

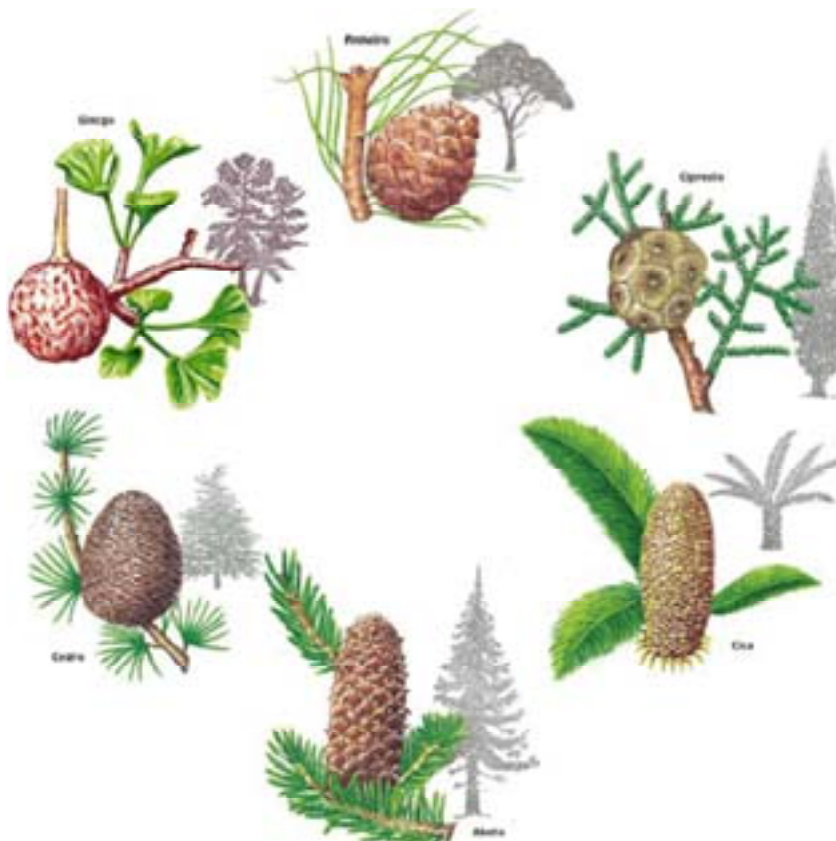
GIMNOSPERMA

META

Apresentar as Gimnospermas, incluindo os grupos extintos e vivos, destacando suas estruturas

OBJETIVOS

Apresentar as Gimnospermas, incluindo os grupos extintos e vivos, destacando suas estruturas



(Fonte: <http://www.algosobre.com.br>)

=B HFC 8I uÈC`

5 dYgf XYdc Xfa cgYbWbhUf YffcbYtá YbhYbU]bhmfYhWU” YggVfYU dYfYb, UXYÚcfYgYUha Yga c XY]bÚcfYgMbW]gXi fubhYUdfYgYbU -c Xc` VWc XYj]XUXgY[fi dcZj UYUdYbUXgUWf ei Yg-c d'Ubh]gei Ydcgg Ya` gYá Ybhg'bi Uğb-c` YbWfUXg fdfch]]Xg'dYc`cj z]cZdcf`]gg`c`bca Y ei Y`YZ]WbZf]Xc.; ja bcdYfa Ugei Yg] b]UW] gYá YbhYfYfa U.Ybi U f] ja bcĥ "8 YggUzfa Uğfi a [fi dc WfUWf]nUc dYUdfYgYb, UXYgYá Ybhg' YU g bWUXYÚcfYgYZi hcgY]bWYá z]f cfYgWá c`cgd]b\ YfcgçgVdfYgYg YUgYei c]Ugei YHá Vfa]bWYá Uga UgUHgYUbh] Uğz] cfYg`

A UggYgUgdUbh]g-b-c`dcgg Ya` ÚcfYgWá c`f Ybhc`ei YgYXz`UfY dfcX, -c XgggYgd]Wg9a fYU -c Ucg] fi dcg] Y] YUg] cWgXY Ya` Ya VUf` ei YXgY6f]CĤgZDf]XĤgUfYWY]Uf{g; ja cgdYfa Uğ Ya` U a YbUbc` c b] YXYUdU -c { j]XUhfYgY`A i]h]gbcj]XUXgY`c i h] UgdUfWá Ya` ; ja bcdYfa UğYfgVY]gg`ei YfYá cghUf]bYgUU` UğcVYUdfYgYb, UXcg YgfC]cgfa]Mc Ya` Y] UZUzfa U -c Xc [f-c XYdCĤb]Uá YUÈc`a U]W]bcZ UZfa U -c Xc`C]i`c`f]Uá YUÈc`Zá]b]bcLYUZfa U -c XYgYá Ybhg`

As plantas com sementes desenvolveram sementes expostas (nuas) ou YbWdg`UXg`I a UgYá YbhYfZfa UXdYUa UihU -c Xc`C]i`c`UdC]UZf] h]nU -c/c`C]i`c`Wbha`c [Uá YUÈc`Zá]b]bcWá Ug UWY`i`Ucjcz]á Vg Ybj c]]Xg'dcf]h]i a Yb]gei YZfa Uá`i a UWgWXYgYá Ybh`C`g`C]i`c`g`g-c`Zfa UXcggVfYa Y] UgdcfUcgci`Ygfi hi fUgUz`c [Ug`8 UXcg]bhYg` gubhggVfYgY[fi dc XYdUbh]gg-c`ei YUgYá YbhggYXgYbj c] Ya` Ya` YgfC]cgci`WbYgYá Wá dUfU -c Wá`cgZi hcgdfch]cfYgei YYbj c] Ya` UğYá Ybhg`dfcX n]Xg`dYUg`5 b]]cgYfa Uğ`5`fa`XggZ`Udc`]b]nU -c`f`Z]UdYc`j Ybhc`ci`]bgYcgdci`W`YgYWU]nUXcgfYgci`fcg`J Uá cgYbhc` conhecer um pouco mais sobre as Gimnospermas? Um detalhamento sobre UWFUWf]nU -c XgY[fi dc Yg Uğbcj]XUXgY`c i h] UgfZcfbW]Xc`UgY]i]f`



F]á c XYWdfYgYa cgfUbc`Z`UgfYXi n]Xg`YgfC]cgZá]b]bcgYa U]W]bcg` (Fonte: <http://www.nucleodeaprendizagem.com.br>)

As plantas com sementes, em sua totalidade possuindo tipicamente a Y|zÚcgf|YUa YbhZc\Ug| fUbXgWa j z|UgUa i |Hgbyfj i fUgdcXbXc` gYfa cX|UWUgYa UWU|Ugci YGWA UgYa U|i bg| fi dcgZ" |bWYa VWV` ÚcgWa fYdfYgYb|bhg| j Ybhg Ug7nWXcd\hZUg; |b|_cd\hZUg7c! b|Zfcd\hZUg; bYcd\hZUg5bcd\hZUg Úc`5bcd\hZUgWa dfYbXY Ug5b| |cgdYfa Ugfti` d'UhgÚcfZfUgLYcgei Ufc ÚcgYa UYgWbhgg-c` frequentemente reunidos em um grupo chamado Gimnospermas.

5g; |a bcdYfa Ug-b-c Wbg|h Ya i a U|b\Uy`c i hj Uei YgYUei j U`Ybh{g5b| |cgdYfa Ug`9a j YnXggzUg; |a bcdYfa Ug`fYdfYgYb|a i a U gff|YXY`|b\Ug`Y`c i hj Ug`XY`d'Uhg`Wa` gYa Ybhg`b|g`ei Ug`Z|h`a` Ug` WUWUf|g|Wg`X|g|h|j Ug`X|g`5b| |cgdYfa Ug`9a VcfU`UUdYbUg`VWXY` , +SYgdfMgXY; |a bcdYfa Ug`j |j Ug`Wa`d'fUg`Wa` &)"SSSYgdfMgXY` 5b| |cgdYfa Ug`XYmfa |bU|g`YgdfMgXY; |a bcdYfa Ug`g-c` Wa` i a Ybh` Xca |bUbhg`Ya` z'fUg`a i |h`'a`d'Ug`

Gy`gYdfYgYb|bhg`dcgg`Ya` \zV|hcg`Vg`h|j`Uf|zj`Yg`Xg`Y`zj`cfYg` Vg`h|Y`Xg`Y`j`c`j`|Xg`Y`f`a`|UWUg`Wa`c`fc`Wg`c`Xg`d|b\Yf`cg`Uf`cg` Uf`i`g`c`g`Y`f`Y`g`Y`b|bhg`Wa` W`Y`g`Vhff|bYc`"

Principais representantes

5g; |a bcdYfa Ug`f`bYa` |fUbXYb`a` Yfc`XYg`|Mg`UVCeUg`Wa`c`Ug` Wb|ZfUg`YbhYUg`ei Ug`U|i a Ug`! Ug`g`ei c|Ug`! g-c`Ug`a`UcfYg`Ya` Ug`cb|Y`Ug` zj`cfYg`Xc`d'UbYU`C`i`hUg`g-c`Uf`i`g`c`g`Yi`a` Ug`dci`Wg`|Ug`Y`M|Cg`5g`Zc` \Ug` X|g` |a bcdYfa Ug`g-c` Ya` |YU`d'Y`b`g`Y`Wa`c`Z`|VU`X`U`h|f`c`f`a` Y`b`Y`d`c`X`a` ter aspecto acicular (pinheiros, abetos etc.), escamiforme (ciprestes) ou lobulado fl|b|_clzci`U`b`X`U`g`U`g`Ya`Y`U`Ya` {g`X`g`d`U`a`Y`f`U`g`f`U`W`X`W`U`g`7`Y`h`U`g`z`j`c`f`Y`g` Wa`c`cg`|b|_cg`Ycg`Uf`|,cg`g-c`XYZ` \Ug`W`X`W`g`5`g`Y`f`i`h`f`U`g`f`Y`d`f`c`X`i`h`j`Ug` ha`U`Z`fa`U`X`Y`W`b`Y`f`i`g`f`c`|cg`Ya` `a`i`|H`g`Y`g`f`M`g`W`a`c`bcg`d|b\Yf`cg` U`W`h`c`g`Y`W`f`cg`c`ei`Y`cf`||b`ci`U`X`b`ca`|b`U`-c`X`Y`W`b`Z`f`U`g`



Pinus



Ephedra



Zamia

: ||i fU%|`9l`Ya`d`cg`XY`zV|hcg`Ya` ; |a bcdYfa Ug`

7UFUMf]nU ~c'a cfZc`Q]W]j Y] YU]j U

5gZc`UgbyY[fi dc hã Vfa `g-c Vg]ubhYX]j Yfg]UWUg]j Uf]Ux`c XY grandes como em Cycas, pequenas e aciculares em Pinus, pequenas e escamiformes em Gnetum, e aciculares em Pinus, pequenas e escamiformes em Gnetum;]b[_c`V]cVU` Cg]bX]j Xi cgXYK Yk]hW]Ug-c'a i]hc`dYW]UfYg]dcgg Ya` Uf]YbUgXi Ug folhas e um meristema intercalar entre elas que proporciona o crescimento]bX]U]Xc`XgY`Q]~c"5gZc`UgXY; bYi a`dcgg Ya`]a Vc`Yi dU]X]c` YbYfj U" YgfY]WU]gã i]hc`gã Y`U]bY`{gZc`UgXY9i X]W]j YX bYUg`



:]]i fU&! 8]j Yfg]X]YX]Zcfa U]Zc`]UfYgã ;]a bcg]Yfa U]ZbUg]WU]ZcWUg]f]b' 6Ez;]b[_c`V]cVU (C), Gnetales (D - E) e Pinus (F). FONTE: Simpson, 2006.



Cycas



Chamaecyparis



Ginkgo



Welwitschia



Cycas

: || i fU' Ĩ 9l Ya d'cgXYXj YfgXLYXYhdcgYZfa UgXlgZ`UgYa ; ja bcdYfa Ug

75F 57H9F =N5uÈC `A CF: C @ê ; =75`

REPRODUTIVA

ESTRUTURAS REPRODUTIVAS

5gYgfi h fUgXYfYdfcXi , -c Xlg; ja bcdYfa UgYg+c YbWffUgYa . Ygfi h fUgXYbca lbUgYgfcV]cgUgei UgdcXYa gyfa]McYgfcV]cgci` a YlUgfcV]cg`CgYgfcV]cggc`gYa dfY UhfUgUdYguf XY Ya `U[i a Ug 7nWUYgdUfYMYa `hfa]bUg`CgYgfcV]cggc`gYa dfY i b]ggY i Ucgz Wa U`b]WMW , -c Xlg6YbbYh]UgZ[fi dc Zgg] Xlg7nWcg]XZcbXY YLa `VggY i Ucg`B Ug7nWcdg]XZcgYgfcV]cgYg+c Ya `dUhggydU radas em Cycadales, ocorrendo o mesmo nas Ginkgopsida em Ginkgo, e nas Gnetopsida em Gnetum, Welwitschia e na maioria das Ephedra. As D]bcdgXUdcXYa gyf YlWgj La YbhYa cbCfMgWa cD]bi g`dioicas como DcXcWfdi gci `X]CfMgYmonoicas como Araucaria.

: cfa U`-c Xc [La YCÈhc`a UgW]bc flf`-c XYdCEbL

5`dUhf`XY; ja bcdYfa UgUdUblUdfcXi nYfyfa `c Ygdcfc`Xyblfc` XYU`9ggYgdcfcgb`-c gyf`-c `Ub, UcgUc j YbrczUMf`-c Xyblfc XcgYgfcV]`cga UgW]bcg`E i Ya `gyfz`Ub, Ucg`dYc j Ybrc`fc [f`-c XYdCEb"

C Vgfj Yei YUf`Dhf`XCEhM]ghU i a Ygfi h fUWLa XUUbhf`Xc`ei Y

Dioica

Rrcpw"ó" F k /ug"fc" gur² ekg"qpf g"i"qtgu" estritamente masculinas e estritamente femininas ocor- tgo "go "kpf k`f wqu" ugr ctcf qu."kuv"²." existem em plantas òo cej quò" g"r rcp/ vcu"òh' o gcuò0Eqp/ vcr ,g/ug"cq"vto o q" r rcpw"o qp»lec0

Monoica

Rrcpw"ó" F k /ug"fc" gur² ekg"qpf g"gu/ truturas dos dois sexos ocorrem na mesma planta em flores unissexuais separadas ou mesmo pc"o guo c"i"qt"qt" cpf t»i kpc`0`Qr quqv" c"i"qt"fl»lec0

formava o gameta masculino que era o anterozoide. De Gimnospermas em X]UbYb-c h'a 'a Ug]Ubhf]Xc' bYa 'Ubhfrc:]Xzc' ei Y'z' U cfUf'c' [f-c' XYdCEB" J Ua cgj Yf'Wa c'c' [f-c' XYdCEB' fZfa Ux3

8 Ybfc' XY W]U YgWa U Xc' YgfCE]c' a U]W]bc' Yl]gha' W]i Ug' WLa U]Ug'W]i Uga -YXc' a]M]G]dcfc" 9g]Ug'W]i Ug'Ha Vfa 'dcXa' g]f' WLa U]Ug'XYa]M]G]dcfc]W]cg" D]fW]Ua 'c bca YX]g]UW]i U'W]i Ua -Y Xc' a]M]G]dcfczci 'g]U]Z]Uj U]Zfa Uf'c' a]M]G]dcfcz'c Yg]dcfc' a U]W]bc"

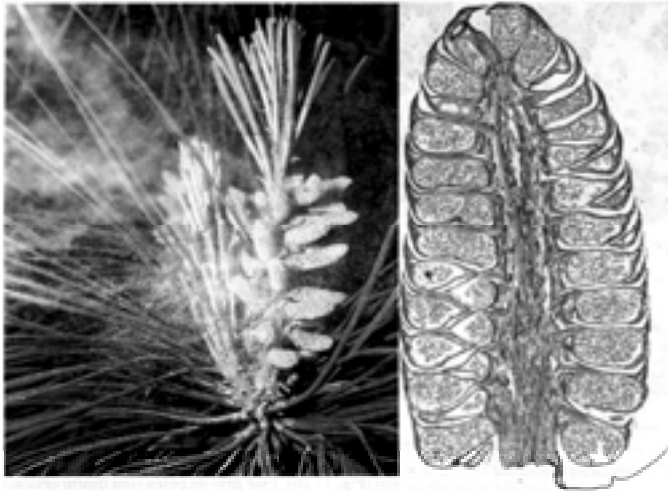
Conforme foi citado anteriormente a partir de Gimnospermas os es-dcfcgb-c g]f-c "Ub, Uxcg]Uc j Ybhc" 9a '6f]CE]hg]YD]Hf]XCE]hg'cW]n]La cg' cgYg]dcfcg]Wa Z]W]X]U]Y]dcfei Y]g]H]g] [fi dcg'Ub, Ua 'cgYg]dcfcg]Uc j Ybhc" 5 d]U]H]f'XY;]a bcg]Yfa Ub-cz]Ud]U]H]U]dcXi nic Yg]dcfc Yf]Yha 'c Yg]dcfc' X]b]fc XYUC Yg]dcfc dcf'g Uj Ynj U]Zfa Uf'c' [Ua Y]CE]hc X]b]fc XYU]b]X]Z YUb-c 'Ub, Uc Yg]dcfc Uc' j Ybhc" 9bh-c'c' ei YU]W]b]H]W]f'ei Y]g]Ug'W]i Ug' a -YXc]ga]M]G]dcfcg]Z]h]Ya Ua Y]cg]Y]Y]Wa]gg' dcfXi n]Ya 'c]ga]M]G]dcfcg]Z' ci 'g]U]Z]cg Yg]dcfc]ga U]W]bcg" 9gg]Yg' Yg]dcfcg]U]M]f-c X]b]fc Xc' YgfCE]c' masculino. E de acordo com o ciclo geral dos vegetais quando o esporo se X]g]b]j c] j Y]Y]X]z'cf]]Ya 'Ui a' [Ua Y]CE]hc]z]f]]gg' ei Y]j U]U]W]b]H]W]M" 9gg]Yg' a]M]G]dcfcg]j -c Ybhc' Zfa Uf'c' [Ua Y]CE]hc' a U]W]bc" G]C]ei YUd]U]H]f'XY []a bcg]Yfa U]g'c' [Ua Y]CE]hc' a U]W]bc' f'c' [f-c' XYdCEB"

A =7FC 9GHF ê 6=@C G'CI '9GHF ê 6=@C G'

MASCULINOS

9a 'lcXcg'cg [fi dcg]g'c' W]bg]h]i Xcg dcf' i a 'Y] c]z]Uc' ei U' Y]g]h-c' d]f]Yg'cg]ga]M]G]dcfc]U'cg]z]c]gei Ugg-c' Zc' \U]ga cX]U]M]U]gei Yg' g]h]b]h]a' 'c]ga]M]G]dcfc]b]]cg' B Y]g]H]g'c' dcfXi n]Xc]ga]M]G]dcfc]g]Z'ei Yg]Y]h]f]b]Ua 'b]U a U]h]f]U -c'cg [f-cgXYdCEB" 8 Y]]Xc' U]Y]g]Ucf] [U]n]U -c]z]cg]a]M]G]Y]gfCE]! 'cg'W]bg]h]i Ya 'YgfCE]c]cg]ga d'Yg]z]dc]g]W]U]a]M]G]dcfc]b]]c' Y]g]z' d]f]Yg' U U]Y]b]U]g]i a 'a]M]G]dcfc]U'c"

Bc']b]h]f]cf' Xcg]a]M]G]dcfc]b]]cg' X]Z]f]Y]b]W]La !g]Ya i]h]U]g'W]i Ug' X]d] 'c]X]g]U]g'W]i U]ga -YXYa]M]G]dcfc]g]Z]U]gei Ug' U]d]CE]g]c' Z]Y]Ya 'a Y]cg]Y]X-c' cf]]Ya 'Ui a U]h]f]U]X]Y]h]f]U]X]f]W]XYa]M]G]dcfc]g' \U]f'c]X]Y]g]Y]i b]W]i 'U]Y]g' 8 i f]U]b]Y]g]i X]g]b]j c] j]a Y]b]c]z]Y]g]g]ga]M]G]dcfc]g]c' Z]Y]U]a 'a]h]cg]Y]cf]]! b]U]a i a U]Y]g]f]i h]f]U]bc' a]b]a c']W]Y]i U]f'c' [f-c]X]M]dCEB]ci a]M]c' [Ua Y]CE]U]hc" 9a D]bi g]c' a]M]c' [Ua Y]CE]hc' f'W]bg]h]i X]zb]U]f]dc]W]X]U]]W]f]U -c]z]d]Y]U]g' X]i U]g'W]i Ug' d]f]U]f]Y]g]z]d]Y]U]W]i U] [Y]f]U]X]c]f]U]Y]d]Y]U]W]i 'U]Xc' h]i Vc"



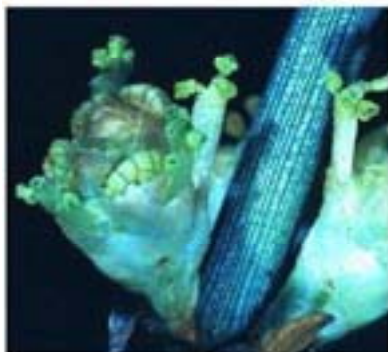
: || i fU(Ì Ç Ygei YFXZygfCE]c'a UGw]bc XYD]bi gfUX]UU]VfUbxç [f-cgXYdCEbz{ XfY]HÉWfH'`cb]]h X]bU`XYi a`YgfcV]tçza cdfUbxç'a]McgdcfCEcgYa]Mcgdcf]b]]cgZwbHbXç'cg[f-cgXYdCEb": cbhY F]jYb'8SS) "

Estruturas reprodutivas masculinas



Pinus

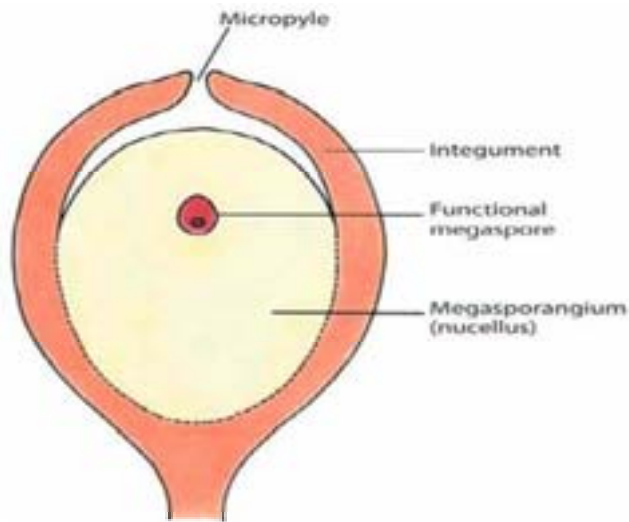
↑
Padrão mais comum !



Ephedra

: || i fU) Ì 9I Ya d'cgXY'Ygfi h fUgfydfcX] hj Uga UGw]bUgYa ;]a bçg]Yfa Ug

: cfa U~c'Xc' [Lā YŪĒĥ Zā]b]bc' fŪĒi `cgĒ.
 Ci hfUbcj]XLY'XY;]a bcg]Yfa Ūg'f'UZfa U~c'XYi a UYgfi h fU
 XYbca]bXUŪĒi `c"9a j Y]YUg'c' [Lā YUZA']b]bc' f'UccgZfU"
 ê j i `c'fc'a Y]Ug'cf|b|]c'fY'Yg]X'c' dcfi a Uci X' Ūg'Wā U]g'XYHW
 Xcg"5' dUj fUŪĒi `c'g'YfZfY' { Ygfi h fUei YUf] [UccgZfU"
 8 Ybfc' XYWU Yg'Wā Uxc'a Y]Ug'f'ŪĒi `c' \Uj Yfz'c' ŪĒi `c"8 Ybfc' Xc'
 ŪĒi `c' dcf'g' Uj Yn \Uj Yfz'c' A Y]Ug'cf'ŪĒi hā Vfa Wā Uxc' XYW'i Ua ~Y
 Xc'a Y]zgcfcz'ci 'g'YUW'i Ua ~YXc' Ygdcfc' Zā]b]bc'"C' dcf'Wgg' j Uj g'Y
 fYdYfz'UW'i Ua ~YXc' Ygdcfc' Zā]b]bc' j Uj Zhf'a Ycg'Y"5' a Ycg'Wā c'
 j cW'g'UW' [YUei Ufc' W'i Ūg'za Ūg'X'g'g'ei Ufc' hf. gj ~cg'YX] YbYf'Y
 ŪWUdYbUgi a Uei Yj Lā cgWā Uf'X'Y'a Y]zgcfc' Z bW'cbU"C' a Y]zgcfc'
 Z bW'cbU' f'c' Ygdcfc' Zā]b]bc'"9gg'Ya Y]zgcfc' Z bW'cbU'j Uj dcf'a]cg'Y
 Zcfa Ufc' [Lā YŪĒĥ Zā]b]bc'"B c' [Lā YŪĒĥ Zā]b]bc' XY;]a bcg]Yfa Ūg'
 j Lā cg]hf'c' Ūfei Y' b]c' YXbfc' Xc' Ūfei Y' b]c' \Uj Yfz' UccgZfUei Yf'c'
 gameta feminino.



:]i fU* ĩ Dfhg'Xc' ŪĒi `c.: cb]Y' Fj Yb' &S)"

1. Tegumento
 &"A]ŪĒĒ]U
 ' "Bi Wc' fa Y]Ug'cf|b|]c'L
 ("A Y]zgcfc'

: 97I B 85uĒC

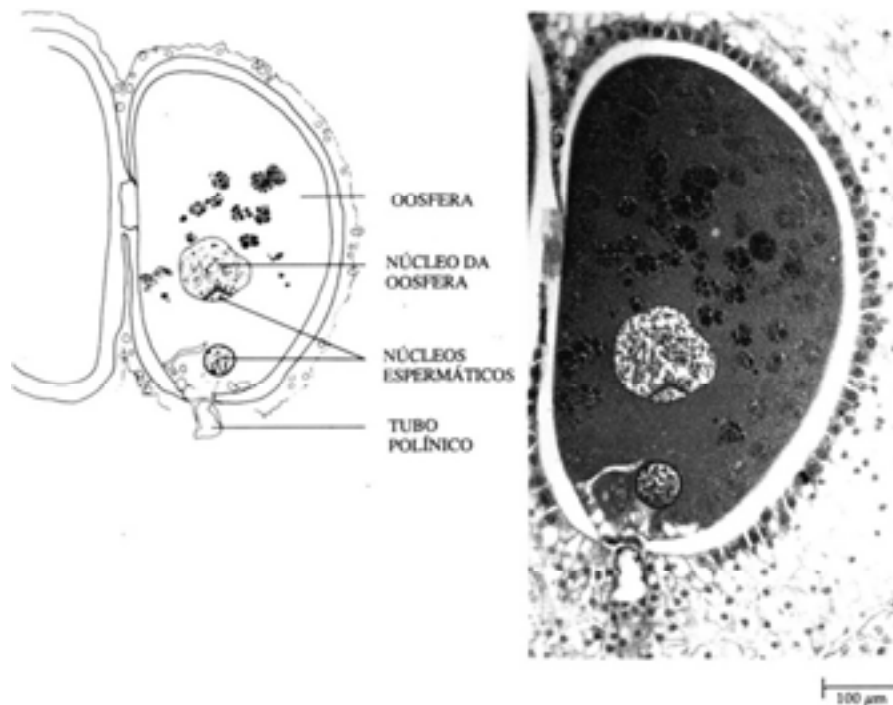
5 [cfUei Y'zj]a cg'UZfa U~c'Xc' [Lā YŪĒĥ a Ūg'W]bc' YXc' [Lā YŪĒĥ
 ŪĒĥ Zā]b]bc' dc'Xā cgj Yf'Wā c'c'WffYUZfWbXU~c"

9a ; ja bcdYfa Ugc hfUbgdcfHYXc [f-c XYdCEMb Uhf c [Ua YdCEhc ZYa]b]bc gYXz dYc j Ybhc "9gUdc]b]nU ~c dYc j Ybhc fWLa UXUYdc!]b]nU ~c UbYa CEU"

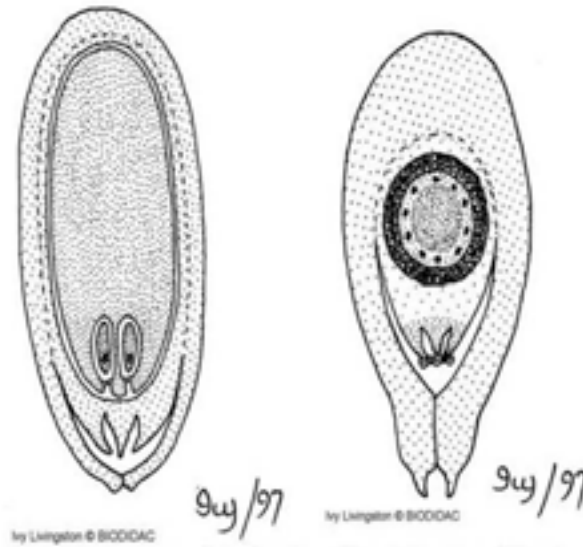
I a Uj Ynei Yc [f-c XYdCEMb W]bUa [MCE] Uzei Yfi a UdYei YbUUM Yfh fUei YdYfa]hfz UZWMbXU ~czYYXgYbj c j Yc hi Vc dc]b]W" C dUdY Xc hi Vc dc]b]W f hfUbgdcfHf c b•Wc YgdYfa zhW Uhf UccgZFU 9bhac j YUVYa žc [f-c XYdCEMb W]bUa [MCE] UYXYgYbj c j Yc hi Vc dc]b]W ei Y Y Uc b•Wc YgdYfa zhW Uhf UccgZFU C b•Wc YgdYfa zhW Ybhc ZWMbXU UccgZFU 9gU ZWMbXU ~c "Y Ule XYgYbj c j ja Ybhc Xc Ya Vf]-c" Dcf g Uj Yzi a Uj Ynei YUZWMbXU ~c cWffY žc Cei c gYXYgYbj c j YYa gYa YbhY 9gU fci hfU [fUBXYbcj]XUY c i hj UXc [fi dc. UZcfa U ~c XY gYa YbhY 5 dUfhf XY; ja bcdYfa UgUZWMbXU ~c f]bXydYbXbHYXUz[i U ~gg žc]i a ZUcf ja dcfhUbggla c dUFUUXUdHU ~c Uj]XUhfYgfy C ei Y Y ci Ug; ja bcdYfa UgUhfYa i a UZWMbXU ~c]bXydYbXbHYXYz[i UB C XYgYbj c j ja Ybhc Xc hi Vc dc]b]W"

Ci hfUei Yhc a i]hc ja dcfhUbhZc]UZcfa U ~c XUgYa YbhY 5 gYa YbhY hfUj UbHU Ybg]b]W Ylg dfchY Yc Ya Vf]-czWffY Ubi hf]YbhgZUM]HU Xgdfgc Y fWdUhfXYXcfa .bVU

Foto 'pelc'
i "wo "r gt"qf q"pq" ciclo de vida de um organismo no qual o desenvolvimento gpvq"2"vgo r qtctk/amente suspenso. Ela minimiza o gasto gpgti 2 vkeq."r qt"tg/duzir a atividade o gvd»nec."g"r qf g" auxiliar um organismo a conservar gpgti k0'Fqto 'pelc" guv" "pqto cno gpvg" associada com as eqpf kzi gu"co dkgp/tais. Os organismos podem sincronizar a entrada em uma fase dormente com o seu ambiente por meios preditivos ou consequenciais. Fonte: <http://pt.wikipedia.org>.



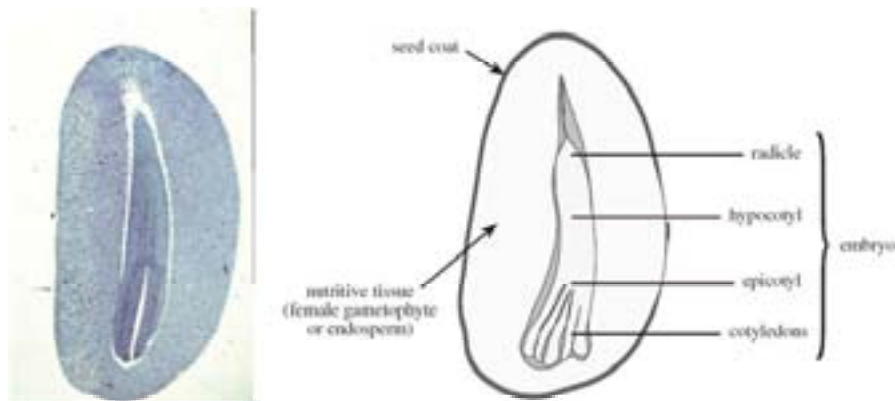
:]i fU+I : YMbXU ~c Ya D]bi g I b]-c XYi a b•Wc YgdYfa zhW Wa c b•Wc XUccgZFU C g[i bXc b•Wc YgdYfa zhW fUVU] cLb-c fZ bV]bU/Y Y]fz gYXYgYbj fUf": cbHY FUY Ybz&SS) "



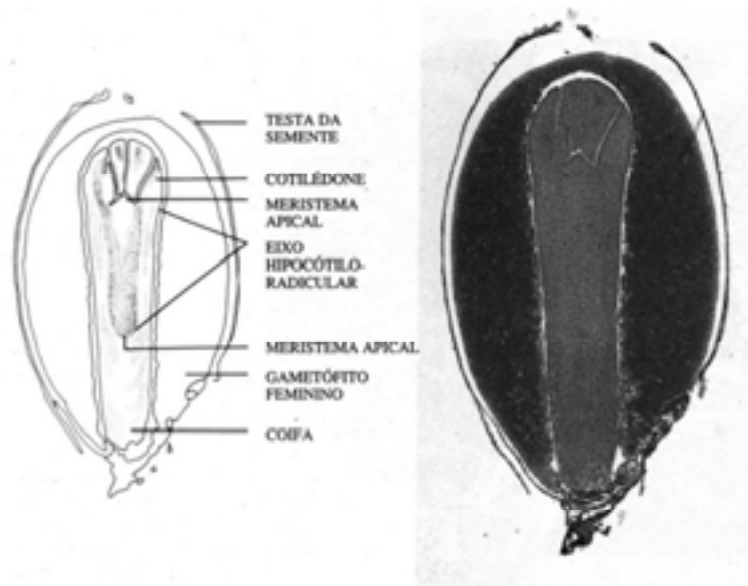
:]]i fU, !8 Yĥj c] ja Ybc Xc [Ua Ycĕc Zā]b]bc Ya D]bi gĥ Ygei YXLĕi ĥa c Yĥz]]c Xc Qĕi c' XYD]bi gUĕ G]UZĥ]]nU -c f' X]f]ĥĕ": cbĥY \ĥd.#V]c X]X]W]c'i chĥk UW

SEMENTE

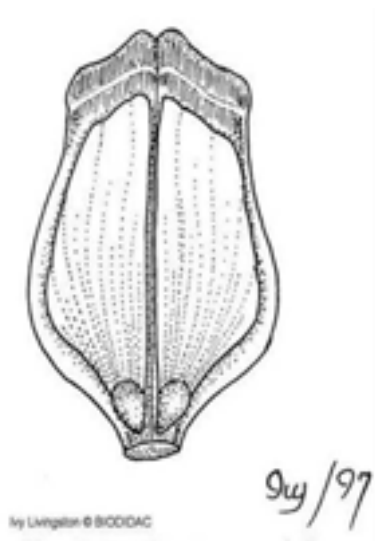
A semente madura nas Gimnospermas apresenta externamente a ma-
 bi ĥb, -c' Xc ĥ]i a Ybcžei YZcfa UUNgU]M]d'c]XLĕY]b]b]Ua Ybĥ d]f!
 a Ub]Wā f]g]c]Xc' a Y]Ug]c]f]]b]]c f]M]d'c]XLĕYc ĥ]M]Xc Xc' a Y]]U] Ua Ycĕc'
 f]Uĕ]c]XLĕc' ei U]g]f] YXYf]g]f] UU]a Ybĥ f]d]U]c Ya V]]c f]M]d'c]XLĕ'9g]f
 X]Z]f]Yb]W]Xc' Ya 'g' g]Yb]c]f]Z]]c W]]b]U] Ya V]]cb]z]]c f]]d]c W]]c Y]d]]W]]c]z
 f]U]n Ya V]]cb]z]]Uff]U]X]W]UĕY]Zc \U]g Ya V]]cb]z]]U]g]f]z]]c g] W]]f]Xc]b]Y]g'. B U]g
 W]b]Z]f]U]g]d]c]f] Y] Ya d'c]z]c' Ya V]]c d]c]f]U]]f]Ua Ybĥ, W]]f]Xc]b]Y]g'



:]]i fU- Ĩ '9gei Ya Ua cfZc Qĕ]W'XUgā YbĥXYD]bi g]g]": cbĥY 'G]a d]g]b' &SS*"



: || i fU%\$Ì 'D]bi g"GYW-c`cb[]h X]bU`XUgã YbH"5`hgUXUgã YbH"Yc`Ya V]-c`fydfygbHã`
[YFU" Yg YdcfcZ]Wgg Wg] UgfBzWa`i a U[YFU`-c`[Lã YrcZ]W]bhfa YXzf]U": cbH. FU Ybz
2005.



: || i fU%ãÌ 'D]bi g" A Y[UgcfcÚc`a U] fc`Wã` X] Uggã YbhgUUXg": cbH. \hd.#V]cX]XW]c"
uottawa.ca

A 9; 5GHF ê 6=@CG'CI`9GHF ê 6=@CG: 9A =B =B CG

G-c X]ZYbh]bcgj zf]cg[fi dcg"B Ug7mWc dg]XdcXã Ygf u g]bhg
em Cycas ou presentes e simples em Dioon, Zamia e Welwitschia. Em Cycas,
cgã Y[UgcfcÚcgg-c`WfUã YbH"Zc`]UfYg[fubXgYgyXgd" Ya`bUdcf,`-c`
hfa]bU`Xc`W`YYdcfHã`[YfUã YbhXYV]W`Uc]c`Ei`cgW]Uã a`"9a`

8]ccb YNlã]žg-c dYhXcgYdcfHã 'UdYbUgXc]gCei `cg'
B Uğ; bYrcdgXžcga Y[UhfCV]`cgg-c dYei YbcgžWa `dci WgCei `cg`
dfch]]Xcgdcf dUfYgXYVzVMUgžWa c`Ya 9d\YfUZbei Ubr`ei YYa ; bY
li a žcgCei `cggYXgd" Ya `Ya j Yfh]WcgYg-c WVMfrcgdcf i a]bj CE Wt'"

Nas Ginkgopsida, em Ginkgo forma-se uma estrutura peduncular, que
dcfHUGã dFYXc]gCei `cg`

B UğD]bcdgXžcga Y[UhfCV]`cgg-c U gYbhgdcf Yl Ya d`c`Ya`HU i g
YdfYgYbhgbcgci hfcg[. bYfcg" C ga Y[UhfCV]`cg bYgY [fi dc`g-c`Wa !
postos, formados basicamente por um eixo caulinar, o qual sustenta a
YgMa U{ ei UYgž dYg`c`Cei `c`fYgMa Ucj i`žfUlyei Yfg gYbHUXdcf`
i a UYgMa UYghf]`fYgMa UVFUMUE"9gUcf[U]nU`-c`fXYXZV]]bhY!
dfYU`-c`a cfZ`CE]Wždcf fa žY]ghã VcUgY]X bWUgZegYgdUfUei YgY
U]hYei YUYgMa UVFUMU`fXYbUhi fYRUZ`]Uf YUYgMa Ucj i`žfUfi a`
ramo reduzido, que nasce na axila da escama bracteal. As escamas bracteal
Ycj i`žfUj U]lã`Ya`Zfa UžHã U]c`Y[fU`XYZ`g-c`fl a UWa Uci hU:
XY UWfXc`Wa`cgj z]cg[fi dcgž Wbg]h]bXcždcfHbrčzi a`Yl WYbhY
WžhY`HU cb`a]Wždf]bW]Ua YbhYa`bj Y`XYZã ž]U`5`fa`Xggžfi a`
Vca`WžhY`Uc[Yb]hWždc]gg UdfYgYb, Uf Wbg]bhYXgYUgd]fa YfUg
D]bUYgXc`7UfVcb]žfc"

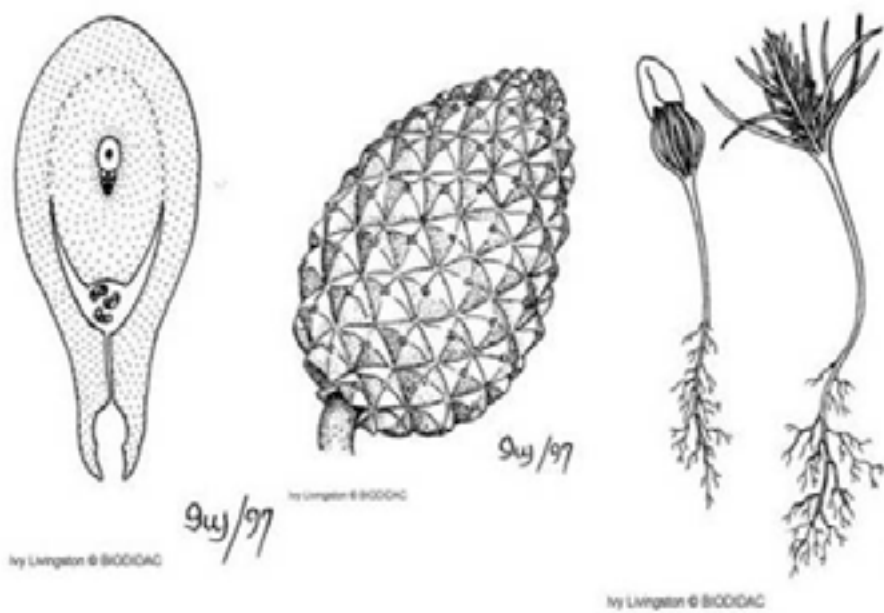
B UğD]bcdgXUHã Vfa`cWffYj U]U`-c`bc`b`a`Yfc`XY Cei `cg`dcf`
YgMa UVFUMUža Ug[YfUa YbhYdcfHã 'UdYbUg&Cei `cg`9bhYUbrčZã`
DcXcWfdi gYHU i gžW]UdYX`bW`c`dfcXi ni a`gCei `c`9a`DcXcWfdi gž
UgYgMa UgVUMUgg-c`a i]h`fYX n]XUgYU`b]WYgMa Ucj i`žfUfa i]h`
XgYbj c]]XUYWYei UgYWa d`Ylã YbhY`Cei `c`9a`HU i gž`Cei `c`f`
dfYg`Ui a`flã c`UHFUZf]h`YZUHã UgYgMa Ucj i`žfUgYVUMU"BU
fdcWXYdc`]b]U`-c`X]žfYbW]UgYi a`Uf]cžei Yfi a`]bj CE Wt`Wfbcg`
que chega a cobrir quase totalmente a semente.

A YfWYXg]h`ei YgYWU`c`YgfCV]`c`a`cbcW]bc`f]ggY i UxLXUg6Yb!
bYh]hUYgZegYgXc [fi dc`XUg7mW]cdgXUdYg`Uc`Y] c`Wb]Užc`Wff]lã`
cgCei `cggdYi bWUXc`gžYdUfUXcgdcf YgMa UgYghfYgYVW]bXUcgdcf`
i a`j Yfh]Wc`XYa]Wc]gdcfU`cg`9l hfbLã YbhY`U]]UYgMa UgYghfYgXY
dfch,`-c"

C Cei `c`bUğ;]a`bcg]Yfa Ug]fWbg]h]Xc`UgMa YbhYdYc`a`Y[Ugcf]b!
[]c`fbi`WcLYbj c]]Xc`dYc`h]i a`Ybr`8`Ybfc`Xc`a`Y[Ugcf]b[]c`X]žfYbW]U
gYi a`UWYi`UžUVYi`Ua`-YXYa`Y]zgd]cfcgfa`UW]c]cfcgžei Ydcf`a`YcgY
cf][]bUi a`U]h]fUXY`]bYU`XYei`Ufc`a`Y]zgd]cfcg`C`a`Ug]bhYfbc`U`a`YbHU
YXz`i`[Uf`Uc`a`Y[U]lã`YU]c]h`fa`UW]c]lã`YU]c]h`ci`[U]lã`YU]c]h`Zã`]b]bc]z
enquanto os outros degeneram.

5`df]a`YfUZgYXYXgYbj c]]a`Ybr`Xc`a`Y[U]lã`YU]c]h`f`W]UM]h]UXU
dcf`i a`Ugff]YXY`Xj`]g`Yg`bi`W]UfYgž`gYi`]XUdYUZcfa`U`-c`XY`dUfYXY`XU
dY]žf]UdUfUc`Wbfc`9g`Ungfi`li`fUf`YbW]fUXUdYUdUfYXYc`a`Y]zgd]cfc`
que, em alguns casos, pode aumentar em espessura durante o desenvolvim-
Ybr`Xc`Cei `c`ci`UdC]UZcfa`U`-c`XUgdUfYXYgXUgYi`Ugei`YWa`d`Ya`c`

a Y U La YCElc"7YHgwYi Uga UgdfoEla UgXUa MCElUX-c'i UfUeg Ufei Y' b]cgfla Yhbl]cgZa]b]bcgZcgei UgdcXa j U]UfYa 'b•a Yfc XgXY &Uf j z]cg' Bcg]. bYfcg; bYi a 'YK Yk]gW]Ub-c'Y]gha 'Uf ei Y' b]cgZydfYghUxc HU'U g bWU a UfYX , -c Xfj UXUj c i hj Ua YbY' FcXYUxc'c'a Y Ugdcf|b|]cZxc'ei Uf'j fYUfYbUgbUdcf, -c hfa]bUz existe um tegumento, exceto em Gnetales, que apresenta dois tegumen- hcg'Wa c' bUgUb|]cgYfa Ug' C' h]i a Ybrc' gY UfYbc' zd]WZcfa UbXc' U a MCElUzei Ydfcd]Wfz UYbhUXZdUfUc]bhY]cf'Xc' Qe' cZxc'a MCElU a YCElc' fla YCElc'a UgW]bc'ci '[f-c!XYdCEYb'Ya YgUXc' h]WU' Uf'

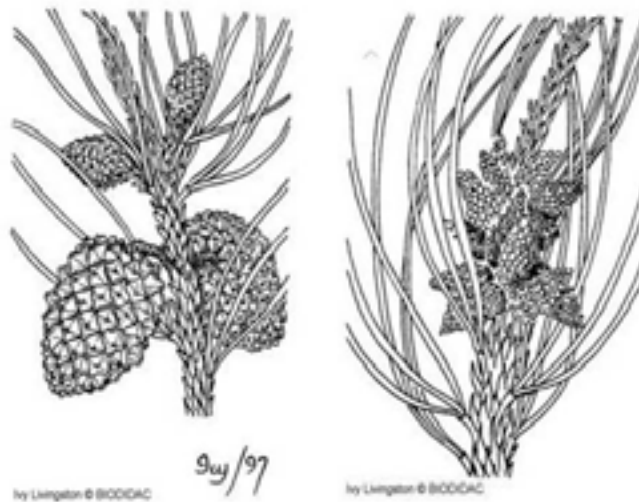


:]i fU&ã 'D]bi g'5"Qei 'c'UdgUZfh]nU-c"6"9ghfCE]c'Za]b]bc'a UX'fc"7"D]bi U': cblY' <http://biodidac.bio.uottawa.com>.

Estruturas reprodutivas femininas



:]i fU% 'Í '9I Ya d'cgXYygf i h fUgfYdfcXi h] U'Za]b]bU'Ya ;]a bcdYfa U'g



:]i fU% ('Í 'D]bi g'I a 'fLa c'Za]b]bc 'y]XbV]bXc 'cg YgfCV]cg': cbhY '\hd.#V]cX]XUW]c" uottawa.ca Um ramo masculino.



Life cycle of the pine

:]i fU% Ì 7]Wé XYj]XUYá D]bi g'

GIMNOSPERMAS EXTINTAS

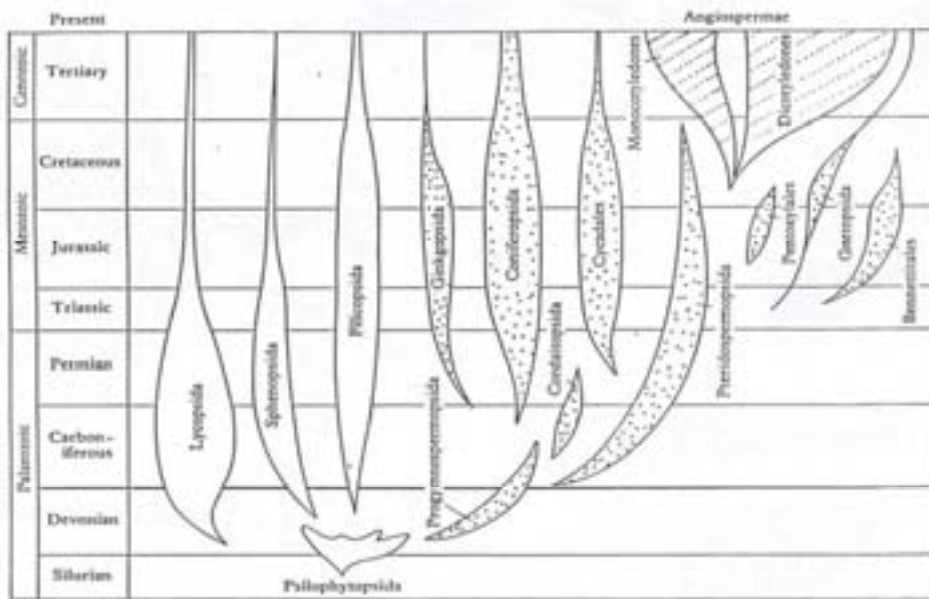
G-c Xc]g [fi dcg XY;]a bcg]fa Ug Y] h]h]g Ug g]á Lá VU]g Wa`
 g]á Ybh]g fUc` D]h]Xc]g]fa cd`n]L]Y Ug 7cfXU]h]U]g d`U]h]g df]a]h] Ug
 g]á Y`U]h]g{gWb]Z]fUg`

5gg]á Lá VU]gWa` g]á Ybh]gci` d]h]Xc]g]fa Ugg`c]a [fi dc`a i]lc`
 X]j Yfg` YU]h]U]a Ybh]XY]bca]bU]g]d]h]Xc]g]fa Ug/g`c` W]U]M]f]n]U]g
 d]YU]Z]cbXYXY]d]h]Xc]h]U]Y]df]y]b, UXY]g]á Ybh]g`5d]f]Y]M]f]á `bc`8`Y`c!
 b]U]bc]Z]U]b]]f]á `c`U` [Y]bc`7]f]V]cb]Z]f]c]Z]X]M]f]á `bc`D]fa]U]bc`Y]f]Y]g]f]]!
 f]á `bc`H]f]z]g]W]z]g]Y]h]b]i]b]Xc`Y]b]f]Yc`si`f]z]g]W]Yc`7]f]Y]z]W]c`"5]h]f]c`Ú]b`
 Xc`g]W]c`d]U]g]Xc]Z]Y]f]á `W]b`Y]M]X]g]df]b]V]d]U]a Y]b]h]d]Y]U]b]U]ca]U]W]a`
 W]U]M]f]g]h]W]g]b]h]fa`X]z]f]U]g]Y]b]f]Y]U]g]7]m]W]g]Y]U]g]á Lá VU]g]Y]f]Y]M]f]á`
 c`bca`XY]7]m]W]Xc]Ú]M]W]Y]g`5]g]d]h]Xc]g]fa Ug]Z]c]f]á`f]Y]W]b`Y]M]X]g]á`
 1903 a partir de folhas com semente e, em pouco tempo, foram relaciona-
 X]g]{g}7]m]W]Xc]Ú]M]W]Y]g]f]bca`Y]W]f]f]Y]c]E":`c]fa`Lá`i`a`[fi dc`Y]h]f]c]`b]Y]c]Z`
 X]Ú]b]Xc`d]Y]U]g`g`b]V]U]X]Y]g]f]c]V]c]g]U]d]Y]g]f`X]U]d]f]Y]g]b, UXY]g]á Ybh]g`

J z]c]g[fi dcgXYd Ub]gY h]b]gXc A Ygcrc]W'g-c h]a Vfa U[i a Ug j Yh]g]bW fXcgb]g]d]h]f]Xc]g]d]fa Ug"

C i f]c' [fi dc' XY []a bcg]d]fa Ug Y h]b]g]g Ug 7]W]Xc]f]X]U]g]ci '6Yb! nettitalis, consistem de plantas com folhas semelhantes as das palmeiras, Ya VfubXc XYWf]Uz]fa U]g]U] Ug V]W]X]c]h]g"

5g6YbbYh]U]Y]g]c' i a [fi dc' Yb]]a z]h]W'XY;]a bcg]d]fa Ug Xc' A Y] g]m]c]W'ei YXYg]d]f]W]U]a Xc' f]y]]g]f]c' Z]g]g] X]i f]u]h]c' 7f]Y]z]Wc' 5 [i bg] d]U]Y]Vch]b]W]g]U]Y]X]h]a ei Y]g]6YbbYh]U]Y]g]d]c]X]a h]f]g]Xc' a Ya Vf]c]g]X]U a Y]g]a U]]b] \ U]y] c' i h]j U]X]g]5]b]]c]g]d]fa Ug' 5]h] U]a Y]b]h]z]f]U]b]X]U]]b]W]f]c]b]X]Y Y] U]h]a Y]b]h]U]g]6YbbYh]U]Y]g]h] U]a !g]Y]U]c]]Y]b]h]W]a Y]b]h]' 5g6YbbYh]U]Y]g] Z]f]U]a W]b]h]a d]c]f]]b]U]g]X]g]V]W]X]c]h]g]Y h]b]h]g]Y]U]a V]c]g]c]g[fi dc]g]d]f]c]X] ! ziam folhas muito semelhantes ao longo da maior parte do Mesozoico. No Y]b]h]U]b]c]z]f]d]f]c]X]i h]j U]a Y]b]h]U]g]6YbbYh]U]Y]g]Z]f]U]a X]g]h]b]h]g]X]g]V]W]X]c]h]g] Ya j z]f]c]g]U]g]W]c]g]]b]W]]b]Xc' U]d]f]Y]g]b, U]X]Y]g]f]i h]i f]U]g]f]Y]d]f]c]X]i h]j U]g]g]a Y! \Ub]h]g]U]U]c]f]Y]z]ei Y]f]U]a V]g]g]Y]i U]X]g]Ya U]]i a Ug]Y]g]d]f]W]g"



:]i f]U]g] 8]U]f]U]a U]g]f]U]]f]z]U]W]Y]d]c]g] -c' U]c]]Y]f]h]W]X]c]g]d]f]b]W]U]g]]f]i dc]g]X]Y]d] Ub]h]g]f]Y]g]f]Y]g

GIMNOSPERMAS ATUAIS

< z' ei U]f]c' U]c]g' XY;]a bcg]d]fa Ug W]a f]Y]d]f]Y]g]b]h]U]b]h]g]j]j c]g' 7]nh cadophyta, Ginkophyta, Coniferophyta e Gnetophyta.

5g;]a bcg]d]fa Ug f]W]b]h]g]U]f]U]]Ya ; S' [.b]Y]f]c]g]Y, +S'Y]g]d]f]W]g]Y]b! W]b]f]U]X]g]d]f]b]W]U]a Y]b]h]U]g]f]Y]]Y]g]h]a d]f]U]X]g' 5 [i bg]]f]i dc]g]X]c]a]b]U]a [f]U]b]X]g]z]f]U]g' U]c]f]Y]g]U]g] W]a c' f]c' W]c' X]g] W]b]Z]f]U]g]b]U]h]U]]U] Y]b]ei U]b]c'

2

ci hfcg g-c fydfybhXcg dcf' dcdi 'U" Yg' lg' UMLg' bUg' fY]" Yg' hfc d]W' Y
 g' Vfcd]Mz' Wa c' f'c' Wg' XUa Ucf]UXLg' 7mWg' 5 [i a g' fi d'cg' g-c Yl!
 hYa La Ybh' c'W]nUXcg' Wa c' f'c' Wg' XU;]b[_c V]c'Vz'Wbg'XYFUxi a'
 Zgg' j j czU•b]WfYa UbYg'VbhXYi a U]b\U Ya z'hi Ua Ybh'Yb'Wbh'UXU
 UYbUg'Ya UcfYg'Ug'fYa ch'g'XU7\]bU'ci UK Yk]hg'W]Ua]fU]]g'Yg']WY
 d]h'cfYg'WZ'Yb'Wbh'UXUg'a Ybh'bc XYg'f'c' XUB La]U'z'bc g' Xyg'YXLa Z]W
 Bc' 6fUg'.;]b[_cd\nHU; bYi a 'bU5a Uf' b]UY9d\XFUbc' F]c'
 ; fU'XY'Xc' G' z'7mWXd\nHU' NLa]UbU5a Uf' b]UYA Utc'; f'cg'z'D]!
 bcd\nHU' 5fu Wf]UUb[i g]Zc']UbUg'zfYUg' g' Vfcd]Mg'Xc' g' `Yg' Xyg'Y/
 DcXc'Wfdi g'g'Y'ck]]Xc' g' `Yg' Xyg'YD' La Vfh]]WY]UbXc' Uf' U'g'g'ffUg'
 do nordeste.

75F 57H9F =N5uÈCž8 =GHF =6I =uÈC '9'
 7@5GG=: =75uÈC '8CG; FI DCG

C U'c' WmWXd\nHU

G-c' d'U'bh'Ug'g'Ya Y\U'bh'Yg'Ud'Ua Y]fUg' Yb'Wbh'UXUg' df]b]W]Ua Ybh'Ya'
 fY]" Yg' hfc d]Mg'Yg' Vfcd]Mg'9' U'g'Ud'fY'WfLa dYc'a Ybcg'z'& \$a]\` Yg'
 XYUbcg'Xi fU'bh'c' dYf'c'Xc' D'Yfa]Ubc"

9fLa 'h-c' bi a Yfc'U'gei YbUYfUA Yg'rc']Wz'1 bhLa Ybh'Wa' U'g'6Yb!
 bYh]HU'Ygei Yg'YUg'Ya Y\U'La 'g' dYfU'W]Ua Ybh'UYU'gei Ygg'YdYf'Xc' f'
 WLa Ux' 19fUXLg'7mWXd\nHU'8]bcg'U f'cg' "5g'7mWXd\nHU'g' j j Ybh'g'
 Wa dYfYbX'Ya '%[. bYfcg'Wa' WfWXY%' \$Yg'f]Mg'"

5g'7mWUXYg' Ya VLa 'd'Ua Y]fUg' ci 'dhf]XCEH'g' Wa' W] 'Yb-c'
 fLa]U'W'cz'Y' Ybh' Ua Ybh'g' Vmff]bYc' Yi a UWfc'UXYZc'\Ug']fUa Ybh'
 d]b'UXLg'bc'zd]W'c' W] 'Yfa Ubc]]W/c' hM'Xc' dYfYbei]a Utcg' f'V'g'U'bh'
 Xyg'bj'c' j]Xcz'Ufa U'bh'UbXc' z]i UbUZc'fa UXY'a i W]U'Ya 'Y'hel]bUg'Ya'
 X]f]a Yb'c' Xc' hM'Xc' j U'g'W'f'zei YZc'fa Ui a "Yb'c' U'bc" G-c' dc']b]n'UXLg'
 df]b]W]Ua Ybh' dcf' Yg'ci f'cg' C'g'a Y]U'f]C]V]cg'zei YdcX'Ya]f'XY'&U, S'
 W' 'XY'Wa df]a Yb'c' YU'Wb, U' Uf' (S'[_z'dcX'Ya' WY]U'f'Ud'fc'Xi n]f' Uf'
) SS'g'Ya Ybh'g' 5gg'Ya Ybh'g'g-c' Yg'cb'c'g'g'Ya' 7mWz'c'ei Yd'cg]V]]HUg' U
 U' h' U' -c' Y'W'bg'Yei Ybh'a Ybh' X]g'Yf'g-c' dYUz]i U'za U'g'b'Ua Ucf]UXcg'
 Wg'g'U'g'g'Ya Ybh'g'g-c' j]g'c'U'g'U'f]UbXc' U]a U'g'z'df]b]W]Ua Ybh'U'Y'gei Y
 as dispersam.

5dYg'f'XYU[i a U'g'Yg'f]Mg'g'YfYa 'i h]n'UXLg'bUU]a Ybh'U' -c' XY'dcdi!
 'U" Yg']bX]]bUg'Y'ci h'Ug' d'cg'g' f'Ya 'i g'g'b'Ua YX]W]U'dcdi 'Uz'Ua Ucf'
]a dcf]b]W]U'Wb' a]W]XLg'7mWUXYg'f'Ui h]n'U' -c' cfbLa Ybh'U'XYg'f]Mg'
 como Cycas revoluta e C. circinalis..

5'cfX'Ya' f'g' g'Ybh'UXU'dYU'W]U'W]UXY'XYZc'fa U'f'bc'Xi' `cg'XY'W]bc!
 VU'Wf]U'g'Xc' [. bYfc' 5bU'U'Wb'U'ei YU'hi La 'Wa c' U' U'Xc'fU'g'XYb]f'c[. b]c'
 bU'g'fU'U'g'z'c'ei Yd'cg]V]]HU'U'c'WdU' -c' XY'fY]" Yg' Wa' g'c'g' dc'V'Yg'Y
 dYUd'fc'Xi, -c' XY'W]U'g'U'f]U'Y' Ybc'b' % - S' "9gz' X]g'f]M' XUYa' fY]" Yg'
 hfc d]Mg'Yg' Vfcd]Mg'XLa Z]Wz]bW]]bXc' A UX] U'g'Wz'5i g'fz']UY]' \U'g'Xc'

DUWUzYbUg5a f]Wg]bW]bXc]\UgXc 7Uf]WzCwffYbXc XgY'a Uĥg
• a]XgUf a Ub[i Yg Y Xi bUg' Ghj Ygcb f%- SLXj]Xi UcfXa Ya 'lf.g
Za f]Ug 7mWUWUz]bW]bXc UdYbUg7mWzGUb[Y]UWUzWa GUb[Y]U
Y6ck Yb]Lz YNLa]UWU' Bcg B YchC]WgZ Yg+c fYdfYgblXcg NLa]U
fWfWXY() Yg]WgZn"i 'Y]YN" 'W]bh] WY] UbXc Uf'c 6fUg z7\]]i U
fLXgW]UfYWha Ybh'dfUU7c" a V]Lz7YUcnLa]Uf%LY8 jccb flE
YbX a]WgXc A fl]W'YA mfc WUgflYa 7i VU

5 a Ucf]UXgVWACEHgg-c zj cfYgUHgZU]i a UgUWb, La % a Yf'cg
ci a UgXYUhfU'Ai]Ugha i a lfcW'WVa XgYbj c j]Xczi YfWVfrc'
Wa UgVUgXUZc\Ug'ei YWfla "'5gZc\UgZ b]cbUg'cWffYa WUW
hf]g]Wb YbhYa i a Uwf'cUbczd]WXC W YUgja zUg7mWXd\nhUggY
parecem com as palmeiras. Diferentemente das palmeiras, no entanto, as
7mWXd\nhUgdfYgha i a WgMa Ybr'gWbXf]c UdUhf'Xi a V]a V]c'
j UgWUfzUbxLei Ya i]h'j U UfcgzUdcf, ~c WbfUXYgY g]fcbWgWbgdY
Ya i a U]fubXYa UgUXYa Xi U'5gVWACEHgg-c ZYei Ybh'a YbhYa i]h'
hC]WgZ'Wa 'Ui bXUhg'byi fchcl]bUg'YWa d'cg'g'WV]bc[. b]Wg'9 Ug
Uf]] La 'W]bcVUWf]Ug'YZhYa 'Ja dcf]Uhg'Wbhf]M], " Yg'dfUUU U ~c'
XYb]fcl . b]c Ya 'zfyUgcbXY'Ug'cWffYa "

5 gi b]XUgYdfcXi hcfUgXVWACEHgg-c Zc\Uga Ugci a YbcgfXi n!
XgWa Ygdcf]b]]cg]bgf]Xc'zei Yg-c U]fi dUXcgZci l Uci X]bga YbhYa '
Ygfi h fUgYa Y'UhgUg]fC]cgdfC]a cgUc zd]WXd'Ubu'c gYg]fC]cg'
dcf]Ubc dCEb YC]ei 'cgXUg 7mWXd\nhUcWffYa Ya X]ZfYbh'gd'Uhg'
Cgh Vcgdc]b]WgZ'fa UcgdYcg] La YCEh'cga UgW]bcgXUg7mWXd\nhU
g-c 'hd]Wb Ybh' b-c]fLa]UWcg'ci UdYbUg']] YfLa Ybh'fLa]UWcg' BU
a Ucf]UXYg]gd'Uhg'z WgMa Ybr' Xc hi Vc dc]b]WfYg 'hYa g]]UW]j U
Xgfi], ~c Xc 'hW]c bi WU" 5 bh'gXUZWbXU ~czUYhfYa]XXYVgU'Xc'
[La YCEh' a UgW]bc X]UhgY'YgYUcb] Lz 'Y UbXc 'cg] La YUga UgW]bcg'
dfUUdfcl]a]XXYXUg'ccgZfUg'5 'Y hfYa]XXYVgU'Ybh'c gYfca dYYcg'
[La YUga i h]U'YUXcg']WUXcg'buLa 'Uf Ug'ccgZfUg' 7UXU] La YCEh'
a UgW]bc d'fcXi nXc]g] La YUga UgW]bcg]f]bh'f'cn]X]ga i h]U'YUXcg'."

C dUdY X]]bg]r'gbUdc]b]nU ~c XYWACEHgg'fYg]W]Ua Ybh]bh'fYg'
g]bh'6Ygci fcgXY'j z]f]cg] fi dcgha 'g]Xc ZYei Ybh'a Ybh'YbWbhfUXcgYa '
Ugg'WU ~c Wa Yg]fC]cga UgW]bcgYWa a YbcfZYei . b]W]Ya Yg]fC]cg'
Za]b]bcgXYa Ya VfcgXY'j z]f]cg] . bYfcgXYWACEHgg'

; fi dc 'Ubh]]czWUWf]g]Wgdf]a]hj Ug'Xg]UWgY'UdfYgYb, UXYUb!
hf'cn]X]g'

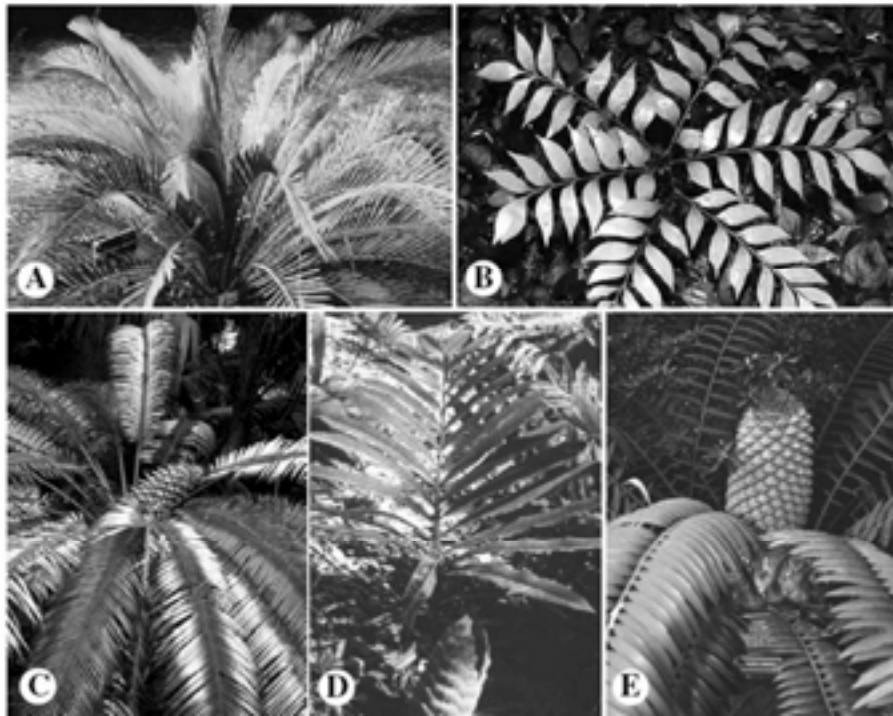
- Dioicas
- : YWbXU ~c Ya 'a Y]c 'zei]Xc
- ; fi dc 'a cbcU' f]W"
- G]bUdca cfUgYa 'WUWfYgYgfi h fUg
- DUX~c YgdYU]nXc XYZ]] Yg] UgWUfYg'bc dYW'c fl a Y]U.
- DfYgYb, UXYWbUgXY'a i W]U Ya
- :]h'ei]a]W 7mW]bUYci hfcgWa d'cg'g'hC]WgWa c XYZgUWbhfU
VUWf]Ug'YZ b]cg'

Principais representantes

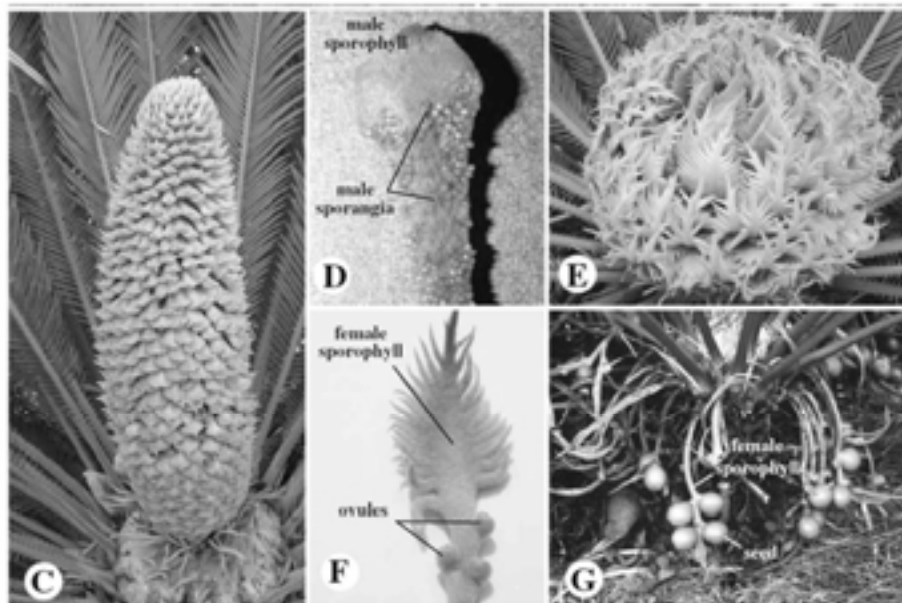
5g7]WXcdnLzei Yy c i fLa 'a i]lc' dci W'Uc`cb[c`XY'a]\UFy:XY
 Ubcgg-c'dUhgXYncblghcd]Wgci g Vhcd]WgZ'Wa hcbW`Yb\cgz'gYa`
 flá]UW" YgX'ei U'VfchU a Wb1 brc XYZ`UggYa Y\UhgUi a`dYbUWcz
 Wa c'c'XlgdUa YfUgdYc'ei Yz' dfja YfUj]ghZdcX'Ya`gY'WbZ bX'X'gWa`
 YgH'5gj YX'X'fUgdUa YfUg'bc YbH'bcz'g-c'5b]]cgdYfa U'gYha`W'FUW
 hf]g]WgVch]b]Wga i]lc'XZfYbhg'5g7]WXcdnL]bWYa`UZa`f]UX'g
 V'WX'WgZ'Wb\Y'X'gWa c'gU i n]b'cg! X'gUW'gYUgd]W'7m'WgY'c i hZ
 dfCdf]UX'g`Xc`Ud-czXYW'Ua YX' U'gYcV'ha`i a`dfcX'lc'Ua Yb]M'zc`
 WLa U'c'gU i Xc`Ud-c`! YUX'g'nLa]zW'g'C`]. bYfc N'La]U'Z'gYbX'c`df`
 Xj Yfg'gY']" YgX'La Z]WY'bc A]l]W'df]b]W'Ua Yb]Z'dfYgYb]U'W' Ya i]lc`
 curto, de que saem pequenas hastes e folhas.



:]i fU%`I`9l Ya d'c`XY'gfi h'fU'gY]YU'hj U'gY'f'df'c'X' h] U'gYa`7m'W'U'g'



:]]i fU% Ì '8]] YgXUYXY7mWCEHg' NLa]WU Y'5" A Wcrla]Ua ccfY] "6" Z\Ug Wa dcdUg de *Bowenia spectabilis*. C. *Lepidozamia peroffskyana*. D. *Stangeria eriopus*. E. *Encephalartos lebomboensis*. Fonte: Simpson 2006.



:]]i fU% Ì '7mWUWU YfydcXl , ~cE" 7!8 E dUfHg a UgW]bUg' 9!; E dUfHg Z'a]b]bUg": cblY' Simpson 2006.

O FILO GINKGOPHYTA

Ginkgoales

ã fj cfYgXc]WgZy' S'a XYUhi fUYsã XYX|a "/fcbW'fla JÚWxcž
 gla dcX|U/a i V]U Ya 'dfYgYbhYbUfUnYbUgZc`\\Ug': c`\\Ug`ÚUY|Zcfa Ygž
 ZYe~ YbhYa YbhY `cVUXgžj YbU -c' dUFUYc!X]W'h a]Mž Yg|]FUXLã YbhY
 X]gdcg]Ugci 'U fi dUXgYa 'VfLei]V]Ug'gžXW]i Ugbc]bj Yfbc"9gdfC]cg'
 U]]fYgžYa 'VfLei]V]Ug'g/c'a U]W]bc 'Wa dcg'c' dcf'j z]cg'a]Mžgdc!
 fU]]CZcfcgžW]Uei U'Wa `&gUWgdc]b]Wg/c'Zã]b]bc 'Wa dcg'c' dcf'
 i a `dYX•bW'c 'Wa `&C]i `cgX]j Yf] YbhYg'bc zd]W]f%[YfUa YbhYUvcf]U"
 Semente verde, globosa, desenvolvendo externamente um tegumento car-
 noso quase livre do resto da semente.

;]b_]c'V]cVUf'c•b]W'fydfYgYbhYj]j c'Xc'Úc';]b_]cd\mU'5g
 z]j cfYgXY;]b_]c'V]cVUg-c'Z]Wã YbhYfWb\W]X]g'dYUg UgZc`\\UgYa `
 Zcfa UXY'Yei YfÚUY|Zcfa YgžWa 'g]i g'dUX" YgX]j YbU -c' UW]frcgYX]Mž
 hca cg'G-c'z]j cfYgUfU]j UgY]a dcbYbhYgYa VcfUXY'Yb]c W]g]Mã Yb]cžei Y
 podem chegar a 30 metros ou mais de altura. As folhas dos brotos ou ramos
 W]frcgXY'Yb]c W]g]Mã Yb]c XY;]b_]c'g-c'a U]gci 'a Ybcg]bhY]UgžYbei U]b]c
 U]gXcgflã cg'cb[YgYX]g'd|bh' U]g-g-c' Wa 'Z'Yei .b]W]UdfcZ bX]ã YbhY'c!
 VUX]g'8]ZfYbhYa YbhYXYa i]]U]gci hfUg;]a bcdYfa U]gž;]b_]c'f'XW]i Už
 g U]gZc`\\Ug]g] a Ya i a UYUW'cfU -c' Xci fUX]UbhYgXW]fYa bc'ci hbc"

;]b_]c'V]cVUf'U•b]W]g'VfY]j YbhYXYi a] .b]Yf'c'ei Ydci W'a i Xci `
 Ya % S'a]` YgXYUbcgYf'c•b]W'a Ya Vfc'j]j c'Xc'Úc';]b_]cd\mU'5`
 Ygd]M]Y'U]i U'Wa dUf]`\\UW]U]M]f]g]W]g'Wa `ci hfUg;]a bcdYfa U]gei Y
 fYa cb]Lã U]]b]M]c'Xc'dYf'c'Xc'Dfa]UbcZU]i bg&+S'a]` YgXYUbcgUfz'g'



Ginkgo biloba. (ao lado) Ramo originando cones masculinos, (abaixo à esquerda) Cone masculino e detalhe do par de esporângios originados de um eixo saindo do cone masculino e (abaixo à direita) planta feminina originando pares de óvulos. Fonte: Simpson, 2006.

:]]ifU&S] ;]b_]c'V]cVU

ESTRUTURAS REPRODUTIVAS

Ì 9gfCV]`cg'a U]W]bcg`cb[cgYdYbXbhg`zdCEyb`b-c`UUXc/
Ì ê j i `cg&ž`cb[c`dYi bWUXcg/
Ì Gá Ybh' W' & W' X] | a Yfcž Y hfblá Ybh' W' bcbgU Y XY WY]fc`XYgU
[fUXj Yž]bhfbLá Ybh' X] fU
Ì 7ch] fXcbYg`&'

Principais representantes

5g; bYcd`n]Ua cghLá `]bX]gM]j Yg`U]b]XUXg`Wa`Ug`5b]]cgdYf!
a Ug`7ca dfYbXÁ`d`UbH]gUfM g]j Ug`UXdH]M]g`U]á V]Ybhg`Xygffh]Wg`
ci`XYghdYzWa`c`cg[. bYfcg9d`YfUYK Yk]]gW]U]Z`Yci hfUg`Ya`Z`fa U
XY`]UbZ`Wa`c`Ug`Xc`[. bYfc`; bYi a žXYUá V]Ybhg`gYj zĥWg`B`UfY]]-c`
a X]hff]bYU]i bXUUYgd]M]Y'9" X]ghUWbZ`Wa`U]ghg`fLá]UM]U]g`U]bUg`
YWa`a i]]cgbC]zei Y`YX-c`UdUf. b]WUfh]W`UXU`9a`fY]]`Yg`zf]X]g`XU
ã Z]W]`z i a UYgd]M]W]f]cg]Z`U]i a VcUfK`"a]fU]]gZ`Wa`dcg]UXYi a U
[fcg]Udcf, -c`g`M]ff]bYU]ei YÁ Yf] YU]f`a Yc`a Yfc`U]á U]Xc`g`cžYXY`
X] U]gZ`U]g`cdcg]U]gei Ya`YXá U]f`Xc]g]a YfcgXYWa`df]a YbrcžYbhg`U`
W-c`C`g`M]C]g`Xc`[. bYfc`; bYi a`Wa`dfYbXÁ`Ygd]M]ghfcd]W]ghd]W]g`
XU5a`U]i b]U]Z`Xc`[c`Z`XU; i]]bfYXY`g]j Ug`U]g]zĥWg`

5g;]b_]cd`n]U]zei YXU]Lá`Xc`dYf`Xc`dYfa]]bczZ`fLá`U]i bXU]bhg`
bc`dU]g`Xc`za Ug]g`Vg]g`Ya`dcf`a Yc`XYU]dYbU]gi a UYgd]M]Y]Z`]b_]c`V]c`M]Z`
cf]]]bzf]UXU7`]bU`

O FILO GNETOPHYTA

v i a ; fi dc]g`U]Xc`XY;]a bcb]f]a Ug`XYfYU`-c`X]j]XcgU]Dcgg]" `Zlá]]U]g`YW`XY`*`S`Ygd]M]Yg`

5`g`VX]j]g`-c`f`W]bg]h]]XUXYi a UW]ggYf] bYrcd]g]X]L]Yf. gcfXYbgž
; bYUYgff%Zlá]]U]Z`S`Ygd]M]Yg]z9d`YfUYgff%Zlá]]U]Z`(\$`Ygd]M]Yg]YK`Y!
k]]gW]U]Ygff%Zlá]]U]Z`%[. bYfcžK`Yk]]gW]U]Zá`cbc`Yg]W]W]W]E`

5dfYg]b]Lá`U]i a Ug`W]U]M]f]g]W]g`Ya`Wa`i a`"
%`DfYg]b, UXYYYá YbrcgXYj Ug`bc`Yb`c`g]W]bXzf]c`"
&`9gfCV]`cg`Wa`dcg]cg`YX]W]bcg`"
'"`ê j i`c`Ybj`c`j]Xc`dcf`U]i a Ug`Yg]Ma`Ug`fti`Vz]M]U]g]Y`dcgg]]c`h]Vc`
a]]M]cd]U]Z`Ya`W`c`c`zd]W]f`g]M]M]U]U]U]]c]UXYdc`]b]r]U`-c`"
("5i`g`b]W]UXY`W]bU]g]fYg]b]Z]f`cg`"
)"9a`V]]-c`Wa`Xc]g`W]h]fXcbYg`

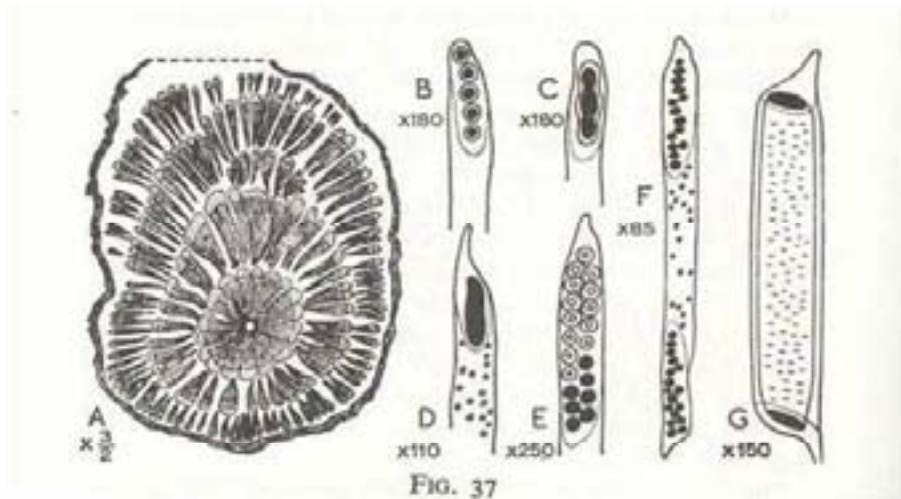
6. Folhas opostas.

: 5A a@-5G

Gnetaceae

; bYi a`f]i a`[. bYfc`hcd]W]z`W]bg]h]]bXc!gYXY`]UbUg`Yb`cg]g`Wa`

Zc`Ug`XY`bYfj`U`~c`fYH`W`UXZ`Ug`Ya`Y`UbXc`lg`Y`Ui`a`U`Ub`l`cg`Yfa`U`bU`
 UdUf.bW`5`df`Yg`b`U`U`i`a`U`g`Yg`f`W`g`b`U`5a`U`i`b`U`



:]i`fU&ã`'9`Ya`Yb`cg`XY`j`Ug``Ya` ;`bY`U`Yg` :`cb`Y`F`U`Yb`z`&S`S`"

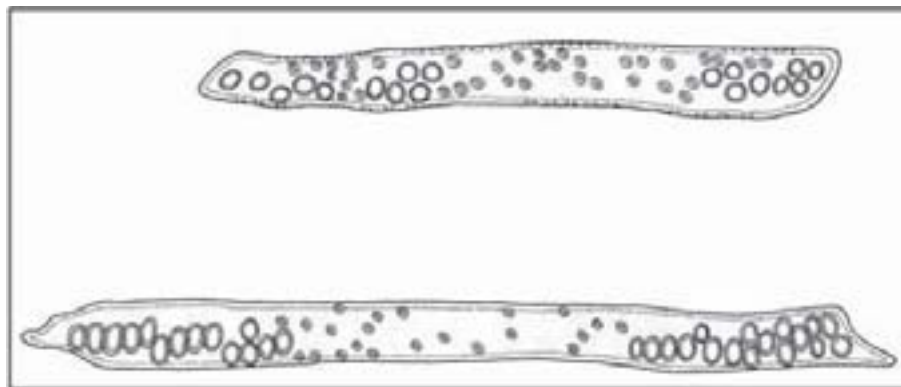


Fig. 22 - Elementos de vaso em Gnetales. Fonte: Simpson, 2006.

Ephedraceae

C`W`ff`Y`b`U`ã`g`U`Y`f`Y`l`]`Y`g`z`f`X`l`g`g`V`f`c`d`W`g`X`U`5`a`f`l`W`X`c`B`c`f`h`Y`Y`
 X`U`5`a`f`l`W`X`c`G`"`D`c`g`g`l`Z`c`U`g`Y`g`M`ã`l`Z`c`f`a`Y`g`Y`W`i`Y`Z`c`h`c`g`g`l`b`h`h`n`U`b`h`Y`
 9`d`X`Y`U`f`Z`c`b`h`X`U`X`c`l`U`Y`Z`X`f`l`b`U`Z`U`d`f`Y`g`b`U`i`a``z`v`l`r`U`f`V`i`g`j`c`a`i`l`r`c`
 f`l`ã`l`J`U`W`X`c`W`ã`Z`c`U`g`Y`g`M`ã`l`Z`c`f`a`Y`g`Y`W`i`Y`Z`c`h`c`g`g`l`b`h`h`n`U`b`h`Y`U`a`U`c`f`l`U`X`l`g`
 Y`g`d`f`W`g`f`U`g`z`h`W`z`c`W`f`f`Y`b`X`c`h`ã`V`f`a``Ya``f`Y`l`]`Y`g`z`f`X`l`g`g`V`f`c`d`W`g`X`U`
 5`a`f`l`W`X`c`B`c`f`h`Y`Y`5`a`f`l`W`X`c`G`"

Welwitschiaceae

K`Y`k`l`g`W`U`l``d`c`g`g`l`i`a`U`•`b`W`Y`g`d`f`W`z`K`"`a`f`l`U`v`l`g`Y`b`X`a`l`W`X`c`g`

6 c] b]WU G]ghYa z]WU Y'9Vt'b' a]WU

X]g]f]c]g]Xc]g]Xc]Y]g]Y]X]L]a]Z]f]W]U]d]f]Y]g]b]U]i]a]W]f]Y]Y]b]c]g]a]i]j]c]W]f]c]Y]b]c]f]l]a]j]U]M]X]c]Y]d]c]g]g]j]U]d]Y]b]U]g]X]i]U]g]Z]c]U]g]e]i]Y]d]f]g]g]h]a]U]f]U]j]f]g]X]Y]h]c]X]U]j]j]X]U]X]U]d]U]b]U]i]W]f]W]X]Y]S]S]U]b]c]g]9]g]U]g]Z]c]U]g]U]d]f]Y]g]b]U]a]h]M]X]c]a]Y]f]g]h]a]z]h]W]V]U]g]d]Y]f]a]U]b]Y]h]Z]d]Y]f]a]j]h]b]X]c]e]i]Y]Y]U]g]W]Y]g]L]a]U]h]f]U]h]b]j]f]Y]a]U]d]f]c]l]j]a]U]X]U]mente dois metros de comprimento.



Gnetum gnemum

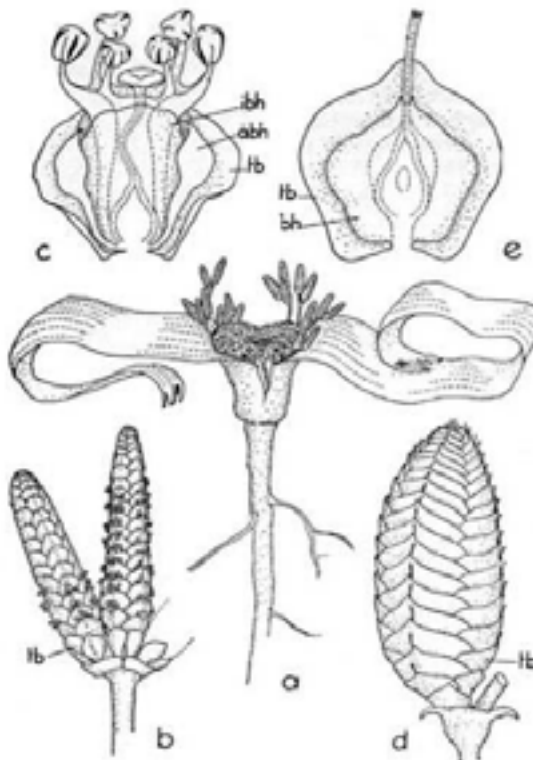


Welwitschiamirabilis



Ephedra

:]]i]f]U]&]i]9]l]Y]a]d]c]g]X]Y]f]d]f]Y]g]b]U]h]g]X]Y]; b]Y]r]c]d]n]h]U]



:]]i]f]U]&]i]9]l]Y]a]d]c]X]Y]f]d]f]Y]g]b]U]h]g]X]Y]; b]Y]r]c]d]n]h]U]K]Y]k]j]g]W]U]a]j]f]U]j]g'

O FILO PINOPHYTA

5gD]bcd\ñUg-c'; ja bcdgYfa Ug'Wa 'M' Yg'fla]UMXcžj]]cfcg' VYgMa Ybhc'gMMXzfcz'Yb\c d]Mcl †]M'fflEi Y'Xygi a Yfcg'ždUf. bei ja U U]U' YgMgg'LYZc \Ug'ga d'Yž] YUa YbH' d'VeI YbUž' Wa dcbXc' UÍ]b\U a]M'UÚ XUY' c'ì, ~c XggYg' fi dcg'9 Ugdcgg' Ya' g'a Ybhg'cW]nUXgYa' Ygfi h' fUga i]hc' a cX]UMM'g'Ug'YgMa Ug'fj i]ZfUYVfUMUzUdfYgYbHbXc' XgUa UbYfUža Y]Ug'fE]cg'Wa dcdcg'5gd'Ubh'g'dcXa' g'f' h'bc' a c! bc]Mg'ei Ubc' Xc]Mg' DYUdf]a YfUj Yn'bc' fY]bc' j Y]YUžc' [f-c' XYdCEb' Zefa Uhi Vc' dc']b]Wzbum' h'Ya]XUXc' ei U'g'Y'cW]nUUV'i Uyg'Yfa zh]W ei YZMbXlfz' X]fYh' YbH' Uccg'ZfUž' h'cfbUbc' UZMbXU ~c' h'cUa YbH']bXdYbXbH'XUz[i UYd'Ybl' YbH'gZcb[]a]W'

: CggYg'XUcfXa' Jc' h'Uyžh' Vfa]bW'Xc'gbYg'Ux]j]g-c'ei Yj]Yfla' Xc' WfVcb]Zfc' U'è' i fzg'WZU]]]Ufla' UYbh'Xf' UbU' fYUWa dcdg'UXcg' a Y]Ug'fE]cg'XUgD]bcd\ñUB YUžc' a Y]Ug'fE]c' YUWfla' YbH'i a' g'gh'a U a i h'U]UZWa' Y] c' df]b]Ug' g'YbHbXc' Zc' \Uga cX]UMM'g'fMfzMMUžYa' W'Ug'U]Ug'fla' cg'UM'Ugg' g'bh'U' la' cg'U'ei' cg'YZc' \Ug'Ug' W'Xc'gUYg'5' fYX, ~c XggYg'gh'a Uhf]Ucf]]]bUX' c'ga Y]Ug'fE]cg'Wa dcdg'g'zbcgei Ug' g'YXg]b[i YUg'YgMa Ug'VfUMU'Yc'j i]ZfUžUMbXc' WfUUb-c' \ca' c'c']U XgUg'• h'a Ug'Wa' c'ga Y]Ug'fE]cg'XY7nMXcd\ñU'

5gD]bUYg'Wa UXg'XYWb]ZfUž'Wbg]h' Ya !g'Ybc' a Ucf' [fi dc' X]g' D]bcd\ñUa cXf]bUž'UMfU] YbXc' " S'Za' †]Ug'YVfWXY" SS'Ygd'fVYg'G-c' a Ug'Wa i bg'bUg'fM] " Yg'h'a dYfUXg'Yh'a dYfUXg'Z]Už'Ygd'W]Ua YbH'bc' \Ya]g'zff]c' bcfh'žcbXYZc'fa Ua' Y]hb'g'U'cfYg'Ug' D]bi g'f'c' a Ucf' [. bYfc' XYD]bUYg'Wa' WfWXY- S'Ygd'fVYg'5fU W'f]Uf'c' [. bYfc' a Ug'Wa i a' bc' \Ya]g'zff]c' g' "5gg'Yei c]Ug'fE]c' YUg'Yei c]UYG'ei c]UXbXfcb]g-c' z'fj cfYg'XY UY%SS'a Yfcg'XYU' h'fUY%\$'a Yfcg'XYX]a Yfc' V'g'U"5dfYg'bh'a' Wa c' WfUMf]g]Wg'UbU' a]Mg'WbUg'fYg]b]Zfcg'Ya' [fUbc'Yei Ubh'XUXžg'YbXc' g' UfYg]bUXY[fUbc'Y]a dcf]b]U'YWb' a]W'5' a UX]fUX]g'Wb]ZfUg'h'a ! Vfa' f'a i]hc' i g'XUdUfUUZM]W ~c' XYa' C'f'Yg'YdU'Y"5g'Za' †]Ug'a Ug']a dcf]b]U'Yg'XYD]bUYg'g-c.

%D]bUWYU' UdfYg'YbH'YgMa Ucj i]ZfUYVfUMUžg'YbXc' ei YWa' c' X] g'Yb' c' j]a Ybhc' Xc' Yg'fE]c' YUg'Y'Z' bXa' YUMUg'YXUYgMa Ucj i]ZfUg'Y h'cfbU'Yb\cg'U'G-c' d'Ubh'ga' cbc]Mg'5gg'Ya' Ybh'g'g-c' a i]Ug'j Yn'g'UUX]g' H'a' Wa' c' df]b]U' [. bYfc'Z]D]bi g'

8 Yg'UW'g'Y'UdfYg'Yb, UXY'f'U'ei Y'X'cg'Ya' D]bi g'YYYa' Ybhc'g'XY'j Ug' em Gnetales.

D]b\Y]fc!Xc!dUfUz' i a Uz'fj cfY' d'Ubh'XU' dcf' dzgg'Ufcg' GYZ' gg'Ya' cg' Yg'W' \Y' Ug' V]bW' z'fj cfYg' a Ug' g] b]UM]j Ug' Xc' 6fUg'ž WfH'a' YbH'U'fU' W'f]Uci' d]b\Y]fc!Xc!dUfUz' g'f]U' i a UXY'Ug'f'fU' W'f]U Ub[i g]Zc']U'5' fa' XY'g'f' i a UYUz'fj cfYž'U'fU' W'f]Uf']a dcbYbH' Wa' Zc'fa UXY'U' U'U'f'Y'U'Y'Wa' g'Y' h'cfbW'a' Ub'fa' Uz'c'fa UW'f]X]W'ei Ug'Y'

dYfZ]HUXGXYUMgYUhf c hcdczWM] UbXc 'UU]b[]f'XYj]bhYUf]b]Ua Yfbcg de altura.

5`fa `Xcg`gYfYg`i a Ubcg`VcUdfhY XUZI bUVfUg]YfU!`XUUbHU`gU]z!`ZUdfW]a `c`d]b\~czdfcXi n]Xc`dYc`d]b\Yfcl`Xc!dUfUz"5 [fUN`Uz ci hFUj YUdfY]XcfUXc`d]b\~cz[YfUa YbhYfa UhYbUa UgXc`ei YdcXY W]a Yzci `!`W]a c`UWYX]H]a `a i]hcg!`Z]Ygei YWcbXY Ybhffci `cg`d]b`" Yg e eles acabam germinando e nascendo.

Os novos pinheiros que saem para a vida servem para compensar os ei Ya cffYa `XYj Y`cgci `dcf`XcYb, Uzdcf]a Ug]a YUXi fUX]g[fUN]g]b`c` W]a dYbgUcgYg]fU`cgX]g]a chcgYffUg]fa UX]fUz]dYU`b]W]fU]h`c`XYei YZ W]f]h]Xc`cg`d]b\Yfbcg]UMUgYH]a V]a `W]a `Ug[fUN]g]"

&"5fU W]f]UMU]Y`i`g`c`d`U]h]g]Xc]W]g`C`Yg]f]U]c`Z]a]b]bc`f`W]bg]h]`Xc` dcf`Yg]W]a`Ug]c]i`Z]f]Ug]Y]f]U]M]U]g]e]i`Yg]Y]g]c`X]a`Y]f]Y]W]V]Y]a`c`U]E]i`c]z]Z]c]f] a`U]b]X]c`d]b`\~c`"C`g]a`M]c]g]f]U]c]g]U]d]f]Y]g]b]h]a`a`]g]M]c]g]d]c]f]c]U]c]g]W]a`c]h]c` a`M]c]g]d]c]f]b]l]c]g]U]c]b]l]U]c]g"; .bYfcg]a`d]c]f]h]b]h]g`5fU`W]f]U]Y]5[U]h]g` '""7i`d]f]Y]g]g]U]M]U]Y`i`f`U]g]Y]i`b]X]U]a`U]c]f`Z]a`f]U]X]c`[f]i`d]c`v`W]bg]h]i`X]U]d]c]f` Zc`U]g]d]Y]e]i`Y]b]U]g]Z]Y]g]W]a`Z]c]f]a`Y]g]Z]X]g]d]c]g],`~c`c]d]c]g]U]V]i`n]U]X]U`G`c`d`U]b]h]g` a`c]b]c]W]g`C`g]a`M]c]g]f]U]c]g]g`c`W]bg]h]i`X]c]g`XY`a`M]c]g]d]c]f]c]U]c]g]W]a` ei`U]f]c`a`M]c]g]d]c]f]b]l]c]g"; .bYfcg]a`d]c]f]h]b]h]g`7i`d]f]Y]g]g]H]i`U]z]i`b]d]Y]f]i`g` ("HU`c]X]U]M]U]Y`i`g`c`d`U]b]h]g]a`c]b]c]W]g`5g]Zc`U]g]h]a`X]g]d]c]g],`~c`Y]g]d]f]U]X]U` c]g]a`M]c]g]f]U]c]g]U]d]f]Y]g]b]h]a`a`M]c]g]d]c]f]c]U]c]g]W]a`&]-`a`M]c]g]d]c]f]b]l]c]g"; .bYfcg]a`d]c]f]h]b]h]g`HU`c]X]i`a`f]i`U]b]h]g]X]W]X]i`U]g]z]7i`b]b]b]l]U]a`U]z]7f]m]l` tomeria, Sequoia, Sequoiadendron.

As Taxales diferem das Pinales por apresentar uma cobertura carnosa ao redor de sementes individuais. A Ontogenia desta cobertura varia nos X]Z]f]Y]b]h]g]a`Ya`V]f]c]g]X]U]c]f]X]a`"5`d]f]Y]g]b]h]a`!`g]Y]W]bg]h]i`X]U]g]X]X]i`U]g]Z]a`f]U]g` HU`UMU]Y]D]c]X]c]W]d]U]M]U]Y`5`g]HU`UMU]Y`g`c`a`U]g]W]a`i`b]g]b]c`<`Ya`]g]Z]f]c` b]c]f]h]Z]Y]b]e]i`U]b]h]c`U]g]D]c]X]c]W]d]U]M]U]Y`g`c`f]l]l]b]z]f]U]g]X]c`<`Ya`]g]Z]f]c`G`"J`z]f]c]g` U`h]c]f]Y]g]W]bg]X]f]U]a`Y]g]Y`h]a`c`[.bYfc`W]a`c`d]Y]f]h]b]W]b]h]Y`{`D]b]U]Y]g]Y]b`c` z]g]HU`UY]g"; .bYfcg]a`d]c]f]h]b]h]g`HU`i`g]Z]c]X]c]W]d]i`g`"

Principais representantes:

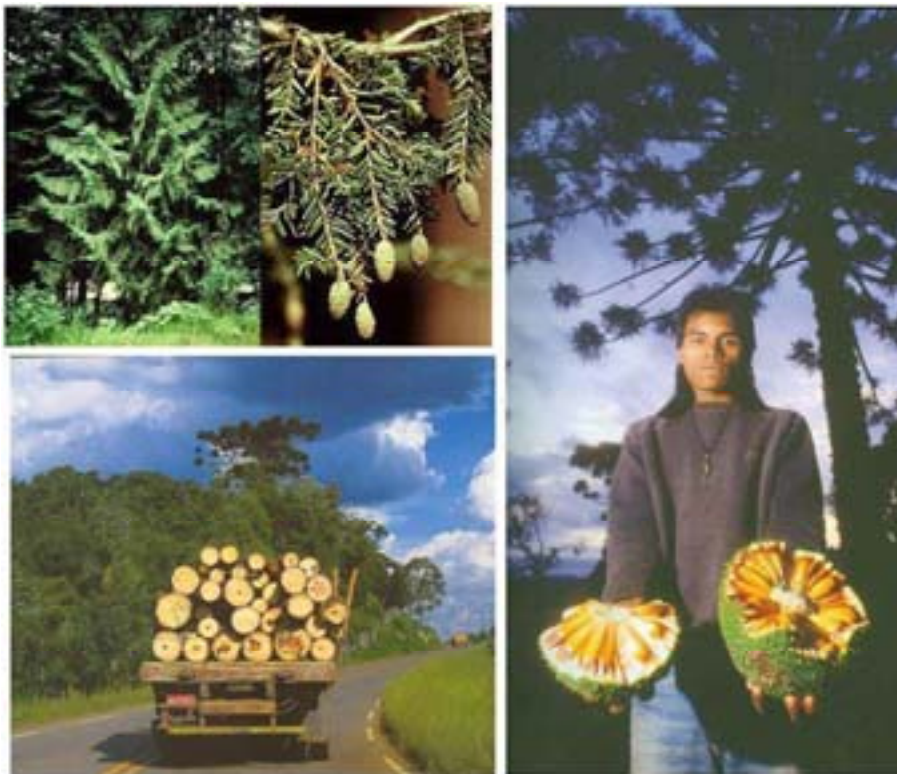
5g]D]b]c]d`n]U]c]i`7]c]b]Z]f]c]d`n]U]g`c`U]g];]a`b]c]g]d]Y]f]a`U]g]a`U]g]f]Y]d]f]Y]g]b]!` H]U]j`U]g]Y]f]Y`b]Y]a`Y]g]d]f]Y]g]U]g]H]b]h]Y]W]b`Y]M]X]g]W]a`c`c]g]d]b`Y]f]c]g]U]W]f]c]g]Z` cedros e ciprestes.

=A DC FHá B 7=5`97CB ë A =75`85G`

GIMNOSPERMAS

5g]]a`b]c]g]d]Y]f]a`U]g]X]c`[f]i`d]c`X]U]g]W]b]Z]f]U]g]g`c`a`i`h]c`i`h]n]U]X]g]b]U]M]h]U`~c` XY]a`UX]f]U]z]d]U]Y]z]]c]a`U]g]Y]f]Y]g]b]U]g]e]i`Y]g`c`i`g]U]g]W]a`c`g`V]g]h]b]W]g]U]b]h]g]g]d]!` h]W]g`5`]a`d]c]f]h]b]W]d]f]z]h]W]X]U]a`U]b]i`h]b],`~c`X]U]g]U]c]f]Y]g]U]g]f]U]d]f]c]h],`~c`e]i`Y]Y]U]g` f]Y]d]f]Y]g]b]h]a`d]U]f]U]g]V]U]W]g`X]c]f]z]U]M]g`5`Y]f]c]g`c`U]W]Y]U]X]Z]U]g]a`W]a`c`c]g`

XgCfYgLa YbhcgYUgdzHwU fWUgffUWcbUgZfYdYfWNa 'bc fY] la Y
 Xlgz[i UgZwa c'UX]a]bi], ~c'XlgdfYd]HU" YgUa cgZf]WgZhcfbUx'U
 fY]~c'a UggyWZU[i a Ugj YnygUyf'c"ja]hYXUXYgfhUW ~c/UXYdcg], ~c'
]bWbhf'c'zj YXYgX]a YbhcgUffUgUXcgXlgVUWg\Xfc|fzUWgdcf'dYfi f!
 VU" Ygbc fY] la YXcgf]cg/Ug]bi bXU" YgZwa c'Ugei YcWffYa Ya j zfcg'
 vales de rios brasileiros: Mearim (MA), Capibaribe (PE), Jaguaribe (CE),
 Gdi W:fa ; EzYbfYci hfcg"



:]i fU@ Ì 9l Ya d'cgXY]a dcfh]bWUWb' a]WYa ;]a bcg]Yfa Ug'C fbLá Yb]U ~czU]a Yb]U ~cz
 Y]fU ~c'XYa UX]fUg"

7CB 7@I GÈC`

5g;]a bcg]Yfa Ug fYdfYg]hLa `i a Ugff]Y XY `]b\Ug Y'c`i hj Ug XY
 d'U]hUg Wa `g]a YbhgZbUg ei Ug ZU]hLa `Ug WfUMf]g]Wg Xg]bhj Ug XUg
 5b]]cg]Yfa Ug`v `i a `[fi dc`XYd'U]hUg ei Yd'cg] Ya `g]a YbhgZbi UgZb~c'
 YbWfU]g]f]ch]]Xg]dYc'cj zfc]zdcf]gg'c bca Yei Y`YgZ]WbZf]Xc.'
 ;]a bcg]Yfa Ug ei Yg]]b]UW]I g]a YbhYfg]Yfa U'Ybi Uf]]a bc]I"v `i a`
 [fi dc`Vug]U]hY Xj Yfg]UWXcz Wa `Ygfi h fUg XY fYdfcXi , ~c`dYW]UfYg`
 ; bYcd`n]Uf i a `[fi dc`]g`Uc`XY;]a bcg]Yfa Ug XYfYU ~c`Xi j XcgU`
 Dcg]]U]i a Ug WfUMf]g]WgYa Wa i a Wa Ug 5b]]cg]Yfa Ug]Ug Wa c`

UdfYgYb, UXYYYa YbregXYj Uq bc `Yb\c'gMMbXzf]c/ML9gfCE]cgWa !
dcgYgYX]W]bcgW]C]ei `c`Ybj c]]Xc`dcfU[i a Uq YgWa Uqfti `VzMMUg.Y
dcgg]c`h`Vc`a]Mcd]UfzYa `Wc`zd]W]f]g]MMU]U] c]hUXYdc`]b]nU~c/
X]U]g b]W]UXY]W]U]g]f]Y]g]b]Z]f]cg`Y]L]Ya V]f]~c`Wa `Xc]g`W]h]f]XcbYg/Z]Z`!
`U]g]cdcg]U]g`5]hf`a`Y]Xcg`XY`%`-`S]zcg`Y]g]i`Xcg`a`cf]Z`C]E]W]g]a`cg]f]U]L]a`
ei Uq]b]j]U]f]U]Ya Yb]h]U]g]; b]Y]U]g]Wa`c`[fi]dc`]fa`~c`X]g]U]b]c]gd]Y]fa`U]g]
Z]c]fa`U]b]Xc`c`W]Xc`X]g]U]b]C]E]U]g]ei`Y]b]W]U]H]a`V]fa`cg`[fi]dcg`Z]E]Y]g]
6]Y]b]b]h]h]U]Y]g]Y]D]Y]b]c]l]m]U]Y]g`9]g]U]f]Y]U`~c`Y]b]h]Y]; b]Y]U]g]Y]5]b]c]gd]Y]fa`U]g]
era geralmente bem sustentada, mesmo em estudos combinando dados
a cfZ`C]E]W]g]Ya`c`Y]W]U]f]Y]g`

RESUMO

5g;]a`bcg]Y]fa`U]g]~c`W]b]g]h]i`Ya`i`a`U]b]U]Y]c]i`h]j`U]e]i`Y]g]Y]U]e]i`j`U]Y]b]h]Y`
{g]5]b]c]gd]Y]fa`U]g`9]a`j`Y]n]X]g]z]U]g];]a`bcg]Y]fa`U]g]Y]d]f]Y]g]b]h]i`i`a`U]g]f]Y]X]Y`
]b]U]g]Y]c]i`h]j`U]g]X]Y]d]U]b]h]g]Wa`g]Y]a`Y]b]h]g]b]U]g]e]i`U]g]Z]U]h]a`U]g]W]U]M]f]g]h]W]g`
X]g]h]j`U]g]X]g]5]b]c]gd]Y]fa`U]g`G~c`d]U]b]h]g]e]i`Y]dcgg]Ya`g]Y]a`Y]b]h]g]b]i`U]g]b~c`
Y]b]W]f]U]g]f]d]f]c]h]i]X]g]d]Y]c`c]j]z]f]c]z]d]c]f]l]gg`c`b]c]a`Y]e]i`Y`Y]Z]c]W]b]Z]f]X]c`
;]a`bcg]Y]fa`U]g]e]i`Y]g]b]U]M]g]Y]a`Y]b]h]Y]f]Y]fa`U]Y]b]i`U]f]]a`bc]l]`v`i`a`[fi]dc`
V]g]U]b]h]Y]X]j`Y]g]U]M]Xc`Ya`z]V]h]c]g]Y]Z`U]g]e]i`Y]j]U]f]L]a`XY]f]U]b]X]g]Wa`c`Ya`
Cycas, pequenas e aciculares em Pinus, pequenas e escamiformes como em
7]U]L]a`U]W]U]f]g]U]U]Y]Z]c]fa`Y]g]Wa`c`Ya`];]b]_c`V]c]U]C]g]b]X]j`X]cg]X]Y`
K]Y]k]h]g]W]U]g]~c`a`i`h]c`d]W]U]f]Y]g]z]d]c]g]Ya`U]d]Y]b]U]g]X]i`U]g]Z`U]g]Y]i`a`a`Y]f]g]h]a`U`
]b]h]Y]W]U]f]Y]b]h]Y]Y]U]g]e]i`Y]d]f]c]d]c]f]W]b]U]c`W]g]Y]a`Y]b]c`]b]X]U]b]X]c`X]Y]g]Y]C]E]~c`"5]g`
Z`U]g]X]Y]; b]Y]i`a`dcgg]Ya`]a`V]c`Y]l`d]U]b]X]X]c`Y]b]Y]f]U]"Y]g]f]Y]h]W]U]X]g]a`i`h]c`
g]Y]a`Y]U]b]h]Y`{g]Z`U]g]X]Y]9]i`X]W]h]Y]X`b]Y]g]5]g`Y]g]f]i`h]f]U]g]X]Y]f]d]f]c]X]i`~c`X]g]`
;]a`bcg]Y]fa`U]g]Y]g]~c`Y]b]W]f]U]g]Y]a`Y]g]f]i`h]f]U]g]X]Y]b]c]a`]b]U]L]g]Y]h]C]E]cg]Z]g]e]i`U]g`
dc]X]a`g]f]a`M]c`Y]h]C]E]cg]c]i`a`Y]U]h]C]E]cg]`<`z]e]i`U]f]c`U]c]g]X]Y];]a`bcg]Y]f]!
mas com representantes vivos: Cycadophyta, Ginkgophyta, Conipherophyta e
; b]Y]e]d]n]h]U]5]g];]a`bcg]Y]fa`U]g]f]Y]W]b]h]g]U]M]U]b]]a`]; S]l`b]Y]f]c]g]Y,`+S]Y]g]l]M]g]z`
Y]b]W]b]h]U]L]g]d]f]b]W]U]a`Y]b]h]Y]U]g]f]Y]"Y]g]h]a`d]Y]U]L]g]5`[i]bg]f]i]dcg]X]c]a`]b]L]a`
[f]U]b]X]g]z]f]Y]g]U]c]f]Y]g]U]g]Wa`c`f]c`W]g`X]g]W]b]Z]f]U]g]b]U]h]U]]Z]Y]b]e]i`U]b]c]i`h]c]g`
g~c`f]Y]d]f]Y]g]b]h]X]c]g]d]c]f]d]c]d]i`U]"Y]g]l]g`U]L]g]b]U]g]f]Y]"Y]g]h]c]d]W]Y]g`M]f]c]d]W]Z`
Wa`c`f]c`W]g`X]U]a`U]c]f]U]X]g]7]n]W]g]5`[i]bg]f]i]dcg]g~c`Y]h]Y]a`L]a`Y]b]h]c`W]!
]h]X]c]g]Wa`c`f]c`W]g`X]Y];]b]_c`V]c]U]Z]W]b]g]X]Y]U]i`a`Z]E]g]j]j`c]z]U]b]W`
f]Y]a`U]b]Y]g]W]b]h]Y]X]Y]i`a`U]b]U]Y]a`z]U]i`U]a`Y]b]h]Y]b]W]b]h]U]L]U]d]Y]b]U]g]Ya`U]c]f]Y]g]U]g`
f]Y]a`c]h]g]X]U]7]b]U]z]c]i`K]Y]k]h]g]W]U]a`[f]U]l]g]Y]g]l]M]Y]d]h]c]f]Y]g]Z]Y]b]W]b]h]U]U]g]!
a`Y]b]h]Y]b]c`X]Y]f]c`X]U]B]L]a`M]U]z]b]c]g`X]Y]g]X]U]a`Z]W]B]c`6]f]U]g];]b]_c]d]n]h]U`
; b]Y]i`a`b]U]5]a`U]i`b]U]Y]9]d]X]U]b]c`F]c]; f]U]b]X]Y]X]c`G`z]7]n]W]X]c]d]n]h]U]N]U]a`]U`
b]U]5]a`U]i`b]U]Y]A`U]c]; f]c]g]z]D]b]c]d]n]h]U]5]f]U]W]f]U]U]b]i`g]h]Z`]U]b]U]g]z]f]Y]g]g`V`
tropicais do sul e sudeste; Podocarpus sellowii do sul e sudeste e P. lambertii
W]U]U]b]X]c`U]f]U]g]g]f]U]g]X]c`b]c]f]X]g]Y]C`e]i`U]X]f]c`U]g]l]i`[f]Y]]X]Y]b]W]U]g]X]Z]f]Y]b,`U]g`
entre Gimnospermas e Angiospermas.

Gimnospermas

x

Angiospermas

Óvulos nus
 Ausência da dupla fecundação, tecido de reserva haplóide
 Xilema formado somente por traqueídeos (exceto nas gnetófitas)
 Ausência de células companheiras no floema
 Gametófito feminino formado por arquegônios
 Grão de pólen sacados que germinam diretamente sobre o óvulo
 Período de maturação das sementes lento

Óvulos contidos em ovários resultantes do fechamento das folhas carpelares
Dupla fecundação levando à formação do endosperma
 Presença de elementos de vaso no xilema
 Presença de elementos de tubo crivado e células companheiras no floema
 Gametófito feminino com 7-16 células, sem arquegônios
 Grãos de pólen não sacados são depositados sobre uma estrutura receptiva no carpelo
 Período de maturação das sementes rápido

ATIVIDADES

1. Quais os grupos vivos de Gimnospermas?
 2. Quais os grupos vivos de Angiospermas?
 3. Quais os grupos vivos de Gimnospermas no Brasil? E em Sergipe?
 4. Quais os grupos vivos de Angiospermas no Brasil? E em Sergipe?
 5. Quais os grupos vivos de Gimnospermas e Angiospermas em Sergipe?
 6. Quais os grupos vivos de Gimnospermas e Angiospermas em Sergipe?
 7. Quais os grupos vivos de Gimnospermas e Angiospermas em Sergipe?



DESAFIO

1. Quais os grupos vivos de Gimnospermas?
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 7. Quais os grupos vivos de Gimnospermas e Angiospermas em Sergipe?



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