PO:00009429 inflorescence
A reproductive shoot system that has as parts all of the shoot axis distal to the most distal foliage leaf of a shoot axis and all of the flowers borne by those axes. Must have two or more flowers as parts.
[source: POC:Ramona_Walls]

is_a PO:0020126 tassel inflorescence
is_a PO:0020136 ear inflorescence

Terms from Plant Ontology [PO] version #16 Oct 2011

B73 Maize Gene Expression Atlas
Plant Ontology Use Case


"...Here we present a comprehensive atlas of global transcription profiles across developmental stages and plant organs. We used a NimbleGen microarray containing 80,501 probe sets to profile transcription patterns in 60 distinct tissues representing 11 major organ systems of inbred line B73. Of the 30,892 probe sets representing the filtered B73 gene models, 91.4% were expressed in at least one tissue. Interestingly, 44.5% of the probe sets were expressed in all tissues, indicating a substantial overlap of gene expression among plant organs. Clustering of maize tissues based on global gene expression profiles resulted in formation of groups of biologically related tissues..."
60 maize tissues seed to seed >300,000 NimbleGen probes B73_V1 based gene models

Sekhon et al Mar 2010 Maize Meeting

• Should we take in these ‘raw’ data?
• Lifetime of data — What about the new version gene models?
• What will the community expect from us in future for similar ‘BIG DATA’?

On board expertise in whole genome gene expression/systems biology
Jack Gardiner, Ethalinda Cannon, Taner Sen

April 2010 all staff meeting at Ames
Integrate tissues into MaizeGDB
- Images, descriptions provided by R. Sekhon.
- Link to maize-specific component terms
- ‘Inherit’ PO accessions from the component terms
- MaizeGDB to provide PO association files
  - after journal publication
  - for probe sets reanalyzed for the V2 gene models

Multiple staging standards for maize
- Atlas (based on Ritchie)
- MaizeGDB (based on multiple sources, including Ritchie)
- PO (all plants)

Ritchie staging - Lack of precision in description of staging (leaf number, days after pollination), but has images to help.

MaizeGDB staging is independent of staging by leaf number, per se, but does describe the common situation for ‘standard’ corn belt lines, which includes B73 and refers to Ritchie staging

Similar term, different definition.
2 tassel initiation/early whorl stage  [MaizeGDB] Apical dome of shoot meristem elongates, followed by appearance of tassel branch primordia. Under favorable conditions in adapted hybrids in the US Corn Belt, this may occur about 2-3 weeks after seedling emergence, when 4-6 leaf collars are visible. Stem growing point is at or near soil surface. Tassel initiation is very sensitive to photoperiod and temperature; maximal sensitivity to these factors occurs during a brief period with a duration equivalent to the emergence of two leaves, just before tassel initiation (Poethig, 1994).

3.2 late whorl stage  [MaizeGDB term] In adapted materials in the US Corn Belt, the collars of leaves 9-11 are visible (some of the lowest leaves may already have degenerated by this stage). By 10-leaf stage, new leaves appear every 2-3 days. Tassel development accelerates, and rapid stem elongation continues.

- PO:0007063 LP.07 7 leaves visible
- PO:0020040 leaf base
- PO:0001052 leaf expansion stage
- PO:0006340 adult vascular leaf
- PO:0008018 transition vascular leaf

Leaf base of expanding leaf V5 [Atlas]

**Leaf number staging**

- 5 stage 3 leaf development (leaflet staging)

**DAP days after pollination**

- FF:00 fruit size up to 10%
- PO:0007032 endosperm development stages
- PO:0001180 B proembryo stage

6.2 exponential [MaizeGDB term]. Salvador (1992) describes the exponential phase as a period of increased metabolic activity and rapid kernel development that links the dilatory phase with the linear grain-filling period. It occurs approximately 5-12 days after pollination (dap). In the endosperm, cell walls are laid down beginning about 5 dap, changing the free nuclear tissue into a cellular one (Kowles et al., 1992, Genetic Engineering, Vol. 14). The embryo continues in the proembryo stage through about 10 dap (Abbe and Stein, 1954). MaizeGDB includes a substage ("6.21 transition") for the late exponential phase when important events take place in the endosperm and embryo.

Kernel 10 DAP [Atlas]

**Definitions vary for similar names**

- 0.3 coleoptile emergence from seed [MaizeGDB]

PO:0007045 Coleoptile emergence. But defined as “emergence of coleoptile above ground”. Hmmm.

Coleoptile 6 DAS [days after sowing; Atlas]
PO revision - no effect on PO revisions

Inflorescence PO:0009049
is_a ear inflorescence PO:0020136
is_a tassel inflorescence PO:0020126

Revised ontology structure only
PO revisions - term merging

Use style instead of silk

Expression Atlas at MaizeGDB

Recomputed to v2 gene models

Information accessible from browser
Information accessible from tissue record

Expression Atlas at MaizeGDB

MaizeGDB links to PO

Plant Ontology Team:

• Provided updated PO term lists and definitions with OBSOLETE terms included and indicated.
• Carefully considered my suggestions re. definitions and structure of the PO via the Source Forge ontology tracker.
• Reviewed the list of some 180 annotations of the 60 tissues and provided information about plant anatomy parts that required double term entry, eg “style” needs also “ear floret”.
• Was happy to accept all the data where expression was over base level, per Sekhon et al. 2011.
• Mapped Classical Genes of Lyons and Schnable to the gene models for this project post delivery of the associations file.
• Updated files to accommodate some changes in PO made after Oct.2011.
**Acknowledgements**

<table>
<thead>
<tr>
<th>ATLAS team</th>
<th>PLEXdb team</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rajan Sekon</td>
<td>[computed v2 expression values]</td>
</tr>
<tr>
<td>Robin Buell</td>
<td>Sudanshu Dash</td>
</tr>
<tr>
<td>Sean Kaeppler</td>
<td>John Van Hemert</td>
</tr>
<tr>
<td></td>
<td>Roger Wise</td>
</tr>
<tr>
<td></td>
<td>Julie Dickerson (currently at NSF)</td>
</tr>
<tr>
<td>MaizeGDB team</td>
<td></td>
</tr>
<tr>
<td>Mary L. Schaeffer [curated]</td>
<td></td>
</tr>
<tr>
<td>Ethelinda Kl. Cannon [v2 probe sets]</td>
<td></td>
</tr>
<tr>
<td>Jack M. Gardiner [coordinated]</td>
<td></td>
</tr>
<tr>
<td>Bremen M. Bean [browser views]</td>
<td></td>
</tr>
<tr>
<td>Darwin A Campbell</td>
<td></td>
</tr>
<tr>
<td>Carson M. Andorf</td>
<td></td>
</tr>
<tr>
<td>Scott M. Birkett</td>
<td></td>
</tr>
<tr>
<td>Lisa C. Harper</td>
<td></td>
</tr>
<tr>
<td>Taner Z. Son</td>
<td></td>
</tr>
<tr>
<td>Carolyn Lawrence</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>We thank these organizations for funding support:</th>
</tr>
</thead>
<tbody>
<tr>
<td>NSF MaizeGDB, PLEXdb</td>
</tr>
<tr>
<td>USDA MaizeGDB</td>
</tr>
<tr>
<td>National Corn Growers Association MaizeGDB</td>
</tr>
</tbody>
</table>