usually be larger, have more but thinner petals and be less likely to have an "eye" in the middle of the bloom. Those are the good things. On the downside they will take longer from colour show to full bloom increasing the chance of stale petals at the base of the bloom and cultivars with any red pigment in the petals will tend to be paler (eg. pinks and bronzes). Due to our hot weather, during March especially, flowering on terminal buds is the safest option but some cultivars are better on break buds and some must be flowered on them to produce anything worthwhile. Cultivars bred in W.A. or Japan usually produce excellent results on terminal buds whereas those bred in the U.K. often require to be flowered on the break bud.

The Weather (Always a safe topic until recent years.)

I thought that we had a cooler summer than normal due to the absence of any forty degree days. It turns out that this summer was actually warmer than the long term average. Global warming has apparently added one degree to the average world temperatures in the lifetime of the average WACS member. I was reading the ABC News online and came across an article entitled "*Perth tree conference investigates ways to boost city's dwindling canopy.*" It turns out that "*data has shown, of all the capital cities, Perth has the least tree canopy, with less than 20 per cent of its area covered. Sadly, 85 per cent of canopy lost has occurred on private land and it's a number that is declining.*" Consideration of codes and bylaws to reduce the loss of mature trees is underway. My neighbour has four big gum trees just his side of our dividing fence and he is so incredibly generous that all the shade from them falls on my garden. What a hero! I had a look at installing grow lights, like they have in the commercial greenhouses, in my orchid house (my other passion). I could run them for free from my solar panels in the day time when the orchid house is

Current thinking is that our sun formed 4.6 billion years ago and the earth formed 4.5 billion years ago. The first living organisms formed 3.7 billion years ago. About 3 billion years ago the first oxygen producing organisms formed. The first land based plants took quite a long time to appear, probably around 450 million years ago. The first plants with vascular tissues, which allowed more complex plants to form, appeared about 435 million years ago. Plants with true roots and leaves were present 400 million years ago. Insects were also prevalent around this time. The first known pesticide use was elemental sulphur by the Sumerians about 4500 years ago. Around 275 million years ago the conifers appeared. As above, the earliest flowering plants appeared 135 million years ago and by 75 million years ago they were the dominant plant type. Take these dates as a rough guide as different authors have their own ideas, as we will see from some of the quotes to follow.

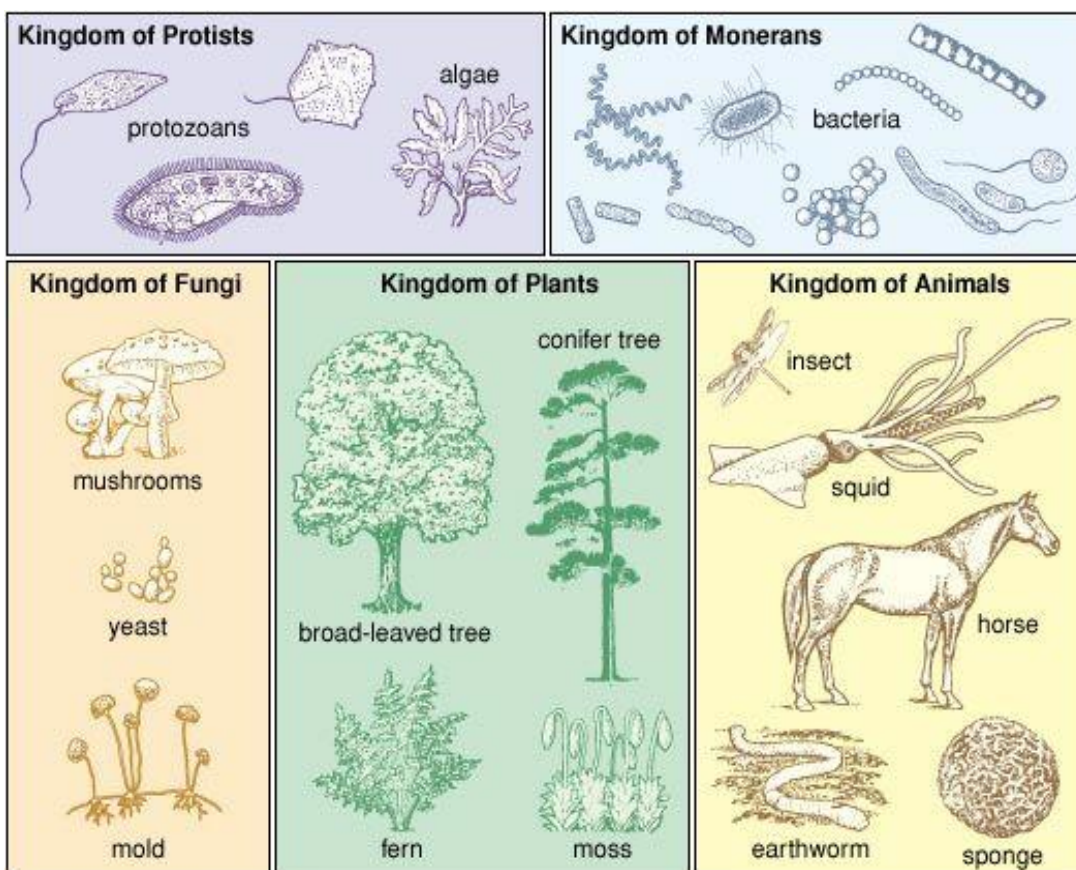
Let us continue with one of our favourite subjects, taxonomy!

The division of familiar objects into animal, vegetable and mineral probably dates back to prehistory. Most students will be aware, also, of the landmark contribution made by the Swedish naturalist, Carolus Linnaeus in the mid-1700s. In his Systema Naturae (first ed. 1735; 10th ed. 1758) Linnaeus established three kingdoms, namely Regnum Animale, Regnum Vegetabile and Regnum Lapideum, or Animal, Vegetable, and Mineral each divided into five ranks: kingdom, class, order, genus, and species.

Animal vegetable or mineral? It seems an obvious question to ask. It used to be but not now. If we ignore minerals we are left with living creatures, which can, or at least could, be divided into animal or vegetable. Everything was fine until someone invented microscopes (around 1600) and then started to understand what they were looking at (around 1800) aided by much better microscopes.

Are single celled organisms animal or vegetable? It is believed that early life forms were single celled organisms and they then evolved into multicellular organisms, both animals and vegetables. Some single celled organisms stayed that way and went off on their own tangents. For a fair period of time many single celled organisms were shoe-horned into animal or vegetable classifications. Whittaker had a eureka moment in the 1960s. Let's have five classifications he proclaimed!

American biologist Robert Whittaker proposed a classification system based on five kingdoms: Monera (prokaryotes), Protista (chiefly protozoa and algae), Fungi (molds, yeasts, and mushrooms), Plantae (plants), and Animalia (animals).



I pinched the following table from somewhere unknown and it explains some of the differences between the five kingdoms of living things.

Table 8.1 Properties of the five kingdoms

Kingdom	Monera	Protista	Fungi	Plantae	Animalia
Cell type	Prokaryotic	Eukaryotic	Eukaryotic	Eukaryotic	Eukaryotic
Cell organization	unicellular	unicellular	Multicellular and unicellular	Multicellular	Multicellular
Cell Wall	Present in most	Present in some absent in others	Present	Present	Absent
Nutritional Class	Phototrophic, heterotrophic or chemoautotrophic	Heterotrophic and phototrophic	Heterotrophic	Phototrophic	Heterotrophic
Mode of nutrition	Absorptive	Absorptive or ingestive	Absorptive	Mostly Absorptive	Mostly ingestive

The table requires an explanation of terms used and they are as follows -

Prokaryote - without a cell nucleus

Eukaryote - having a cell nucleus

Phototrophic - uses energy from light for metabolism

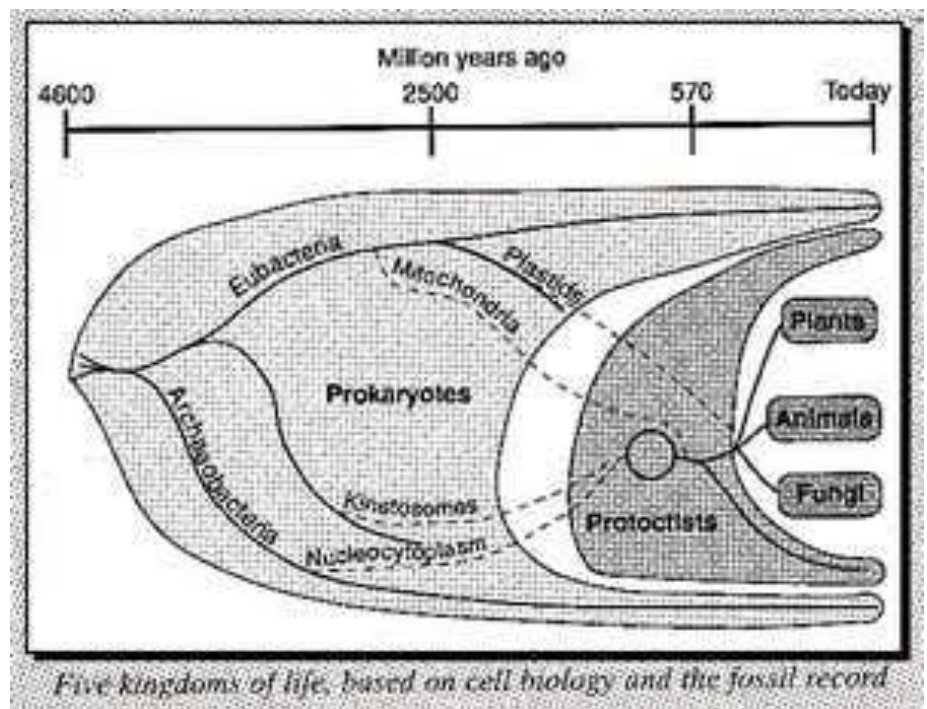
Heterotrophic - uses energy from digestion of other organisms for metabolism

Chemoautotrophic - uses energy from chemical reactions for metabolism

Absorptive nutrition - nutrients are absorbed through the outer cell membrane(s)

Ingestive nutrition - nutrients are obtained by "eating"

This picture shows the proposed evolutionary development of the five kingdoms. It shows that Eukaryotes first evolved from Prokaryotes, aka Monerans (by the formation of a cell nucleus). The first eukaryotes were single celled Protocists (Protista) which then gave rise to plants, animals and fungi. The prokaryotes are shown with two diverging arms being the Eubacteria and the Archaeobacteria (aka Archaea). You will note within the Eubacteria arm we have plastids and mitochondria. These are now distinct walled bodies within the cell(s) of eukaryotic organisms but are believed to be primitive prokaryotic organisms that became incorporated into larger eukaryotic cells creating a highly effective symbiotic relationship. At some point, especially when the Monera kingdom is better understood, taxonomists may wish to formally divide it into two with common ancestors and then we will have seven kingdoms of life. If seven is taxonomists' lucky number it may stay that way. Unfortunately taxonomists divide themselves into "lumpers" and "splitters", so, do not count on it, unless the "conservative" power brokers form themselves into another group.

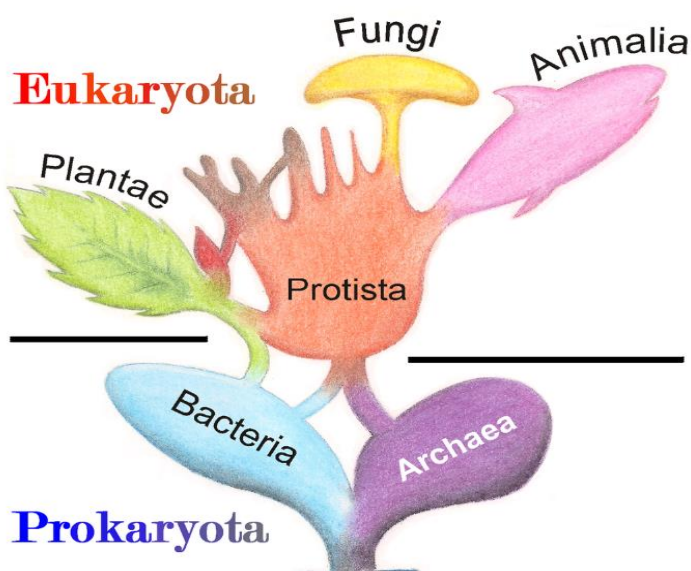


All good? So, it appears that we are all evolved from bacteria and Archaea and so it is worth knowing more about them. Wikipedia provides the following table and commentary.

Property	Archaea	Bacteria	Eukarya
Cell membrane	Ether-linked lipids	Ester-linked lipids	Ester-linked lipids
Cell wall	Pseudopeptidoglycan, glycoprotein, or S-layer	Peptidoglycan, S-layer, or no cell wall	Various structures
Gene structure	Circular chromosomes, similar translation and transcription to Eukarya	Circular chromosomes, unique translation and transcription	Multiple, linear chromosomes, but translation and transcription similar to Archaea
Internal cell structure	No membrane-bound organelles (? ^[66]) or nucleus	No membrane-bound organelles or nucleus	Membrane-bound organelles and nucleus
Metabolism ^[67]	Various, including diazotrophy, with methanogenesis unique to Archaea	Various, including photosynthesis, aerobic and anaerobic respiration, fermentation, diazotrophy, and autotrophy	Photosynthesis, cellular respiration, and fermentation; no diazotrophy
Reproduction	Asexual reproduction, horizontal gene transfer	Asexual reproduction, horizontal gene transfer	Sexual and asexual reproduction
Protein synthesis initiation	Methionine	Formylmethionine	Methionine
RNA polymerase	One	One	Many
EF-2/EF-G	Sensitive to diphtheria toxin	Resistant to diphtheria toxin	Sensitive to diphtheria toxin

The ancestors of bacteria (and Archaea) were unicellular microorganisms that were the first forms of life to appear on Earth, about 4 billion years ago. For about 3 billion years, most organisms were microscopic, and bacteria and archaea were the dominant forms of life. Although bacterial fossils exist, such as stromatolites, their lack of distinctive morphology prevents them from being used to examine the history of bacterial evolution, or to date the time of origin of a particular bacterial species. (Archaeal fossils have not been identified.) However, gene sequences can be used to reconstruct the bacterial phylogeny, and these studies indicate that bacteria diverged first from the archaeal/eukaryotic lineage. The most recent common ancestor of bacteria and archaea was probably a hyperthermophile that lived about 2.5 billion–3.2 billion years ago. The earliest life on land may have been bacteria some 3.22 billion years ago.

Eukaryotes resulted from the entering of ancient bacteria into endosymbiotic associations with the ancestors of eukaryotic cells, which were themselves possibly related to the Archaea. This involved the engulfment by proto-eukaryotic cells of alphaproteobacterial symbionts to form either mitochondria or hydrogenosomes, which are still found in all known Eukarya. Later, some eukaryotes that already contained mitochondria also engulfed cyanobacteria-like organisms, leading to the formation of chloroplasts in algae and plants.



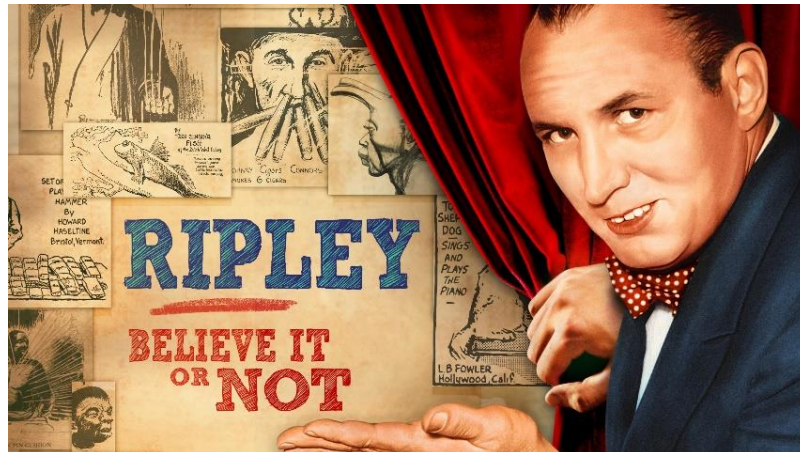
Here is an alternative diagram which also explains the current thinking. It is pretty, so you get more marks from the teacher.

You see that there was a common basal ancestor which then split off into Bacteria and Archaea. Specific bacteria (mitochondrial and hydrogenosome ancestors) became incorporated into the cells of specific archaea. These organisms then formed a nucleus and so the Protista were formed. Some Protistans then incorporated other specific bacteria (chloroplast ancestors that were capable of producing energy from sunlight) leading to the formation of plants. Other Protistans evolved to become fungi and animals.

But wait, there's more. I just cannot help myself! I have left out the whole period between the "big bang" and the formation of the sun. Rest assured, I am not going into that because it is physics and we are a horticultural society.. However, I have also left out the bit between the formation of the earth and the origin of life. How did life begin? What were the basal common ancestors of life? This first requires a definition of what life is. The following are generally accepted as the criteria to be met.

- Living things have cells.
- Living things reproduce
- Living things use energy
- Living things respond to their environment

There have been multiple theories regarding the origin of life stretching back to antiquity. The theory most commonly believed by scientists now is called the "Theory of Biochemical Evolution".



The theory has two components, chemical and biological, which must have occurred simultaneously.

1. Chemical Evolution of Life

Chemical evolution presents the idea of the formation of biomolecules before the origin of life. It is believed that simple inorganic compounds like water vapour, ammonia, hydrogen gas, etc., combine to form organic monomers. These simple organic monomers formed organic compounds like simple sugars, purines, pyrimidines, amino acids, etc. In primordial oceanic water, these organic molecules polymerised and formed complex organic molecules like proteins, nucleic acids, amino acids, etc.

2. Biological Evolution of Life

The basic concept of biological evolution revolves around the creation of a self-replicating body from non-living substances. Very little is known about the transition from non-living matter to living entities. It is believed that around 2000 million years ago, the first self-reproducing cellular appeared in the primordial soup of the primitive ocean. They metabolized the chemicals present in their surroundings.

Complex biomolecules formed in the primitive environment somehow led to the formation of protocell or pre-cell structures like Coacervates and Microsphere. Coacervates and microspheres are both microscopic, lipid membrane-bound droplets. Coacervates are seen to have a single lipid membrane, whereas microspheres are seen to have a double lipid membrane.

These prelife structures resembled living things in some ways like, they metabolised some compounds employing biochemical reactions. Though they had cell-like features, they lacked genetic material. It is now broadly believed that the first-ever genetic material was RNA. The discovery of ribozymes presented us with the evidence that led us to believe in the concept of the RNA world. RNA can self-replicate, and they possess catalytic functions, which are essential for a living cell to have.

Presumably, the first-ever cell received energy from inorganic molecules present in their environment. This led

to the evolution of an organisms that were able to form nutritional organic substances from simple inorganic substances. Gradually with time, these organisms evolved into DNA-based anaerobes (organisms that do not require oxygen) that used sunlight to produce energy. These organisms were cyanobacteria that performed photosynthesis and produced oxygen. As oxygen levels rose in the sea and the atmosphere, multicellular beings began to appear.

What about viruses, I hear you ask?

Viruses do not fit into any of the five kingdoms of living things. They are composed of nucleic acid enveloped within a protein coat and their only function is to reproduce themselves within the cell(s) of a living thing. There is debate as to whether or not viruses are living things. Feel free to read up on it.

The evolutionary history of viruses represents a fascinating, albeit murky, topic for virologists and cell biologists. Because of the great diversity among viruses, biologists have struggled with how to classify these entities and how to relate them to the conventional tree of life.

Where Did Viruses Come From? There is much debate among virologists about this question. Three main hypotheses have been articulated: 1. The progressive, or escape, hypothesis states that viruses arose from genetic elements that gained the ability to move between cells; 2. the regressive, or reduction, hypothesis asserts that viruses are remnants of cellular organisms; and 3. the virus-first hypothesis states that viruses predate or coevolved with their current cellular hosts.

Good news! I have now covered all the time back to the origin of the universe and this will probably be the last time you will need to be annoyed by similar discussions.

Right, is this really the end? How about some horticultural music recommendations.

Tom Jones - Green Green Grass of Home https://www.youtube.com/watch?v=vM_7msjCtYw

Cold Chisel - Flame Trees <https://www.youtube.com/watch?v=K8KgP2aOXcA>

The Cranberries - Dreams <https://www.youtube.com/watch?v=Yam5uK6e-bQ>

LeAnn Rimes Performs "The Rose" with The Gay Men's Chorus of Los Angeles
<https://www.youtube.com/watch?v=CaROI1j-xBY>

Tommy Roe - Sweet Pea
<https://www.youtube.com/watch?v=zGClj1iKa2k>

Nat King Cole - Autumn Leaves
<https://www.youtube.com/watch?v=aCi59-y6dNg>

Tiny Tim - Tip Toe Thru' the Tulips with Me
<https://www.youtube.com/watch?v=WO2duw0eCwE>

Harry Belafonte - Banana Boat (Day-O)
<https://www.youtube.com/watch?v=DYYkJOkwNss>

Here are a couple of chrysanthemum specific videos that I have suggested previously but you have almost certainly not listened to.

Janusz Poplawski - Stare polskie tango: 'Złociste chryzantemy'
<https://www.youtube.com/watch?v=djJGEWeeNUo>

Scott Joplin - The Chrysanthemum
<https://www.youtube.com/watch?v=VCAGqAVJB0M>



Contacts

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Newsletter Editor – Carl Slusarczyk 9272 1356 (H) carl.lina.slu@gmail.com

Forthcoming Meetings & Events - It's all happening!

Social Day 1:30 pm Sunday 12th March 2023 6 Regent St West, Mt Lawley Sunday.

General Meeting Noon, Tuesday 11 April 2023 (day after Easter Monday holiday) John McGrath Pavilion, 97 Hensman Street, South Perth.

Social Day 1:30 pm Sunday 23rd April 2023 136 Merrivale Road, Pickering Brook

Annual Flower Show Thursday 11th to Saturday 13th May 2023 Hawaiian Forrestfield Shopping Centre

Awards Luncheon 11:30 - 3:00 pm Tuesday 23rd May 2023 John McGrath Pavilion, 97 Hensman Street, South Perth.

WAHC Garden Clubs' & Societies' Plant Fair 9th & 10th September 2023 South Perth Community Centre

AGM & General Meeting Noon, Tuesday 12th September John McGrath Pavilion, 97 Hensman Street, South Perth.

Distribution Day 1:30 pm Sunday 29th October 2023 John McGrath Pavilion, 97 Hensman Street, South Perth.

General Meeting Noon, Tuesday 14 November 2023 John McGrath Pavilion, 97 Hensman Street, South Perth.

Facebook Page

<https://www.facebook.com/groups/chrysanthemumwa/>

Website

www.chrysanthemumwa.com

Mentors

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Carl Slusarczyk – Mount Lawley 0480 188 875
Richard Williams – Inglewood 0439 103 500

You must have some admiration for people who try their level best and still fail. Even more so if they are brave enough to own up to it. Here is a YouTube video from Lotus Garden who now, thanks to the miracle of the internet, is a “legend”.

Try growing chrysanthemums from leaves and results <https://www.youtube.com/watch?v=5Hx6oc>

