

# SSF7, Chapter 21: Genes, Chromosomes, and Related Genetic Materials: A Preview

**Jane Edwards, on behalf of the CSE Style Manual Subcommittee**

This article describes changes in the chapter on gene and chromosome nomenclature for the seventh edition of *Scientific Style and Format (SSF7)*. Chapter 20 of SSF6 has been reorganized, updated, and expanded to form the new Chapter 21. The section on cells has been moved to another chapter. The remaining text has been *reorganized* so that everything about each organism appears together, *updated* with new material and citations (including Web sites), and *expanded* by including organisms not mentioned in the sixth edition. The revised text has been reviewed and approved by a qualified researcher working with each taxon, usually the chair of the appropriate nomenclature committee.

The list of organisms covered (see Table 1) has grown considerably since SSF6 and might grow even more before we go to press. SSF7 will include all taxa for which we obtain published rules or guidelines for the nomenclature of genes or the description of chromosomes.

As editor of Chapter 21, I have been collecting and summarizing the existing rules, describing the conventions used, displaying examples of the rules in action, and citing the major references for the rules. My role has *not* been to judge, change, rearrange, or reword the rules, although I admit to the occasional inclination and temptation to do so. I have asked nomenclature committees for clarification when I found inconsistencies and for examples when they were not included in the published rules.

The summaries are presented in Chapter

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21 in text and/or tables, the choice depending on which format seemed most appropriate for each organism. Some of the summaries are more detailed than others, reflecting the extent of detail in the original rules. For some organisms (such as onion) we have detailed rules for describing the chromosomes but nothing for the genes; more often, the reverse is true (as for fish and cucurbits). For most organisms for which we have any rules at all, we have at least some for both genes and chromosomes.

The rules are presented in the same order as in the source document and with the same terminology and examples. I have tried to summarize the major conventions concisely without ambiguity. The goal has been to cover the basic rules, then refer the reader to the source document for the details and nuances.

## Questions and Concerns

In drafting Chapter 21, I was quickly overwhelmed by the number and variety of rules. Why are there so many sets of rules? Why is there so much variation between sets for similar organisms? Why don't the genetic-nomenclature committees coordinate their efforts and develop a model set of basic rules that could be adapted as needed for each taxon? I soon learned that they had done so many years ago.

In 1954 the Permanent International Committee for Genetics Congresses appointed a committee to formulate general principles of nomenclature and symbolism and to make recommendations that could be used for all organisms. The committee's report was published in 1957 as 14 "recommended rules for genetic symbolization".<sup>1</sup> The rules ranged from the use of "languages of higher internationality" to the use of italics for gene symbols, from the use of capital letters for symbols of dominant genes and lowercase letters for those of recessive genes to the use of brackets

around the symbols for extrachromosomal factors. They are all rather basic, and all are still in use for at least some organisms. Some nomenclature committees have adopted all of them as written (even when some of the rules are inappropriate for the organism in question); some of the committees have adopted the rules as written, then adapted them to their own needs, changing little more than the examples given; and some of the committees have ignored or rejected this set of rules, choosing instead to develop their own rules from scratch.

One frustrating task has been to deal with the subtle—and some not so subtle—differences between the sets of rules for what seems to be the same situation in different organisms. For instance, is the *gene name* a concise description of the major feature of a mutant phenotype and the *gene symbol* a short character string that can be used for the same feature? Or is the *gene name* the short character string? Are the two terms synonymous? The answers depend on the organism. Who needs meaningful gene names or symbols in this era of computers and automatic sequencing? The answer depends on whom you ask. No rules have been established for some of the organisms being sequenced. Instead, the sequencer's computers will "name" the genes, giving them unique codes that will serve—at least temporarily—the purposes of both names and symbols.

Another frustrating task has been to cite the correct model being emulated. The rules for some organisms follow an old version of a model, not the most current one. For instance, according to the curator of the *Peromyscus* Stock Center (Michael Dewey, personal communication), the rules for gene nomenclature for deer mouse follow the 1989 rules for mouse, not the 2001 version. According to a paper by Ladjali-Mohammedi and others published in 1999,<sup>2</sup> the basis for chicken chromo-

some nomenclature is the set of rules for human nomenclature published in 1978, not the set published in 1995.

It's enough to give an editor nightmares! No wonder the CSE membership directory for 2000 doesn't list anyone who works for the journal *Genetics*.

## What's an Editor To Do?

As editors, we can ask why there are so many different sets of rules with so much variation between them, but the fact remains that we have them. Wouldn't you rather have rules that differ from one organism to another than no rules at all?

If there are rules for your group of organisms, please find them, memorize them, add them to your style manual, follow them, and encourage others to do the same. If you have questions about how to apply them, ask the curator of the appropriate database or the chair of the nomenclature committee for assistance. They want to hear from you. One of them begged me to beg my readers to consult the curators before coining any new gene names, to avoid the use of an inappropriate name or one that had already been assigned to a different gene.

If there are no rules for your organism of interest, go back to the basic international rules for guidance, or adapt an existing set of rules that were developed for related organisms and let it be known that that's what you're doing, or work with the appropriate nomenclature committee to develop the rules and guidelines you need. The committee should—and probably will—welcome your interest. Editors can make a difference.

For a preview of some of the citations to the rules and guidelines that will be included in the new Chapter 21, go to the CSE Web site ([www.councilscienceeditors.org](http://www.councilscienceeditors.org)), click on "Scientific Style and Format" (under "Publications"), click on "Preview some important new material", and then click on "Resources for genetic and cytogenetic nomenclature". 

## References

1. International Committee on Genetic Symbols and Nomenclature. Report of the International Committee on Genetic Symbols and Nomenclature.

**Table 1**  
**Organisms and subcellular components represented in Chapter 21 of SSF7 by at least some guidelines for genes (g) and/or chromosomes (c)**

<b>Genetic units and measures</b>	Alfalfa - g,c
Base pairs	Arabidopsis and other crucifers
Sequence-tagged sites (STS)	- g,c
Contigs	Barley - g,c
Loci and markers	Cotton - g,c
Centimorgans	Cucurbits - g
Anonymous DNA sequences	Lettuce - g
Probes	Maize (corn) - g,c
Banding patterns	Oat - g,c
<b>Related proteins</b>	Onion - c
Restriction endonucleases	Pea - g,c
Initiation and elongation factors	Pepper - g
<b>Transposons - g</b>	Rice - g,c
<b>Transspecies gene families - g</b>	Rye - g,c
<b>Oncogenes - g</b>	Soybean - g,c
<b>Plasmids - g</b>	Tomato - g,c
<b>Viruses</b>	Wheat - g,c
Bacteriophages - g	<b>Animals</b>
Human retroviruses - g	<i>Caenorhabditis elegans</i> - g,c
<b>Bacteria - g</b>	Cat - g,c
<b>Yeasts</b>	Cattle - g,c
Budding yeast ( <i>Saccharomyces cerevisiae</i> ) - g,c	Chicken and other avian species
Fission yeast ( <i>Schizosaccharomyces pombe</i> ) - g,c	- g,c
<b>Filamentous fungi</b>	Deer mouse - g,c
Ascomycete mating type genes - g	Dog - g,c
<i>Aspergillus nidulans</i> - g,c	Domestic animals - g,c
<i>Neurospora crassa</i> - g,c	<i>Drosophila</i> - g,c
<i>Phycomyces spp</i> - g,c	Fish - g
Plant-pathogenic fungi - g,c	Goat - g,c
<b>Protists</b>	Horse and other equines - g,c
<i>Chlamydomonas reinhardtii</i> - g,c	Human - g,c
<i>Dictyostelium discoideum</i> - g,c	Mouse - g,c
<b>Plants</b>	Pig - g,c
Gene families - g	Rabbit - g,c
Chloroplasts - g	Rat - g,c
	Sheep - g,c
	Zebrafish - g,c
	Transgenic animals - g

Union Int Sci Biol, Ser B. 1957;(30):1-6.

2. Ladjali-Mohammedi K, Bitgood JJ, Tixier-Boichard M, Ponce de Leon FA. International system for standardized avian karyotypes (ISSAK): standardized banded karyotypes of the domestic fowl (*Gallus domesticus*). Cytogenet Cell Genet 1999;86:271-6.