



1 + 2 = Joeys!

COI & Kinship Explained

Prepared for the 2015 SGGA
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Selective Breeding

- Health
 - *Research lines to ensure no health defects*
 - *Many are not noted in database – talk to breeders for this information*
- Temperament
 - *Select those with desirable characteristics*
- Longevity
 - *Select those with longevity in the lines (live to full captive life expectancy)*
- Color
 - *Color is a bonus – know the genetics and how to pair to get the desired outcome*



Before Breeding...

- Behaviors
- Bonding
- Diets
- Safe Products (Toys, Cage Sets, Wheels, etc.)
- Colors
- Genetics
 - *COI*
 - *Kinship*
 - *% Hets*



COI

Coefficient of Inbreeding

Coefficient of Inbreeding (COI) is the possibility, in a percentage, the offspring has a pair of alleles that are identical by descent from a common ancestor. Breeders strive for a low to 0% COI. Understanding the COI will reduce the potential of inbreeding and potential genetic problems.



Calculate COI

- Online Pedigree Program
 - *The Pet Glider Database*

Using this online program, you simply set up a virtual or “test joey”. The system will calculate the COI of the potential offspring once you have selected a set of parents.

- Be sure to select the correct parent to ensure accuracy.



High? Low? Sufficient?

- Each individual must determine an acceptable COI standard for their breeding program. There is no set right or wrong number.
- Does the COI of the potential offspring fit within your standards?
 - *No? Then seek a better pairing.*
 - *Yes? Then let's check the Kinship!*



Check Kinship

- Set up a test joey to see the full lineage
- Find the CLOSEST common ancestor
- Add the common ancestor into the kinship chart
- Add all descendants until you get to the male and female you'd like to pair together
- Follow the chart across then down to determine the kinship

Kinship Chart

Common Ancestor	Child	Grand child	Gr. Grand Child	2x Gr. Grand Child	3x Gr. Grand Child	4x Gr. Grand Child	5x Gr. Grand child	6x Gr. Grand child
Child	Sibling	Niece/ Nephew	Grand Niece/ Nephew	Gr. Grand Niece/ Nephew	2x Gr. Grand Niece/ Nephew	3x Gr. Grand Niece/ Nephew	4x Gr. Grand Niece/ Nephew	5x Gr. Grand Niece/ Nephew
Grand Child	Niece/ Nephew	First Cousin	First Cousin 1x Removed	First Cousin 2x Removed	First Cousin 3x Removed	First Cousin 4x Removed	First Cousin 5x Removed	First Cousin 6x Removed
Gr. Grand Child	Grand Niece/ Nephew	First Cousin 1x Removed	Second Cousin	Second Cousin 1x Removed	Second Cousin 2x Removed	Second Cousin 3x Removed	Second Cousin 4x Removed	Second Cousin 5x Removed
2x Gr. Grand Child	Gr. Grand Niece/ Nephew	First Cousin 2x Removed	Second Cousin 1x Removed	Third Cousin	Third Cousin 1x Removed	Third Cousin 2x Removed	Third Cousin 3x Removed	Third Cousin 4x Removed
3x Gr. Grand Child	2x Gr. Grand Niece/ Nephew	First Cousin 3x Removed	Second Cousin 2x Removed	Third Cousin 1x Removed	Fourth Cousin	Fourth Cousin 1x Removed	Fourth Cousin 2x Removed	Fourth Cousin 3x Removed
4x Gr. Grand Child	3x Gr. Grand Niece/ Nephew	First Cousin 4x Removed	Second Cousin 3x Removed	Third Cousin 2x Removed	Fourth Cousin 1x Removed	Fifth Cousin	Fifth Cousin 1x Removed	Fifth Cousin 2x Removed
5x Gr. Grand Child	4x Gr. Grand Niece/ Nephew	First Cousin 5x Removed	Second Cousin 4x Removed	Third Cousin 3x Removed	Fourth Cousin 2x Removed	Fifth Cousin 1x Removed	Sixth Cousin	Sixth Cousin 1x Removed
6x Gr. Grand Child	5x Gr. Grand Niece/ Nephew	First Cousin 6x Removed	Second Cousin 5x Removed	Third Cousin 4x Removed	Fourth Cousin 3x Removed	Fifth Cousin 2x Removed	Sixth Cousin 1x Removed	Seventh Cousin





Kinship Definitions

Abbreviations: Gr = Great

Colors

Inbreeding These pairings are very close and should be avoided. These pairings have the highest amount of likelihood of genetic defects and issues.

Close Line Breeding: Should only be done limitedly when necessary to achieve, perfect, and maintain certain characteristics, but should only be done selectively and responsibly by knowledgeable breeders.

Line Breeding: Can be done limitedly to achieve, perfect, and maintain certain characteristics, but should only be done selectively and responsibly by knowledgeable breeders.

Distant Line Breeding: At this point some breeders will classify them as "unrelated" and safely paired together with limited possibilities of potential genetic problems.

"Unrelated" Even though they are technically "related", there is enough genetic difference to avoid most all problems related to inbreeding or line breeding.

A green chalkboard with two pieces of pink chalk and some faint white chalk markings. The chalk is positioned in the lower-left quadrant. The background is a soft-focus green surface with some white chalk lines and a large, faint white number '2' visible in the upper-middle section.

Let's Practice!



Step 1

- If the COI is acceptable to you, then continue on to determine the Kinship.
- If the COI is above your standards, then seek a different pairing.

Calculate COI

Using TPG database, or your own database, select the sugar gliders you are interested in pairing together and submit for the COI.

Select Father & Mother for the virtual mating.

Select Father:

Glider Name	OOP Date	Color	Genetics	Owner	Breeder	Added By
Oliver Ford	2013/01/04	Mosaic with reverse white stripe	100% het for creamino, 25% het for platinum, 12.5% het for leu	Ford,Nancy	Ford,Nancy	Nancy Ford

Select Mother:

Glider Name	OOP Date	Color	Genetics	Owner	Breeder	Added By
Pickle	2011/04/30	Mosaic Marble	Piebald, Proven WF.	Cowles,Melissa - Treasured Gliders	Franco (LaurensBabies),Lauren	LaurensBabies



Step 2 - Kinship

- Use the Kinship Chart to determine the kinship between the sugar gliders you plan on pairing together.

How to use the Kinship Chart

- Use the Kinship Chart in the same manner as a child's math chart for school. Go across the top, then down the side – where it meets in the middle is the answer. Example: $2 + 2 = 4$





Find Closest Common Ancestor

- You will use the female and the male that you are planning on pairing together and look for the closest common ancestor. To do this, you will need to look closely at the mother and the father's pedigree to find the name that appears closest on both sides. There could be more than one common ancestor, so look for the one that is the closest in the pedigree,
- In the following lineage chart, I have created a pedigree for the "test joey" and have already calculated the COI using TPG database. In this example, the closest common ancestor is Gilthanas.

2nd Cousins

Common Ancestor	Child	Grand child	Gr. Grand Child	2x Gr. Grand Child	3x Gr. Grand Child	4x Gr. Grand Child	5x Gr. Grand child	6x Gr. Grand child
Gilthanas	Lukas	Adonis	Oliver					
Child	Sibling	Niece/ Nephew	Grand Niece/ Nephew	Gr. Grand Niece/ Nephew	2x Gr. Grand Niece/ Nephew	3x Gr. Grand Niece/ Nephew	4x Gr. Grand Niece/ Nephew	5x Gr. Grand Niece/ Nephew
Carlisle								
Grand Child	Niece/ Nephew	First Cousin	First Cousin 1x Removed	First Cousin 2x Removed	First Cousin 3x Removed	First Cousin 4x Removed	First Cousin 5x Removed	First Cousin 6x Removed
Rhett								
Gr. Grand Child	Grand Niece/ Nephew	First Cousin 1x Removed	Second Cousin XXX	Second Cousin 1x Removed	Second Cousin 2x Removed	Second Cousin 3x Removed	Second Cousin 4x Removed	Second Cousin 5x Removed
Pickle								
2x Gr. Grand Child	Gr. Grand Niece/ Nephew	First Cousin 2x Removed	Second Cousin 1x Removed	Third Cousin	Third Cousin 1x Removed	Third Cousin 2x Removed	Third Cousin 3x Removed	Third Cousin 4x Removed
3x Gr. Grand Child	2x Gr. Grand Niece/ Nephew	First Cousin 3x Removed	Second Cousin 2x Removed	Third Cousin 1x Removed	Fourth Cousin	Fourth Cousin 1x Removed	Fourth Cousin 2x Removed	Fourth Cousin 3x Removed
4x Gr. Grand Child	3x Gr. Grand Niece/ Nephew	First Cousin 4x Removed	Second Cousin 3x Removed	Third Cousin 2x Removed	Fourth Cousin 1x Removed	Fifth Cousin	Fifth Cousin 1x Removed	Fifth Cousin 2x Removed
5x Gr. Grand Child	4x Gr. Grand Niece/ Nephew	First Cousin 5x Removed	Second Cousin 4x Removed	Third Cousin 3x Removed	Fourth Cousin 2x Removed	Fifth Cousin 1x Removed	Sixth Cousin	Sixth Cousin 1x Removed
6x Gr. Grand Child	5x Gr. Grand Niece/ Nephew	First Cousin 6x Removed	Second Cousin 5x Removed	Third Cousin 4x Removed	Fourth Cousin 3x Removed	Fifth Cousin 2x Removed	Sixth Cousin 1x Removed	Seventh Cousin





Line Breeding

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Compatible?

- COI is 2.021%
- Kinship is Second Cousins



Not a Good Pair

This is an excellent example of why you should NEVER go by COI alone. The COI is simply a starting tool.

Kinship will tell you how closely related the potential pairing is from the closest common ancestor.

In this example, the COI is 'acceptable', but the Kinship is not*.

*Based on the opinion of Glider Nursery, some breeders feel 2nd Cousins is fine. Again this is where your personal standards apply.

A green chalkboard with two pieces of pink chalk and some faint white chalk markings. The chalkboard is the background for the text.

Let's try another one!

Try to find the closest common ancestor.

Test for Kinship

Potential Offspring/Test Joey
COI: 0.7934%



2nd Cousins 2X Removed

Common Ancestor	Child	Grand child	Gr. Grand Child	2x Gr. Grand Child	3x Gr. Grand Child	4x Gr. Grand Child	5x Gr. Grand child	6x Gr. Grand child
Mick/Hera	Bo Peep	Styx	Styx/Lethe					
Child	Sibling	Niece/ Nephew	Grand Niece/ Nephew	Gr. Grand Niece/ Nephew	2x Gr. Grand Niece/ Nephew	3x Gr. Grand Niece/ Nephew	4x Gr. Grand Niece/ Nephew	5x Gr. Grand Niece/ Nephew
Thunder								
Grand Child	Niece/ Nephew	First Cousin	First Cousin 1x Removed	First Cousin 2x Removed	First Cousin 3x Removed	First Cousin 4x Removed	First Cousin 5x Removed	First Cousin 6x Removed
Racket								
Gr. Grand Child	Grand Niece/ Nephew	First Cousin 1x Removed	Second Cousin	Second Cousin 1x Removed	Second Cousin 2x Removed	Second Cousin 3x Removed	Second Cousin 4x Removed	Second Cousin 5x Removed
Honeysuckle								
2x Gr. Grand Child	Gr. Grand Niece/ Nephew	First Cousin 2x Removed	Second Cousin 1x Removed	Third Cousin	Third Cousin 1x Removed	Third Cousin 2x Removed	Third Cousin 3x Removed	Third Cousin 4x Removed
Whiskey								
3x Gr. Grand Child	2x Gr. Grand Niece/ Nephew	First Cousin 3x Removed	Second Cousin 2x Removed	Third Cousin 1x Removed	Fourth Cousin	Fourth Cousin 1x Removed	Fourth Cousin 2x Removed	Fourth Cousin 3x Removed
Sienna			XXX					
4x Gr. Grand Child	3x Gr. Grand Niece/ Nephew	First Cousin 4x Removed	Second Cousin 3x Removed	Third Cousin 2x Removed	Fourth Cousin 1x Removed	Fifth Cousin	Fifth Cousin 1x Removed	Fifth Cousin 2x Removed
5x Gr. Grand Child	4x Gr. Grand Niece/ Nephew	First Cousin 5x Removed	Second Cousin 4x Removed	Third Cousin 3x Removed	Fourth Cousin 2x Removed	Fifth Cousin 1x Removed	Sixth Cousin	Sixth Cousin 1x Removed
6x Gr. Grand Child	5x Gr. Grand Niece/ Nephew	First Cousin 6x Removed	Second Cousin 5x Removed	Third Cousin 4x Removed	Fourth Cousin 3x Removed	Fifth Cousin 2x Removed	Sixth Cousin 1x Removed	Seventh Cousin





Distant Line Breeding

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Compatible?

- COI is 0.7934%
- Kinship is Second Cousins 2 times Removed



Good Pairing

This is an example of where the COI is very low and the Kinship is where “*most*” breeders will consider the potential parents as being unrelated.



For more information about breeding sugar gliders,
please visit:

www.GliderNursery.com