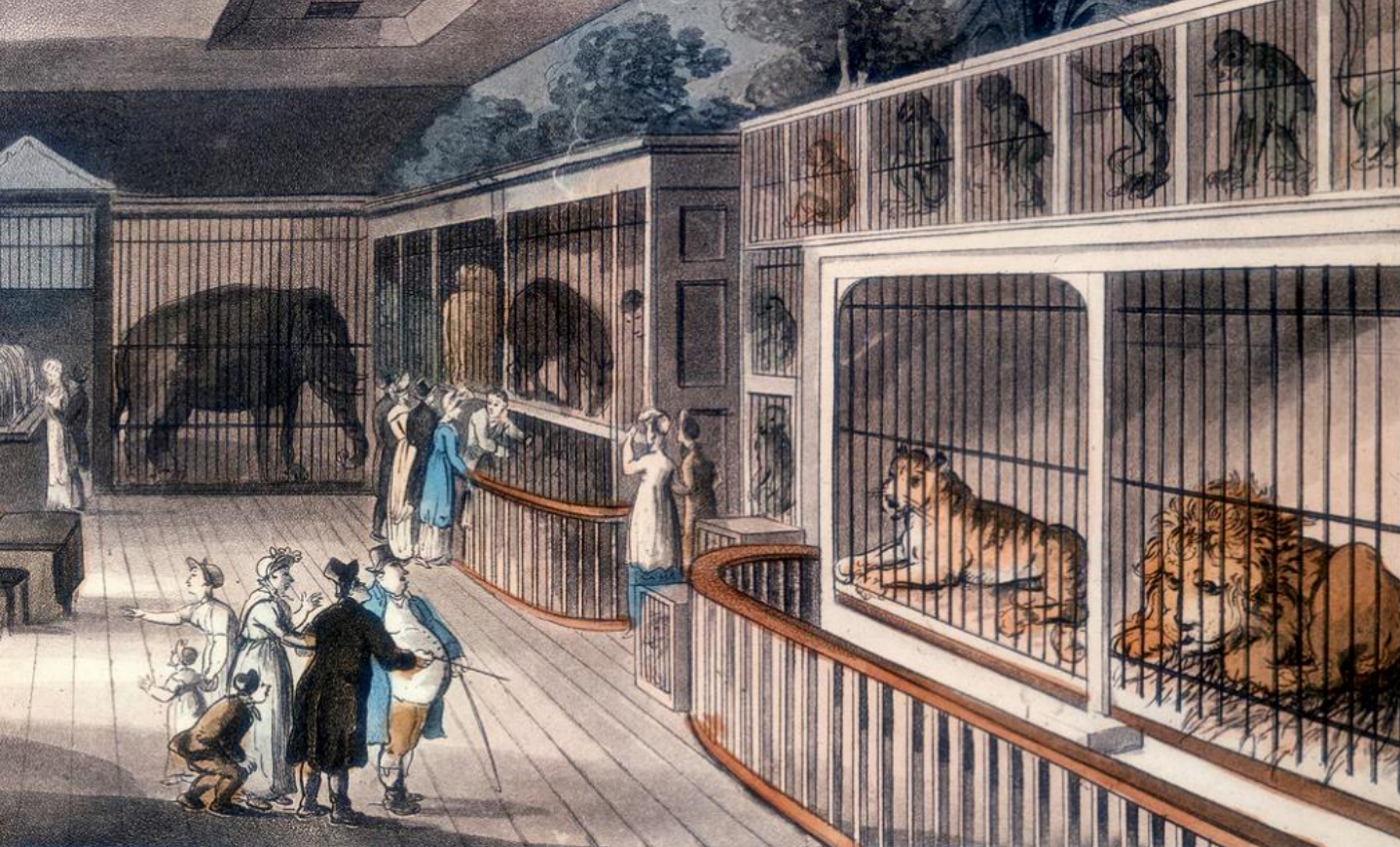


Using Species Survival Plans to Manage Small Zoo Populations

Kenton Kerns

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Consequences of Small Populations

- Risk of population extinction
- Reduced growth rate
- Reduced ability to adapt to change and increased expression of deleterious traits
- Decreased immunity
- Decreased reproductive success



Black-footed Ferret (*Mustela nigripes*)

7 genetic founders

**ASSOCIATION
OF ZOOS &
AQUARIUMS**



Goals of SSP genetic diversity

A **Green** SSP Program has a population size of 50 or more animals and is projected to retain 90% gene diversity for a minimum of 100 years or 10 generations.

A **Yellow** SSP Program has a population size of 50 or more animals but cannot retain 90% gene diversity for 100 years or 10 generations.

A **Red** SSP Program has a population size of 20 or more animals managed among 3 or more participating AZA institutions.

Golden-Headed Lion Tamarin Studbook

- 77 animals
- @ 24 N.A. facilities
- Monogamous breeding pairs turn into family groups
- Breeding taboo
- Remove juveniles ~2 years
- Contracept females as needed



Leontopithecus chrysomelas

The Studbook

The Studbook Keeper:

- communicates with all holder zoos;
- distributes annual population update survey;
- receives communication sporadically and constantly;
- updates relevant information in the studbook, most importantly:
 - births,
 - deaths,
 - transfers,
 - medical updates,
 - and reproductive updates.

Studbooks can utilize two different programs:

- DOS-based SPARKS
- PopLink

DOSBox 0.74, Cpu speed: max 100% cycles, Frameskip 0, Program: FOXDX260

SPARKS Data Edit

Master Record		Event Records	
Studbook N°: 2854		Birth	FORTWORTH 207709 22 Nov 2012
Sex: Female		Social -In	FORTWORTH 136N 22 Nov 2012
Birth Date: 22 Nov 2012	Captive birth ->	Social -In	FORTWORTH 181I 5 Jun 2014
Sire: 2005 FRANK	Parent reared	Transfer to	NZP-WASH 115146 8 Jan 2015
Dam: 2035 GISELLE		Social -In	NZP-WASH 189B 10 Feb 2015

Special Data		User Defined Fields	
VALENTINE		MK/IE/DREPORT/	
MR	16 Jan 2013	0.000	
N KEEP WITH FAMILY			
Old Studbook Number	18 May 2014		
T1691			
MR	5 Aug 2014		
Y BREED WITH 2116 AT NZP-WASH			
Contraception			
IMPLANTED P			

Print specimen worksheet (Immediately/File)?
<Esc> key to Return

Breeding and Transfer Plan

Population Analysis & Breeding and Transfer Plan

Golden-Headed Lion Tamarin
(*Leontopithecus chrysomelas*)
AZA Species Survival Plan®
Yellow Program



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20 April 2018

PMC

Population Management Center

 LINCOLN PARK ZOO.

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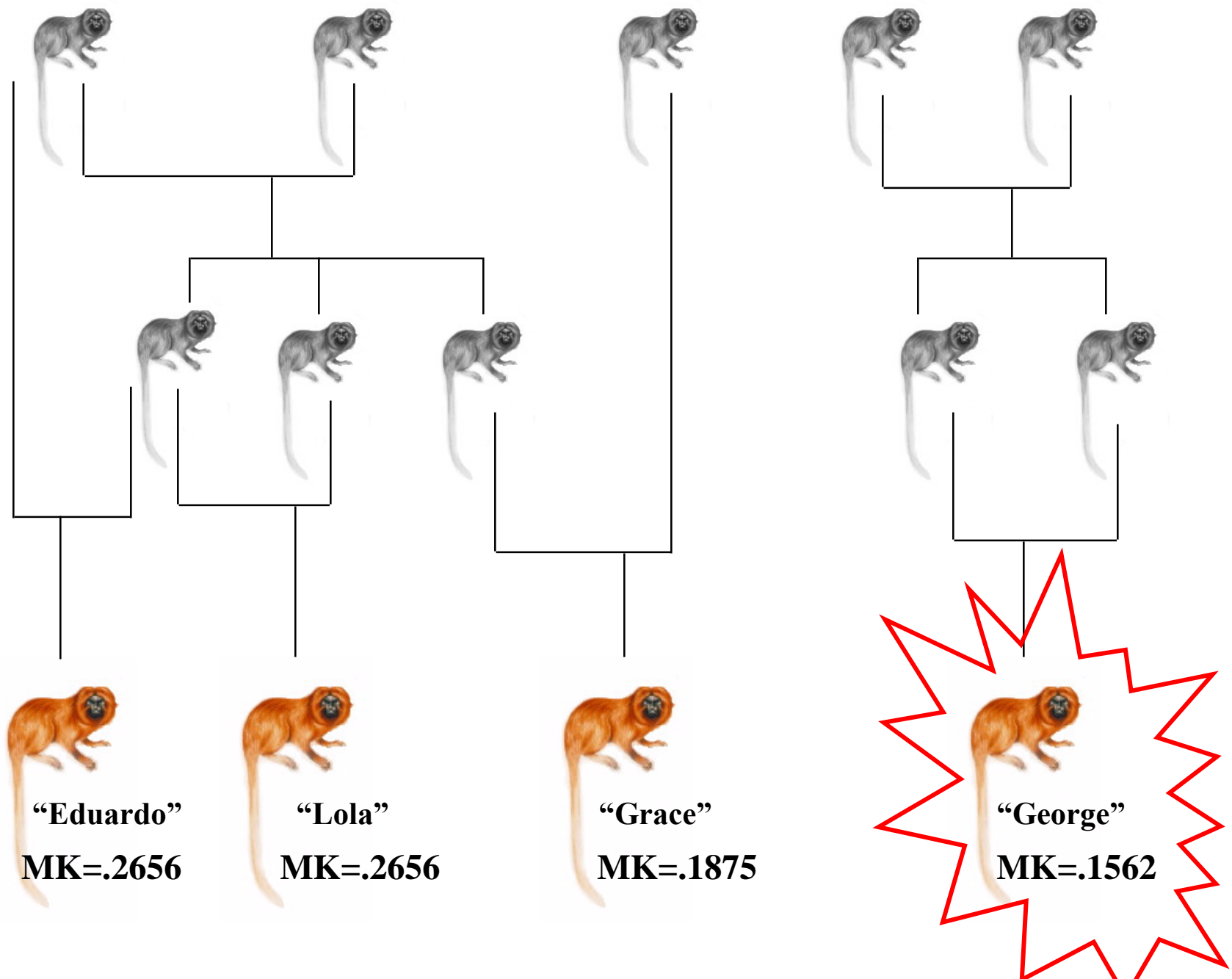
Mean Kinship

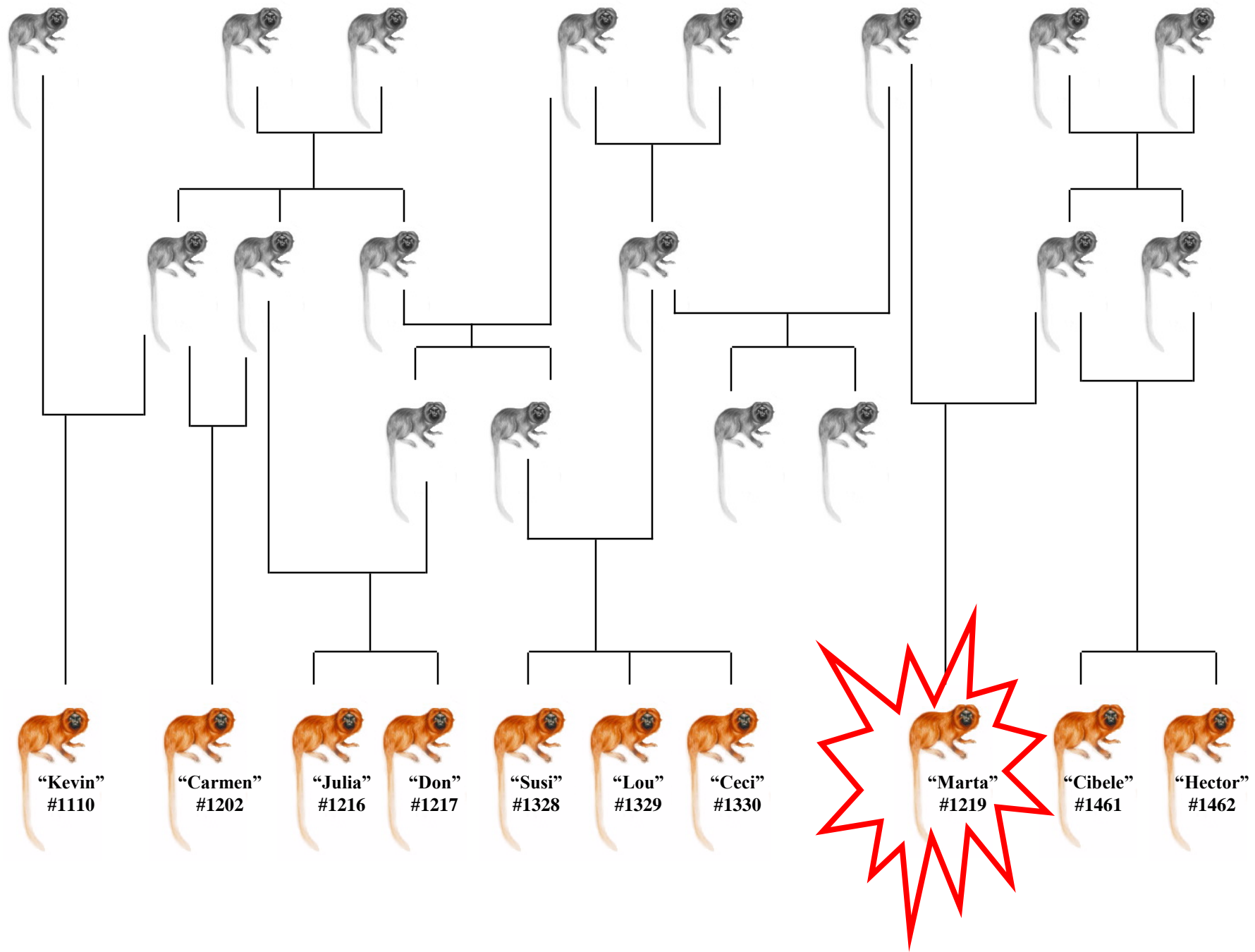
- Measures how related an animal is to the entire population, including itself.
- Mean kinship changes with every birth and death within the population.
- A lower number is better.

TABLE 19.6. Pedigree structures that create specific average levels of kinship among a set of relatives

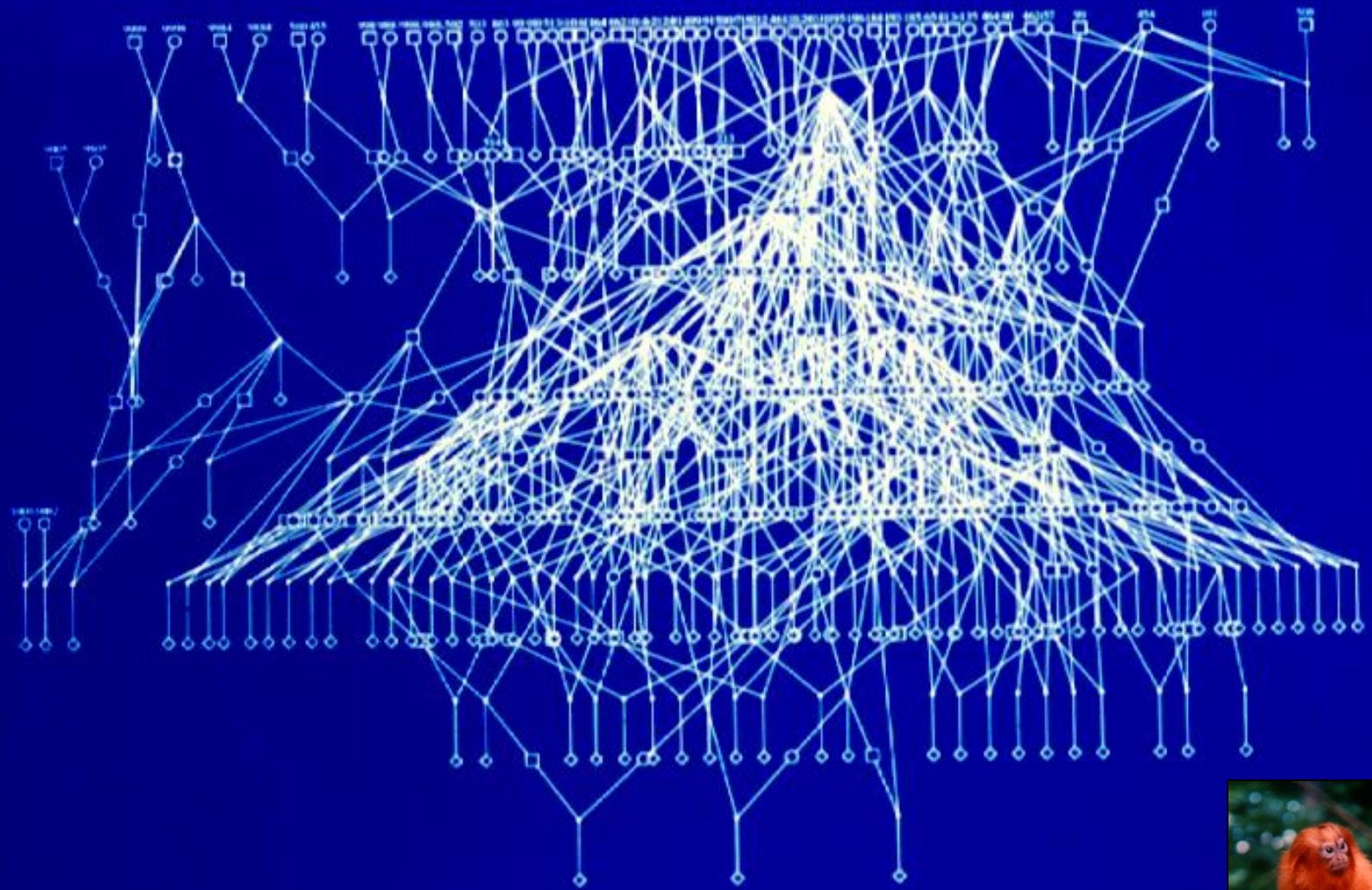
Average kinship (\bar{k})	Pedigree structure that creates that average kinship
0.375	Full siblings of full siblings
0.25	Full sibs (share 2 parents)
0.1875	Share one parent and one grandparent
0.125	Half-sibs (share one parent)
0.0625	First cousins (share 2 grandparents)
0.03125	Share one grandparent
0	None

BF Ferret Avg. MK is .1434
GHL Tamarin Avg. MK is .1605





Golden Lion Tamarin, main component



Using Mean Kinship for Recommendations

Ordered Mean Kinship List

Note: Mean kinship values are current to the population as of March 2018 and are subject to change with each birth, death, import, export, or changes in exclusions or assumptions.

Population average MK = 0.1605

- Studbook data is exported into PMx, a program that allows you to make breeding recommendations
- Try to connect like animals with similar mean kinship values
- Rank probability of success of mating
- Export that information as breeding pair recommendations

Male				Female			
Stbk#	MK	AgeYears	Location	Stbk#	MK	AgeYears	Location
2017	0.0543	15	CAPE MAY	2855	0.0972	5	CINCINNAT
2864	0.0972	4	BISMARCK	2115	0.1007	14	NY BRONX
2116	0.1007	14	NZP-WASH	2416	0.1524	11	NY BRONX
2258	0.1249	12	CINCINNAT	2422	0.1524	10	CAPE MAY
2771	0.1406	6	SANDIEGOZ	2509	0.1524	9	SANTA ANA
2051	0.144	14	DALLAS WA	2510	0.1524	9	UTICA
2127	0.1508	13	UTICA	2661	0.1583	7	HOUSTON
2228	0.1508	12	TULSA	2759	0.1583	7	BREVARD
2423	0.1524	10	DALLAS WA	2427	0.1628	10	CHICAGOLP
2660	0.1583	7	HOUSTON	2662	0.1628	7	LOXAHATCH
2707	0.1583	7	BREVARD	2853	0.1628	5	DES MOINE
2758	0.1583	7	NEW BEDFO	2854	0.1628	5	NZP-WASH
2525	0.1628	9	NY BRONX	2883	0.1628	4	BISMARCK
2559	0.1628	9	NZP-WASH	2459	0.1641	9	BROUSSARD
2634	0.1628	8	NY BRONX	2632	0.1641	9	LOXAHATCH
2663	0.1628	7	FORTWORTH	2799	0.1641	7	SALISB L
2862	0.1628	4	FORTWORTH	2798	0.1659	8	RAIN ADV
2884	0.1628	4	FORTWORTH	2752	0.1694	7	GULF BREZ
3371	0.1631	1	SANDIEGOZ	2765	0.1716	7	SAN ANTON
2034	0.1633	14	SAN ANTON	2772	0.1716	6	SAN ANTON
2460	0.1641	9	BROUSSARD	2942	0.1716	4	SAN ANTON
2791	0.1641	6	SALISB L	2943	0.1716	4	SAN ANTON
2631	0.1659	9	LOXAHATCH	2947	0.1716	3	NEW BEDFO

Recommendations

- Draft recommendations for transfer, breed, or hold sent to all holders with 30-day review period
- Edits are made and a final document is sent out
- Holders are responsible for following recommendations, setting up shipments, etc.

Summary of Breeding and Transfer Recommendations
By studbook ID

ID	Local ID	Sex	Age	Disposition	Location	Breeding	With	Notes
1593	14355	M	19	HOLD	TULSA	DO NOT BREED		House post-repro with 1812. Excluded from genetic analysis.
1812	14368	F	16	HOLD	TULSA	DO NOT BREED		House post-repro with 1593. Excluded from genetic analysis.
1839	2040	M	16	HOLD	DES MOINE	BREED WITH	2853	Assumed post-reproductive and excluded from genetic analysis, but breeding ok.
2017	3253	M	14	HOLD	CAPE MAY	BREED WITH	2422	
2034	A06018	M	14	HOLD	SAN ANTON	DO NOT BREED		House with 2765.
2035	206541	F	14	HOLD	FORTWORTH	DO NOT BREED		Implant; house with 2663.
2051	5M006	M	14	HOLD	DALLAS WA	DO NOT BREED		Companion for 2423.
2115	M07173	F	13	HOLD	NY BRONX	BREED WITH	2525	
2116	113876	M	13	HOLD	NZP-WASH	BREED WITH	2854	

And it continues...

- Continue with studbook updates
- Complete annual surveys
- Create next Breeding & Transfer Plan
 - Can do every year, two years, etc.
- 500+ SSPs with another 100+ candidates

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