A Creationist Assessment of Sexual Databases

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www.CreationismOnline.com

September 2016

Evolutionists claim that sexual reproduction evolved from asexual reproduction into the modern array of types we see in complex multi cellular organisms we see today. If this was true we would expect so see that animals of a common descent have the same types and the distribution of techniques in nature lines up with the evolutionary tree of life. As far as identical types of very complex sexual processes arising independently would be impossible. Imagine two teams of engineers independently designing two identical Chevrolet Corvettes or two identical Microsoft Windows. The chances are far too remote to happen in even in trillions of years.

Creationists have long pointed out (Harrub 2004a, 2004b) that the origin of sex like the origin of other complex organs is impossible. One way that has not been demonstrated before by creationist literature is the problem of immense homoplasy. Numerous phyla/orders with no evolutionary relationship have identical or nearly identical methods. The probability of so many arising independently is just zero. Another problem not listed by creationist literature is the huge array of methods. The sixty nine plant families with have not two (Tree Of Sex, Plants, 2015, Column N) but forty sexes!

Diversity of Sexual Determination Systems

Leo Beukeboom's book (2014a) The Evolution of Sex Determination has an online database (2014b) with nineteen sexual features in nine kingdoms and 75 phyla. Half of the nineteen features are the opposite of the other half which rules out common ancestry for all of them. There are 974 overlaps in the systems of various phyla and kingdoms. The probability of them arising independently dozens of times by chance is zero

Table 1. Nineteen sexual systems nine phyla.

System	1	2	3	4	5	6	7	8	9	Totals
A	8			7	3	6			1	25
B	17	2		6	6		2	2	1	36
C	1	2	86		7	1				97
D	7									7
E				2						2
F	7	2		6	6	2	3	2	2	30
G	6			2	4	7				19
H	23		86	1	9					119
I	1			6						7
J					2	4	1			7
K	24	2		15	9	6	2	2	2	62
L	10	1	85		7	1				104
M	22		56	12	13	5	2	1	2	113
N	21	1	42	7	9	3	1	1	1	86
O	20		69	2	9	6				106
P	22		35	3	8	2				70
Q	16			7	4	3	1		1	32
R	26			12	8	1	1		2	50
S	1			1						2
Totals	232	10	459	89	104	47	13	8	12	974

Kingdoms: 1. Archaeplastida, 2. Excavata, 3. Animals, 4. Fungi, 5. Stramenopiles, 6. Alveolates, 7. Rhizaria, 8. Hacrobia, 9. Amoebozoa. **Systems:** A. haplontic. B. haplo-diplontic. C. Diplontic. D. subdiplontic cycles (very limited and non-independent gametophyte). E. Haplodiplointic but with prolonged dikaryotic or heterokaryotic phase (zygotic meiosis). F. Isogamous. G. Anisogamous. H. Oogamous. I. Somatogamy. J. Gamontogamy. K. haploid stage. L. diploid stage. M. genotypic. N. Epigenetic. O. Unisexual: one single individual gametophyte (under haploid SD) or sprophyte (under diploid SD) produces either male or female gametes, but not both. P. Cosexual: the same individual gametophyte (under haploid SD) or sporophyte (under diploid SD) can produce both male and female gametes. Q. homothallic; mating can occur between genetically identical gametes originating from the same meiotic spore, resulting in a completely homozygous zygote. R. heterothallic; mating is prevented between genetically identical gametes originating from the same meiotic spore. (**Beukeboom, 2014b**)

Table 2. Sexual systems that contain more than one phyla

System	Kingdom	Phyla	System	Kingdom	Phyla
AFGHKMNOPQR	Archaeplastida	Chlorophyceae	CHLMNOP	Animals	Arthropoda
	Stramenopiles	Xanthophyceae		Animals	Echinodermata
AFKMNQR	Archaeplastida	Zygnematophyceae		Animals	Chordata
	Amoebozoa	Mycetozoa		Stramenopiles	Phaeophyceae
AFKMR	Archaeplastida	Prasinophyceae	CHLMO	Animals	Sipuncula
	Archaeplastida	Ulvophyceae		Animals	Pogonophora
	Stramenopiles	Synurophyceae		Animals	Rotifers
	Stramenopiles	Chrysophyceae		Animals	Onychophora
AHKMNOPQR	Archaeplastida	Chlorophyceae		Animals	Arthropoda
	Archaeplastida	Coleochaetophyceae		Animals	Echinodermata
	Archaeplastida	Charophyceae		Animals	Chordata
BFKM	Rhizaria	Cercozoa	CHLNO	Animals	Echiura
	Hacrobia	Haptophyta		Animals	Chordata
BFKMR	Archaeplastida	Ulvophyceae		Stramenopiles	Diatoms
	Fungi	Dikarya	CHLNP	Animals	Porifera
	Stramenopiles	Phaeophyceae		Animals	Ctenaria
	Amoebozoa	Mycetozoa		Animals	Annelida
BGKMOR	Archaeplastida	Florideophyceae		Animals	Mollusca
	Archaeplastida	Ulvophyceae		Animals	Entoprocta
	Stramenopiles	Phaeophyceae		Animals	Bryozoa
BHKMNOPQR	Archaeplastida	Hepatophyta		Animals	Gnathostomulida
	Archaeplastida	Bryophyta		Animals	Gastrotricha
	Stramenopiles	Phaeophyceae		Animals	Platyhelminthes
BHKNPQ	Archaeplastida	Anthocerophyta		Animals	Arthropoda
	Archaeplastida	Lycophyta		Animals	Chaetognatha
	Stramenopiles	Phaeophyceae		Animals	Chordata
BHLNPR	Archaeplastida	Lycophyta		Stramenopiles	Oomycota
	Archaeplastida	Monilophyta	CHLO	Animals	Placozoa
CHLMNO	Animals	Arthropoda		Animals	Mollusca
	Animals	Chordata		Animals	Brachiopods
CHLMNOP	Animals	Cnidaria		Animals	Nematomorpha
	Animals	Annelida		Animals	Priapulida
	Animals	Mollusca		Animals	Loricifera
	Animals	Phoronida		Animals	Kinorhyncha
	Animals	Nemertea		Animals	Hemichordata
	Animals	Platyhelminthes	DHLMNOPR	Archaeplastida	Gymnosperms
	Animals	Tardigrade		Archaeplastida	Angiosperms
	Animals	Nematode			

(Beukeboom, 2014b)

Another problem for evolutionists [Tables 2 and 3] is that you cannot arrange them in a phylogenetic tree.

Table 3. Phyla that contain more than one sexual system

Kingdom	Phyla	System
Animals	Annelida	CHLMNOP CHLNP
Alveolates	Apicomplexa	AFGJKMO AGJKMO AGKNOQ
Animals	Arthropoda	CHLMNO CHLMNOP CHLMO CHLNP
Animals	Chordata	CHLMNO CHLMNOP CHLMO CHLNO CHLNP
Fungi	Chytridiomycota	AFIKMOR AHKNPQ BFGKMNOPQR
Stramenopiles	Diatoms	CFGJLMO CFJLMN CHLNO
Fungi	Dikarya	BFKMNQR BFKMR EGIKMNPQR EIKMR
Animals	Echinodermata	CHLMNOP CHLMO
Archaeplastida	Gymnosperms	DHLMNOPR DHLMOR
Excavata	Heterolobosea	BFK BK
Archaeplastida	Lycophyta	BHKNPQ BHLNPR

Kingdom	Phyla	System
Fungi	Microsporidia	AKNQ BKMR
Animals	Mollusca	CHLMNOP CHLNP CHLO
Archaeplastida	Monilophyta	BHKLNOPQR BHKNOPQ BHKNOPQR BHLNPR
Amoebozoa	Mycetozoa	AFKMNQR BFKMR
Stramenopiles	Phaeophyceae	BFKMR BGKMOR BHKMNOPQR BHKMOR BHKNPQ CHLMNOP
Animals	Platyhelminthes	CHLMNOP CHLNP
Animals	Rotifera	CH CHLMO
Archaeplastida	Ulvophyceae	AFKMR BFKMR BGKMOR DFKMR
Archaeplastida	Zygnematophyceae	AFGIKMNOPQR AFKMNQR
Fungi	Zygomycota	AIKMNQR AIKMR

(**Beukeboom, 2014b**)

The Tree of Sex consortium (Bachtrog, 2014, 2015, Ashman 2014) has an online database of 40,000 species in three phyla (plants, insects and vertebrates). If we look at table 4 we can see that there are nine main reproductive systems in fourteen major groups of organisms. Many reproductive systems overlap different totally unrelated groups. Hermaphrodite procreation exists in all three phyla. Considering the complexity of DNA the chances of identical systems arising independently is zero.

Table 4. Diversity of sex determination systems

Sub-Phyla	Groups	A	B	C	D	E	F	G	H	I
Aves	Birds		B							
Mammals	Placental, marsupial, monotremes	A								
Reptiles	Turtles, snakes, crocodiles, lizards	A	B	C	D	E				
Amphibians	Frogs, toads, salamanders	A	B	C						
Teleost	Bony fishes	A	B	C	D	E				
Acari	Mites and ticks	A					F	G		
Crustacea	Shrimps, barnacles, crabs	A	B	C	D					
Coleoptera	Beetles	A								
Coccoidea	Scale insects	A		C	D		F	G		
Hymenoptera	Ants, bees, and wasps						F			
Lepidoptera	Butterflies		B							
Diptera	Flies	A		C						
Gymnosperms	Non-flowering plants						F		H	
Angiosperms	Flowering plants				D				H	I

A. XO, XY, complex XY, B. ZO, ZW, complex ZW, C. Homomorphic, D. Hermaphrodites, E. ESD, F. Haplo-Diploids, G. Paternal Genome Elimination, H. Monoecy, I. Dioecy. **(Bachtrog, 2014)**

In table five we can see three more phyla (nematodes, molluscs and annelids) and four more sexual systems. The XY system is present in five phyla and the XO and ZW systems are present in four phyla.

Table 5. Thirteen sexual systems ten phyla/sub phyla

Phyla	A	B	C	D	E	F	G	H	I	J	K	L	M	Total
Arthropods	A	B	C	D	E	F	G	H	I	J	K	L		12
Fish		B		D	E	F			I		K	L	M	8
Amphibians		B			E	F			I		K	L	M	7
Reptiles		B		D	E				I			L		5
Mammals		B				F			I			L		4
Birds				D								L		2
Nematodes						F								1
Molluscs						F			I			L	M	4
Plants		B			E				I			L		4
Annelids									I					1
Total	1	6	1	4	5	6	1	1	8	1	3	8	3	

A. complex XO, B. complex XY, C. complex XY | homomorphic, D. complex ZW, E. homomorphic, F. XO, G. XO | homomorphic, H. XO|XY, I. XY, J. XY | homomorphic, K. ZO, L. ZW, M. WO. (Tree of sex, 2015, Plants, Vertebrates, Invertebrates, Avise, 2004, Thiriot, 2003, Hodgkin, 1986, Tosuji, 2004)

Arthropod Sexuality

An arthropod is an invertebrate animal having an exoskeleton (external skeleton), a segmented body, and jointed appendages (paired appendages). Arthropods form the phylum Arthropoda, which includes the insects, arachnids, myriapods, and crustaceans. Estimates of the number of arthropod species vary between 1,170,000 and 5 to 10 million and account for over 80% of all known living animal species.

If we add two more factors to table 4 (number of female and male chromosomes) we get a three level (System-Female-Male) view of molecular homology (Table 6). Invertebrates have 13 sexual systems, males have 1 to 381 chromosomes (380) and females have 2 to 192 chromosomes (190) giving 938,600 (= 13 x 380 x 190) combinations. Vertebrates have 8 sexual systems, males have 1 to 475 chromosomes (474) and females have 1 to 184 chromosomes (183) giving 69 thousand combinations. The chances of have one species in both phyla with identical systems is one in 65 billion. If we look in table 7 we can see that some families overlap between two (probability = 4.31 x 10^{-21}) to ten systems (probability = 1.49 x 10^{-108}).

Table 6. Three level system of sexuality

Phyla	System	Males	Females	Total
Invertebrates	13	380	190	938,600
Vertebrates	8	94	93	69,936
Total	21	474	183	65,641,929,600

(Tree Of Sex, Vertebrates, Invertebrates, 2015)

Table 7. Identical [Three Level] sex determination systems in vertebrates and insects

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
A	f		f					f	f				f		
B	hijkm	jm			h	j			h		hijk				
C	fhklm	m	f		h			f	fh		hkl		f		l
D	cfghijkl	cj	f	c	h	j	c	cdf	fgh	cd	ghijkl		f	d	l
E	ejk	ej				j	e	e	e		jk				
F								a							
G	l										l				l
H	hjlm	jm			h	j			h		hjl				l
I	m	m													
J	bc	c	c	bc			c	bcd	b	bcd		b		d	
K	f		f					f	f				f		
L	i										i				
M	l										l				l
N	jm	jm				j					j				
O	cefghijklm	cejm	f	c	h	j	ce	cdef	efgh	cd	ghijkl		f	d	l
P	cefhijklm	cejm	f	c	h	j	ce	cdef	efh	cd	hijkl		f	d	l
Q	c	c		c			c	c		c					

Insects: 1. Coleoptera, 2. Dermaptera, 3. Diptera, 4. Ephemeroptera, 5. Grylloblattodea, 6. Mantodea, 7. Megaloptera, 8. Neuroptera, 9. Odonata, 10. Orthoptera, 11. Phasmatodea, 12. Psocoptera, 13. Raphidioptera, 14. Siphonaptera, 15. Zoraptera. **Vertebrates:** A. Anura, B. Carnivores, C. Cetartiodactyla, D. Chiroptera, E. Cyprinodontiformes, F. Diprotodonts, G. Gymnotiformes, H. Insectivora, I. Lagomorpha, J. Marsupials, K. Perciformes, L. Perissodactyla, M. Pleuronectiformes, N. Primates, O. Rodents, P. Squamata, Q. Tubulidentata. **Systems:** a. Complex XY-16-15, b. XY-16-16, c. XY-18-18, d. XY-22-22, e. XY-24-24, f. XY-26-26, g. XY-28-28, h. XY-30-30, i. XY-32-32, j. XY-34-34, k. XY-36-36, l. XY-38-38, m. XY-40-40. (Tree Of Sex, Vertebrates, Invertebrates, 2015)

Table 8. Number of species that overlap and probability of overlaps (10^{-x})

Systems	a	b	c	d	e	f	g	h	i	j	k	l	m	Overlaps
a	1													1
b		2												2
c			13											13
d				4										4
e					1									1
f						2								2
h								1						1
i									1					1
j										1				1
l												2		2
m													1	1
bc		1	1											1
cd			1	1										1
ce			1		1									1
cj			1							1				1
ej					1					1				1
fh						1		1						1
jk										2	2			2
jm										8			8	8
bcd		6	6	6										6
cdf			3	3		3								3
efh					3	3		3						3
ejk					3					3	3			3
fgh						3	3	3						3
hjl								3		3		3		3
hkl								3			3	3		3
cdef			8	8	8	8								8
cejm			8		8					8			8	8
efgh					4	4	4	4						4
hijk								4	4	4	4			4
hjlm								4		4		4	4	4
fhklm						5		5			5	5	5	5
hijkl								5	5	5	5	5		5
hijkm								5	5	5	5		5	5
ghijkl							12	12	12	12	12	12		12
cfghijkl			8			8	8	8	8	8	8	8		8
cefhijklm			9		9	9		9	9	9	9	9	9	9
cefghijklm			10		10	10	10	10	10	10	10	10	10	10
Overlaps	1	9	69	22	48	56	37	80	54	84	66	61	50	151
Probability	11	97	746	238	519	606	400	865	584	909	714	660	541	

(Tree of Sex, Invertebrates, 2015)

In table 8 we can see that the probability of so many overlapping systems is between 10^{-11} and 10^{-1633}. The systems [A-C-D] are the a. chromosome type – b. number of female chromosomes – c. number of male chromosomes. We can add a fourth criteria [the genotype] which makes the probability of overlap between one species in each phyla (vertebrates and insects) one in 525 billion. To give you an idea there are 525 billion seconds in 16,641 years.

Table 9. Four level system of sexuality

Phyla	System	Males	Females	Genotype	Total
Invertebrates	13	380	190	2	1,877,200
Vertebrates	8	94	93	4	279,744
Total	21	474	183	183	525,135,436,800

(Tree of Sex, Invertebrates, 2015)

The systems [A-B-C-D] are the chromosome type – genotype - number of female chromosomes – number of male chromosomes. In table 10 some systems like XY-M-20-20 exist in 783 species (778 insects and 5 vertebrates). The probability of this overlap in two different phyla is $525{,}135{,}436{,}800^{783} = 10^{9176}$. Not only that, many species in the same phyla but different sub phyla, orders and families overlap with identical systems. Vertebrates have overlap in four sub phyla (Amphibians, Fish, Mammals and Reptiles) which have 43 orders and 177 families. 4 x 43 x 177 = 30,444. For instance the system XY-M-50-50 (Book: Invertebrates, Sheet: 4_Systems_Ver) exists in 23 species, 3 sub phyla, 12 orders and 16 families.

Table 10. Identical [Four Level] sex determination systems in vertebrates and insects

System	Insect	Vertebrate	Probability (10^{-x})	System	Insect	Vertebrate	Probability (10^{-x})
CXY-M-10-11	1	1	23.44	XY-M-56-56	5	21	304.73
CXY-M-14-15	1	1	23.44	XY-M-48-48	6	49	644.61
CXY-M-20-19	1	1	23.44	XO-M-48-47	11	3	164.08
CXY-M-22-23	1	4	58.60	XY-M-42-42	12	35	550.85
CXY-M-24-25	1	1	23.44	XY-M-46-46	16	29	527.41
CXY-M-32-31	1	2	35.16	CXY-M-22-21	19	1	234.41
CXY-M-44-42	1	1	23.44	XO-M-46-45	20	2	257.85
CXY-M-48-47	1	15	187.52	XY-M-44-44	23	30	621.17
CXY-M-52-52	1	1	23.44	XO-M-50-49	30	1	363.33
CXY-M-54-53	1	2	35.16	XO-M-40-39	32	1	386.77
XY-M-54-54	1	19	234.41	XY-M-38-38	38	47	996.22
XY-M-58-58	1	9	117.20	XO-M-44-43	42	1	503.97
XY-M-60-60	1	18	222.69	XY-M-36-36	49	29	914.18
ZW-F-22-22	1	1	23.44	XY-M-40-40	64	20	984.50
ZW-F-26-26	1	3	46.88	XY-M-34-34	91	28	1,394.71
ZW-F-28-28	1	3	46.88	XY-M-32-32	107	17	1,453.31
ZW-F-30-30	1	14	175.80	XY-M-14-14	112	7	1,394.71
ZW-F-46-46	1	7	93.76	XY-M-26-26	142	8	1,758.04
CXY-M-16-15	2	1	35.16	XY-M-30-30	149	22	2,004.17
CXY-M-24-24	2	1	35.16	XY-M-16-16	167	1	1,969.01
CXY-M-38-37	2	4	70.32	XY-M-28-28	170	4	2,039.33
XY-M-62-62	2	9	128.92	XY-M-18-18	375	2	4,418.54
ZW-F-56-56	2	2	46.88	XY-M-24-24	400	4	4,734.99
XY-M-52-52	4	18	257.85	XY-M-22-22	602	16	7,243.13
XY-M-50-50	5	23	328.17	XY-M-20-20	778	5	9,176.97

(Tree of Sex, Invertebrates, 2015)

If we look in table 11 below we can see that insect order A (Blattodea) and B (Coleoptera) have 20 overlapping sexual systems. There are 84 times that sexual systems in A (Blattodea) that overlap 11 of the other 26 insect orders.

Table 11. Fifty seven overlapping systems in twenty six insect orders

Ω	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	Ψ
A		20				3			1		13	9		1	7	5	16		3		6						84
B	20		2	12	8	3	5	1	1		17	11	3	11	16	13	23	1	5	2	8	1	2	1		1	167
C		2		1	1		1							1	1						1						8
D		12	1		5		4				3	1	2	6	3	5	1	1	1	2			1				48
E		8	1	5			5							6	5	6		1	1	3	1	1	1	1			45
F	3	3									3	1		1	3	3	2		2		3						24
G		5	1	4	5								1	4	2	4			1	1	1						29
H		1													1		1										3
I	1	1									1	1					1										5
J																									3		3
K	13	17		3		3			1			6		1	9	5	11		3		6						78
L	9	11		1		1			1		6				3	2	9		1		2						46
M		3		2			1							3	1	2							1				13
N	1	11	1	6	6	1	4				1		3		7	8	1	1	2	2	3	1	2				61
O	7	16	1	3	5	3	2	1			9	3	1	7		7	7		4	2	7	1					86
P	5	13		5	6	3	4				5	2	2	8	7		3	1	4	1	5		2	1			77
Q	16	23		1		2		1	1		11	9		1	7	3			2		3					1	81
R		1		1	1									1		1							1				6
S	3	5		1	1	2	1				3	1		2	4	4	2			1	2						32
T		2		2	3		1							2	2	1			1								14
U	6	8	1		1	3	1				6	2		3	7	5	3		2								48
V		1			1									1	1												4
W		2		1	1								1	2		2		1									10
X		1			1											1											3
Y										3																	3
Z		1															1										2
Θ	11	23	7	15	14	10	11	3	5	1	12	11	7	18	18	18	14	6	13	8	12	4	7	3	1	2	26

Column **Ψ**: Number of times identical systems in one insect order exist other insect orders**.** Row and column **Ω**: The twenty six insect orders (A-Z). A. Blattodea, B. Coleoptera, C. Collembola, D. Dermaptera, E. Diptera, F. Embiidina, G. Ephemeroptera, H. Grylloblattodea, I. Isoptera, J. Lepidoptera, K. Mantodea, L. Mecoptera, M. Megaloptera, N. Neuroptera, O. Odonata, P. Orthoptera, Q. Phasmatodea, R. Phthiraptera, S. Plecoptera, T. Protura, U. Psocoptera, V. Raphidioptera, W. Siphonaptera, X. Strepsiptera, Y. Trichoptera, Z. Zoraptera. Row **Θ**: The number of orders that overlap another order with identical systems. (Tree of sex, Invertebrates, 2015)

Invertebrates have 13 sexual systems. If we arrange their distribution (Tables 12-14) into various orders we see that the XY and XO system exists in 20 arthropod orders. The probability of the same system arising independently so many times is zero. Trying to arrange their distribution into a phylogenetic tree is impossible.

Table 12. Number of species and orders per system (blue: non insects)

System	Order	Species	System	Order	Species
CXO	Coleoptera	11	XO	Plecoptera	2
	Hemiptera	1		Psocoptera	90
	Plecoptera	7		Zygentoma	3
CXY	Coleoptera	206	XO | HMP	Diptera	1
	Dermaptera	26		Hemiptera	1
	Diptera	9	XO|XY	Odonata	2
	Isoptera	1		Phasmatodea	1
	Mantodea	39	XY	Acariformes	4
	Mecoptera	1		Coleoptera	3,140
	Neuroptera	1		Dermaptera	21
	Orthoptera	8		Diptera	1,160
	Parasitiformes	1		Ephemeroptera	5
	Siphonaptera	3		Grylloblattodea	1
CXY | HMP	Isoptera	58		Mantodea	1
CZW	Lepidoptera	11		Megaloptera	3
HMP	Diptera	64		Neuroptera	69
	Hemiptera	1		Odonata	16
	Isoptera	1		Orthoptera	48
XO	Acariformes	12		Parasitiformes	19
	Blattodea	107		Phasmatodea	12
	Coleoptera	753		Phthiraptera	1
	Collembola	16		Plecoptera	1
	Dermaptera	1		Protura	1
	Diptera	41		Psocoptera	1
	Embiidina	7		Raphidioptera	5
	Ephemeroptera	1		Siphonaptera	1
	Hemiptera	18		Strepsiptera	1
	Isoptera	1		Zoraptera	1
	Mantodea	59	XY | HMP	Diptera	26
	Mecoptera	12		Isoptera	1
	Neuroptera	1		Protura	1
	Odonata	399	ZO	Lepidoptera	9
	Orthoptera	222		Trichoptera	14
	Parasitiformes	53	ZW	Diptera	6
	Phasmatodea	67		Lepidoptera	17

(CXY: complex XY, CXO: complex XO, CZW: complex ZW, HMP: homomorphic)
(Tree Of Sex, Invertebrates, 2015)

Table 13. Number of systems and species per order

Order	System	Species	Order	System	Species
Acariformes	XO	12	Mantodea	CXY	39
	XY	4		XO	59
Blattodea	XO	107		XY	1
Coleoptera	CXO	11	Mecoptera	CXY	1
	CXY	206		XO	12
	XO	753	Megaloptera	XY	3
	XY	3,140	Neuroptera	CXY	1
Collembola	XO	16		XO	1
Dermaptera	CXY	26		XY	69
	XO	1	Odonata	XO	399
	XY	21		XO|XY	2
Diptera	CXY	9		XY	16
	HMP	64	Orthoptera	CXY	8
	XO	41		XO	222
	XO| HMP	1		XY	48
	XY	1,160	Parasitiformes	CXY	1
	XY| HMP	26		XO	53
	ZW	6		XY	19
Embiidina	XO	7	Phasmatodea	XO	67
Ephemeroptera	XO	1		XO|XY	1
	XY	5		XY	12
Grylloblattodea	XY	1	Phthiraptera	XY	1
Hemiptera	CXO	1	Plecoptera	CXO	7
	HMP	1		XO	2
	XO	18		XY	1
	XO| HMP	1	Protura	XY	1
Isoptera	CXY	1		XY| HMP	1
	CXY| HMP	58	Psocoptera	XO	90
	HMP	1		XY	1
	XO	1	Raphidioptera	XY	5
	XY| HMP	1	Siphonaptera	CXY	3
Lepidoptera	CZW	11		XY	1
	ZO	9	Strepsiptera	XY	1
	ZW	17	Trichoptera	ZO	14
			Zoraptera	XY	1
			Zygentoma	XO	3

(CXY: complex XY, CXO: complex XO, CZW: complex ZW, HMP: homomorphic)
(Tree Of Sex, Invertebrates, 2015)

Table 14. Number of systems and species per order

Orders	A	B	C	D	E	F	G	H	I	J	K	L	Species
Acariformes						12			4				16
Blattodea						107							107
Coleoptera	11	206				753			3,140				4,110
Collembola						16							16
Dermaptera		26				1			21				48
Diptera		9			64	41	1		1,160	26		6	1,307
Embiidina						7							7
Ephemeroptera						1			5				6
Grylloblattodea									1				1
Hemiptera	1				1	18	1						21
Isoptera		1	58		1	1				1			62
Lepidoptera				11							9	17	37
Mantodea		39				59			1				99
Mecoptera		1				12							13
Megaloptera									3				3
Neuroptera		1				1			69				71
Odonata						399		2	16				417
Orthoptera		8				222			48				278
Parasitiformes		1				53			19				73
Phasmatodea						67		1	12				80
Phthiraptera									1				1
Plecoptera	7					2			1				10
Protura									1	1			2
Psocoptera						90			1				91
Raphidioptera									5				5
Siphonaptera		3							1				4
Strepsiptera									1				1
Trichoptera											14		14
Zoraptera									1				1
Zygentoma						3							3
Total	19	295	58	11	66	1,865	2	3	4,511	28	23	23	

(A. CXO, B. CXY, C. CXY|HMP, D. CZW, E. HMP, F. XO,
G. XO|HMP, H. XO|XY, I. XY, J. XY|HMP, K. ZO, L. ZW)
(Tree Of Sex, Invertebrates, 2015)

Table 15. Mating arrangements in arthropods

Common Name	Group	G	P	H
Mites	Acariformes	297	264	
Beetles	Coleoptera	4,504	116	
Flies	Diptera	1,313	5	
Damsel Flies	Ephemeroptera	8	1	
Aphids	Hemiptera	368	90	2
Butterflies	Lepidoptera	1,204	3	
Ticks	Parasitiformes	250	80	
Stick Insects	Phasmatodea	83	13	
Bark Flies	Psocoptera	94	9	
Winged Parasites	Strepsiptera	2	1	
Caddis Flies	Trichoptera	15	3	

Number of species in each column. G: Gonochorous, P: Parthenogenetic, H: Hermaphrodite

(Tree Of Sex, Invertebrates, 2015)

Arthropod Chromosome Homoplasy

Out of the eight reproduction mechanisms used in animals, six (arrhenotoky, cyclic parthenogenesis, gynogenesis, hybridogenesis, parent-specific allele expression and paternal genome elimination) are used by arthropods and have arisen independently **(Normark, 2014)** in four other phyla: Loricifera, Nematodes, Rotifers and Vertebrata. Parthenogenesis as well as being used by arthropods has arisen independently in thirteen other phyla: Annelids, Jelly Fish, Echinodermata, Gastrotrich, Molluscs, Nematodes, Nematomorpha, Onychophora, Platyhelminthes, Rotifers, Sipuncula, Tardigrade and Vertebrates **(Normark, 2014).** Satoko lists **(Satoko, 2010, P. 72-81)** 305 species within arthropods which have independently evolved parthenogenesis:

Insects	14 Orders	77 Families	265 species
Crustaceans	6 Orders	14 Families	19 species
Arachnids	3 Orders	6 Families	20 species
Pycnogonida	1 Order	1 Families	1 species

If we look at all the insect families listed in the tree of sex database how many sexual systems are there per family? This tells us how many arose independently per family. We then add up the family totals for each order and see that the twelve systems listed in tables 12-14 arose independently at least 365 times. Some orders have 95 independent evolutions. Some systems have arisen independently 137 times:

A	**7**	**E**	**14**	**I**	**137**
B	**32**	**F**	**124**	**J**	**11**
C	**3**	**G**	**3**	**K**	**12**
D	**7**	**H**	**4**	**L**	**11**

Table 16. 365 Independent origins of twelve sexual systems in thirty insect phyla

Order	Total	Order	Total
Acariformes	6	Neuroptera	9
Blattodea	4	Odonata	29
Coleoptera	95	Orthoptera	12
Collembola	8	Parasitiformes	4
Dermaptera	11	Phasmatodea	5
Diptera	74	Phthiraptera	1
Embiidina	2	Plecoptera	4
Ephemeroptera	6	Protura	3
Grylloblattodea	1	Psocoptera	21
Hemiptera	12	Raphidioptera	1
Isoptera	8	Siphonaptera	3
Lepidoptera	23	Strepsiptera	1
Mantodea	9	Trichoptera	6
Mecoptera	4	Zoraptera	1
Megaloptera	1	Zygentoma	1

(Tree Of Sex, Invertebrates, 2015)

Table 17. Fifty seven [three level] overlapping genome arrangements in 26 insect orders

Orders	Orders	Probability	Orders	Orders	Probability
Blattodea	20	2.82×10^{119}	Neuroptera	12	4.67×10^{71}
Coleoptera	47	5.09×10^{280}	Odonata	19	3.00×10^{113}
Collembola	2	8.81×10^{11}	Orthoptera	15	3.87×10^{89}
Dermaptera	12	4.67×10^{71}	Phasmatodea	23	2.33×10^{137}
Diptera	12	4.67×10^{71}	Phthiraptera	1	9.39×10^{5}
Embiidina	3	8.27×10^{17}	Plecoptera	5	7.28×10^{29}
Ephemeroptera	6	6.84×10^{35}	Protura	3	8.27×10^{17}
Grylloblattodea	1	9.39×10^{5}	Psocoptera	8	6.02×10^{47}
Isoptera	1	9.39×10^{5}	Raphidioptera	1	9.39×10^{5}
Lepidoptera	3	8.27×10^{17}	Siphonaptera	2	8.81×10^{11}
Mantodea	19	3.00×10^{113}	Strepsiptera	1	9.39×10^{5}
Mecoptera	11	4.98×10^{65}	Trichoptera	3	8.27×10^{17}
Megaloptera	3	8.27×10^{17}	Zoraptera	1	9.39×10^{5}

(Tree Of Sex, Invertebrates, 2015)

It would be extremely difficult to decide which crustacean is the ancestor of terrestrial arthropods. If we assume that there is one ancestor (with one DNA system) for insects then twelve of the thirteen systems arose independently in other groups (Centipedes, Millipedes, Mites, Spiders and Ticks). If we look at table 5 we see that all five vertebrate orders have seven identical systems so the parallel evolution is endless.

What is the probability that identical systems (E.g. XO-22-21 is in ten families) would arise in several different families or orders independently? Since insects would have one ancestor with one DNA system any others would arise by parallel evolution. Out of 191 systems that actually exist Coleoptera has 47 different systems which it shares with other families.

Table 18. Overlapping orders in arthropod genome systems

Orders	System	Probability	Orders	System	Probability
10	XO-22-21	5.31×10^{59}	4	XY-30-30	7.76×10^{23}
9	XO-24-23	5.65×10^{53}	4	XY-34-34	7.76×10^{23}
9	XY-10-10	5.65×10^{53}	4	XY-8-8	7.76×10^{23}
8	XO-20-19	6.02×10^{47}	3	CXY-22-21	8.27×10^{17}
8	XO-26-25	6.02×10^{47}	3	CXY-28-27	8.27×10^{17}
7	XO-30-29	6.42×10^{41}	3	XO-50-49	8.27×10^{17}
7	XY-14-14	6.42×10^{41}	3	XO-54-53	8.27×10^{17}
7	XY-16-16	6.42×10^{41}	3	XY-28-28	8.27×10^{17}
6	XO-18-17	6.84×10^{35}	3	XY-38-38	8.27×10^{17}
6	XO-32-31	6.84×10^{35}	2	CXO-24-22	8.81×10^{11}
6	XY-12-12	6.84×10^{35}	2	CXY-14-13	8.81×10^{11}
6	XY-18-18	6.84×10^{35}	2	CXY-16-15	8.81×10^{11}
6	XY-20-20	6.84×10^{35}	2	CXY-24-23	8.81×10^{11}
5	XO-12-11	7.28×10^{29}	2	XO-21-20	8.81×10^{11}
5	XO-14-13	7.28×10^{29}	2	XO-27-26	8.81×10^{11}
5	XO-28-27	7.28×10^{29}	2	XO-52-51	8.81×10^{11}
5	XO-40-39	7.28×10^{29}	2	XO-58-57	8.81×10^{11}
5	XY-22-22	7.28×10^{29}	2	XO-64-63	8.81×10^{11}
5	XY-24-24	7.28×10^{29}	2	XO-9-8	8.81×10^{11}
5	XY-26-26	7.28×10^{29}	2	XY-24-25	8.81×10^{11}
4	CXY-26-25	7.76×10^{23}	2	XY-32-32	8.81×10^{11}
4	XO-16-15	7.76×10^{23}	2	XY-36-36	8.81×10^{11}
4	XO-34-33	7.76×10^{23}	2	XY-40-40	8.81×10^{11}
4	XO-36-35	7.76×10^{23}	2	XY-6-6	8.81×10^{11}
4	XO-38-37	7.76×10^{23}	2	XY|HMP-18-18	8.81×10^{11}
4	XO-42-41	7.76×10^{23}	2	ZO-27-28	8.81×10^{11}
4	XO-44-43	7.76×10^{23}	2	ZO-57-58	8.81×10^{11}
4	XO-46-45	7.76×10^{23}	2	ZO-59-60	8.81×10^{11}
4	XO-48-47	7.76×10^{23}			

(Tree Of Sex, Invertebrates, 2015)

Table 19. Homoplasy probability in arthropod genome sub-systems

System	Probability	System	Probability	System	Probability
10-10-NeoXY	5.04×10^{14}	56-56-Xyp	5.04×10^{14}	22-21-XXY	2.54×10^{29}
10-10-X long	5.04×10^{14}	59-58-ZWW/ZZ	5.04×10^{14}	26-25-XXY	2.54×10^{29}
10-10-X medium	5.04×10^{14}	6-6-large X	5.04×10^{14}	28-27-XXY	2.54×10^{29}
12-11-heteromorphic	5.04×10^{14}	6-6-small X	5.04×10^{14}	28-28-NeoXY	2.54×10^{29}
12-12-heteromorphic	5.04×10^{14}	8-8-X short	5.04×10^{14}	30-30-NeoXY	2.54×10^{29}
12-12-large X	5.04×10^{14}	8-8-X short telo	5.04×10^{14}	34-34-Xyp	2.54×10^{29}
12-12-lX and lY	5.04×10^{14}	10-10-small sex chr	1.13×10^{22}	36-36-Xyp	2.54×10^{29}
12-12-mX-?	5.04×10^{14}	10-10-small X	1.13×10^{22}	38-38-Xyp	2.54×10^{29}
12-12-short X	5.04×10^{14}	10-10-X short telo	1.13×10^{22}	12-12-shX-shY	5.71×10^{36}
12-12-X long	5.04×10^{14}	12-10-hetero	1.13×10^{22}	20-20-Xyr	5.71×10^{36}
12-12-X long hetero	5.04×10^{14}	12-12-lX-lY	1.13×10^{22}	32-32-Xyp	5.71×10^{36}
12-12-X medium	5.04×10^{14}	12-12-lX-mY	1.13×10^{22}	12-12-NeoXY	1.28×10^{44}
12-12-X medium length	5.04×10^{14}	12-12-lX-shY	1.13×10^{22}	16-16-Xyp	1.28×10^{44}
14-14-small X	5.04×10^{14}	14-14-hetero	1.13×10^{22}	18-18-Xyr	1.28×10^{44}
16-16-Xy+	5.04×10^{14}	14-14-X short	1.13×10^{22}	28-28-Xyp	1.28×10^{44}
18-18-heteromorphic	5.04×10^{14}	16-16-Xyr	1.13×10^{22}	30-30-Xyp	1.28×10^{44}
18-18-Xy+	5.04×10^{14}	22-22-NeoXY	1.13×10^{22}	12-12-small X	2.88×10^{51}
22-22-heteromorphic	5.04×10^{14}	26-26-NeoXY	1.13×10^{22}	14-14-NeoXY	2.88×10^{51}
22-22-Xyr	5.04×10^{14}	40-40-Xyp	1.13×10^{22}	14-14-Xyp	2.88×10^{51}
24-23-XXY	5.04×10^{14}	42-42-Xyp	1.13×10^{22}	16-16-NeoXY	2.88×10^{51}
24-24-Xy+	5.04×10^{14}	44-44-Xyp	1.13×10^{22}	12-12-small sex chr	6.46×10^{58}
26-26-Xy+	5.04×10^{14}	8-8-small X	1.13×10^{22}	20-20-NeoXY	6.46×10^{58}
26-26-Xyr	5.04×10^{14}	10-10-X short	2.54×10^{29}	24-24-NeoXY	6.46×10^{58}
30-30-Xyr	5.04×10^{14}	12-12-long X	2.54×10^{29}	24-24-Xyp	1.45×10^{66}
32-32-NeoXY	5.04×10^{14}	12-12-mX-shY	2.54×10^{29}	18-18-NeoXY	7.32×10^{80}
38-37-XXY	5.04×10^{14}	12-12-X short	2.54×10^{29}	26-26-Xyp	1.64×10^{88}
42-42-X1X1X2X2/X1X2Y1Y2	5.04×10^{14}	12-12-X short telo	2.54×10^{29}	22-22-Xyp	4.73×10^{139}
44-44-NeoXY	5.04×10^{14}	12-12-Xyp	2.54×10^{29}	18-18-Xyp	2.38×10^{154}
46-46-Xyp	5.04×10^{14}	14-13-hetero	2.54×10^{29}	20-20-Xyp	1.20×10^{169}

(Tree Of Sex, Invertebrates, 2015, Column K)

To give you an idea of the complexity of arranging insect DNA: The Oriental fruit fly (Dacus dorsalis) has 18,857 proteins (Uniprot, 2015, Dacus) which equals 9 megabytes of data. Drosophila ananassae (Fruit fly) has 19,806 proteins (Uniprot, 2015, Drosophila) which equals 13 megabytes of DNA data.

Vertebrates Sexuality

Vertebrates comprise all species of animals within the subphylum Vertebrata (chordates with backbones). Vertebrates represent the overwhelming majority of the phylum Chordata, with currently about 64,000 species described. According to evolutionary theory fish evolved into amphibians which evolved into reptiles. Reptiles then evolved into birds and mammals. With 33,100 described species, fish exhibit greater species diversity than any other group of vertebrates.

Table 20. Number of species per system in vertebrate orders

Phyla	CXY	CZW	HMP	WO	XO	XY	ZO	ZW
Fish	48	3	239		12	78	3	42
Amphibians	1		94	1		28		16
Reptiles	140	9	253			581		277
Mammals	100				15	502		
Birds		12						469
Totals	289	24	586	1	27	1189	3	804

CXY: Complex XY, CZX: Complex ZW, HMP: Homomorphic. (Tree Of Sex, Vertebrates, 2015)

We can see in table 20 that the CZW system disappears in amphibians and reappears in reptiles. The XO system bypasses amphibians and reptiles and reappears in mammals. The HMP system is passed onto reptiles but does not exist in mammals or birds. Birds have at least two ancestors CZW and ZW. Mammals have three (CXY, XY and XO) ancestors. Reptiles have five (CZW, CXY, HMP, XY and ZW). Amphibians have four (CXY, HMP, ZY, WO and ZW).

We can see in table 20 that the CZW system disappears in amphibians and reappears in reptiles. The XO system bypasses amphibians and reptiles and reappears in mammals. The HMP system is passed onto reptiles but does not exist in mammals or birds. Birds have at least two ancestors CZW and ZW. Mammals have three (CXY, XY and XO) ancestors. Reptiles have five (CZW, CXY, HMP, XY and ZW). Amphibians have four (CXY, HMP, ZY and ZW).

If we look in table 21 we can see that the seven different sexual systems have arisen independently in fish 137 times in 26 orders and 137 families. Highlighted yellow are in the shark/ray sub phyla. Eighteen orders (112 families) have between two to six systems. Five orders (Cypriniformes, Cyprinodontiformes, Gasterosteiformes, Perciformes, Siluriformes) have four of the five systems found in amphibians. If only one fish species were the ancestor of amphibians they should all have only one genetic system. The root ancestor could only have one system in its DNA. The overlapping of systems is so complex it would be impossible to determine how fish evolved from their original ancestor.

Table 21. Sexual systems in 26 fish orders

Orders	CXY	CZW	HMP	XO	XY	ZO	ZW	Families	Systems
Anguilliformes	1		1				3	5	3
Aulopiformes		1	2				1	4	3
Beloniformes			1		1		1	3	3
Beryciformes	1							1	1
Carcharhiniformes					1			1	1
Characiformes	1	1	6		1		1	10	5
Clupeiformes	1		1		1	1		4	4
Cypriniformes	1		2		1		1	5	4
Cyprinodontiformes	3		4		4		3	14	4
Gasterosteiformes	1		1		1		1	4	4
Gobiesociformes				1				1	1
Gymnotiformes	3		1		1			5	3
Myctophiformes			2	1				3	2
Myliobatiformes					2			2	1
Osteoglossiformes			2					2	1
Perciformes	9		10	4	9	1	1	34	6
Pleuronectiformes			2	1	1	1		5	4
Rajiformes	1		1		1			3	3
Salmoniformes	1		3	1	1			6	4
Scorpaeniformes	1		1					2	2
Siluriformes	2	1	7	1	1		1	13	6
Squatiniformes					1			1	1
Stomiiformes				1				1	1
Synbranchiformes			1		1			2	2
Tetraodontiformes	2		2	1				5	3
Zeiformes	1							1	1
Families	29	3	50	11	28	3	13	137	7
Orders	15	3	19	8	16	3	9	64	

The number of known amphibian species is approximately 7,000, of which nearly 90% are frogs. If we look in table 22 we can see that the five different sexual systems have arisen independently in amphibians 33 times in 2 orders and 33 families.

Table 22. Fish families with more than one sexual system

Order	Family	CXY	CZW	HMP	XO	XY	ZO	ZW	Systems
Anguilliformes	Ophichthidae	1						1	2
Aulopiformes	Synodontidae		1					1	2
Beloniformes	Adrianichthyidae			1		1		1	3
Characiformes	Parodontidae		1	1					2
	Erythrinidae	1		1		1			3
Clupeiformes	Clupeidae	1		1					2
Cypriniformes	Cobitidae	1		1					2
	Cyprinidae			1		1		1	3
Cyprinodontiformes	Cyprinodontidae	1		1					2
	Nothobranchiidae	1				1			2
	Aplocheilidae			1				1	2
	Goodeidae	1		1				1	3
	Poeciliidae			1		1		1	3
Gasterosteiformes	Gasterosteidae	1		1		1		1	4
Gymnotiformes	Gymnotidae	1		1					2
	Sternopygidae	1				1			2
Myctophiformes	Myctophidae			1	1				2
Perciformes	Callionymidae	1		1					2
	Lutjanidae	1		1					2
	Monodactylidae	1		1					2
	Percidae	1		1					2
	Blenniidae	1				1			2
	Centrarchidae			1	1				2
	Cichlidae			1		1			2
	Eleotridae	1		1		1			3
	Belontiidae				1		1	1	3
	Gobiidae	1		1	1	1			4
Pleuronectiformes	Cynoglossidae				1		1		2
Salmoniformes	Salmonidae	1		1		1			3
Siluriformes	Loricariidae	1	1	1	1	1		1	6
Synbranchiformes	Mastacembelidae			1		1			2
Tetraodontiformes	Tetraodontidae	1		1					2
	Systems	20	3	25	6	14	2	10	80

Coloured families have identical systems.

Reptiles are tetrapod animals in the class Reptilia, comprising today's turtles, crocodilians, snakes, lizards and tuatara. Several living subgroups are recognized: Chelonia (Turtles, terrapins and tortoises), approximately 400 species; Sphenodontia (tuatara from New Zealand), 1 species; Squamata (lizards, snakes, and worm lizards), over 9,600 species and Crocodilia (crocodiles, gavials, caimans, and alligators), 25 species. If we look in table 23 we can see that the five different sexual systems have arisen independently in reptiles 32 times in 2 orders and 32 families. Both orders (32 families) have between three to five systems.

Table 23. Amphibian sexual systems

Order	CXY	HMP	WO	XY	ZW	Families	Systems
Anura	1	10	1	4	9	25	5
Caudata		4		2	2	8	3
Families	1	14	1	6	11	33	5
Orders	1	2	1	2	2	8	

Table 24. Amphibian sexual systems

Order	Family	CXY	HMP	WO	XY	ZW	Systems
Anura	Bombinatoridae		1				1
	Bufonidae		1		1	1	3
	Centronelidae				1		1
	Cycloramphidae					1	1
	Dendrobatidae		1				1
	Discoglossidae		1			1	2
	Hylidae		1		1	1	3
	Hyperoliidae		1				1
	Leiopelmatidae		1	1		1	3
	Leptodactylidae	1	1			1	3
	Myobatrachidae					1	1
	Pipidae		1				1
	Racophoridae					1	1
	Ranidae		1		1	1	3
Caudata	Ambystomatidae		1				1
	Hynobiidae		1			1	2
	Plethodontidae				1	1	2
	Proteidae				1		1
	Salamandridae		1				1
	Sirenidae		1				1
	Systems	1	14	1	6	11	33

Coloured families have identical systems.

Table 25. Reptilian sexual systems

Order	Family	CXY	CZW	HMP	XY	ZW	Systems
Chelonia	Bataguridae				1	1	2
	Chelidae			1	1		2
	Emydidae			1			1
	Kinosternidae			1	1		2
	Trionychidae			1		1	2
Squamata	Agamidae			1		1	2
	Boidae					1	1
	Chamaeleontidae			1			1
	Colubridae					1	1
	Dibamidae				1		1
	Elapidae		1			1	2
	Eublepharidae			1			1
	Gekkonidae				1	1	2
	Gymnophthalmidae	1			1		2
	Iguanidae	1		1	1		3
	Lacertidae					1	1
	Pygopodidae	1			1		2
	Scincidae				1		1
	Teiidae				1		1
	Varanidae					1	1
	Viperidae					1	1
	Systems	3	1	8	10	10	32

Coloured families have identical systems.

According to Mammal Species of the World, 5,416 species were known in 2006. These were grouped in 1,229 genera, 153 families and 29 orders. If we look in table 26 we can see that the three different sexual systems have arisen independently in mammals 104 times in 20 orders and 104 families. Six orders (71 families) have between two to three systems.

Table 26. Mammalian sexual systems

Orders	CXY	XO	XY	Families	Systems
Carnivora	1		10	11	2
Cetacea			4	4	1
Cetartiodactyla	2		7	9	2
Chiroptera	1		10	11	2
Dermoptera			1	1	1
Diprotodontia	2			2	1
Hyracoidea			1	1	1
Insectivora			4	4	1
Lagomorpha			2	2	1
Marsupialia			6	6	1
Monotremata	2			2	1
Perissodactyla			3	3	1
Pilosa	1			1	1
Primates	4		12	16	2
Proboscidea			1	1	1
Rodentia	2	2	20	24	3
Scandentia			1	1	1
Soricomorpha	1			1	1
Tubulidentata			1	1	1
Xenarthra			3	3	1
Families	16	2	86	104	3
Orders	9	1	16	20	-

If we look in table 27 we can see that the two different sexual systems have arisen in birds.

Table 27. Bird sexual systems

Orders	ZW	CZW	Families	Systems
Accipitriformes	1		1	1
Anseriformes	2		2	1
Apodiformes	1		1	1
Bucerotiformes	2		2	1
Casuariiformes	1		1	1
Charadriiformes	6		6	1
Ciconiiformes	1		1	1
Columbiformes	1		1	1
Coraciiformes	1		1	1
Falconiformes	1		1	1
Galliformes	5		5	1
Gaviiformes	1		1	1
Gruiformes	2		2	1
Passeriformes	14	3	17	2
Pelecaniformes	5		5	1
Piciformes	2		2	1
Podicipediformes	1		1	1
Psittaciformes	2		2	1
Rheiformes	1		1	1
Strigiformes	1		1	1
Suliformes	1		1	1
Tinamiformes	1		1	1
Families	53	3	56	2
Orders	22	1	23	-

Plant Sexuality

Plants, also called green plants, are multicellular eukaryotes of the kingdom Plantae. They form an unranked clade Viridiplantae (Latin for green plants) that includes the flowering plants, conifers and other gymnosperms, ferns, clubmosses, hornworts, liverworts, mosses and the green algae. Precise numbers are difficult to determine, but as of 2010, there are thought to be 300–315 thousand species of plants, of which the great majority, some 260–290 thousand, are seed plants. According to Dellaporta (Dellaporta, 1993) there are at least twenty four sexes in flowering plants. If we look at the eleven (A-K) sub systems (Tree of Sex, Plants, 2015, column N) that plant sexuality is built on.

Table 28. Ten identical sexual systems in coral and plants

Number	System	Plants	Coral
1	Androdioecy	Y	Y
2	Andromonoecy	Y	Y
3	Apomictic	Y	Y
4	Dioecy	Y	Y
5	Gynodioecy	Y	Y
6	Gynomonoecy	Y	Y
7	Hermaphrodite	Y	Y
8	Monoecy	Y	Y
9	Polygamodioecy	Y	Y
10	Polygamomonoecy	Y	Y

(Tree Of Sex, Plants, 2015, Guest, 2012, Combosch, 2013)

Table 29. Forty sexual groups in 31 plant families

Family	A	B	C	D	E	F	G	H	I	J	K	Total
Apiales		30		28			4				1	63
Arecales				16								16
Asparagales				45			110					155
Asterales			10	44	30		43	27		4		158
Austrobaileyales				20				5				25
Brassicales				34				1		2		37
Caryophyllales	3	6		72	39	25	482	149		12	1	789
Cucurbitales	1		1	95	1			967				1,065
Dipsacales				7	42		26			4		79
Ericales				102			8					110
Fabales	2	13		3	1		56			1	1	77
Fagales				48				5				53
Genianales				3								3
Gentianales		1		141	1		135	2		25		305
Gunnerales				5				23				28
Incertae Sedis				5			4	3				12
Lamiales	21	2		30	7		2,347	4		15	2	2,428
Laurales				51	2		46	7				106
Liliales				11	3		18			1		33
Malpighiales		2		255	2		94	827				1,180
Malvales				6	32		10	2			1	51
Piperales				75			47	11				133
Poales			14	41	21	14	175	3		2		270
Ranunculales		17		15		2	100	1				135
Rhamnales				4			11			32		47
Rosales			6	260	121	3	66	327		5		788
Santalales		1	3	377	1		1,448	166				1,996
Sapindales	2	2		177	2	2	1	35	11	11		243
Saxifragales				23			78	24		1		126
Solanales		124		26	3		583					736
Zygophyllales							18					18
Total	29	198	34	2,019	308	46	5,910	2,589	11	115	6	11,265

(Tree Of Sex, Plants, 2015) Androdioecy A, Andromonoecy B, Apomictic C, Dioecy D, Gynodioecy E, Gynomonoecy F, Hermaphrodite G, Monoecy H, Other I, Polygamodioecy J, Polygamomonoecy K.

Conclusion

The infinite complexity and overlapping homoplasy **(Sarfati, 2011)** in sex defies the evolutionary logic and demands a supernatural creator. In table 23 we can see that 29 phyla can have between 1 to five of the seven known systems.

Table 23. Seven sexual systems in 29 phyla

Phyla	H	SH	D	P	V	SQ	R	Systems
Acanthocephala			D					1
Cycliophora			D					1
Hemichordata			D					1
Kinorhyncha			D					1
Loricifera			D					1
Nematoda			D					1
Nematomorpha			D					1
Nemertea			D					1
Onychophora			D					1
Priapulida			D					1
Rotifera			D					1
Sipuncula			D					1
Tardigrada			D					1
Chaetognatha		SH						1
Entoprocta		SH		P				2
Cnidaria	H							1
Ctenophora	H							1
Ectoprocta	H							1
Gastrotricha	H							1
Platyhelminthes	H							1
Porifera	H							1
Annelida	H		D					2
Brachiopoda	H		D					2
Echinodermata	H		D					2
Mesozoa	H		D					2
Phoronida	H		D					2
Chordata	H		D			SQH		3
Arthropods	H	SH	D			SQH	R	5
Mollusca	H	SH	D		V			4

H. Hermaphrodites, SH. Simultaneous Hermaphrodites, D. Dioecious, P. Protandric, V. Varied Sexuality, SQ. Sequential Hermaphrodites, R. Parthenogenetic. (Leonard, 2013)

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