The evolution of plants: a major problem for Darwinism

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A major problem for Neo-Darwinism is the complete lack of evidence for plant evolution in the fossil record. As a whole, the fossil evidence of prehistoric plants is actually very good, yet no convincing transitional forms have been discovered in the abundant plant fossil record. This fact has been recognized by both creationists and evolutionists as providing strong evidence for abrupt appearance theory. If macroevolution were true, some evidence of plant evolution should exist in the abundant plant fossil record. Instead, what is found are many examples of modern plants, variations of modern plants, or extinct plants that require still more transitional forms.

The lack of support in the fossil record for plant evolution has long been a concern of evolutionists.[1] Furthermore, this fact has long been recognized by creationists.[2–15] Even Charles Darwin acknowledged that the apparent sudden appearance of plants in the fossil record was a major problem for his theory.[16–18] And the problem remains today, so much so that in texts dealing with plant evolution, the topic of fossil non-support is conspicuous by its absence.[19] Many reference texts and leading authors on evolution ignore the issue entirely (e.g. Ridley[20]). At best, writers discussed hypothetical scenarios for which they usually admitted a lack of evidence.

Today, an estimated 375,000 species of living plants are known to exist. For years plants were divided into Thallophyta, primarily sea plants (plus mosses and ferns); and land-dwelling plants called spermatophytes. The former was considered 'primitive', and the latter 'advanced'.[21] The Thallophyta included all non-seed-producing plants, while the Spermatophyta included all seed-producing plants (*sperma* = seed, *phyta* = plant). Recent research has stirred many to abandon this long held Darwinistic scheme. Most seed-producing plants are also flowering plants. Spermatophytes are divided into gymnosperms (naked seed plants such as evergreens that use pine cones as seeds) and angiosperms (*angion* = vessel)—plants whose seeds are enclosed in a vessel called the ovary, into which pollen must penetrate in order to fertilize the seed.[22]

Angiosperms, in turn, are divided into monocotyledons (plants with seeds that have one cotyledon such as grains, grasses, and certain flowers, including orchids and lilies), and dicotyledons (plants with seeds with two cotyledons, which includes most angiosperms). Went concludes that botanists have used a seemingly insignificant character—viz., the number of seedling leaves (cotyledons)—to classify the estimated 250,000 types of flowering plants. Categorizing the 300 different groups of flowering plants into families is enormously difficult because the

> '… individual species are so numerous that they have never yet been listed in any one book, or even in one series of books. Such a listing would have to describe about a quarter million known plants; to compile it, all the taxonomic botanists in the world would have to work together for years and years, and the finished product would have perhaps half a million pages, enough to cover a whole wall in a library.'[23]

The basic groups for which Darwinists must demonstrate the existence of transitional forms include:[24]

Kingdom Protoctista
- Subkingdom: Phycobionta - Algae
- Division: Chrysophyta - Golden-brown Algae
- Division: Pyrrophyta - Dinoflagellates
- Division: Euglenophyta - Euglenoids
- Division: Chlorophyta - Green Algae
- Division: Phaeophyta - Brown Algae
- Division: Rhodophyta - Red Algae

Kingdom Fungi and Lichens
- Division: Zygomycota - Coenocytic True Fungi
- Division: Eumycota - Noncoenocytic True Fungi
  - Class: Basidomycetes - Club Fungi
  - Class: Deuteromycetes - Imperfect Fungi

Plant Kingdom
- Division: Hepaticophyta - Liverworts
- Division: Anthocerotophyta - Hornworts
- Division: Bryophyta - Mosses
- Division: Psilotophyta - Whisk Ferns
- Division: Lycophyta - Club Mosses and Quillworts
- Division: Sphenophyta - Horsetails and Scouring Rushes
- Division: Pterophyta - Ferns
- Division: Pinophyta
  - Class: Pinatae - The Conifers
- Division: Magnoliophyta - Flowering Plants
- Division: Monocots
  - Class: Poaceae - Grasses
  - Class: Liliaceae - Lily Family
  - Class: Orchidaceae - Orchid Family
- Division: Dicots
  - Class: Ranunculaceae - Buttercup Family
  - Class: Lauraceae - Laurel Family
  - Class: Papaveraceae - Poppy Family

Class: Brassicaceae - Mustard Family
Class: Rosaceae - Rose Family
Class: Fabaceae - Legume Family
Class: Euphorbiaceae - Spurge Family
Class: Cactaceae - Cactus Family
Class: Lamiaceae - Mint Family
Class: Solanaceae - Nightshade Family
Class: Apiaceae - Carrot Family
Class: Cucurbitaceae - Pumpkin Family
Class: Asteraceae - Sunflower Family

The evidence for plant evolution

What is the evidence that plants evolved from some simple one celled organism? Harold C. Bold and his co-authors at the University of Texas concluded that

> ' … after carefully weighing the currently available evidence of comparative morphology, cytology, biochemistry, and fossil record, are *at present* unwilling to amalgamate any two or more of the 19 divisions in which they have tentatively classified the organisms of the plant kingdom. When and if additional relevant data become available, such amalgamations will undoubtedly be required, but at this time *there are no known living or fossil forms that unequivocally link any two of the proposed divisions*' [emphasis added].[25]

Evidence for the origin of *almost all plant divisions and classes* listed above is totally lacking, and little evidence exists as to the origin of *any* land plants, in spite of an enormously large plant fossil record. Most reference books on fossils include hundreds of excellent plant fossil examples (see, for example, Pinna[26]), yet the fossil record reveals no clear evidence for evolution. We have so many fossils that we can conclude confidently that plants have changed little 'over millions of years' and that

> ' … the rootless, seedless plants ... offer fascinating clues to the structure and nature of ancient and extinct forms. The leafless whisk fern is a direct descendant of some of the first plants to develop woody supporting tissue and an internal plumbing system. The liverwort, whose ancestors lived at the same time as those of the whisk fern, failed to evolve such tissue, and as a result never grows more than an inch or two tall.'[27]

Given about 375,000 kinds of plants, and an average of 'only' 1,000 transitional forms for each one (most likely many more would be necessary), then *375 million* transitional forms would be required. *Not one clear example has ever been found in the abundant plant fossil record.* And yet, the 'only direct evidence' of evolution is 'provided by the fossil record'.[28] The important survey of the entire fossil record by Donovan and Paul ignored plants, except to note that phosphatized soft tissues have been found in plants[29] and that fossil plants are favored by reducing-atmosphere environments once commonly postulated to exist on the early Earth.[30] The history of plant life is dominated at all levels by the

> ' … stability of many species over millions of years. Some blue-green algae appear to be the same as those that lived over a billion years ago; there are species of horsetails apparently identical to plants living in the great coal swamps of the Carboniferous some 130 million years ago; and the beautiful, broad-leaved gymnosperm, the ginkgo, has remained unchanged since the Cretaceous. In the case of these old species, it appears that the particular environments to which they are adapted have shrunk in extent and area through time, while the organisms have continuously remained in a stable equilibrium with their environments.'[31]

Because of this lack of evidence, most texts ignore the problems of plant evolution or try to rationalize them. One argument is to conclude that evidence for evolution is not found in the fossil record because most plants were so well adapted that little change was required. For example, Went noted:

> 'The earliest seed plants that have survived to the present day are conifers, the members of the pine and spruce family. They are so well adapted to life on earth that in the 300 million years of their existence, there has been relatively little evolutionary change in them. They are among the most successful plants in the world. Pine, spruce and fir populate about a third of all existing forest areas. Where the living is difficult for other plants ... conifers are usually the last outpost trees. Among the living higher plants, the one with the oldest fossil record, the maidenhair tree, or *Ginkgo*, is related to the conifers.'[32]

The botany text now used at the college where I teach includes only a general chapter on evolution, which almost totally ignores plant evolution, as does the remainder of the book. Often it is only speculation that is presented in the sections on plant evolution, such as the statement that

> ' … progymnosperms and Paleozoic ferns *may have* evolved from the more ancient trimerophytes … *another possibility* is that ferns evolved from the progymnosperms … *nor is it certain* from which group(s) of progymnosperms the gymnosperms evolved' [emphasis mine].[33]

The plant phyletic tree

Evolutionists have found it more difficult to develop plant phyletic trees (compared to animal phyletic trees) for several reasons. In the past decade alone, at least 15 phyletic trees of flowering plant lineages have been published.[34] One of the problems includes the difficulty of developing a natural classification scheme which arranges:

> ' … plants according to degrees of primitiveness or advancedness … [requires] determining those features that are primitive or advanced. As

we shall see, it is not easy to decide, and in many cases, because evidence is totally lacking, it is impossible to decide. One then has the alternative of either being content with an incomplete system or deciding arbitrarily about the importance of certain characters. Virtually no one is content with an incomplete system; thus arbitrary decisions are inevitably made. As soon as an arbitrary decision enters into a classification scheme, the system becomes to that degree artificial.'[35]

As is apparent in the following quote, evolutionists are forced to use the existing fossil record, along with known plants, to speculate on what might have evolved from what.

'It is now generally agreed that the angiosperms evolved from some primitive gymnosperm, probably a shrub. No likely candidates are known from the Cretaceous period, but there are a number of gymnosperms represented earlier in the Mesozoic and Paleozoic eras that display certain combinations of angiosperm-like traits. This in itself suggests an earlier origin for the angiosperms than can be documented from the fossil record.'[36]

Photo by Ian Buchanan

The Wollemi Pine was discovered in 1994 near Sydney, Australia. The Wollemi Pine is just one of many 'living fossils' which were thought to have become extinct 'millions of years ago', yet are discovered alive today, essentially unchanged despite all that 'evolutionary time'.

The evidence for the evolution of plants

The fossil record shows stasis and extinction, while evidence for evolution of *all* of the major plant groups is totally lacking. Cronquist concluded that 'the origin of angiosperms was an abominable mystery to Charles Darwin, and it remains scarcely less so to modern students of evolution'.[37] This problem prompted Briggs and Walters to conclude that the fossil evidence for evolution is more in harmony with the Biblical account of Creation and shows primarily variation within kinds, a change called 'microevolution'.[38]

'Since 1859 … with the publication of *On the Origin of Species*, all such studies have been made in the light of Darwin's profound generalisation of evolution by natural selection. Even though this theory has not always been accepted, it has had a tremendous impact on all fields of biology. Nowadays, the fact of evolution is taken for granted, in part because of the wealth of evidence assembled by Darwin and other scientists. There is often at the same time an uncritical acceptance of the theory—a tendency to say "it must be true, for it is in all the books". Implicit in Darwin's ideas is the assumption that evolution is still taking place. Thus in this book we shall not only look at the problems of species and patterns of variation but also the evidence for evolution, particularly experimental evidence for evolution on a small scale, often called "microevolution".'[39]

Jensen and Salisbury admit that they believe evolution is true; thus, there *must* have existed some

' … common ancestry for present-day plants. Yet the record has been written on the winds of millions of years, and only the survivors and a few buried, incomplete, transformed remains are left to outline the great epic of plant evolution. Into the gaps man can throw only his imagination and ingenuity.'[40]

Not only does a lack of evidence for plant evolution exist, but it is difficult to even construct mental pictures of how it *could* have occurred. This is why Duddington concluded that the 'carnivorous plants are a remarkable … group that defeats the imagination when one speculates on how they have evolved'.[41] Botanists have speculated that plant evolution must have occurred in seven major steps, which may be summarized as follows:

- Archaic bacteria evolved during the Precambrian and were the first organized living things to have appeared more than 2 billion years ago.
- 'Uralgae' are Precambrian plants that supposedly were the first oxygen-producing plants. They are assumed to have evolved about 2 billion years ago.
- Chlorophyta were Cambrian plants that are alleged to have evolved 600 million years ago as the first organized chloroplasts.
- Psilophyta were the first true stemmed plants that allegedly evolved 420 million years ago during the Silurian.
- Filicophyta were the first plants with true leaves that supposedly evolved during the Devonian, 390 million years ago.
- Gymnospermae are said to have evolved during the Carboniferous era, 345 million years ago, and were the first true seed plants.
- Angiospermae allegedly evolved during the Cretaceous, 135 million years ago, and were the first true flowering plants.

Because no evidence exists in the fossil record to bridge any of these seven steps, Darwinists acknowledge that

> ' … no one is able to say with certainty how the seven groups are related to each other. But paleobotanists assume that as a group branched out it produced at least one offshoot with enough genetic plasticity to make the next great advance. While a new group was forming, the old group continued to evolve, gradually losing its potential for major evolutionary change as its various members became increasingly specialized.'[42]

Often the assumption is made that the problem in tracing plant evolution is the fact that the fossil record is 'too fragmentary' or inadequate to show evidence of evolution—a claim often repeated by evolutionists and creationists alike (for example, see Futuyma[28]). A more accurate assessment of the situation is that the fossil record is abundant, but shows clear evidence for stasis rather than for algae-to-angiosperm evolution. Additional fossil finds only show more examples of known types of either modern or ancient life or, occasionally, new examples of ancient life that (for evolution to be true) require even more transitional fossil forms.

The fossil record

Plant fossils are found in sedimentary rock. (Sedimentary rock is formed by the accumulation and cementation of eroded mineral grains (sand, mud or clay) transported by wind, water or ice and deposited under water. Pressure, heat and time eventually solidify the deposits, forming hardened rock.) Plant remains that were buried in sediments can become fossilized as the deposited material is cemented into rock. Excellent sources of plant fossils include coal, beds of clay, and unconsolidated volcanic ash. Since the plant remains (usually consisting of leaves or leaf parts, portions of stems, spores, seeds or cones) were apparently transported from where the plants grew to the site of deposition, often only fragmentary fossils are found. It is rare indeed to find plant parts as they existed when they were alive.

Plant fossils are classified into four basic types: compressions, casts, moulds, and petrifactions. A compression is formed by the imprint of a leaf or plant part upon a soft surface such as mud, fine sand, or clay. The material bearing the imprint is slowly compacted, cemented, and transformed into rock. The plant material may be entirely decayed, or some of it may remain in the form of a thin, compressed film of carbon that occasionally may reveal some of the structure of the original plant. Embedded plant parts (such as stems) that later decay produce a cavity or mould in the rock which retains the shape and size of the entombed plant part. A cast results when the mould is filled with minerals deposited by ground water.

The most important type of plant fossil used for research in plant evolution is petrifaction, in which plant tissues (especially wood, roots and reproductive organs) are embedded in an inorganic matrix such as petrified wood, silica, iron, hydroxides or calcium carbonate. Thin sections can be prepared for microscopic study, and sometimes can reveal

> ' … almost as many details of internal structure as similar preparations made from living plants—even, in some examples, including nuclei and chloroplasts. It was long believed that the original plant material in a petrifaction was replaced, molecule by molecule, by mineral substances such as silica, the replacement being so gradual that the mineral skeleton preserved was the exact replica of the original tissue. Modern investigations show, however, that the original carbon compounds, or their modified remnants, of the cell walls of a petrifaction are still present, although such compounds have usually undergone chemical alteration.'[43]

The structures of thousands of extinct plant types are known only from their fossils. The fact that the fossil record of past plant life does *not* show any evidence of evolution is explained away by evolutionists by the claim that the record is 'incomplete', meaning the fossils that prove Darwinism in fact exist, but we 'just have not found them yet'. Millions of plant fossils have been discovered, and they tell a story of consistent stasis, not change. There is no reason to believe that the discovery of more fossils will significantly alter this finding. Each new finding only adds another example to the list of known plant types, or of an unknown type that often requires even *more* transitional forms to bridge them to the hypothetical evolutionary tree.

The lack of fossils is not the problem for evolutionists, but rather the problem is *a lack of evidence for evolution in the abundant record* that now exists. The fossil evidence

for ancient land plants was described almost a half-century ago as 'abundant', beginning with the early Paleozoic:

> 'The plant life of the Cambrian, Ordovician, and Silurian was almost entirely aquatic and consisted of algae descended from the simpler forms of the Pre-Cambrian. These algae were numerous and included many kinds which resembled living calcareous green and red algae, together with brown algae … it is not until Devonian fossils are studied that we approach an understanding of the nature of the early plant pioneers of the land.'[44]

Since many more plant fossils have been discovered since 1954, the fossil record now could be described as 'rich' and 'very abundant'.[45] Much speculation exists about possible plant evolutionary histories because, as is obvious in the following quote, no empirical evidence for plant evolution is found in the abundant fossil record:

> 'The immediate progenitors of land plants were *probably* green algae. It may be *assumed* that the red and brown algae, before there was vegetation upon the land, had become about as specialized as they are today. … *We have no means of knowing* whether this transition occurred once or many times or whether it came about from fresh or salt water. *If we can reason from present-day conditions*, tidal beaches, and pools formed as the land gradually arose from the sea, were among the significant areas involved in the migration of plants to the land. In such habitats the plants which developed structures permitting survival in a dry environment became the first plants of the land. Many radical changes were necessary before these new land plants could prosper. Among such alterations were the development of a cuticle and epidermis which resist desiccation, stomates, specialized absorptive organs, and spores which could be dispersed by air.'[46]

Howe, a creationist, summarized the fossil record as follows:

> 'Do fossils show links of plant "evolution"? Fossils of large and small groups are recorded in the earth as if they were not related to each other or to any other living forms. One need look no further than the evolutionary writings to prove the reality of numerous gaps in the world of fossil plants … .'[47]

Heribert-Nilsson noted in his extensive study of plant fossils that fossil evidence is lacking to support the evolution of *any* plant group. He even concluded that the fossil record concisely indicates that plants did not evolve but 'flared up' in a non-evolutionary manner. The hope that more discoveries will help fill in the putative record of plant evolution has not been realized—a fact recognized as long as a half-century ago:

> 'It has long been hoped that extinct plants will ultimately reveal some of the stages through which existing groups have passed during the course of their [evolutionary] development, but it must be freely admitted that this aspiration has been fulfilled [only] to a very slight extent, even though paleobotanical research has been in progress for more than one hundred years. As yet *we have not been able to trace the phylogenetic history of a single group of modern plants from its beginning to the present*' [emphasis mine].[48]

The past half-century of research has confirmed the following observation: evidence for plant evolution is not found in the fossil record because plant evolution never occurred, not because of the limited conditions that cause fossilization. Researchers have attempted to construct angiosperm phylogenies based on pollen, leaves and wood samples, a difficult task because none of these structures are definitive characters of angiosperms.[49]

Evidence for the evolution of bryophytes

No fossil evidence exists for the evolution of any of the bryophytes, including the mosses, hornworts or liverworts. Consequently, theories of bryophytic phylogeny are based on comparing the morphology of living plants.[50] Hutchins notes that bryophytes have been around since ancient times and have changed little since then.[51] In Hutchins' words, bryophytes became stuck 'in an evolutionary rut and remained there'.[52] In a review of the literature, Beck notes that bryophytes appear very early in the fossil record and have not changed since they first appeared.[53]

Little agreement exists even on the general path of evolution leading up to the appearance of the bryophytes. Some believe that they formed a link between water-living plants, while others argue that because the 'fossil record is not illuminating regarding the relationship and evolutionary sequence' the evidence indicates they developed by 'de-evolution' from a vascular plant such as Rhyniophyta.[54] Yet other researchers conclude that they evolved from algae and land ferns, with some arguing that it is more likely that bryophytes evolved directly from algae.[55] Still others believe their origin was either from a monobiontic haploid or dibiontic green-algae ancestor.[56] The reason for the enormous amount of disagreement is that all of these views are based on speculation rather than empirical fossil evidence.

All bryophytes lack a water-conducting system, and for this reason they are speculated to have 'bridged' water and land plants in evolution. The problem with this explanation is that bryophytes (including mosses and liverworts) are small and grow in moist places. Consequently, they do not need an extensive fluid-conducting system such as the xylem and phloem vascular systems in larger plants. No evidence of evolving vascular systems has been found; only systems designed to meet the individual plant needs have been elucidated.

Since modern bryophytes are classified as 'primitive plants' and are found very early in the fossil record, the question of *what* they evolved into is also a major concern. On this point, Nadakavukaren and McCracken conclude

Photo by Edmond Holroyd

The Pinyon Pine (pictured) has a 'mutualistic association' with the Pinyon Jay (a species of bird). The Pinyon Jay harvests the seeds of the pine and stores them temporarily in an expandable pouch. This pouch can hold up to 56 seeds. The birds eat what they immediately need to survive, and then 'plant' the rest in the soil for future needs. Some of these seeds are either forgotten or not needed by the Pinyon Jay and therefore survive to become the next generation of Pinyon trees.

that bryophytes

> ' … appear to represent an evolutionary dead end although the adaptations that developed in this group were sufficiently successful that the bryophytes have survived to this day. For some reason, however, mutations that would have led to the development of more efficient conducting tissue, roots, and cuticle did not appear in the genetic information of the bryophytes, thus limiting them in size and distribution. Modern and fossil species are very similar, indicating lack of change within the group. In fact, the habitat of the group has not really changed from that of the ancestral bryophyte … .'[57]

Delevoryas concludes that green algae may be the ancestor of bryophytes, but cites no evidence except biochemical similarities of the plant life samples that he has examined.[58]

Although mosses lack the highly organized xylem and phloem of the vascular plants, they possess stomate pores regulated by guard cells located in the epidermis. The fact that they posses this 'aerating' system which is very similar to guard cells in the 'higher plants' is one of many examples that supports ReMine's thesis that an intelligent designer was sending a 'Biotic Message' to highlight His handiwork.[59]

The evolution of vascular plants

A critical step in evolution is the one from simple water plants to complex land plants. Delevoryas acknowledged that the problems involved in the evolution of water plants into land plants are enormous, and that we have few clues as to how this could have occurred. Gensel and Andrews conclude that 'land plants did not evolve for at least 1.5 billion years after the appearance of the first recognizable algae' and that 'it seems clear that this transition was an extremely difficult one'.[60] Furthermore, the problems needed to be overcome were of 'no small magnitude.' The lack of evidence for the evolution of land plants is reflected in the highly speculative statements commonly made by investigators.

> 'Based on similarities of many aspects of life history and on biochemistry, however, certain green algae in the charophycean line seem to be the most likely ancestors of land plants. Some researchers suggest that charophyceans with a predominantly haploid life cycle constitute the probable antecedents, while others favor extinct, predominantly diploid terrestrial forms.'[61]

A perusal of botany textbooks indicates that botanists are more candid about the shortcomings of evolution than zoologists and scientists in other branches of biology. One text even admitted that among the numerous problems that exist in botany, a major lack of evidence for plant evolution is the most serious. The authors also noted that modern evolutionary theory holds that the

> ' … ultimate origin of variability upon which natural selection acts is genetic mutation. Even here, however, we may be faced with problems. Now that we understand the order of complexity of genes and enzymes, we cannot be absolutely certain that random mutations of genes occurring for about four billion years can account for all the complexity observable in organisms.'[62]

Fossil evidence for the evolution of vascular land plants (plants with distinctive water-conducting tissues, in contrast to nonvascular plants such as the bryophytes discussed above) is also lacking, as is any possible explanation for such evolution:

> 'We still lack any precise information concerning the presumed aquatic ancestors from which land

plants evolved, and the search for evidence of these precursors and of probable transitional stages continues. … Further fossil evidence is needed to test these ideas and to determine whether the transition was sudden or gradual.'[61]

Evidence for the evolution of flowering plants

The origin of flowering plants is one of 'evolutionary biology's most enduring puzzles'.[63] Scott long ago aptly described the origin of flowering plant groups by asserting: 'We know nothing whatever of the origin of Angiospermous families … .'[64] And the 'apparently sudden appearance of quite well-developed Flowering Plants is still, perhaps, the greatest difficulty in the record of evolution'.[65] The origin of flowering plants still bedevils biologists today,[66] as does the evolution of all plants.[67,68] Roth concludes that the

' … flowering plants appear suddenly, fully formed and in abundance in the fossil record. Darwin called the origin of flowering plants "an abominable mystery". More than a century later some of the leading paleontologists (Axelrod, Bold, Knoll, and Rothwell) still call the problem "abominable".'[69]

Axelrod added that the evolution of flowering plants presented Darwin with a major set of problems.

'Although great progress has been made … during the past century, the data in hand even now provide only partial answers to most of the problems considered by Darwin. In particular, these included the "abominable mystery" surrounding their early evolution, notably their center of origin, their ancestry, and their "sudden appearance" in the Middle Cretaceous as a fully evolved, wholly modern phylum … . The ancestral group that gave rise to angiosperms has not yet been identified in the fossil record, and no living angiosperm points to such an ancestral alliance. In addition, the record has shed almost no light on relations between taxa at ordinal and family level.'[70]

The most recent report, by NASA Science (17 April 2001, p. 1),[71] concluded that 'how and when flowering plants appeared on Earth remains a mystery, a question that has gone unanswered by evolutionary scientists for more than a century'. Evidence does indicate that they go back farther in the fossil record than evolutionists previously suspected.[71,72]

Plants were created on Day 3, a day before the Sun and the Moon, and two days before the flying creatures on Day 5. This is in direct contrast to the day-age theory that proposes that the days in Genesis represent millions of years. If this was the case, then how were the plants that rely on nectar-eating bats, hummingbirds etc. for pollination able to reproduce and survive for millions of years?

General problems in plant evolution

A major problem in plant evolution theory is that many biochemical and morphological differences contradict even the most plausible evolutionary tree. An example is the Hatch and Slack photosynthesis pathway (which eventually produces free 6-carbon sugars) that is found in

'several species of tropical grasses as well as in sugar cane. It occurs in corn (which was originally a tropical grass) and in such unrelated species of dicots as amaranth (*Amaranthus*) and desert saltbush (*Atriplex*). *The fact that this unique metabolic pathway occurs in a number of unrelated species poses an interesting problem for the evolutionist*' [emphasis mine].[73]

This common finding in plants often is explained away by parallel or convergent evolution:

'Parallel evolution is often mentioned in relation to desert plants; that is, quite unrelated species may evolve to fill the various available niches in the desert, arriving at similar growth forms. According to the structure of the flowers, the cacti of North America and the *Euphorbia* of Africa are quite unrelated, although their succulent appearances are strikingly similar.'[74]

Parallel or convergent evolution, though, required twice as much evidence in the fossil record for the animals or plants under consideration to demonstrate. Another example of putative convergent evolution is the sieve tubes of *Nereocystis,* which are morphologically, chemically and physiologically

> ' … similar to those of vascular land plants. Since there is no indication that the brown algae gave rise to the land plants, we have here a remarkable example of convergent evolution.'[75]

Another problem in constructing plant evolution is that it is, as noted above, often difficult to even *imagine* feasible transitional forms. For example, Howe notes that evolutionists claim that palms, duckweeds and orchids are all related to some hypothetical common ancestor of all monocotyledonous plants. The many problems with this conclusion include the enormous differences between these plant types. For example, duckweed plants are tiny, herbaceous, and float upon the pond surface. They lack stem or distinct leaves, and their flowers are without sepals or petals.

Conversely, palms are generally large columnar trees that can approach 30 m in height. Palm flowers generally have a regular and symmetrical arrangement of three petals and three sepals. The sepals and petals join the stem below the insertion of the ovary (hypogynous flower parts). The orchid flower has very different flowers than the regular flowers of palms or the extremely simple ones of duckweed. Orchids have strikingly irregular flower parts with one of the petals frequently forming a cup-like structure, and are epigynous (flower parts appear to arise from the top of the ovary). Howe concludes that 'it is not easy to imagine that these three diverse plant kinds have descended from a common ancestor … such a proposition stretches one's scientific imagination to the breaking point'![76]

The evidence that contradicts Darwinism has forced reliance on the 'convergent evolution' theory in order to explain the lack of fossil record. As noted, though, this theory actually requires *more* transitional forms, and *more* fossils, and thus, rather than solving the problem, actually highlights the lack of a fossil record. An example is the gnetales, which are of research interest primarily because their xylem contains both vessels and tracheids—a prominent angiosperm characteristic.

> 'Some of their reproductive features also approach those of the angiosperms. For these reasons some morphologists have argued that the gnetales formed the ancestral stock from which the angiosperms evolved. The general consensus now is that this is unlikely and that the advanced features are simply a case of convergent evolution with the angiosperms. In any case, the three genera are so different from each other that some authors have suggested each should constitute its own division, as does ginkgo.'[77]

Among the many problems in interpreting the plant fossil record is the fact that varied 'modern' and 'ancient' types of vascular plants have been found mixed together in early Paleozoic sediments. This finding does not fit the views prevalent among contemporary evolutionists, and to deal with the problem within an evolutionary framework it is usually assumed that the rock samples were somehow contaminated by younger sediments.[78] Another problem in understanding the plant fossil record has to do with the fact that much caution is required in the interpretation of ecological facies of sedimentary rocks. Leclercq gives the following example:

> 'On the basis of a megaflora, ecological associations may erroneously be considered as evolutionary stages. For instance the *Rhyniaceae*, upon which most of our information about the structure of the lower Devonian plants is based, owe the simplicity of their structure *in part* to the peculiar environment to which they are adapted. Though primitive in features, they probably represent relic forms in a plant world composed of varied and *more highly organized forms whose complexity we only are beginning to foresee*' [emphasis in last sentence mine].[79]

Research on plant genes was hoped to collaborate the established plant evolutionary tree, but instead often contradicted it, requiring redrawing large sections of it.[80-82] Research on *Arabidopsis* and Hox genes has also created major problems for the Darwinist interpretation of plant origins.

Summary

The conclusion by Corner of the University of Cambridge department of Botany, made almost 40 years ago, is still the most accurate summary of the evidence for plant evolution:

> 'Much evidence can be adduced in favor of the theory of evolution—from biology, biogeography and paleontology, but I still think that, to the unprejudiced, the fossil record of plants is in favor of special creation. … The evolutionist must be prepared with an answer, but I think that most [attempts to answer] would break down before an inquisition.'[83]

The reason for such a statement has to do with the fact that the fossil record consistently shows

> ' … persistence of type with imperceptible change and, from time to time, the sudden influx of new types, correlative with favorable stable geological conditions, are among the outstanding features of the history of evolution as shown by paleontology.'[84]

The most recent attempt to create an evolutionary genealogy of the plant kingdom, said to be the result of 'five years of exhaustive research' has again rewritten the plant family tree. This research has in a major way 'challenged conventional scientific notions about the development and interrelationships of plant species'.[86] As a result of this

research the 'complete reclassification' of all existing botanical species is now considered warranted. The group also concluded that the plant Kingdom is not a single group as long believed, but rather is divided 'into four related but distinct divisions: green plants, brown plants, red plants, and fungi.' The researchers also concluded that 'fungi are more closely related to animals than to plants'.

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Erratum TJ 15(3)

Chronology for everybody by Ruth Beechick: in Table 1 on p. 67, the years given to Mahalaleel, Jared and Terah, should be 65, 162 and 130, respectively.

Erratum TJ 16(1)

The design of tears: an example of irreducible complexity by Jerry Bergman: on p. 86, the total thickness of tears, and that of the thin outer oil layer and the inner layer should be 3 μm, 0.2 μm and 0.5 μm, respectively.