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INTRODUCTION OF TRACHEOPHYTA

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ABSTRACT:

Tracheophyta, commonly known as tracheophytes, is the name given to the vascular plants, which constitute a monophyletic subclass of land plants. the main tracheophyte lineages (many groups excluded). Any plant, usually terrestrial, with fully established conducting tissue is referred to as a tracheophyte. The Greek words trakhys, which means "rough, unequal," gave rise to the terms trachea, which means "duct," and phyton, which means "plant."

KEYWORDS:

1. INTRODUCTION:

The circulatory system of tracheophytes is similar to that of humans in that it transports both water and mineral salts. It is composed of actual vessels, called trachea, which are aligned tubular cells at contact sites devoid of walls, and/or tracheids, which are aligned tubular cells at contact sites with walls and stippling. Parenchyma, sclerenchyma, and occasionally trachea and tracheids make up the xylem, or conducting tissue. Therefore, a tracheophyte and a vascular plant are the same. Both words have gradually replaced the term cormophyte, which defined the production of a corm (root, stem, and leaves). Tracheophytes are a complex category of vascular plants, numbering over 315,000 species. They are identified by the sporophyte's dominance and independence from the gametophyte, as well as by the presence of differentiated tissues with specialized functions for long-distance chemical transport and support. These characteristics, among others, allowed them to colonize numerous terrestrial environments. Because of this, tracheophytes quickly rose to the top of all land eco-systems, a position they still hold today. Molecular phylogenies distinguish three major clades of vascular plants: lycopodiophytes, ferns, and spermatophytes (seed plants). This evolutionary schema has fundamentally changed the conventional hypotheses that combined ferns and lycopodiophytes under the general name "pteridophytes". Although most phylogenies place ferns as the sister group to seed plants in the clade known as euphyllophytes,

2. CHARACTERISTICS:

Vascular plants are characterized by three main traits by botanists:

1. Vascular tissues of plants allow resources to be distributed throughout the plant. Plants have two types of vascular tissue: phloem and xylem. Xylem and phloem are tightly related to one another and are usually found in close proximity to one another within plants. A vascular bundle is made up of one xylem and one phloem strand that are next to one another. Plants with vascular tissue have the ability to grow larger than non-vascular plants, which are limited to relatively small sizes because they do not have these specialized conducting tissues.
2. The main generation or phase in vascular plants is called the sporophyte, which is diploid (containing two sets of chromosomes per cell) and generates spores. (In contrast, the gametophyte- which generates gametes and contains one set of chromosomes per cell- is the main generation phase in non-vascular plants.). Predominance and independence of the sporophyte from the gametophyte.
3. Even if some kinds of vascular plants have secondary lost one or more of these characteristics, all vascular plants have real roots, leaves, and stems.
4. Production of cellular endodermis in the roots and some underground stems.

The Latin term "faciesdiploida xylem et phloem instructa" (diploid phase with xylem and phloem) defines two of these features, which Cavalier-Smith (1998) interpreted as a phylum or botanical division including the Tracheophyta.

The increased effectiveness of spore dispersal with more complex diploid structures is one potential explanation for the assumed shift from emphasis on haploid generation to emphasis on diploid generation. The spore stalk's evolution allowed for the creation of more spores as well as their ability to be released higher and farther. Such improvements could include more branching, the capacity to establish independent roots, greater photosynthetic area for the spore-bearing structure, and woody structure for support.

The taxonomic diversity of the many surviving tracheophyte groupings varies greatly. With roughly 1340 species distributed across six genera and three families, lycopodiophytes thus account for less than 1% of the diversity of vascular plants that exist today. The ferns, which comprise around 4% of tracheophytes and have about 12,400 species, are the next most diverse group. Finally, the most diverse group of vascular plants is made up of seed plants, or spermatophytes, which account for about 300,000 species and 95% of all tracheophytes. Not only do they exhibit a wide range of shapes, but they also exhibit significant genetic differentiation. With almost 300,000 species, angiosperms are by far the plant group that most contributes to the variety of spermatophytes (99%) and tracheophytes (95%). The gymnosperms consist of about 850 species, about 80 genera, and 15 families. However, this has not always been the case with regard to terrestrial plant variety. Paleobotanical evidence indicates that throughout the Mesozoic, gymnosperms—which are currently less common—dominated Earth's flora.Tracheophytes may be traced back to the Late Silurian (425–419 Mya), when the first fossils that were recognized as the progenitors of modern lycopodiophytes were discovered. As a result, this phylogenetic tracheophyte node is employed as a minimum age for calibrating molecular estimations of divergence periods on the vascular plants. The presence of structures that are unmistakably identified as tracheids makes the identification of these fossils credible. Even so, certain molecular clock estimations for this group point to a more prehistoric origin between 503 and 496 Mya in the Late Cambrian. In a similar vein, ferns had to split off early from the euphyllophytes lineage. Reconstructing accurate phylogenetic histories is hampered by the tracheophytes' ancient origin and the imbalance in the number of extant clades across the tree. This is because lineages that are weakly diversified today (lycopodiophytes, ferns, and gymnosperms) and lineages that were highly diversified in the past (lineages afflicted by a high rate of extinction) coexist with the other lineage (angiosperms), which exhibits a high rate of speciation. Living fossils offer an extreme example of a high rate of extinction. When experts refer to an organism that originated millions of years ago and has had minimal morphological change since then, they are referring to an animal or plant that is considered a living fossil.

It must be a phylogenetic relict—a member of a group that was once highly varied but today only consists of one or a few surviving lineages. Additionally, it ought to have inhabited a larger distribution, which is currently significantly smaller (geographic relict). Living fossils include Ginkgo biloba (see Figure 2) and Weltwitschia mirabilis (see Figure 1).

While there used to be several species in the genus Weltwitschia, there is currently only one extant example that is found in a small region of western Africa—the Namib deserts, south of Angola. Paleobotanists have compared Ginkgo biloba to fossils that date back 60 million years. It's reported that 3000 years ago, when the Chinese started planting ginkgo in their temple gardens, the plant was on the verge of extinction and they prevented it from happening.

FIGURE 1

FIGURE 2

Whatever the exact date assigned to the genesis of vascular plants, all available data seems to suggest that the two lineages clades that gave rise to the modern lycopodiophytes and euphyllophytes (ferns and spermatophytes) had to have broken apart rather quickly.

Several key clades names and phylogenetic definitions will be included in the companion volume, which will also show how the PhyloCode. Because some groups of species have well-supported phylogenies and experienced systematists who are willing to contribute to the phylogenetic nomenclature of their specialization groups. We expect that vertebrates and vascular plants will be among the best represented. Although it poses a barrier, poor resolution does not preclude the use of phylogenetic nomenclature. While deciding on names for plant clades with regardless of the incompleteness of our understanding of basal phylogeny or outgroup relationships, we will present tactics that can be generally applied to comparable circumstances in other groups.

3. TRACHEOPHYTA:

Sinnott 1935: 441 [P.D. Cantino& M.J. Donoghue], converted clade name. Comments on name. -Sinnott introduced the name, but the Latin diagnosis required by the ICBN was first provided by Cavalier-Smith (1998: 251).

Definition (branch-modified node-based): Definition (branch-modified node-based). — The most inclusive crown clade containing Zea mays L. (Spermatophyta) but not Phaeoceroslaevis (L.) Prosk. (Anthocerotophyta) or Marchantiapolymorpha L. (Marchantiophyta) or Polytrichum commune Hedw. (Bryophyta). Here, we employ a node-based definition changed by branches in order to guarantee a stable composition for Tracheophyta. The monophyly of mosses, liverworts, and hornworts is well supported by molecular data, and the sister group of Tracheophyta that now exists either belongs to one of these clades or to a clade that includes two or more of them.The definition presented here is more definite in terms of compositional stability than the traditional node-based definition, which would be simpler and have two internal specifiers for /Lycopodiophyta and /Euphyllophyta. We estimate the likelihood that the crown group of either mosses, liverworts or hornworts is paraphyletic because it gave rise to tracheophytes to be even lower than the likelihood that the lycophyte or euphyllophyte crown group is not monophyletic.

Pan-Lycopodiophyta and PanEuphyllophyta: walls of water-conducting cells with a thick, lignified, decay-resistant layer. Free-living sporophyte and multiple sporangia per sporophyte are synapomorphies relative to other crown clades; however, when fossils are considered, these traits are synapomorphiesat a more inclusive level (Pan-Tracheophyta). Sterome (a well-developed peripheral zone of the stem consisting of thick-walled, decay-resistant cells) and pitlets in the tracheid wall are listed by Kenrick& Crane (1997) as synapomorphies of "eutracheophytes" (= Tracheophyta), but the extent of missing data for fossils combined with the apparent loss of these traits in extant tracheophytes reduces confidence in their inferred originations.

Synonymy: "Eutracheophytes" is a clear synonym for "the tracheophyte crown group," according to Kenrick& Crane (1997). An approximate synonym is Cormatae Jeffrey (1982); all subordinate taxa listed are living.

Apo-Tracheophyta: P.D. Cantino& M.J. Donoghue, new clade name.

Definition (apomorphy-based): The most inclusive clade exhibiting tracheids (i.e., differentially thickened water conducting cells) synapomorphic with those in Pinussylvestris L.The clade Apo-Tracheophyta comprises Tracheophyta and RhyniopsidasensuKenrick& Crane (1997), assuming that tracheids with S-type and G-type cell walls (Kenrick& Crane, 1997) are identical. The current membership of Apo-Tracheophyta and Tracheophyta would be the same if the alternative hypothesis- that these traceid kinds evolved independently- were true. Rhyniopsida would not be a part of Apo-Tracheophyta as defined above.

Synonymy: TracheophytasensuKenrick& Crane (1997). Although Kenrick& Crane listed Tracheidatae Bremer (1985) as a synonym of their "Eutracheophytes," implying that that Tracheidatae referred to the crown group, it is clear from Bremer's comments that he considered rhyniopsids to be part of Tracheidatae; thus, based on composition, Tracheidatae is an approximate synonym of Apo-Tracheophyta. Pteridophyta of some earlier authors (Haupt, 1953) is a partial synonym; the pteridophytes originated from the same ancestor as Apo-Tracheophyta but are paraphyletic with respect to Apo-Spermatophyta.

Pan-Tracheophyta: P.D. Cantino& M.J. Donoghue, new clade name.

Definition: The total clade of Tracheophyta. All extinct plants that have a more recent common ancestor with Tracheophyta than with living mosses, liverworts, and hornworts, such as Aglaophyton and Horneophyton. Although Kenrick& Crane (1997) list several sporangia and an independent sporophyte as synapomorphies of Polysporangiomorpha (a slightly less inclusive clade than PanTracheophyta), only the latter would be considered a synapomorphy of Polysporangiomorpha if an apomorphy-based definition were to be applied based on the etymology of the name.It is unknown which trait came first to emerge. Kenrick& Crane (1997) also mention sunken archegonia as a potential synapomorphy of Polysporangiomorpha, but it's unclear if they evolved before or after numerous sporangia. Furthermore, if hornworts are the closest living relatives of tracheophytes, then sunken archegonia could be a synapomorphy of a more inclusive clade (Qiu et al., 2006b). Sunken archegonia also appear in Anthocerophyta.

4. CONCLUSION:

A vascular plant is any of the approximately 260,000 species of plants that have vascular systems, which includes the whole planet's recognizable plant life. The two primary components of plant vascular systems are phloem, which is primarily involved in the conduction of food substances like sugar, and xylem, which is primarily concerned with the conduction of water and dissolved minerals. The term "tracheid plant," or "tracheophyte," describes a type of water-conducting cell known as a tracheid, or tracheary element, which resembles spiral bands found in insect tracheae, or air tubes.

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