

## Brief summary on the international agreements

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This document contains an overview of the principal 'International Agreements for Naming Colour Mutations in Psittaciformes', which were drawn up in 1999 and are valid up to today, and also give an overview of the basic rules of taxonomy.

### Names for colour mutations in birds

*Just to be clear: these are not the rules of MUTAVI, Research & Advice Group and/or Ornitho-Genetics VZW. They are the result of years of discussion through internet, phone and meetings with breeders and representatives of Psittaciformes breeders clubs worldwide. At MUTAVI and Ornitho-Genetics VZW we only contributed with supportive feather research and (mainly literature) study of the genetic background of colour mutations. Our goal is, as it always was, bridging science and the bird keeping hobby, by backing up decisions with evidence from scientific research. For doing this, we can count on a network of researchers and scientists. Most of them deliberately stay in the background and don't interfere with the actual discussions on this matter.*

*All agreements are made in mutual consultation, with most of the participants backing up whatever was decided. Some of the discussions went through the Genetics-Psittacin list of Dr. Terry Martin from Australia. At times, there were over 650 members involved. Logically, there's never 100% unanimity on an agreement, but most of the participants did approve on the decisions made. Some agreements originated from consultation of specialized working groups or with scientists. In case a scientific name was already in place, this name was adopted. We don't have to make new names when there's already one available.*

### Agreements on names for colour mutations:

- New established colour mutations get an English name
- If this type of mutation – based on pigment synthesis and distribution – is already described in other species, then this name is adopted. Of course, only if it's in line with the other agreements on naming colour mutations.
- No personal names nor references to locations are accepted in a new name
- In Dutch and English language the basic form (green, blue, aqua or turquoise) is always last mentioned, for example pastel green, this is the pastel mutant in the green series.
- The name of a colour mutation in Dutch is always written without a capital: dominant pied, opaline, turquoise, etc. Except at the start of a sentence or in another context

in which a capital is appropriate. This can differ between countries and depends on the local grammar.

- These names preferably are useful in all species of a taxonomical order (in all Psittaciformes, or Passeriformes, ...)
- A phenotype created by two or more colour mutations, or SF and DF phenotypes of a dominant gene, don't get a separate name. *One exception to this rule was made for the lutino and albino. We preferred to rename these to ino green and ino blue. Everybody agreed this would actually be the correct thing to do, yet lutino and albino were preferred as these names were already used on an international scale.*
- Combinations by crossing-over are indicated by naming the basic mutations with a hyphen in between, for example: cinnamon-ino or opaline-ino. This can easily be associated with the term crossing-over which is also written with a hyphen.
- Combinations of multiple alleles with recessive inheritance are indicated by writing the mutant names one after the other, for example Pastellno. A capital is used to indicate the start of each mutants name. Pastellno is the combination of pastel and ino. In case that one of the alleles has a dominant inheritance, we suggest to write the name of this allele completely in capitals, DOMINANTALLELErecessiveallele. When both alleles have dominant inheritance, we suggest to write both in capitals except for the first letter of each mutants' name: dOMINANTALLELE1dOMINANTALLELE2. This way, each mutants' name can be recognized.
- In combinations of allelomorphs and crossing-overs, the name of the least mutated allele – in terms of eumelanin or psittacin reduction, compared to the wildtype – is written first.
- Abbreviations SF and DF are used to indicate single factor and double factor in colour mutations with dominant inheritance (in Dutch, EF and DF is used, but the English SF and DF are preferred)
- Two types of ino are known, a sex-linked recessive and an autosomal recessive type. These are indicated by NSL ino for the autosomal recessive type and SL ino for the sex-linked recessive form.
- In mutations with sex-linked dominant inheritance, abbreviations SL SF and SL DF are used.
- Dark factors are indicated with capital D: D green (one dark factor) and DD green (two dark factors). The letter 'D' refers to the genetic symbol of the mutation. The advantage of this system is that both in green and blue and every other basic mutant, the presence of dark factors can easily be indicated.
- A (temporally) name used for a mutation which is not really correct, need to be placed between asterisks (\*)

### Agreements on genetic codes:

Several agreements were made on the allocation and use of genetic symbols on an international and scientific level. Let's have a look:

- The symbol of a locus has to coincide – as much as possible – with the first letters of the English name of the mutation. The locus name has to consist of at least 3 letters (and numbers, if necessary), chosen carefully so that it's not identical to other symbols, for example '**Sl**' for *slaty*, '**cin**' for *cinnamon*.
- The locus symbol is written with a capital when the factor has dominant inheritance – compared to the wildtype – and without capital in case of recessive inheritance, for example **V** for *violet* and **pf** for *pale fallow*.
- Symbols for alleles can be written with or without capital and Arabic numerals. The symbol of an allele is written in superscript with the locus symbol. If the locus symbol is with a '+' in superscript, the gene is not mutated.
- Linked genes are indicated with an underscore "\_" or with a fraction bar in formulas.
- In Agapornis species, green birds (**bl<sup>+</sup>D<sup>+</sup> / bl<sup>+</sup>D<sup>+</sup>**) are considered to be the wildtype. Here we see that the *D* or dark factor is linked to the (*bl*) blue locus. Of course this dark factor is not mutated in the wildtype and subsequently is written as **D<sup>+</sup>**.
- Genotypes are always written in italic. A slash between the alleles facilitates reading: **bl<sup>+</sup>D<sup>+</sup> / bl<sup>aq</sup>D**; **Pi / Pi** or **dil / dil<sup>+</sup>**. A semicolon ";" differentiates the chromosomes.
- Alleles of a gene are written in superscript: **bl<sup>aq</sup>**, but as it's difficult to use superscript in an email, we use an asterisk (\*). The allele is then separated of the gene symbol by the asterisk. First the locus symbol is noted, for example **ino**, and when an allele is mutated, for example pallid, this is written in the following way: **ino\*pd**
- Split birds are indicated by a slash "/" between the mutations, for example: green/blue. The mutation name following the slash is the mutated factor that the bird carries as a split.

### Colour mutation names

Below, a list of genetic symbols of the most common colour mutations in Psittaciformes. For these names a consensus was reached. Most of these mutants were examined by us.

Mutation	Inheritance	Wild-type	Mutant
blue	autosomal recessive	<i>bl<sup>+</sup></i>	<i>bl</i>
turquoise	autosomal recessive	<i>bl<sup>+</sup></i>	<i>bl<sup>aq</sup></i>
aqua	autosomal recessive	<i>bl<sup>+</sup></i>	<i>bl<sup>aa</sup></i>
dark factor	autosomal incomplete dominant	<i>D<sup>+</sup></i>	<i>D</i>
NSL ino	autosomal recessive	<i>a<sup>+</sup></i>	<i>a</i>

dark eyed clear (dec)	autosomal recessive	$a^+$	$a^{dec}$
pastel	autosomal recessive	$a^+$	$a^{pa}$
bronze fallow	autosomal recessive	$a^+$	$a^{bz}$
dilute	autosomal recessive	$dil^+$	$dil$
greywing	autosomal recessive	$dil^+$	$dil^{gw}$
clearwing	autosomal recessive	$dil^+$	$dil^{cw}$
dominant edged	autosomal incomplete dominant	$Ed^+$	$Ed$
spangle	autosomal incomplete dominant	$Sp^+$	$Sp$
marbled	autosomal recessive	$mb^+$	$mb$
pale fallow	autosomal recessive	$pf^+$	$pf$
dun fallow	autosomal recessive	$df^+$	$df$
faded	autosomal recessive	$fd^+$	$fd$
orange face	autosomal recessive	$of^+$	$of$
pale headed	autosomal incomplete dominant	$Ph^+$	$Ph$
dominant grey	autosomal dominant	$G^+$	$G$
recessive grey	autosomal recessive	$gr^+$	$gr$
brownwing	autosomal recessive	$bw^+$	$bw$
dominant pied	autosomal dominant	$Pi^+$	$Pi$
recessive pied	autosomal recessive	$s^+$	$s$
mottle	autosomal multifactorial	$mo^+$	$mo$
violet	autosomal incomplete dominant	$V^+$	$V$
slaty	autosomal dominant	$Sl^+$	$Sl$
misty	autosomal incomplete dominant	$Mt^+$	$Mt$
euwing	autosomal incomplete dominant	$Ew^+$	$Ew$
crested	autosomal multifactorial dominant	$Cr^+$	$Cr$
cinnamon	sex-linked recessive	$cin^+$	$cin$
opaline	sex-linked recessive	$op^+$	$op$

ino	sex-linked recessive	<i>ino</i> <sup>+</sup>	<i>ino</i>
pallid	sex-linked recessive	<i>ino</i> <sup>+</sup>	<i>ino</i> <sup>pd</sup>
platinum	sex-linked recessive	<i>ino</i> <sup>+</sup>	<i>ino</i> <sup>pl</sup>
pearly	sex-linked recessive	<i>ino</i> <sup>+</sup>	<i>ino</i> <sup>py</sup>
pale	sex-linked recessive	<i>ino</i> <sup>+</sup>	<i>ino</i> <sup>pe</sup>
slate	sex-linked recessive	<i>sl</i> <sup>+</sup>	<i>sl</i>
SL dominant greywing	sex-linked incomplete dominant	<i>Grw</i> <sup>+</sup>	<i>Grw</i>
yellow-cheek	sex-linked recessive	<i>ych</i> <sup>+</sup>	<i>ych</i>
jade	autosomal recessive	<i>ja</i> <sup>+</sup>	<i>ja</i>
yellam	autosomal recessive	<i>yel</i> <sup>+</sup>	<i>yel</i>

More examples of symbols used in other species can be found on [www.mutavi.info](http://www.mutavi.info)

**Attention:** *many colour mutation names, for example in budgerigars, are not in line with the agreements and are still typical bird fanciers jargon. The reason for this is the lack of a consensus with certain bird clubs, mainly the ones that are specialized in a certain species (group). It's not our intention to force a new naming system upon these people and we respect other opinions, but where possible we try to use the proper genetic symbols. This way one can see which mutation is discussed.*

### Recognized mutation combinations

These guidelines are made to keep up the distinguish ability of all present colour mutations in Psittaciformes. Let's have a look:

- Combinations of multiple eumelanin mutations are not wanted (for example, no cinnamon with dilute)
- Combinations of multiple psittacin mutations are not wanted (for example, no aqua with orange face)
- Only the opaline mutation is accepted in combination with both an eumelanin and a psittacin mutation
- Try to avoid the combinations of alleles of the same gene (for example, Pastellino)
- For selection types, respect the phenotype of the wild type as much as possible

This simple set of rules has to safeguard the distinguish ability of every colour mutation in a bird, for the breeder and fancier as well as the show judges.

## Basic rules of taxonomy

### Scientific names for birds

- The genus name is written first, followed by the species name and – when appropriate – the name of the subspecies. For example: *Forpus conspicillatus cauae*
- The genus name is written with a capital, this is not so for the name of the (sub)species. (also when a species name refers to a personal name)
- If we want to write down all taxonomical elements of a species' name, the names of kingdom, phylum, subphylum, class, subclass, superorder, order, suborder, superfamily, family, subfamily and tribe are also written with a capital.
- The genus name of genus, subgenus, species and subspecies is italicized or underlined.
- Scientific names don't have a plural form, for example: one *Forpus conspicillatus*, two *Forpus conspicillatus*, one *Forpus coelestis*, two *Forpus coelestis*
- Basically, no article is used with scientific names
- To be 100% complete, the name of the person who described the species should also be mentioned, for example: *Forpus modestus sclateri* (G.R. Gray, 1859). But this is not essential.

### Strickland's rules or Strickland's code

These rules apply the principle of priority in taxonomy and contain the following:

- A species that was described by more than one author, keeps its first name that was published, as long as this name is appropriate. One of the conditions is that it has to be a scientific name (Latin, Greek or Latinized) that's not already in use.
- When a species changes genus, the species name remains unchanged. An exception is made for the Latin conjugation: when the grammatical gender of the new genus is different from the old one, an adaptation is made. For example: Lafresnaye described *Psittacula conspicillata* in 1848. The grammatical gender of *Psittacula* is feminine and thus the species name ended with "a": *conspicillata*. Ten years later, this species was placed in the genus of *Forpus* and the name changed to *Forpus conspicillatus*. The grammatical gender of *Forpus* is masculine, so the species name had to be adjusted. Attention: when the new genus already contains a species with that name, the species name has to be changed. In case that one or more alternatives are available of (an)other author(s), the eldest is preferred.
- In taxonomical literature the name of the author, with the year in which the species was described, is placed behind: *Forpus conspicillatus metea* Borrero & Hernandez, 1961. When a species is described but moved to another genus, the name of the original author is placed between brackets: *Forpus passerinus passerinus* (Linnaeus, 1758).

## Interesting details

During the second 'International Congress of Zoology' in Moscow in 1892, the tenth edition of '*Systema Naturae*' by the Swedish scientist Carl Linnaeus and the binomial nomenclature was decided to be the guideline for future taxonomy.

The 'International Commission on Zoological Nomenclature' (ICZN) acts as an international advisor and supervisor of the correct use of scientific names for organisms. This organization is situated in London and currently has 28 members (mainly taxonomists) of 20 different countries. Their guidelines are published in 'The International Code of Zoological Nomenclature'. Until now, four congresses have been held, the last one occurred at the end of the previous century. The agreements made on this congress came into force on the first of January 2000.

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