
The Maize Genetics Cooperation Newsletter MNL

# *maize gene review*

www.maizegenereview.org

## A new on-line journal promotes community curation of phenotypes

Mary Schaeffer

MaizeGDB
Maize Genetics and Genomics Database

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# MNL and MaizeGDB ties

**1933 First formal listings of maize genes and genetic stocks M. Rhoades** *MNL 3:5-16*

**1991 Maize[G]DB online with data parsed from MNL**

- **MGC Stock Center List E. Patterson.** ***MNL 65:129-133*****.**
- **Gene List E. Coe, D. Hoisington, and S. Chao.** ***MNL 65:134-148*****.**

**MaizeGDB hosts online MNL**

MaizeGDB
Maize Genetics and Genomics Database

# Phenotype data at MaizeGDB

SOURCES:

- The MGCSC Maize Genetics Cooperation Stock Center, Illinois USA, Marty Sachs, Director
- High-throughput projects
- *Mutants of Maize*, eds MG Neuffer, EH Coe, SR Wessler (1997)
- Images - Community, MG Neuffer collection
- Literature

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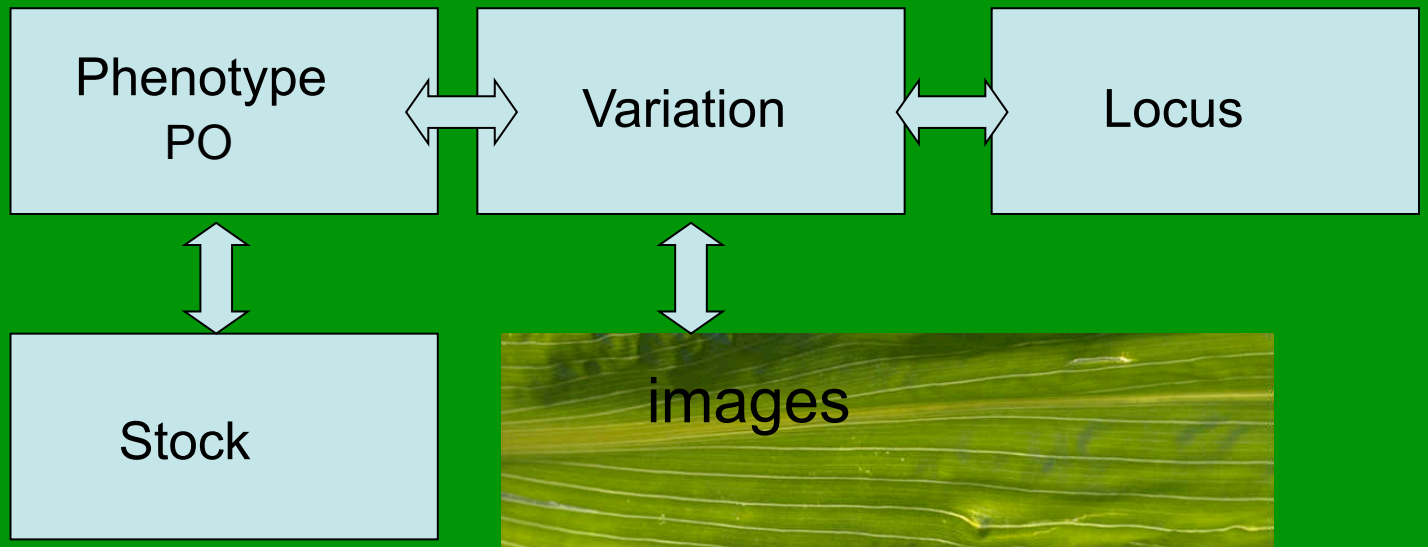


*kn1 knotted1*
*a homeobox gene*

## knotted leaf (phenotype)

This is also known by the following names:
**knotted leaf**

**Definition:**
scattered proliferations of tissue at vascular bundles on leaf

**Add your own annotation to this record!**

**Body Part(s) Affected:** leaf

**Genes:**
cr4 *crinkly4*
kn1 *knotted1*

**Variations:** (see all 13 images of these)
**cr4-6143** (variation of cr4 *crinkly4*)
**Kn*-N1234D**
**Kn*-N64B**
**Kn1-167::Mu** (variation of kn1 *knotted1*)
**Kn1-174::Mu** (variation of kn1 *knotted1*)
**Kn1-N2** (variation of kn1 *knotted1*)
**Kn1-Z3** (variation of kn1 *knotted1*)
**Kn*-HsuA1191**
**kn*-N1891**
**Kn1** (variation of kn1 *knotted1*)
**Kn1-169::Mu** (variation of kn1 *knotted1*)
**Kn1-2F11::Ds2** (variation of kn1 *knotted1*)
**Kn1-O** (variation of kn1 *knotted1*)
**Rs1-Z** (variation of rs1 *rough sheath1*)

**Stocks:** (stocks listed in **bold** are avaliable from the Stock Center)
**117E** **4011M**

This phenotype has **4** references that describe it. Click the arrow to the left to view these references.

See record in a printer-friendly format

Return to the homepage

### Research Tools

Here are some internet resources to aid your investigation into knotted leaf.

**Phenotype Browser**

**Search Tools**
Search **Google** for knotted leaf
Search **PubMed** for knotted leaf
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W3C HTML 4.01

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# annotation by community at MaizeGDB

Register once with MaizeGDB

Add comments to any page.

Add new records

Soon, annotate genome.

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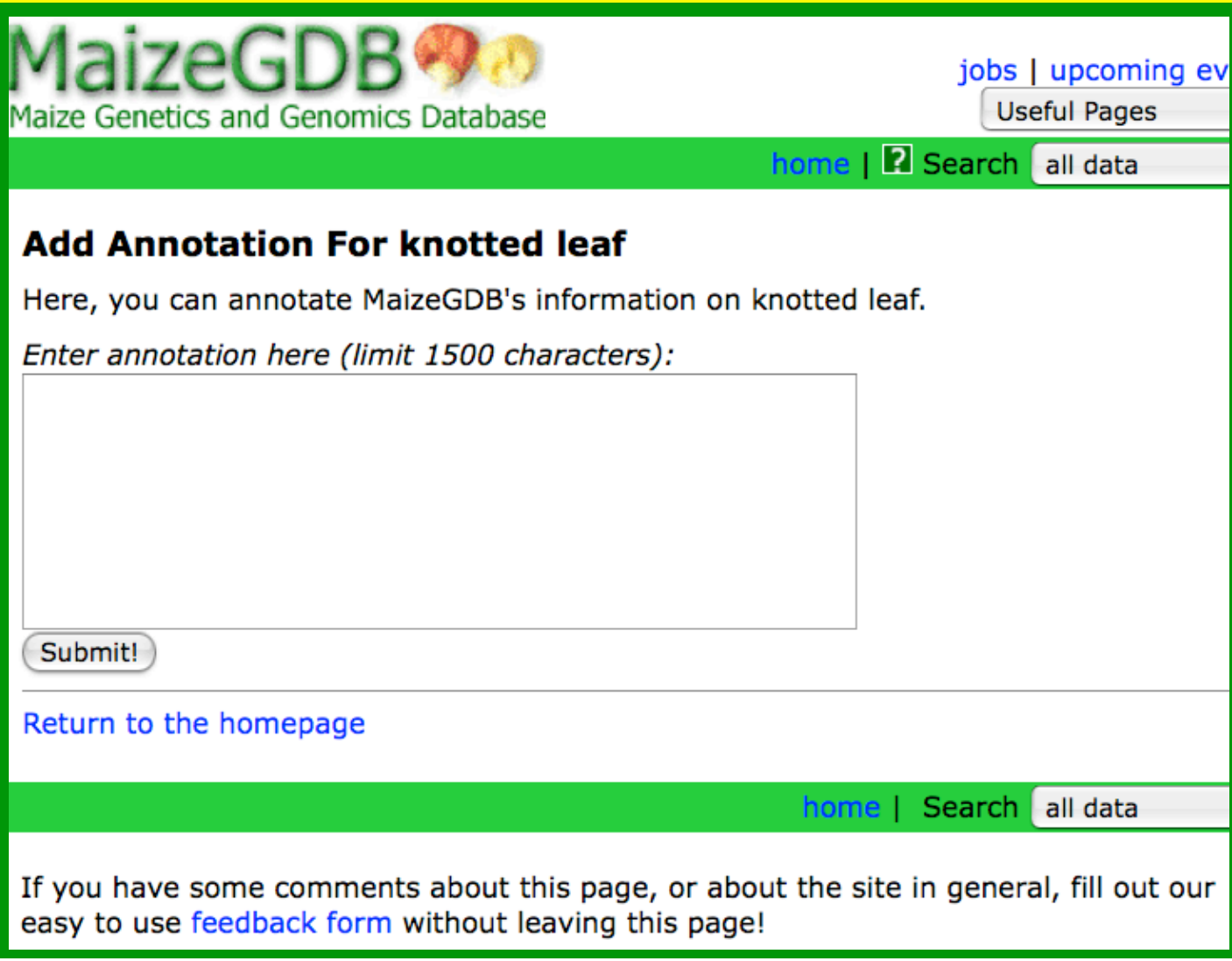
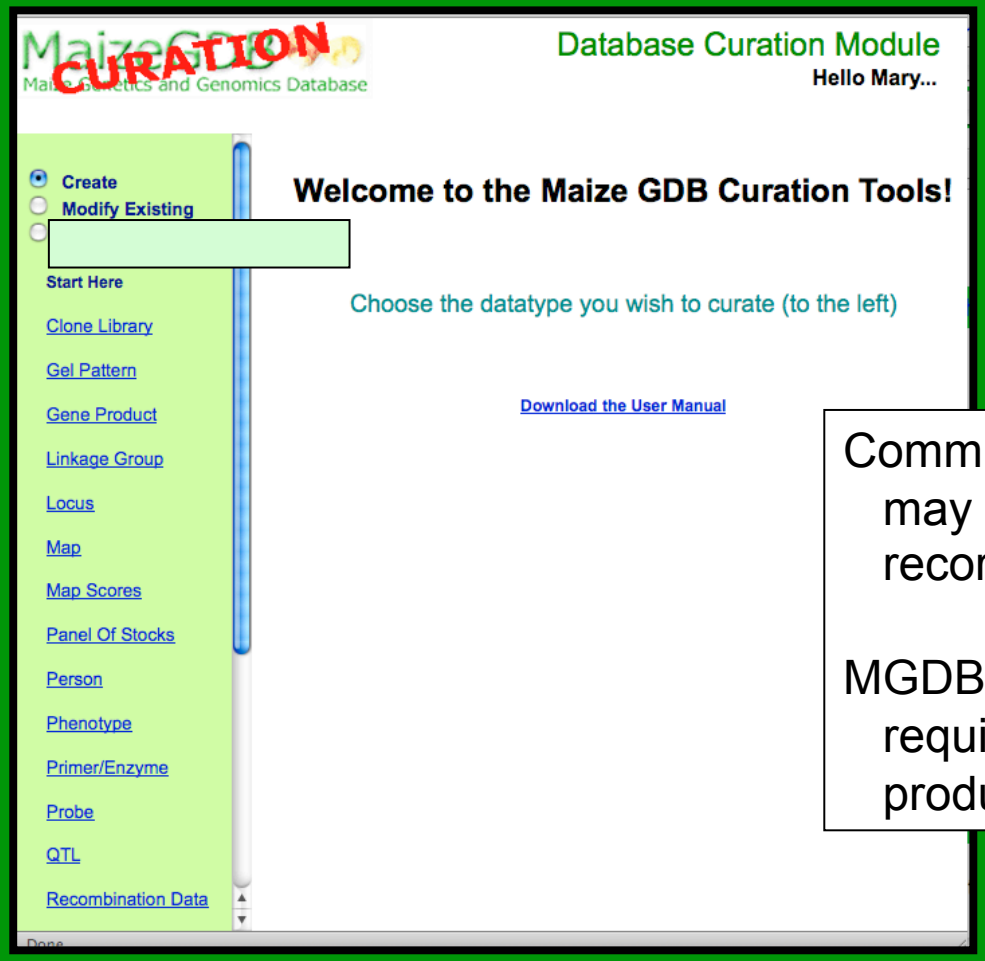
# annotation window



# Community curation - detailed tool suite




Community curator
may create and update a new record prior to production

MGDB Curator approval
required before advancing to production

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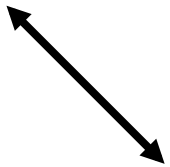
# *kn1* comment in MaizeGDB

Extracted from Mutants of Maize 1997 ed. Neuffer, Coe, & Wessler

Dominant Kn1, localized proliferation of tissue at vascular bundles on leaf to give a knotted appearance. Homozygotes more extreme. Primary effect is to lateral veins of leaf blades; veins are often more prominent, localized extra cell divisions (knots) occur sporadically along the veins, ligule fringes are found along the veins (Gelinas et al. 1969 Am J Bot 56:671). The phenotype is not determined by the epidermis (Hake and Freeling 1986 Nature 320:621), but by the inner middle mesophyll-bundle sheath layer (Sinha and Hake 1990 Dev Biol Symp 19:77). The dominant mutation is neomorphic (Freeling and Hake 1985 Genetics 111:617). A number of alleles have been cloned (Hake et al. 1989 Embo J 8:15, Veit et al 1990 Genetics 125:623; Gelinas et al. 1969 Am J Bot 56:671). Classification varies widely among alleles and according to genetic background **(Hake)**



Parenthetic acknowledgement of contributor

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# *maize gene review-* in brief

Unlike notes in the Newsletter, these contributions will be:

- tailored for entry into the MaizeGDB,
- peer-reviewed,
- freely available for use by anyone who cites the work, as is the practice for any MaizeGDB data.

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# authors provide

* a short summary of the mutant with reference citations
* an unpublished image with a caption
* the reference(s) that first reports or defines this locus
* key alleles, with phenotypes, information about viability or special conditions
* regulation of/by other genes or genetic elements
* expression--tissue/conditions/inhibitors/inducers
* gene product, function, pathways (GO terms welcome)
* map location, how mapped
* any other information, e.g. paralogous loci.

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# MGDB curator/editor provides

- Links to relevant databases: MGDB, NCBI, UniProt
- consensus map coordinates
- known synonyms
- nomenclature checks
- other

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# *Under development*

automated generation of gene review pages with XML markup

DOI registry

# Maize Genetics Cooperation Newsletter

**maize gene review**

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Author: David Braun, Department of Biology, 208 Mueller Lab Pennsylvania State University, University Park, PA 16802

DOI/

Pub date: Feb. 2009

Reviewed: Mar 2009

**Name:** ***tdy1 tie-dyed1***

Chromosome 6L bin 6.07 BAC* c0256b22/AC204318
*BAC determined by NCBI BLAST

Description: Leaf blades develop variegated chlorotic and green regions; chlorotic regions hyper-accumulate carbohydrates.

**Summary:** *tdy1* is a recessive mutation that results in leaf blades developing chlorotic, nonclonal regions that hyperaccumulate carbohydrates. Expression of the phenotype is dependent on growth in high light. The chlorotic regions appear soon after a leaf emerges from the whorl and stable once formed. *tdy1* is proposed to function in the same genetic pathway as *tdy2* based on their nearly identical mutant phenotypes and a dosage-sensitive genetic interaction between the loci (Baker and Braun, 2008). *tdy1* appears to be a grass-specific gene that encodes a novel, predicted membrane-localized protein (Ma et al., 2009). *tdy1* RNA is expressed in phloem cells in mature and immature leaves, stems and developing ears. *tdy1* RNA accumulates in protophloem sieve elements upon differentiation and is one of the earliest phloem-expressed genes reported in maize. *tdy1* is hypothesized to function as an osmotic stress or sugar sensor that prevents the over accumulation of carbohydrates in developing leaves.

**Images:** Leaf of tdy1, courtesy Frank Baker and David Braun.

**First reported:** Braun et al. (2006) *tie-dyed1 regulates carbohydrate accumulation in maize leaves*, Plant Physiology 142: 1511-1522 PUBMED:17071639

MGDB: tdy1
NCBI: FJ376984
UniProt: B8XIB0

**Key Alleles:**

*tdy1-Reference (tdy1-R):* recessive, EMS-induced, proline to arginine substitution at the 112th amino acid

*tdy1-D190:* recessive, *Mu1* insertion in the 5'UTR 101 base pairs upstream of the ATG

*tdy1 tie-dyed1*
carbohydrate transport mutant

# Links to MaizeGDB

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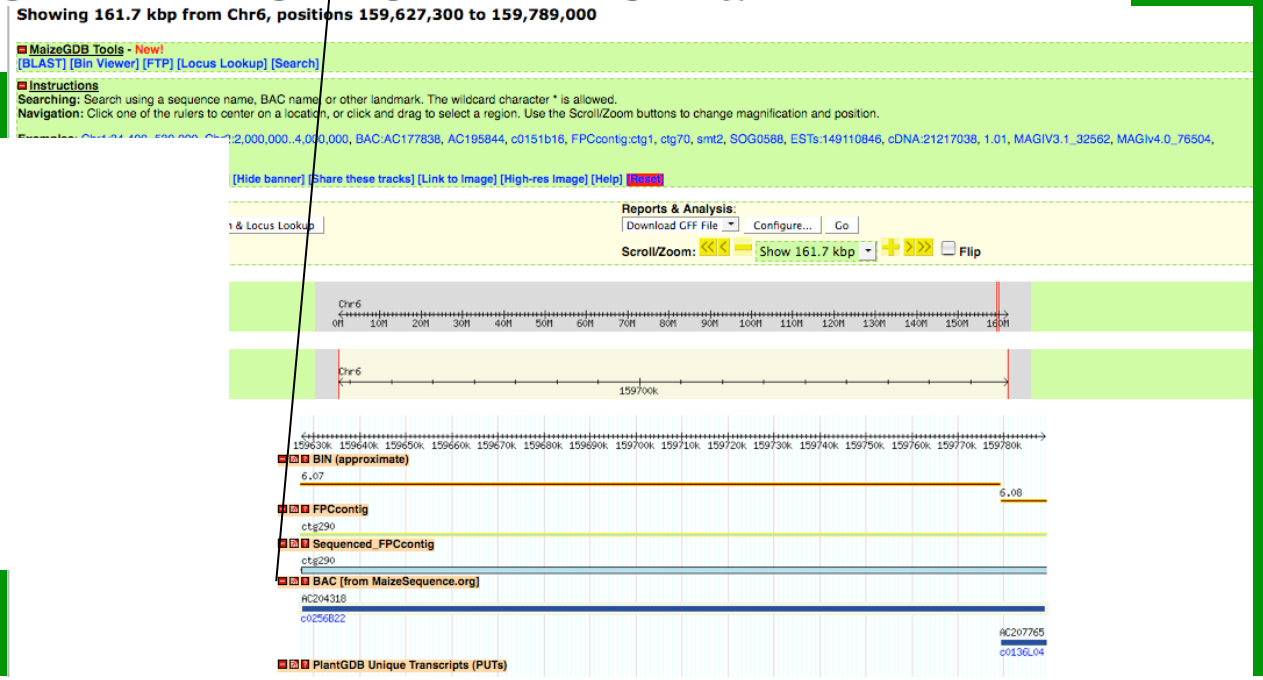
| | | |
|---|---|---|
| php20599 | 133.20 | 6.07 |
| umc1653 | 133.65 | 6.07 |
| mmp105 | 133.65 | 6.07 |
| agp2 | 134.10 | 6.07 |
| asg7a (CBM 6.08) | 134.10 | 6.08 |
| tdy1 | 134.13 | 6.07 |
| umc2059 | 135.68 | 6.07 |
| ago104 | 135.75 | 6.07 |
| hir3 | 136.13 | 6.07 |
| umc2324 | 136.13 | 6.07 |
| cdo345c | 136.45 | 6.07 |
| cdo202a(mcf) | 137.18 | 6.07 |
| telomere6L | 145.00 +/- 8 | |



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Other links.

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# Data transfer to MaizeGDB

Summary description and image added, citing the MGR

New records, including gene, reference mutant allele, phenotype, and adding sequence accessions, consensus map placement, gene products.

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# scale

> 800 designated genes in MaizeGDB with an assigned phenotype

< 250 with some description in Neuffer et al 1997. Most of these were not sequenced at the time.

~100 not yet listed at MaizeGDB

46 reviews from 8 authors in process and evaluation for semi-automation.

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| BIN | 2008 cM | NAME | FULL_NAME | Author |
|---|---|---|---|---|
| 1.01 | | *brk2* | *brick2* | Laurie Smith |
| 1.03 | 71.8 | *phyB1* | *phytochromeB1* | Patrick Dubois,Tom Brutnell |
| 1.05 | 121.5 | *bif2* | *barren inflorescence2* | Paula McSteen |
| 1.05 | 202.0 | *tha4* | *thylakoid assembly4* | Alice Barkan |
| 1.05 | | *wtf1* | *what's this factor?1* | Alice Barkan |
| 1.07 | 164.8 | *crs1* | *chloroplast RNA splicing1* | Alice Barkan |
| 1.10 | 222.5 | *phyA1* | *phytochromeA1* | Patrick Dubois, Tom Brutnell |
| 1.11 | 262.8 | *ts6* | *tasselseed6* | George Chuck |
| 1.12 | | *phyC1* | *phytochromeC1* | Patrick Dubois, Tom Brutnell |
| 2.06 | 57.3 | *tha8* | *thylakoid assembly8* | Alice Barkan |
| 3.02 | 24.4 | *cg1* | *corngrass1* | George Chuck |
| 3.03 | 32.8 | *ra2* | *ramosa2* | Erik Vollbrecht, Sarah Hake |
| 3.04 | 57.3 | *caf2* | *CRS2 associated factor2* | Alice Barkan |
| 3.04 | 57.3 | *tha1* | *thylakoid assembly1* | Alice Barkan |
| 3.05 | 78.0 | *ts4* | *tasselseed4* | George Chuck |
| 3.06 | | *rnc1* | *ribonuclease1* | Alice Barkan |
| 3.08 | 161.8 | *spi1* | *sparse inflorescence1* | Paula McSteen |
| 4.07 | | *ppr5* | *pentricopeptide5* | Alice Barkan |
| 5.00 | | *crp2* | *chloroplast RNA processing2* | Alice Barkan |
| 5.01 | | *phyA2* | *phytochromeA2* | Patrick Dubois, Tom Brutnell |
| 5.01 | | *phyC2* | *phytochromeC2* | Patrick Dubois, Tom Brutnell |
| 5.03 | 50.0 | *csy1* | *chloroplast SecY-1* | Alice Barkan |
| 5.03 | 74.4 | *dvd1* | *developmental disaster1* | Paula McSteen |
| 5.08 | 167.3 | *brk1* | *brick1* | Laurie Smith |
| 6.01 | 30.3 | *si1* | *silky1* | George Chuck |
| 6.01 | | *why1* | *whirly1* | Alice Barkan |
| 6.02 | | *ppr10* | *pentricopeptide10* | Alice Barkan |
| 6.05 | 77.8 | *tan1* | *tangled1* | Laurie Smith |
| 6.05 | | *afd1* | *absence of first division1* | Rachel Wang |
| 6.07 | 134.1 | *tdy1* | *tie-dyed1* | David Braun |

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# triage

New genes described by editorial board for MaizeGDB (5 papers a month)

Genes not in Neuffer 1997, that are sequenced, peer-reviewed literature

Updates to Neuffer 1997, but now sequenced

# Acknowledgements

University of Missouri, Columbia, MO USA

Joseph Kokenge, Graduate Student, Community Journalism
Jim Birchler, MNL co-editor
Ed Coe ('retired') and Gerry Neuffer ('retired')

MaizeGDB team

Carolyn Lawrence, Director
Lisa Harper, Taner Sen, Carson Andorf, Darwin Campbell

MGC Endowment for the MNL; USDA-ARS