Anatomy of monocot stem pdf

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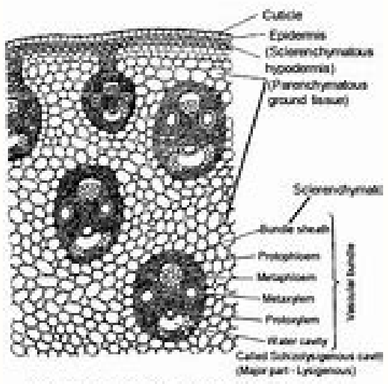
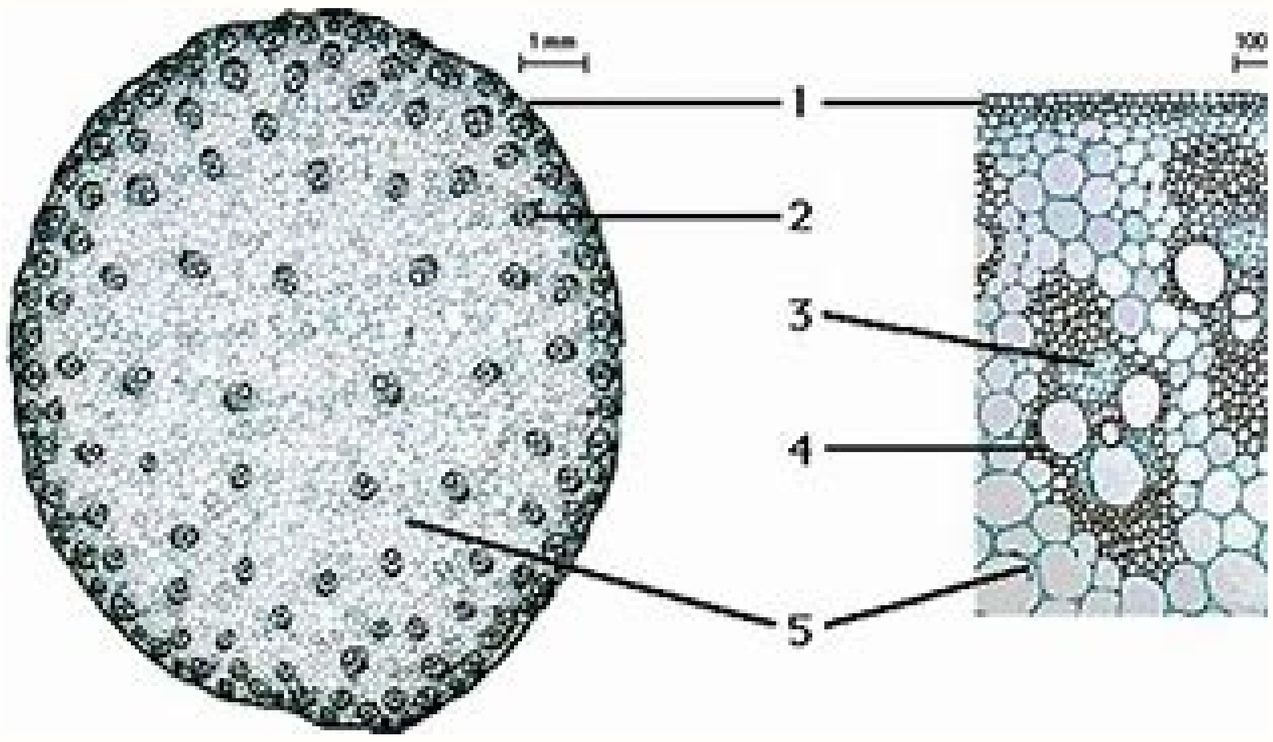
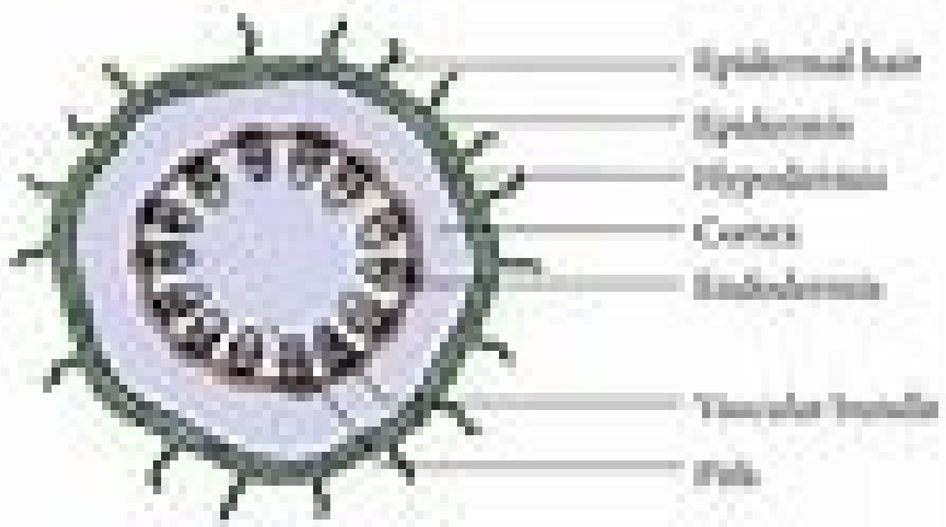


T.S. of monocot *Stem (A part of cellular diagram)*





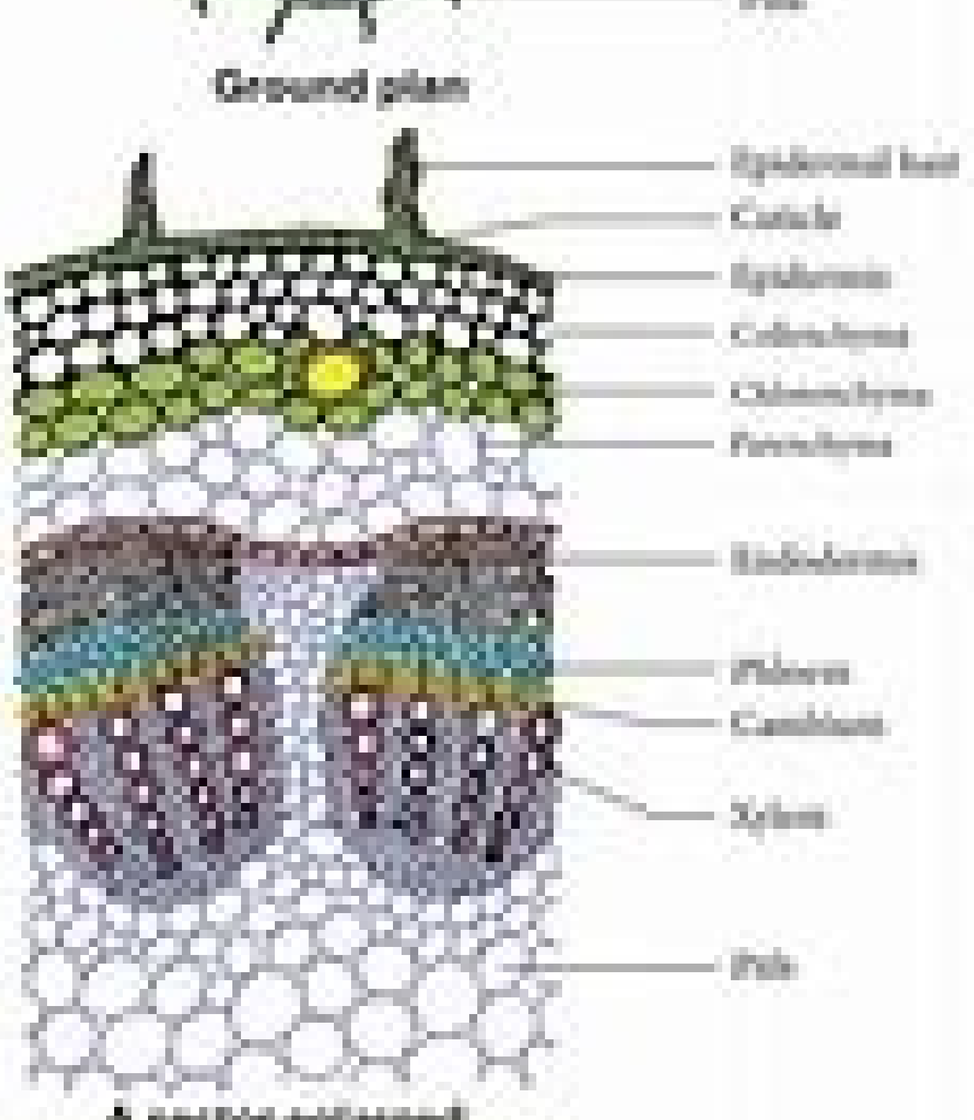
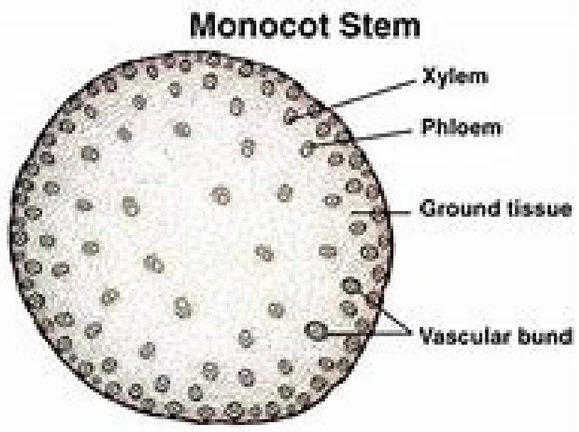
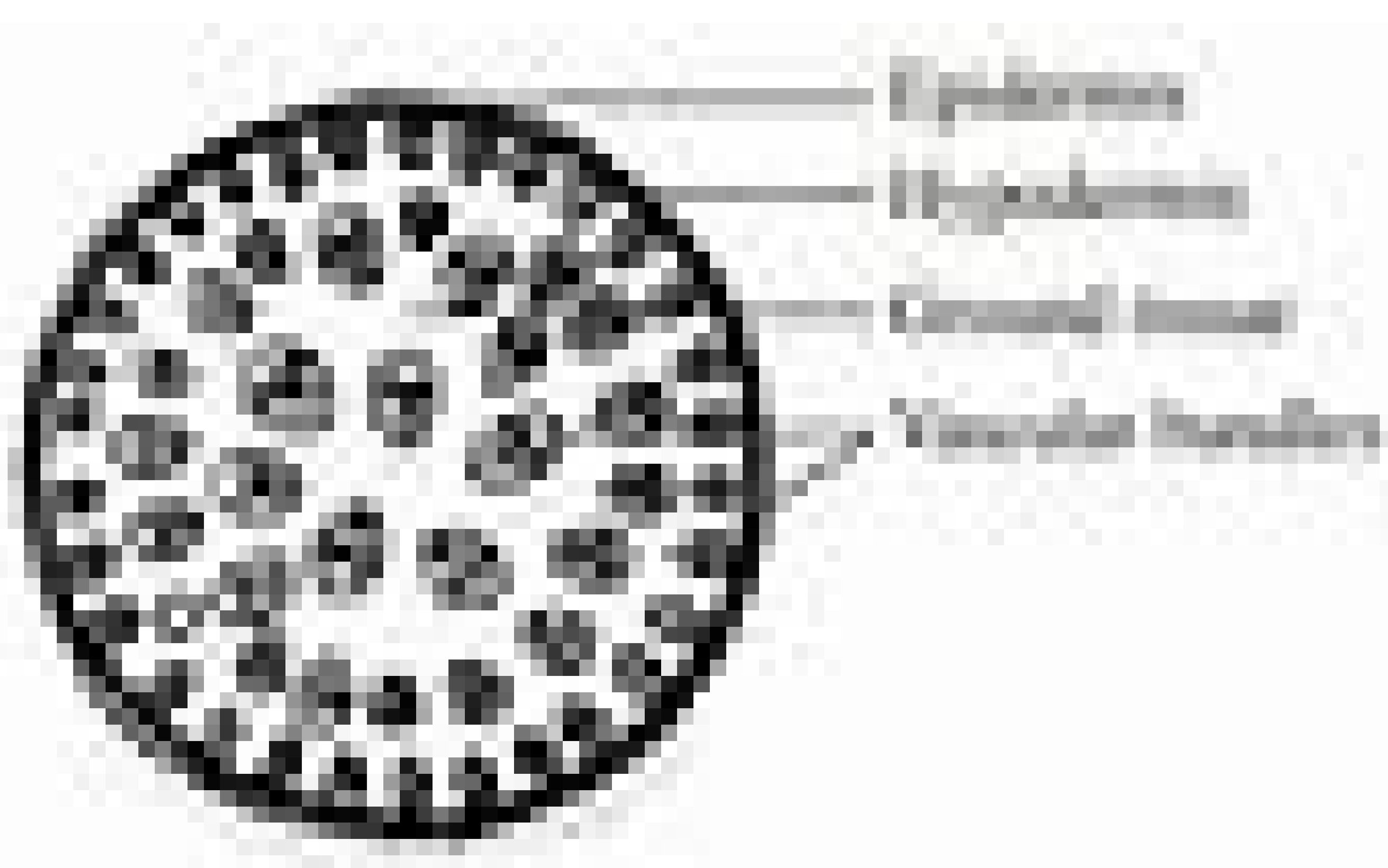
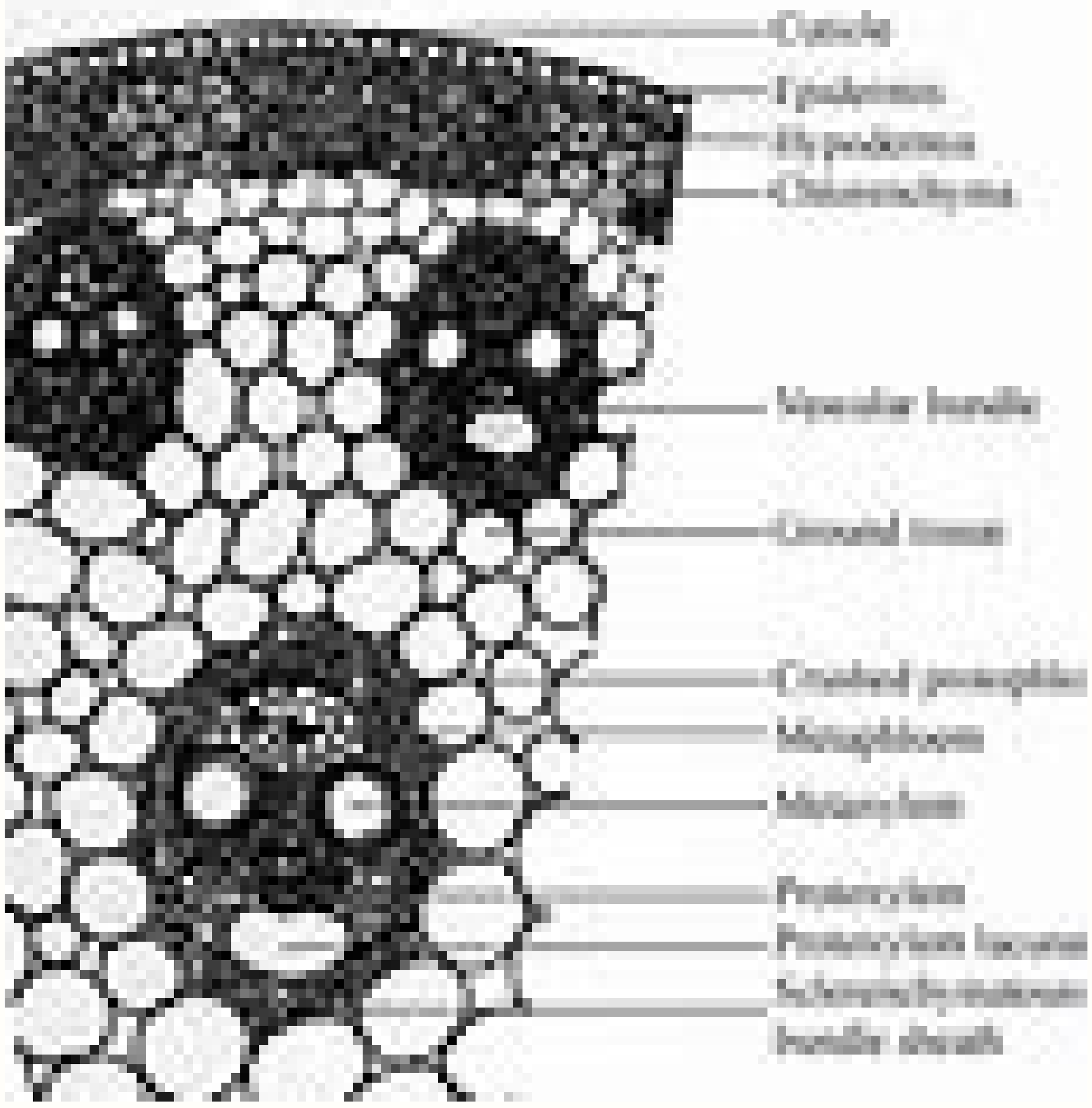


Figure 12.4 Transverse section of Dicot stem







Anatomy of monocot stem biology discussion. Anatomy of monocot stem notes. Anatomy of monocot stem ppt. Anatomy of monocot stem diagram. Anatomy of monocot stem maize. Anatomy of dicot and monocot stem. Anatomy of monocot stem pdf. Anatomy of monocot stem class 11.

Recent article in Science Vol. 291 (26th January 2001) by N.M. Holbrook, M. Zwieniecki and P. Melcher suggest that Xylem cells can be more than inert tubes. They seem to be a very sophisticated system to regulate and lead water to specific areas of the plant that need more water. This preferential water conduction involves the direction and redirection of water molecules through openings (pores) in adjacent cell walls called wells. The wells are flanked by a membrane of the well composed of cellulose and pectin. According to researchers, this control of water movement can result in pectin hydrogels that serve glue with adjacent cell walls together. One of the properties of polycarbohydrates is to swell or shrink due to inhibition. "When the pectin swells, the pores in the membranes are squeezed, slowing the flow of water to a reef. But when the pectin shrinks, the pores can open wide, and the water blushes through the Xylem membrane towards the thirsty leaves above." This remarkable control of the water movement can allow the plant to respond to the drought conditions. The spiral attachments in the secondary walls of ships and tracheas give them the appearance of microscopic coils under high magnification with a light microscope. Enlarged horizontal view (400x) of an inner perianth segment of a species of Brodiaea in San Marcos that shows a primary vascular package composed of different threads of ships. The wires are made up of ships with spiral-reinforced walls that look like rolled minimum springs. Although this species has been called B. Jolonensis of San Diego Botanists for decades, it appears to be more similar to B. Terrestris SSP. Corensis. This species contains at least three strands of ships per beam, while B. Jolonensis has only one strand per beam. The Xylem fabric conducts in water in the vegetable is actually composed of dead cells. In fact, wood is essentially dead xylem cells that have dried up. The dead tissue is hard and dense due to lignin in the secondary insumarate Die. Lignin is a complex phenolic polymer that produces hardness, density and brown colour of wood. The cactus stems are composed of soft tissues of parenchyma, which decompose when the plant dies. Wooden vascular tissue (lignified) provides support and is often visible in dead cactus stems. On the left: Giant Saguaro (Giant Carnegie) in northern Sonora, Mexico. The weight of this large cactus is largely due to the tissue of water accumulation in the stems. To the right: a dead saguaro showing the wooden vascular filaments (lignified) that support the massive stems. See article on hardwood See Specific Gravity of Wood Floema fabric leads carbohydrates produced in the leaves down into the stems of the plants. It consists of sieved tubes (elements of sieved tubes) and accompanying cells. The final perforated wall of a sieve tube is called a sieve plate. Thick fiber cells are also associated with the floema tissue. In the roots of the 19th century, the xylem tissue appears as a three-pointed or four-pointed star. The tissue between the extremities of the star is floema. The central xylem and the floema are surrounded by an endoderma, and the entire central structure is called steles. Microscopic view of the root of a ranunculus (Ranunculus) with the central stem and the 4-pointed xylem. The large cells that lead the water into the xylem are vases. [Enlargement of approximately 400X.] In dicot drums, silk is produced inside the exchangerate layer. Floema tissue is produced outside the exchange rate. The flower of some stems also contains thick and elongated fiber cells on the wall that are called hemp fibers. Flax fibres (Linum usitatissimum) are the source of flax textile fibres. The gymnastics generally do not have pots, so the wood is composed essentially of tracheid. The notable exception are the members of the gymnastics division who have ships. This remarkable division includes Ephedra (Mormon tea), Gnetum, and the amazing Welwitschia of di Desert Namib. See article Information on the stems of Welwitgete Pine also contain cell bands called rays and scattered resin ducts. The rays and resin ducts are also present in flowering plants. In fact, the insidious poisonous allergen called Urushio is produced inside the resin ducts. Wooden rays extend outwards in a stem cross section like the rays of a wheel. The rays are composed of parenchyma cells with thin walls that disintegrate after the wood dries up. This is why wood with prominent rays often splits along the rays. In pines, spring strokes are larger than summer courses. Since the summer trachies are smaller and more dense, they appear as dark bands in a cross section of a trunk. Every concentric band of spring and summer stretches is called annual ring. Counting the rings (dark bands of summer xilem in pine wood), the ages of a tree can be determined. Other data, such as fire and climatic data, can be determined by the appearance and distance of the rings. Some of the most ancient granite pines (Pinus Longaeva) in the white mountains of eastern California are more than 4,000 rings. The annual rings and rays produce the characteristic granule of the wood, depending on how the boards are cut to the hacksaw. Microscopic exposed of a three-year-old pine stalk (Pinus) showing resin ducts, rays and three years of growth of Xilm (annual rings). [Magnificent approximately 200x.] A transversal section of luxuried pine wood (Pinus Taada) showing eighteen dark xilm summer bands (annual rings). Angioospermi typically have both tracheids and vessels. In anully wood, such as oak and base, spring vessels are much larger and porous than smaller summer features. This difference in size and cell density produces rings Visible and concentric in these woods. Due to the density of wood, the angiospar are considered thieving woods, while gyms, such as pine and fir, are considered softwood forests. See item Information on wooden bases See specific wood gravity The following below and the photos show American basswood (Tilia americana), a typical porous ring leaf of the eastern United States: a cross section of the basaswood stem (Tilia americana) that shows large piths, numerous rays, and three distinct annual rings. A cross section of the base stem (Tilia americana) that shows pith, numerous rays and three distinct annual rings. The big spring cells are vases. Lack of annual rings visible in tropical trees? In tropical forests, relatively few species of trees, such as teak, have visible annual rings. The difference between wet and dry seasons for most trees is too thin to make significant differences in cell size and density between wet and dry seasonal growth. According to Pascale Poussart, a geochemist at Princeton University, tropical hardwood has "invisible rings". She and her colleagues studied the seemingly ring-free tree of Thailand. Their team used X-rays at Brookhaven's National Synchroton Resource to watch cell football during the growing season. There is clearly a difference between the calcium content of wood during wet and dry seasons that is compared to carbon isotope measurements. The football record can be determined in an afternoon at the synchrotron lab compared to four months in an isotope lab. Poussart, P.M., Myneni, S.C.B., Lanzirotti, A., et al. 2006. Geophysical research letter 3: L17711. Anatomy of Monocot Stems Monocot steles, such as corn, palms and bamboo, do not have a vascular change and do not show secondary growth with the production of annual concentric rings. They cannot increase the circumference by adding side layers of cells such as conifers and wooden dicots. Instead, they've dispersed vascular bundles of xilm and loem tissue. Each beam is surrounded by a ring Cell called sheath beam. The structural strength and the hardness of woody woody monocolts due to highly ligated trachea clusters and fibres associated with vascular bundles. The following illustrations and photos show vascular bundles scattered in the corn stalk sections (Zea mays): a cross section of the corn stalk (Zea mays) that shows parenchymal tissue and scattered vascular bundles. The large cells in the vascular beams are vases. Unlike most monocytes, palm legs can grow in conjunction with an increase in the number of parenchyma cells and vascular bundles. This primary growth is due to a region of active division of the meristetic cells called the "meristem with primary thickness" that surrounds the apical meric at the tip of a stem. In wooden monocots this meristematic region extends along the periphery of the stem where it is called "secondary thickness meristema". New vascular bundles and parenchyma tissue are added as the stem grows in diameter. The massive trunk of this Chilean wine palm (Jubaea chilensis) has grown in circumference due to the production of new vascular bands from the south primary and secondary thickness. Palma Wood The scattered vascular beams containing large (porous) vases are very visible in palm wood. In fact, the vascular beams are also preserved in the petrified palm. Cross section of the trunk of the native California palm tree (Washington branch) showing scattered vascular beams. The large cells (pores) in the vascular beams are vases. The trunk of a California palm tree in Palm Canyon, Anza-Borrego State Park. The palm was washed along the steep canyon during the September 2004 flash flood. Fibrous filaments are vascular bundles composed of lignified cells. Right, cross section of the trunk of a California palm tree that shows scattered vascular beams that look like dark brown spots. The dot scheme appears in the petrified palm of Washington (on the left). The pores in the petrified palm are the remains Ships. The large circular tunnel in the palm wood (right) is caused by the larva of the bizarre palm-boring beetle (Dinapate Wrights) shown at the bottom of the photo. An adult beetle is shown in the next photo. A beautiful cutting board made of numerous bamboo flatstrips (Phyllosachys Pubescens) glued together. Through a specialized heating process, natural sugar in the wood is caramelized to produce the color of honey. The typical vascular beams of a woody monocot are clearly visible on the smooth transverse section. The transversal surface of numerous lignified trachoids and fibers is actually more difficult than maple. Cutting table available from Total BambooÂ ¢ â ¢ Website: www.totallybamboo.com Bamboos: Extraordinary Giant Grasses at 270 Million-Year-Old Petrified Tree Fern During the carbonifera era, about 300 million years ago, the earth was dominated From Vast Forests of Giant Lisanthropes (Lyphota Division), Stails (Sphenophyta Division) and Trees Ferns (Pterophytive Division). Most of the lands of coal of the Earth came from massive deposits of carbonized plants of this era. The trunks petrified by Brazil reveal cellular details of a fern of extinct trees (Psaronus Brasiliensis) who lived about 270 million years ago, before the dinosaurs. The petrified stem of Pseronius has no concentric growth rings typical of conifers and angiospar. Instead, it has a central stele composed of numerous arches that represent the vascular beams of the Xilm fabric. Surrounded the stem are the bases of the leaves. In life, Psaronus probably resembled the current ferns of New Zealand's Cyathea trees. A trunk petrified by the Psaronus Brasiliensis arboreal fern. The central region of the stele contains vascular beams in the shape of a bow of Xilm tissue. The stem is surrounded by leaf bases forming the leaf crown of felts, similar to current felts of trees of Cyathea in New Zealand. This petrified petrified It was cut and polished to make a couple of bookstores. A section of stem well preserved by the extinct tree fern Psaronus brasiliensis. Note the central region of the stem containing xylem tissue arches (vascular beams). The structure of this stem is very different from the concentric rings of conifers and dicots growth, and from the vascular bands scattered by palm trees. Page2 Some notes on Duckwees Identification A brief technical description of the technical description of Lemnoidae 160? 1919; 160? 19? 19? 160? 19? 160? 1919; 160? 1919; 160? 19? 160? 160? 19? 160? 160? 19? 160? 160? 19.160; 160? 191919\160; 191919191919196666666; The flowers of Bisesssssssssssssssssssssssssssssssssssssssssssssssssssssssssssssssflowers.\\\\\\160;\\The flowers of Bisesssssssssssssssssssssssssssssssssssssssssssssssssssssssssssssssssssssssssssssss Species of seeds 16; A 19? 16019? 19160160; 160? 161919; 19\\\\19 19; 1919's? O 160;\ 1601919194; 160;\\\\\\\\\\ 1644444160160160160160; 160? 160? 160;\\\\\\\\\ "Nerves (Veins)" Airspace in Duckweed Identification 160; 1919; N 194; 160? Dorsal Papules Separating L. turionifera From L. minor194; Importation of rear lighting When Duckweeds is identified is 160; Duckweed Culture s in Agar Media Control of Duckweed Bloms in Ponds and Reservoirs Wayne's Word &Lemnoidea on-line Copyright Policy Index and Keys to the Genera of Lemnoidea Additions On other Pages: This Page is Dedicad to Dr. Elias Landolt (1926-2013) Although I have never met him in person, I spoke to Elias Landolt at the Geobotanical Institute in Zurich, Switzerland, for the last thirty years. In fact, he sent me aseptic cultures of numerous species that I grew and photographed in my home in San Marcos, CA. I could never have known the taxonomy of paper or published my articles without first hand observations of his wonderful specimens and his Monography of the Lemnaceae. He was a brilliant scientist and was so willing to share his phenomenal knowledge. Elias Landolt has really been an inspiration to my life. I'll miss him and I'll never forget him. WPA, September 2013 Dr. Landolt Walter Lammer's assistant has created a valuable website dedicated to the Duckweed Landolt Collection. This extraordinary collection contains samples of all the species of duck algae known in the world. The purpose of the collection is to preserve these species, to provide live samples available for research and to provide a forum for the exchange of information. The study of duck algae is important. In a world where resources are increasingly scarce, we continually discover many new useful applications. Duck algae are a source of animal feed, a means of purifying polluted water, and can also be used for the production of renewable energy forms. 1. Some notes on Duckweed Identification © Flowering and fructification are rare in most species of Lemnaceae, the following keys and descriptions are mainly based on vegetative characteristics. Smaller characters that may seem insignificant in morphologically complex plants take on greater importance in the Lemnaceae. Ideally, it is better to observe living plants with a 30X dissection microscope, preferably with a sub-stage illumination to see the veins and the shape of the bags in grass (dried herbal specimens can be hydrated in water to obtain a resemblance to their previous form). For difficult species it is often necessary to grow them in containers to observe the development of diagnostic characteristics such as shape, size, number of co-existing plants, nervousness, anthocyanin pigmentation and turmoil. Some species may show significant variations especially when they grow under suboptimal environmental conditions, making their precise vegetative identification very difficult. A bloom bloom bloom microscopic next to the tip of a needle to sew. The unusual form of golf tee is unique among all wolf species. A minute of resistance can be seen protruding from the upper (expanded) side of the plant's body. See Right Pin &l Needle used in Wayne Articles 2. A brief technical description of Duckweed Family Duckweeds are small aquatic herbs floating on or below the surface of calm streams and ponds, often forming dense and homogeneous clonal populations. The plant body is not differentiated in stem or leaf. It is reduced to a fleshy ovoid or thallium or to a flattened structure with one or more roots (without root hair) on the lower part, or without roots. The dorsal and ventral terms are often used in literature for the upper and lower surfaces of the plant body that float in water. The adaxial and abaxial terms are typically used for leaves, referring to the surface adjacent to the axial of the leaves (adaxial) and to the opposite surface away from the axial of the leaves (abaxial). Adaxial and abaxial also refer to the upper and lower sides of a leaf; However, the abaxial side is also the back or back side. This terminology is particularly suitable for leaves placed vertically on a stem. Poiche. © the plant body of a duck is not technically a leaf, the adaxial and abaxial terms are confused for general descriptions. For ducks it is preferable to use the upper and lower surface. [Thanks to Elena George of Humboldt State University for making me notice this]. The plant body often has one-different layers of well-visible airspace (airtight) and one-different veins (nerves). Daughter plants are produced in a grass bag at the base end or along the side edges of the mother plant, often you stay attached to the mother plant by a short stem. Some species produce daughter plants without roots (or much roots), faeces, said towers that sink to the bottom and overweight. The flowers are bisexual and usually protogenic, the androecium consisting of 1 or 2 and the gingecium consisting of a single piston. The flowers are produced in a floral cavity on the dorsal surface (Wolffiella and Wolffia), or in a membranous and sacine sweep (atricular scale) inside a bag of lateral grass (Spirodela, Landoltia and Lemna). Some authorities consider duck species to be monoecious with one or two morning flowers (each consisting of a single strain) and a piston flower (consisting of a single piston). There is no Corolla or Calyx. The ovary is superior and one-eyed with a short style and the circular concave stigma. The stigma often drains a liquid drop of it to anthesis. The stem has a short filament and one-eyed or two-eyed antecedent, transversely or openly descended, with grains of spineless pollen. The fruit is an inceidic, vesicular utruticola, containing several seeds with a prohibition of opertum. The traditional family Anatreweed (Lemstraceae) contains five genera and at least 38 species. DNA studies indicate that lemperins are better included within the Araceae. The ducks have a worldwide distribution, particularly temperate and tropical regions. They are the smallest and structurally simpler of all angiosperms, with considerably reduced vascular tissue (tracheids) limited to the veins of the implant body, strain filaments and roots of some species. Anatrochols and associated microfauna are an important source of food for certain aquatic birds. They are potentially valuable for the purification of waste water and a species (Wolffia Globosa (Roxb.) Hartog &Plas) locally known as "Khai-Nam", is eaten by people in S.E. Asia. Main references on taxonomy of ducks: Landolt, E. 1986. "The family of Lemstraceae: a monographic study" (vol. 1). Veroff! Geobot! ETH Institute, Ruble 71 Foundation. Landolt, E. and R. Kandeler. 1987 "The family of Lemstraceae: a monographic study" (vol. 2). Veroff! Geobot! ETH Institute, Ruble 71 Foundation. E. 1957. "Physiological and ecological research and development". Switzerland, Bot! Jesus. 67: 271-410. 271-410. tissue in minute wood (1000x). The large intercellular spaces are surrounded by layers of cells of coroplastic parenchyma. Air-filled spaces provide floating duck seaweed, keeping it afloat on the surface of the water. Although larger airspaces can provide a competitive advantage for greater floatability, some species have significantly reduced airspace and float below the surface of the water. Back view of Lemna gibba in full bloom. Two stems and a short style emerge from a growing side pocket at the base of the plant. The android is composed of two strains of pollen carriers. The ginecium consists of a single concave pistil, slanted stigma and basal ovary with one or two eggs. The bisexual flower is enclosed inside a diaphragm spatula inside the sprouting bag. Note: Some authorities consider duck seaweed a mono species with one or two flowers of staminate (each consisting of one strain) and a pistillate flower (composed of a single pistil) on the same plant body. Back view of the Bisexual Flower of Landoltia dotted lateral view of the Boreal Wolffia in flower that shows the dorsal floral cavity containing a leading stem and a piston (gynaecio). The piston has a small seed door, a slender (short) style and a circular and concave stigma. The flowers are protogenic, with the stigma that becomes receptive before the flower matures and spreads pollen. A daughter plant springs from a plunger-like sprouting bag at the base extremity. The entire flowering plant is only one millimeter long. Weight approximately 200 micrograms (approximately 1/150.000 of one ounce). Back view of several Boreal northern Wolffia in full bloom. The floral cavity on the back reveals a concave circular stigma (closer to the base extremity) and a single pollinic antera. Unlike Lemna, Spirodela and Landoltia, the flower is not enclosed in a membranes. The flowers are protogenic, with becoming receptive before the anther matures and releases pollen. The plant on the far right shows only the stigma, while the plant on the far left shows only the anther. The upper and lower plants show both stigma and a weak anther. Utricles of the duck algae family (Lemnaceae). The uterus is a small bladder fruit with thin walls. It is often compared to a monosemed achene, except that the uterus has a loose and fragile pericarp. Due to their small size (usually only 1-2 mm or less), the utricula of the duckweed family are rarely seen. In fact, the mono-seeded utricula of the species Wolffia are unquestionably the smallest fruits in the world. The smallest are from the Australian W. angusta and the Asian/African W. globosa. The smallest fruits in the world are produced by species of Wolffia, including the Australian W. angusta. The image above shows a ripe fruit inside the plant body. The largest Lemna fruit shows a thin and transparent pericarp surrounding a ribbed seed. A layer of pericarp is not evident on the fruits of the wolf. Germinated seeds of Lemna perpusilla with plants with attached seeds. Two of the Wolffia species included in Landolt's Monograph of Lemnaceae of 1986 (Vol. 1) have been divided into two species (E. Landolt, 1994, Ber. Geobot. Inst. ETH, Fondazione Rubrica 60). Justification for two more Wolffia species is based on allozyme studies conducted by D.J. Crawford, Columbus, Ohio (Crawford, D.J. & E. Landolt, 1995, Allozyme Diversity Among Species of Wolffia (Lemnaceae), Plant Systematics & Evolution 197: 59-70). South African populations of W. globosa (Roxb.) Hartog & Plas are now recognized as W. cylindracea Hegelm., an older name used in literature by Hegelmaier (1868). The widespread Asian W. globosa (also from California and South Florida) has been maintained as W. globosa. The populations W. narrow Landolt in Pakistan and India were called W. neglected Landolt. The Malaysian and Australian populations of W. angusta were maintained as W. angusta. Anguish. Furthermore, a new species of Wolffiel from the Amazon basin has been named W. Caudata Landolt (E. Landolt, 1992, Ber. Geobot. Inst. Eth, Stiftung Rubel 58). The specific epithet for the latter curious species refers to the queue-similar, distal extremity of the vegetable body (see Wayne's term: strange ducks from a distant land). Another new species of Lemna (L. yungensis) has also been described by Landolt from Vertical Wet Rocks of Andean Yugas in Bolivia (E. Landolt, 1998, Bulletin of the Geobotanical Institute ETH 64). D.H. Les and D.j. Crawford (1999) proposed the new Landoltia genus containing a species L. punctata, previously puncted spirodela. This species is morphologically intermediate between Lemna and Spirodela. According to Les Crawford, it represents a blade isolated from Lemna and Spirodela. [LES, D.H. and d.j. Crawford. 1999. "Landoltia (Lemnaceae), in New Genus of Duckweeds." Novon 9: 530-533.] These revisions increase the total number of taxa around the world in the lemnaceae species at 38 in five genres. Mudmiddles (lingulated Wolfielella) in full bloom. It is a dorsal view that shows several broad and languaged plants (in the shape of a language) with their free-born devices (recurring) in the water. Each plant has an immature yellow anthill protruding from a floral cavity. The lower plants show a metic circular stigma adjacent to the anthill. The plants are about 7 mm in length. The Wolffiella genre includes some of the most bizarre of all the plants in bloom. Although the generic name for Mudmigets refers to the decrease in Wolfia, they are not as small as the species of Wolffia. A strainer full of lingulated Wolfielella. The thousands of recurrent plants, languels resemble translucent green leaves or chips. 3. Some generalizations about the Duckweed family The Anatrouch Family is well represented in North America Western America with almost half Specialtys of the world. The vegetable body of ducklings is very different from other plants in bloom because it does They have stems or leaves. It represents the last reduction in the entire vascular plant. The terms Â «Fradaâ» and â «Talloâ» are sometimes used in literature, but they are not appropriate because the vegetable body of algae is not homologous to the fronds of ferns or to that of mushrooms and algae. Although the algae body has a guard cells and stomachs coupled on the upper surface and resemble a leaf (in particular the flattened algae spirodela, Landoltia and Lemna), is morphologically and embryously completely different. In Spirodela, Landoltia and Lemna It is a flattened structure with slender and hairy roots on the lower side. Spirodela and Landoltia are unique among duck algae due to the presence of a tiny membranous leaf (profile) that envelops the dorsal and ventral surface of basal end. In Spirodela Polyrrhiza the profile is visible on young plants (escape in older plants) and on the wintering turions. This basal portion and its connection stem correspond to a condensed sprout that has greatly reduced with the evolution. Landoltia has a reduced profile that perishes in the plants raised. Missing a profile to Lemna, Wolffia and Wolfffiella. These last two kinds have been reduced by evolution to tiny spheres without roots or flattened ribbons. Wolffia has a globular or ovoid body of 1 mm or less. In Wolfielella the heighted body is transparent and flattened, with the free ends often curved down in the water. Enlarged view (1000x) of the upper surface of the small lamna showing a pore slot (stoma) flanked by two thin guard cells. The cells surrounding the stoma resemble the subsidiary cells of the true leaves. Although the vegetable bodies of duck algae have stomenges and perform gaseous exchanges with the atmosphere, they are not counterparted to the leaves. See stomata and subsidiary cells of a real leaf (Tradescantia) of Spirodela polyrrhiza. Note the minute, transparent, similar to a bracket leaf a prophyllum at the base end. Prophyllum overlaps with both the back and ventral sides of tourism, but is more visible on the lower surface (ventral). Landoltia prophyllum point is much smaller. If the prophyllum is homologous to a leaf in its embryonic origin, then it is one of the smallest leaves in the world. See Prophyllum on turrets of Spirodela Polyrrisrhiza Ventral lateral of a specimen of the hydrated herb of Landoltia punctuated. A bag of grass in the main plant brings a younger plant and daughter that extends horizontally to the right in the photo. The daughter's plant shows a related prophyllum that is penetrated by two roots. Ventral prophyllum is very difficult to see without careful examination under a dissection microscope. A prophyllum is present in the Landoltia and Spirodela genera. It is a membranous and scalable leaf that envelops the dorsal and ventral surfaces of the basal end, but is usually not evident in older plants. The portion of prophyllum and its connecting rod are similar to a condensed shot that has become considerably reduced through evolution. More advanced generation, such as Lemna, Wolffiella and Wolffia do not have a prophyllum. Lower part of a hydrated herb of Spirodela Polyrrisrhiza that shows a small scaled prophyllum at the base end of a daughter plant. This species has 7-12 or more roots, with one or two roots that pass through the ventral prophyllum. Most of the roots are outside the margin of prophyllum. Prophyllum is most evident on plants as a young daughter. Spirodel and Landoltia are the only Duckweed Generate with a prophyllum. This scalable base leaf is absent in the most advanced genes, including Lemna, Wolffiella and Wolffia. Although all species of Lemna have a basal guaina root near the node of attack, two species in the section Alatae (L. Aequoctiialis and L. Perpusilla) have distinctive root guaina with two lateral alateral appendices. Lower part of Lemna Aequinoctiialis showing the winged root forage near the base knot. This species has a prominent apical papule on the upper side. Seeds have 8-26 distinct ribs and generally fall from the fruit wall when ripe. L. perpussilla, closely connected to the eastern United States, also has a root sheath with two lateral appendages similar to the base. It has seeds with indistinct ribs 35-70, remaining inside the fruit wall after ripening. They are present in Lemna, Landoltia and Spirodela tracts of cells called nerves. They come from the node (point of attachment to the root) and extend through the body of the plant to the distal (apical) region. A similar stretch of elongated cells (called the coast) can be seen in Wolffiella's triagular budding bag. The location of the ribs relative to the incoming bag is an important feature used to separate W. lingulata from W. obonga. Traces of elongated cells also extend through the center of the roots of Lemna, Landoltia and Spirodela. Nerves and stretched cell traits can be used to transport minerals and sugars, similar to the function of veins. In some species of Lemna, Landoltia and Spirodela, the elongated nerve cells contain tracheids with ring-shaped or spiral-shaped ispecies in the walls (annual tracheids). These elongated cells are not called veins because the plant bodies of ducklings are not homologous to the leaves. 4! Cladogram of the Duckweed Family Several genes within the nucleus and cytoplasmic organelles (chloroplasts and mitochondria) can be used to build phylogenetic trees called cladriograms. A gene in the nucleolus codes for the subunit is smaller than the ribosome. The gene is called SSU rDNA or small ribosomal DNA subunit. The basic sequences of this gene are sometimes used to compare taxa at the species level. Chloroplast DNA, including the protein boocL gene, is often used at the familial level to show Between genres and species within the family. The intruders are also used to build family trees. Introduction are sections of RNA that are removed before translation to ribosome. Most botanists believe that Lemnaceae is closely related to the arum family (Araceae), and comparative studies on the DNA of chloroplasts have confirmed this taxonomic affinity (Duvall, et al. Annali of Missouri Botanical Garden Vol. 80, 1993). In fact, several authorities have proposed some drastic and significant changes in the classification of many traditional families of angiosperma, including the placement of all ducks in the Araceae rather than Lemnaceae. 1998 "An ordered classification for flower families." Annals of Missouri Botanical Garden 85: 531-553; Judd, W., C. Campbell, T. Kellogg and P. Stevens. 2002! Plant Systematics: A Phylonnetic Approach. Sinauer Associates, Inc., Sunderland, MA. Some of these proposed changes are summarised in an article by E. Dean in Fremont 30(2) 3-12, 2003. If accepted by the botanica l community, incorporating these changes into botanical textbooks, floras, checklists and herbal collections will be a formidable task. The evolutionary trees generated by the computer or cladograms were used to show taxonomic relationships of the species of duck within the family. d on thousands of data characters, including morphology, anatomy, flavonoids, allozymes and DNA sequences of genes and chloroplastic introns. The length and position of the branch (clade) in the tree correspond to the number of character differences between the rate. Characters are numerically weighted according to their evolutionary importance. For example, a root would be worth more than a papule. The cladograms are generated several times, and do not always come out the same way. The term "bootstrap" refers to a cladriogram or phylogenetic tree that comes out in the same way from a total number of times. For example, a thousand tree cladriograms are generated and the same model comes out times. This cladegogram clam a bootstrap value of the 90 percent. The following cladogramma shows all five genera genera and 38 species within the family of legs (lemnaceae). It was generated by the DNA sequences of RBCL genes of all known family members using the PAUP computer program: a cladogram of the duck family based on the chloroplast rbcl gene. Five genera and 38 species are shown. According to the cladogram, the ancestral genus is Spirodela and the Genus Wolfgang is further away because

© has the lowest number of characters shared with Spirodela. Spirodela, Landoltia and Lemna are more closely related, while Wolffia and Wolffiella have more in common. With the exception of a new genus Genus Landolti and some changes within the family sections, most of the results are consistent with previous studies based exclusively on morphological characteristics made by meticulous botanists. Cladogram modified by Les, D.H., Crawford, D.J., Landolt, E., Gabel, J.D. and R.T. Kimball. 2002! "Phylogeny and systematic of Lanticamaceae, the family of ducks." Systematic botany 27 (2): 221-240. Look at the chemical structure of the flavonoids because of their degree of reduction, Landolt (1986) considers the two minidients genres Wolffia and Wolffiella to be the newly evolved propagations in the philosophy of this family. Wolffia has the least characters shared with the supposed ancestor Spirodela and is located farther in an evolutionary tree (cladogram). The new genus Landoltia is morphologically intermediate between Lemna and Spirodela. According to D.H. LES & D.J. Crawford (Novon 9: 530-533, 1999), it represents an isolated clade distinct from Lemna that Spirodela. DNA comparisons of all members of the lemtraceae of Les, et al. (Systemic botany 27 (2): 221-240, 2002) Indicates that all five genera represent distinct clades. With the exception of Landolti and some changes in the sections, the 38th rate in the study of Les et al. (2002) are remarkably consistent with those as morphologically distinct from Landolt. The tanning algae now placed in the Arum (Araceae) family Amorphophallus titanum Most authors agree that the tanning algae are an early offspring of the Aroid Link (Araceae) and are represented in fossil finds since late Cretaceous by the genus Limnobiophyllum. Although the latter genus is related to Pistia, the oldest fossils attributable to Pistia date back to the late Oligocene/early Miocene. Because of its morphological resemblance, Pistia stratioides was considered a close relative (cousin) of the Lemnaceae. The morphological analysis of the fossil arsenic of the paleocene Limnobiophyllum scutatum di Stockey et al. (1997) indicates that the most track wood forms a monophyllitic group within the Araceae; However, more recent cladistic DNA tests have shown different results. Phytogenetic studies by G.W. Rothwell et al. (2004) and L.I. Cabrera et al. (2008) indicate that Pistia and Lemnaceae belong to distant clades, suggesting at least two independent origins of the form of water growth floating within the arum family (Araceae). Cladogram From Cabrera et al. (2008) More Amorphophallus titanum Images Therefore, Pistia cannot be considered as a morphological intermediate between duckweed and other ruminants. Maintaining Lemnaceae and Araceae as separate families would make the arum family paraphyllic, with a common ancestor but not all its descendants (i.e. duck seaweed are excluded). Their cladograms are based on sequences of the intergenic region trnL-trnF of the chloroplastic genome. This region of space is non-coding DNA between trnL and trnF locations. Poiche. © non-coding, is not in the selection phase (not highly conserved), compared to highly conserved genes coding for structural products, regulating proteins or RNA transfer. It is interesting to note that duck seaweed To the same family as plants of Arum Titanium (Amorphophallus Titanum). This remarkable plant has a one m Erect Spadix protruding from a jar-shaped spatula with a circumference of 4 m. Cabrera, L.i., Salazar, G.A., Chase, M.W., Mayo, S.J., Bogner, J. and P. DÃÂ¡vila. 2008. "The phylogenetic relationships of Aroids and Duckweeds (Araceae) infer from the coding and DNA Plastid not convincing." American Journal of Botany 95 (9): 1153-1165. Rothwell, G.W., Van Atta, M.R., Ballard Jr., H.E. and r.a. STOCKEY. 2004. "Molecular phylogenetic relationships between lemstraceae and araceae using chloroplast trnl-trnf intergenic spacer." Phylogenetics and Molecular Evolution 30: 378-385. Stockey, R. A., Hoffman, G.L. and G. W. Rothwell. 1997. "The fossil Monocot Limnobiopyllum Scutatum: Solving the Phylogeny of Lemstraceae." American Journal of Botany 84 (3): 355-368. Pistia Stratiotes: an aquatic member of the family Arum (Araceae) with characteristics similar to Genus Genus Spirodela. Phylogenetic studies using chloroplast DNA indicate that Pistia cannot be considered a morphological intermediate between the legs and other arms. Note the small white spaton (red arrow) surrounding the anters at the apex of a reduced spadix. 5. Controversies about the genus Landoltia Many traditional phylogenetic groupings of species within families and genera are not monophyletic and are inconsistent with modern cladistic DNA analysis. In other words, the groupings are paraphyletic or polyphalytic, and do not show all the species within a group descending from a common ancestor. Monofyly is the natural evolutionary model in which all species are descended from a common ancestor. To have consistent computer-generated reviewers, monopolized cladograms, sometimes it is necessary to change the paraphyletic and polyphyletic groupings by moving species into different genera and moving Genera into different families. Many of the taxonomic revisions in the 2nd edition of Jepson Manual 2nd Edition (2012) were made to have groupings coherent. This is why Spirodela Punctata was In the genus, Landoltia and because the Lemstraceae was placed in family araceae. The Cladogram (on the left) is from D.H. Les and D.j. Crawford (1999). It has high boot boot values and is based on molecular data (RBCL) from the DNA of the chloroplast. It clearly shows that a group consisting of 3 species of spirotela is parafinotic. This is why St. Punctata was placed in the monotypic genus Genus Landoltia. Ã, Ã, monofiletic group: all descendants from a common ancestor in 1999, D.H. Les and D.j. Crawford proposed the new Landoltia genus containing a species L. punctata, previously puncted spirodela. This species is morphologically intermediate between Lemna and Spirodela. According to Les & Crawford, it represents a blade isolated from Lemna Spirofela. Without this change, the Spirodela genus would be Paracyletc. Les, D.H. and d.j. Crawford. "Landoltia (Lemstraceae), a new kind of ducks." Novon 9: 530-533. Morphological characteristic spirodela intermediate spirodela polyrrhiza landolta punctata previously foasting punctata lemna all the species prophyllum at the base of the frond present present but reduced number absent of roots penetrating prophyllum s. intermedia: 2 to 5 s. polyrrhiza: 1 (rarely 2) all the roots no PROPHYLLUM OVERWINTERING TURITIONS S. Intermedia: None S. Polirerhiza: No distinct present; Some small piccofronds resemble Turions in L. Turionifera Number of frond grain from 7 to 16 from 3 to 7 from 1 to 5 No. of roots from 7 to 21 Generally from 2 to 5 only 1 root tracheids extend to the baseline tip Only absent dorsal melistem of new fronds on one side (side on the other side.) On both sides on both sides the external front loggers do not extend above the interior rooms extend slightly above the interior rooms extend over the interior rooms. Celle of the brown pigment in the Fendi present present absent cells with crystals Raphures & Druss & DRURS Raphide only a comparison between the morphological characteristics between Landolti, Spirodela and Lemna. With so few taxonomic characteristics, these assume assume assume more important role in the distinction of genders. Spirodela punctata has an intermediate taxonomic position between Spirodela (S. intermedia & S. polirrhiza) and Lemna. A hypothetical cladegogram in Les and Crawford (1999) based on the morphological data of Landolt (1986) revealed a paraphyletic grouping of Spirodela before Spirodela punctata was finally placed in the monotypic genus Landoltia. According to Professor Elias Landolt (personal communication, 2001), the creation of the new genus Landoltia is not necessary on the basis of a purely morphological point of view; However, based on DNA and enzymatic studies, the modification is justified to form coherent phylogenetic taxa. The inclusion of a fifth genus Landoltia appears necessary on the basis of an exhaustive analysis of Lemnaceae by D.H. Les, D.J. Crawford, E. Landolt, J.D. Gabel and R.T. Kimball (2002). In addition, 4,700 characters were studied, including data on morphology and anatomy, flavonoids, allozymes and DNA sequences of chloroplast genes (rbcL, matK) and introns (trnK, rpl16). The Angiosperm Phylogeny Group (APG) has proposed some significant changes in the classification of many traditional angiosperm families, including the placement of all ducks in Araceae rather than Lemnaceae. Nomenclature changes are cited in APG II (2003) and superrequested in APG III (2009). These changes are based on computer-generated evolutionary trees or cladriograms. Thousands of data characters were used, including morphology, anatomy, flavonoids, allozymes and DNA sequences of genes and chloroplasted introns. The Jepson Manual Second Edition (2012) essentially follows the changes summarized in the following reference by W.T. Judd, et al. 2008. Since the genus Landoltia was proposed by D.H. Les and D.J. Cawford in 1999, several classic journals on the phylogeny of the duckling subfamily (Lemnoidea) Other aroids (Araceae) used the name Landoltia. In my opinion, La La Landoltia is justified because it is consistent with the objectives of the Jepson 2nd Edition (2012) manual based on phylogenetic studies using the plastic DNA. Judd, W.S., Campbell, C.S., Kellogg, E.A., and M. P.f. and M. Donaghue. 2008. Vegetable systematic: a phylogenetic approach (third edition). Sinauer Associates, Inc., Sunderland, Massachusetts. 611 pages Les, D.H., D.J. Crawford, E. Landolt, J.D. Gabel, and R.T. Kimball. 2002. "Philogenesis and systematic of the Lemnaceae, the Duckweed family." Systematic botany 27 (2): 221-240. Cabrera, L.i., Salazar, G.a., Chase, M.W., Mayo, S.j., Bogner, J., and P. DavilÃ¡. 2008. Â «Philogenetic relationships between aroids and duck algae (Araceae) Inferred from coding and noncoding DNA Plastide.â € 8 am American Journal of Botany 95 (9): 1153-1165. Names published for this Lemna species punctata G.F.W. Meyer This was the original name of Meyer based on the exemplary type harvested along the Essquibo river, Guyana, South America in 1818. Unfortunately, the original specimen of the Meyer has gone lost. Punted Spirodela (G.F.W. Meyer) Thompson C.H. Thompson placed this species in a spiroding genus in 1898. Given that the exemplary like lost, he basis the new name on a specimen of the Wilkes shipment of 1938-1842, called Orange Harbor, Tierra del Fuego. According to Landolt (1986), Thompson has neutyped this species in his publication of 1898. Landoltia punctata (G.f.W. Meyer) Les & D.j. Crawford in 1999, D.H. Les and D.j. Crawford inserted this species as Lendoltia based on DNA tests. Ri-Neotypification of G.f.W. Meyerâ € ™ s 1818 Type exemplary of Â «Lemna punctataâ» Note: it is a taxonomic complex argument that involves many articles of the international nomenclature code for algae, mushrooms and plants (Melbourne code) 2011: available online at the ™ Address: . Daniel B. Ward (2011) presented an argument in favor of the names Landoltia punctata and Spirodela punctata with the previous name Spirodela oligorrhiza. In In In To make sure we are referring to the same species, Ward suggested naming this "Lesser Greater Duckweed" to avoid confusing it with the larger species of Spirodela (S. polirrhiza &S. intermedia) called "Greater Duckweeds." In this article I will simply call it LG Duckweed instead of Lesser Greater Duckweed. Ward's proposal provides for the re-neotyping of G.F.W.Meyer's 1818 type called Lemna punctaka which apparently has been lost. Ward has also proposed as a new type a different species that we now know as the intermediate spirodela. Ward, D.B. 2011. "Oligorrhizal spur (Lemnaceae) is the correct name for the Lesser Greater Duckweed." J. Bot. Res. Inst. Texas 5 (1): 197-203. Ward's LG Duckweed is the species we have called Spirodela (Landoltia) punctata in the current taxonomic literature. If the original name (basionym) punctated Lemna G.F.W. Meyer is re-neotyped by Ward using the native South American species Spirodela intermediate W. Koch (1932), then the names Spirodela punctata G.F.W. Meyer (Thompson) and Landoltia puncttata (G.F.W. Meyer) &S. Crawford will be applied to Spirodela intermediate and not to LG Duckweed. The genus Landoltia was based on DNA analysis of Ward's LG Duckweed (see below) and not on intermediate Spirodela. Therefore, the first correct name for LG Duckweed is Lemna oligorrhiza Kurz (1866) which was transferred to Spirodela oligorrhiza (Kurz) Hegelmaeir (1868). If a separate genre is created for LG Duckweed, Landoltia cannot be used. In July 2012, I received an e-mail from Dr. Thomas Rosatti, editor of the Jepson Handbook (2nd edition), asking for my opinion on the new typing of Ward. Since C.H. Thompson already neotyped this species as Spirodela punctata in 1898, Ward's regeneration should really be a "re-neotyping." As I wrote the section on ducks (subfamily Lemnoidea), adopt the of Ward would have involved changes to several related species. In July 2012, I expressed my opposition opposition opposition Ward's proposal on my LemnoMoideae online page on Wayne's Word. I also included a two-paragraph email from Dr. Elias Landot, Zurich stating his opposition to the proposed re-neotyping (see below). This quote can be verified on Internet Archive Wayback Machine DATED September 8, 2012. Spirodela punctata (Meyer) Thompson was named by C.H. Thompson in 1898 based on a collection of the expedition of 1938-1842 Wilkes, tagged the port of Orange, Tierra del Fuego. Whether this collection actually came from the tip of South America is debatable. Parentetic author G.F.W. Meyer previously described this species as Lemna punctated by a type specimen collected in Guyana, South America in 1818. Unfortunately, Meyer's original sample was lost. According to Ward (2011), LG Duckweed does not occur in the areas where these collections were made: the Tierra del Fuego collection was wrong and the Guyana collection was not LG Burinweed. Fullemore claims that the only native Spirodela in South America is S. Intermedia. Since the Meyer type type was lost, department re-neotyped the species as G.F.W. Meyer dotted lemna and designated S. Intermedia as type. Thompson's binomial is still punctalized spiridela (Meyer) Thompson; However, this no longer refers to LG Duckweed. Now it is the right pair for the South American Spirodela Intermedia. The correct name for LG Duckweed now becomes Spirodela Oligorruiza (Kurz) Hegelmaier, a name published by Hegelmeier in 1868. Hegelmeier apparently never saw the South American specimens discussed above, so his name is probably based on the real LG Duckweed. The 2011 neotyping of the Ward will make the Landoltia a synonym of Spirodela and is no longer available for the planned LG lemperia. Restoring the separate generic state for LG Duckweed now known as Spirodela (Kurz) Hegelm. will require the creation of a new genus name. The Binomial Spirodela punctata (Meyer) Thompson will now refer to the American species known as Intermediate Spirodel W. Koch. With the neotypification the name Landoltia becomes synonymous with intermediate Spirodela. E-mail from Dr Elias Landolt Second E. Landolt (Personal Communication, 2012), Ward's proposed change of name is unsustainable. This citation can be checked on Internet Archive Wayback Machine dated 8September 2012. "I think this problem cannot be solved definitively. The main problem is that it is not possible to decide which species Meyer was describing under the name of Punctuated Lemna. Of course, it must be a species of the genus Spirodela sensu side because © we do not know other species within the Lemnoid with pigment cells ("punctuated") The description of Meyer is very rudimentary. I did not find any specimens of herb harvested by Meyer. His description could concern Spirodela oligorrhiza, Spirodela intermediate or Spirodela polorrhiza. I collected all these species in North South America. The description fits best for Spila oligorrhiza because © Most individuals of S. oligorrhiza in nature have from 2 to 5 roots. Only very rarely and only in very young fronds show less then 5 roots. The score has been collected by Meyer in Guyana. On the other hand, S. intermedia t e is known by the nearby state of Suriname and is definitely ind Today S. scored is frequent in the r Regions of Rio and Sao Paulo, in Venezuela, Colombia and Ecuador. I collected S. polyrrhiza in Colombia and Ecuador. Although S. scored is introduced in South America it is not known in what year the introduction had It seems that S. Punta would have been easily distributed in ship from port to port and from "and with the bird to places within a continent." "I can understand that Thompson New guy for Lemna Punctata. The correctness of his decision is not contested. I checked Wilkes'collection into four different Herbars. It is clearly the species that is now called "punctuated". It is not important whether the material was collected in Orange Harbor or elsewhere. Poiche. © It is not possible and it will probably never be possible to decide with certainty the identity of Lemna Puntata is not advisable to change Thompson's correctly published neotype. If we change the type of L. Punctata again, we'll have terrible nomenclature chaos. Therefore, I am not following Ward's suggestion. "A. Pointed Landoltia (Spirodela punctata = S. oligorrhiza); B. Minute wood. The upper surface of pointed Landoltia is clearly punctured (which appears Pitta) In dead fronds these parts are presented as brown pigment cells composed of polymerised quinones oxidised polymerised similar to brown, oxidised phenolic compounds in apples and sliced potatoes. The punctured surface is without doubt the reason why G.F.W. Meyer originally called this species Lemna dotted about 200 years ago. Dorsal view of the sample of dried herbarium of Landoltia dotted that shows brown pigment cells (dots) in the subepidermal layer of the plant body (doted) The image was taken through an Olympus microscope with a Sony W-300 digital camera. Pigment cells are found in the plant bodies of other species of Spirodela. They are also in some species of Wolffie and Wolffiella, but not in Lemna. In fact, the punched species Wolffia Braziliiensis (previously W. dotted) It was originally called after these pigment cells or dot. Pointed Wolffia was also used for W. borealis, but the correct synonym is W. brasiliensis. Magnification 100x and 400x. South America Spirodela intermediate (insect) superficially similar to S. polyrrhiza in size, shape and number of roots; however, does not produce Turions. In fact, it does not occur in the cold northern latitudes. In addition, 2-5 roots pierce the ventral lobe of the basal prophyllum compared to only 1-2 roots penetrating the prophyllum to S. Polyrrhiza. Because of their larger size, Spirodela species are sometimes called Greater Duckweeds. Pointed heel is smaller and, in my opinion, more clearly pointed. INSET BY E. LANDOLT (1986): the family Lemstraceae- a monographic study. VOLUME 1. VEROFF! GEOB! Inst. ETH, Zurich 71: 1-566. My proposed neotyping of Ward by Ward is based on two primary points. (1) It is re-neotyping the lost type of Meyer with the name Lemna dotted; However, he is using Spirodela Intermedia as a type. It is impossible to know with the certainty of the 100% that the Meyer species was describing under the name of Lemna Punctata in the 1818. It could have been the "LG Duckweed" we know as Scored Landoltia (Scored Spirodela = oligorruiza spirit), or it could have been another kind of Spirodela like S. Intermedia. Why? © complicate this taxonomy on the basis of speculation. (2) The full analysis has clearly shown that Spirodela Punctata belongs to a separate genus (Landolti), otherwise the grouping of Spirodela with three species is paraphyletic. The trend of modern floras as as the second edition of Jepson Manual Edition (2012) is for consistent monopophilic groupings. The reintegration of the re-neotyping of the re-neotyping re-neotyping of the Ward's proposal by Lemna Punctata has been reviewed by J.H. WiersEMA of the USDA agricultural research service, national laboratory of germplasm resources, Beltsville, Maryland: Wiegerma, J.H. (2014), application of the name Lemna scored G. Mey. The type of Landoltia Les &D. J. Crawford. Vegetable biology. DOI: 10.1111 / PLB.12209. Here are the conclusions of Dr. Wiedema: "The re-neotyping of Lemna Punctata G. Mey G. Mey. Per Ward (2011) be rejected for reasons that have not been unequivocally established that the previously selected It differs atonomically from the original Meyer concept, nor that this notype is in a serious conflict with the Meyer's protoologist. St. Punctata and Landoltia punctata, both based on a punctata Lemna, remain the correct names in spirodela or Landoltia for the sometimes known species known as S. Oligorrhiza and the name S. Intermedia remains correct for a relative neotropic species. "194; 194; see another taxonomic counterly concerning the irregular type specimens194; 194; 160; 6. An updated key for the duckweed family The following indented dichotomic key separates the duckling family in five distinct kinds: a key for the Genus of lemnaceae ã, 160a. The vegetable body with 1 - different roots. Þ~ Ã, Ã, Ã, Ã, Ã, Ã, Ã, Ã þ~; 2a. Root one .... 16019; 194 ; 160; 194; 16064; 1604; 16019; 194; 160; 194; 160; 194; 194; b; 160b. Roots 2 -12. Þ~ Ã, þœ Ã, Ã, Ã, Ã, Ã, Ã, 1944 ;;;;; 19444 ;;;; roots 7 -12 (or more); the plant 10 mm long ...... Spirodela ã, 160; 194; 194; 194; 194; 19; ã, 194; 1948; ¯ 1944 ;; ;;;;; 1944 ;; roots 2 -3 (up to 5); the plant 3 -6 mm long .... Landoltia ã, 160b. A vegetable body without roots. þ~ Ã, Ã, Ã, Ã, Ã Ã Ã Ã Ã Ã î °; a. crushed vegetable body; 3 -10 mm long ...... Wolffiella Ã, 160; 194; 160; 194; 194; ã, 194; 194; 194b. Globose-ovoid vegetable body; 0.6 -1. 2 mm long .... Wolffia depending on the kind, the daughter plants are produced vegetatively in 2 sideways, flattened, sachets in pudding (Spirodela, Landoltia & Ugna), a sachet with a flat, triangular gut to the basal end (Fellala), or a funnel-shaped functions in the basal end (Wolffia). Each plant produces up to a dozen daughter plants during his life of 1-2 (or more) months. Daughters plants repeat the nascent history of their clonal parents, resulting in exponential growth. It is estimated that the Indian microscopy of Wolffia (Griff.) Kurz can reproduce moving every thirty hours in conditions of Optimal. At the end of 4 months this would result in about 1 non-illion plants (1 followed by 30 zeros) occupying a total volume approximately equivalent to the earth of the planet. Astronomical vegetative growth and the ability of some species to grow in stagnant and polluted water is the reason why some pedunna are suitable for water reclamation. Some species not only thrive on water rich in manure, but can be returned to livestock, thus completing the recycling process. In addition, some species (such as Wolffia) are a potential source of food for humans because they contain about 40% protein (dry weight) and are equivalent to soybeans in their amino acid content. (with high levels of all essential amino acids except methionine). Although flowers are rarely seen in some species, all ducklings bloom and reproduce sexually; However, some populations in small ponds may be clones of each other and unable to produce viable seeds. Since the flowers are usually protoogythous with the receptive stigma before the ANTHER is ripe, the plants must be crossed by genetically different individuals with anthers with mature pollen synchronizing with the receptive stigma. During the summer months, 2 stamens (Androecum) and one Pistil (Gynoecium), all enclosed in a schlike membrane flap, appear inside grass bags at the edges of the body of the plant at Spirodela, Landoltia and Lemna. In Wolffiella and Wolffia, a minute floral cavity develops on the top side of the body of the plant containing a single stamen and pistil (not enclosed by a spatona). The tiny bisexual flowers have no sepals or petals and are barely discernible without magnification. Because of the sweet (sugar) stigmatic secretions and cereal spiny pollen (covered with minute bumps), there is evidence that some species can be pollinated by insects. In fact, Lemstraceae Pollen has been detected on flies, aphids, mites, small spiders and honeybees on the surface of drugged layers. With the floral sex organs that from the surface or from the side grass bags, many catwalk species can be pollinated in contact as flowering individuals bump together or piled up together wind sails along the edges of ponds and lakes. The 7th. Identification of species Morphologically Simili Lemna minuta vs. L. valdiviana © flowers and fruits are rarely observed, most of the taxonomic keys of the Lemnaceae are based on relatively few vegetative diagnostic characteristics that can vary depending on different environmental conditions. This often makes it difficult, or in some cases virtually impossible, to precisely identify certain species. All North American species have been separated from their flavonoid point patterns using two-dimensional paper chromatography (see McClure & Alston (1966), Amer. J. Bot. 53: 849-860). It should be noted that flavonoid chemistry is not always reliable for taxon differentiation as © chromatographic models can be influenced by environmental factors (see Ball, Beal & Flecker (1967), Brittany 19: 273-279). In addition, R. Scogin of RSA and J.L. Platt of OSU studied two-dimensional chromatography on clonal populations of Lemna minute Kunth from San Diego County and provided models identical to those of L. valdivian Phil of McClure & Alston. According to Landolt (1987), the original clones of L. valdiviana studied by McClure & Alston could indeed have been L. minute. During the last century, the taxonomy of L. minuta Kunth was complicated by different names used by different authors. Many of the synonyms commonly found in literature include L. valdiviana var. minima Hegelm., L. minima Phil. ex Hegelm. and L. Minscula Herter. James L. Reveal (Taxon 19: 328-329, 1990) renamed the oldest L. minuta Kunth and clarified some of the confusion and controversy about this very common species. The plant bodies (fronds) of the Valdivian Wood are often connected in clusters from four to seven, and the nerve (vein) typically extends to 3/4 of the distance from the node (point of radical attachment) to the apex. The L minute, Required, it has a weak nerve that only extends about 1/2 of the distance from the peak node. When they grow up grow In full sunlight, the plant bodies of L. minuta are often only 2 mm long and are connected to clusters of two. One of the most difficult to identify in the field is the growth form of Lemna minuta found in shady habitats. The plant bodies are often connected in clonal clusters of four and are slightly longer than the typical L. minuta ones that grow in full sun. The shadow form of L. minuta can be separated from L. valdivisana by the size of the nerve. The dark nerve of L. minuta extends only about 1/2 the distance from the node to the apex. Veins (Nerves) and Air Spaces Dorsal view of Lemna validaviana with backlight, showing the reach of the nerve in relation to the node (point of attachment to the root) and apex of the plant body. The single nerve extends beyond the center to about 3/4 of the distance between the node and the apex. The nerve extends clearly beyond the region of air spaces (aerenchyma tissue). These characteristics exclude L. Minuta, at least the typical shape that grows in full sun. In L. minuta, the nerve rarely extends beyond the aerenchyma tissue and only extends about half the distance from the node to the apex. These may appear to be relatively minor morphological differences, but DNA sequencing studies clearly separate these two closely related species. General shape and extension of the nerve in Lemna valdivisana compared to L. minuta. L. valdivisana plants are connected in clonal groups of four or seven, whereas L. minuta plants are typically connected in two. Each daughter plant is connected by a short stem (style). Note: Sometimes placing difficult species in an observation vessel and examining them for several days can be helpful. Digital images can also bring out subtle differences. The following ducks were photographed through a sectioning microscope with a Sony backlit digital camera: three ducks from Pinnacles Monument in central California. A. Lemna minor: three veins deriving from the point of attack to the root (N), without back to the back of papules and reddish anthocyanin on the ventral side (as in L. Turionifera) and without winged root sheath (like in L. aequinoctialis). B. Lemna Valdivisana: a weak vein that extends more than 3/4 remote from the root node (n) to the apex (red arrow), a very thin and transparent plant body in everything and floats up or just below the surface Water (sliding under the vegetable bodies of L. Minor and L. Minuta in an observation vessel). C. Lemna Minuta: a vein that extends less than 2/3 from the distance of the root node (n) to the apex, a vein that n on extends beyond the larger air spaces region (red arrow), the Slightly thicker plant body in the center (not evenly subtle and transparent as L. Valdivisana), small size (only 1-2 mm long) or larger when they grow in the shade, floating on the water surface (not submerged as in L.valdivisana). Photo taken with background lighting. Ventral view of Lemna Valdivisana showing a single vein that extends 3/4 of the distance between the node (point of attack to the root) according to Landolt, this is one of the most reliable characteristics to separate it from L. Minuta due to the variability of these Two species in different conditions of growth. This sample has been put on a microscope slide with a cover and photographed slide through a Bausch & B microscope with a Sony W-300. T The airchyma fabric is better when all the water under the cover slide allowed to dry. The image was reversed to a "negative" with Photoshop to show the scope of the vein. Use the row of papules to separate Lemna Turionifera by L. Minor another difficult group of ducks is Lemna Turionifera and L. minor. L. Turionifera has three main veins and is superficially similar to L. Minor and not Gibbos L. Gibba. It differs from L. Minor and L. Gibba in a row or F 3-7 minutes papules along the line of the dorsal surface. It also differs from L. Minor developing reddish anthocyanin on its lower part, starting in the region around the root. What really sets this this in addition to other duck algae is the presence of winter turtles without roots in the autumn months. These are listed as "winter gems" in the Jepson Manual of California Plants (1996). L. turionifera appears to be more common than L. minor in San Diego County. It generally replaces L. gibba in heights. Unfortunately, red anthocyanin and turrets are not always present, so it is necessary to rely on the row of papules along the median line of the dorsal surface. This can be difficult to see, especially on dried herbal specimens. Ideally, herbal samples should include field notes on the presence of a dorsal row of papules and red anthocyanin on the ventral surface. With a little practice, these traits can be observed with a manual lens. On the left: Ventral view of the Turionifera Wood with stains of red anthocyanin, especially in the radical region. L. minor is not typically suffused with red anthocyanin. Nongibbous L. gibba generally lacks the backrow of papules and often develops anthocyanin on its upper side. To the right: Back view of L. turionifera showing the middle row of minute papules. L. minor generally does not have a distinct row of papules, even if it may have minute apical and/ or nodal papules. A. Turquoise wood from Moose Lake, Minnesota. The plant body has a distinct median line of dorsal papules and is suffocated with red anthocyanin. B. Lesser wood (apparently) from Clearwater Lake. There's no middle row of dorsal papules and no red anthocyanin. Some plants identified as L. minor had a minute apical papula. Landolt, E. 1975. 'Morphological differentiation and geographical distribution of the group Lemna gibba-Lemna minor.A'Aquatic botany 1: 345-363. Approximate view of the Turionifera Wood through a 20x manual lens. Without turrets and red anthocyanin on the lower side, it is difficult to distinguish this From L. Minor. In fact, once they were named L. Minor I and L. Minor II, respectively, by Landolt. Both i are common in North West America, although L. turionifera can be more common, especially in the colder regions. This view shows the characteristic middle line of minute papules on the upper surface (dorsal). L. minor typically has a smooth surface without any more papules lined up. The papules are quite different on fresh samples, but the dried specimens must be hydrated. The term "boom" rather than papules in the Jepson manual is unlucky. Eight. Importance of rear lighting for Duckweed identification When identifying duck species (in particular Lemna, Landoltia and Spirodela), it is very important to see the bodies of the plants with rear lighting (substantial lighting) to see the number and extent of the nerves. With a good 10x hand lens this can be achieved by holding the plant's body against the bright sky. Backlighting is also crucial to see the stretch of the stretched cells (coast) in Wolffiella's pocket arriving. The cost position inside the triangular pocket is very important to distinguish between W. lingulata and W. oblong. Illustration of Wolffiella lingulata compared to W. oblungo. With the rear lighting you can observe the shape of the pocket in motion and the relative position of the coast. In W. Language the bowel angle is 80-120 degrees, with the coast located between the center and the edge of the lower wall of the pocket. In W. oblong the corner of the pocket in grass is 40-70 degrees, with the coast located along the edge of the lower wall of the pocket. Without retro-lighting under a microscope or a good quality hand lens, it is virtually impossible to see these characteristics. Illustration modified by W.P. Armstrong's photos. 1993 Limnaceae. In the California Higher Plant Jepson Manual, J.M. Hickman, Editor. University of California Press, Berkeley, California. Dorsal view of Lemna turionifera. Image It has lighting from above and below. The right image has only one substance To observe the number and position of nerves, it is best to use only the lighting of the supports. The lateral dark bodies at the base of the mother plant are overhanging starch-filled bodies called Turions. Since the specific gravity of the starch is about 1.5, the tutions sank to the bottom of streams and quiet ponds during the fall where the frozen winter months survive. In spring when temperatures are once again suitable for growth, the tutions produce carbon dioxide bubbles and rise to the surface. They give rise to plants from budding daughters, and soon the clonal colonies of this remarkable duck cover the surface of the water once again. Without tutions, it is sometimes difficult to distinguish this species from the related closety L. Minor. The dorsal surface of L. Turionifera has a row of minute papules along the median line that are absent at L. Minor. In addition, patches of reddish anthocyanin sometimes develop on the ventral surface of L. Turionifera, which are absent from the lower part of L. Minor. At L. Turionifera, the largest (widest) distance between the 2 lateral veins is near the center or higher (distal). In the image above it is so close to the midpoint that this feature is not useful. Transparent view of Lesser Lemna from Clearwater Lake, Minnesota. Another characteristic used to separate Lesser Lemna from L. Turionifera is the relative position of the greatest distance between the lateral veins (internal lateral veins): at L. Minor the widest point is near the center of the veins or below (proximal). A L. turionifera is close to the center or higher (distal). Since the widest distance can be close to the center of both species, this stretch is not always useful. Images of Lemna Turionifera See the image of Lemna Minor in these high-tech times, as botanical research moves towards a molecular emphasis, it is very important to have samples verified by Taxonomom. It is also imperative to have carefully prepared the voucher voucher samples In a nationally recognized herbarium. Modern molecular techniques, such as DNA sequencing, can lead to a better understanding of these fascinating species. 9. Photoperiodism in the Family of Protection Although some species of the Lempinza are superficially resemble, they can have significantly different biochemical models, such as a completely different photoperiodism in response to the length of the day (hours of obscurity). During the hours of daylight the protein leaf pigment â €

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