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Author(s)	OGUMA, Kan; MAKINO, Sajiro
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A New List of the Chromosome Numbers in Vertebrata (March 1937)¹⁾

By

Kan Oguma and Sajiro Makino

Zoological Institute, Hokkaido Imperial University, Sapporo

At the request of Prof. Punnett, the editor of the *Journal of Genetics*, A Revised Check-List of the Chromosome Numbers in Vertebrata was published by us in that *Journal*, Vol. 26, in the year 1932²⁾. In that list were tabulated 180 species of Vertebrata, taxonomically different, in which the chromosome numbers had been reported more or less fully up to the beginning of the year 1932.

During the five years that have elapsed since the publication of our paper, a large number of cytological papers has been published. In several of these papers the investigations of previous authors on the chromosome numbers of the known species have either been revised or confirmed, while, a large number of other papers deal with cytologically new species and have recorded their chromosomal constitution. Thus, as far as we are aware, some 120 new species have been reported up to the end of March 1937. In these species their respective chromosome numbers as well as the nature of their sex chromosomes have been recorded. The literature pertaining to these investigations is of course voluminous, as much of the work previously done had to be repeated in order to settle the questions at issue regarding the chromosome numbers, etc.

Obviously, as the chief purpose of the tabulations of this kind is to keep the research workers informed of the additions to the knowledge that have taken place as well as to help the beginning students in undertaking new investigations, we deem it necessary to revise and issue such up-to-date lists from time to time. The

1) Contribution No. 119 from the Zoological Institute, Faculty of Science, Hokkaido Imperial University, Sapporo.

2) The original list was published in the *Zoological Magazine*, (Japan), Vol. 43, 1931.

following table has been compiled with a view to indicating briefly the remarkable increase that has taken place during recent years in our knowledge of the chromosome numbers of various species of Vertebrata.

Names of Classes	Nos. of Species, till 1932	Nos. of Species known at present	Nos. of References consulted
Cyclostomata	2	2	4
Pisces	18	39	40
Amphibia	41	68	140
Reptilia	51	77	46
Aves	11	27	46
Mammalia	57	92	245
Total	180	305	521

The following alterations and improvements have been incorporated in the existing list.

(1). Species investigated appear under different classes, grouped into families.

(2). The Arabic numerals in the first column refer to the number of species investigated.

(3). In naming the species, scientific names have been used first, the common or vernacular names used by the original authors being retained, but put into parentheses.

(4). Even scientific names have been altered where necessary, precedence being given to those proposed recently by more thorough taxonomical investigations, the old names being retained in parentheses.

(5). In the column of the diploid number, the number within parentheses denotes the diploid number of chromosomes presumed by the author, the presumption being based on the haploid number actually observed.

(6). All the three kinds of germ cells, namely, primary and secondary cytes and tids have been put together in a single column showing the haploid number (n). Abbreviations used for these cells and put in this column will be found in the list of abbreviations.

(7). The column indicating the fixatives employed by the authors in their investigations and the one showing references to

literature, both of which appeared in our previous list, have been omitted. A bibliography of papers giving their titles in full is incorporated with this new list.

Abbreviations used in the List

chrom.	= chromosome
diff. chrom.	= differential chromosome
div.	= division
hetero.	= heterogametic
J ₁	= the largest J-shaped chromosome
J (in <i>Homo</i>)	= Japanese
M	= macrochromosome
m	= microchromosome
M (in <i>Homo</i>)	= Manchurian
N (in <i>Homo</i>)	= Negro
oog	= oogonium
parth.	= parthenogenetic
path.	= pathological
postred.	= postreduction
prered.	= prereduction
prob.	= probably
R	= long rod-shaped chromosome
R ₁	= the longest rod-shaped chromosome
R ₂	= the second longest rod-shaped chromosome
r	= rod-shaped chromosome of medium size
sex-chrom.	= sex-chromosome
som	= somatic cell
spg	= spermatogonium
S	= chromosome of spherule-shape
tid	= spermatid
V	= large V-shaped chromosome
V ₁	= the largest V-shaped chromosome
V ₂	= the second largest V-shaped chromosome
v	= V-shaped chromosome of medium size
W (in <i>Homo</i>)	= White
X	= X-chromosome
Y	= Y-chromosome
W	= W-chromosome
Z	= Z-chromosome
♂ (I)	= primary spermatocyte
♂ (II)	= secondary spermatocyte
♀ (I)	= primary oocyte
♀ (II)	= secondary oocyte

I. CYCLOSTOMATA

No.	Species	Diploid number	Haploid number	Remarks	Author
1	<i>Bdellostoma burgeri</i>	48? spg	—	—	SCHREINER, '08
2	<i>Myxine glutinosa</i>	ca. 50 som	—	—	RETZIUS, '90
	—	ca. 52 spg ca. 52 som	26 ♂ (I, II)		SCHREINER, '04a, '04b

II. PISCES

A. Dipnoi

	Lepidosirenidae				
1	<i>Lepidosiren paradoxa</i>	36? som	—	—	MURRY, '06
	—	38 som	19 ♂ (I)		AGAR, '11, '12

B. Elasmobranchii

	Catulidae				
2	<i>Pristiurus melano-</i> <i>stomus</i>	—	30-50 ♀ (I)	—	KASTSCHENKO, '90
	(<i>Pristiurus</i> sp.)	ca. 36 spg 30-36 oog 30-36 som	ca. 18 ♀ (I, II)	—	RÜCKERT, '92
	(<i>Pristiurus</i> sp.)	24 spg	12 ♂ (I, II)	—	MOORE, '95; FARMER & MOORE, '04
3	<i>Scyllium canicula</i>	—	30-50 ♀ (I)	—	KASTSCHENKO, '90
	—	24 spg	12 ♂ (I, II)	—	MOORE, '94, '95; FARMER & MOORE, '04
	—	—	20-24 ♂ (I) 14-16 ♂ (II)	—	RAWITZ, '99
	—	—	17-19 ♀ (I)	—	CERRUTI, '08
	Squalidae				
4	<i>Spinax niger</i>	60-70 spg	—	—	SCHREINER, '07
5	<i>Squalus suckleyi</i>	62 spg	31 ♂ (I, II)	Sex-chrom. unknown	MAKINO, '37b
	Rajidae				
6	<i>Raja macrorhynchus</i>	24 spg	12 ♂ (I, II)	—	MOORE, '95; FARMER & MOORE, '04
7	<i>Raja maculata</i>	24 spg	12 ♂ (I, II)	—	MOORE, '95; FARMER & MOORE, '04

(Continued)

No.	Species	Diploid number	Haploid number	Remarks	Author
8	<i>Raja meerdervoortii</i> Torpedidae	104 spg	52 ♂ (I, II)	Sex-chrom. unknown	MAKINO, '37b
9	<i>Torpedo ocellata</i> (<i>Torpedo</i> sp.)	— 24 spg	30-50 ♀ (I) 12 ♂ (I, II)	— —	KASTSCHENKO, '90 MOORE, '95; FARMER & MOORE, '04

C. Teleostomi

10	Salmonidae <i>Salmo fario</i> — (= <i>Trutta fario</i>) — ('Forelle')	— 24 som Prob. 12 som	12 ♀ (I, II) 12 ♀ (I, II) —	— — Sperm treated with radium	BÖHM, '91 BEHRENS, '98 OPPERMANN, '13
	—	84 som	—	—	PROKOFIEVA, '34
11	<i>Salmo (Trutta) lacustris</i>	—	24 ♀ (I, II)	—	BLANC, '94
12	<i>Salmo salar</i>	60 som	—	—	PROKOFIEVA, '34
13	<i>Salmo irideus</i> <i>Salmo salar</i> × <i>Salvelinus fontinalis</i>	12? spg 70 som	— —	— —	MRSIC, '23 PROKOFIEVA, '34
14	<i>Coregonus lavaretus baeri</i> <i>Coreg. l. baeri</i> × <i>Salv. font.</i>	80 som 80 som	— —	— —	PROKOFIEVA, '34 PROKOFIEVA, '34
15	<i>Oncorhynchus keta</i>	74	—	Primordial germ cells, sex undetermined	MAKINO, '33, '37a
16	Anguillidae <i>Anguilla vulgaris</i>	36? spg, 36? oog	—	—	RODOLICO, '33
17	Cyprinidae <i>Cyprinus carpio</i>	104 spg	52 ♂ (I, II)	—	MAKINO, '34b
18	<i>Carassius carassius</i>	94 spg	47 ♂ (I, II)	Goldfish and 'Funa'	MAKINO, '34b, '35
19	Cobitidae <i>Misgurnus anguillicaudatus</i>	52 spg	26 ♂ (I, II)	Sex-chrom. unknown	MAKINO, '37a
20	Esocidae <i>Umbra limi</i>	22 spg, 20? som	11 ♂ (I, II)	Prob. X-X ♂ ; X = V ₁	FOLEY, '26
21	Cyprinodontidae <i>Oryzias latipes</i>	—	22-24 ♂ (I)	—	GOODRICH, '27

(Continued)

No.	Species	Diploid number	Haploid number	Remarks	Author
	<i>Oryzias (Aplocheilus) latipes</i>	48 spg	24 ♂ (I, II)	Sex-chrom. unknown	IRIKI, '32a, '32b, '32c
22	<i>Lebistes reticulatus</i>	46 spg 46 oog	23 ♂ (I, II) 23 ♀ (I)	Prob. X-Y ♂	WINGE, '22, '23
	—	(46) spg	23 ♂ (I, II)	X-Y ♂	VAUPEL, '29
	—	46 spg	23 ♂ (I, II)	Sex-chrom. unknown	IRIKI, '32a, '32b
23	<i>Xiphophorus hellerii</i>	(48) spg	24 ♂ (I)	—	FRIEDMAN & GORDON, '34
24	<i>Xiphophorus montezumae</i>	(48) spg	24 ♂ (I)	—	FRIEDMAN & GORDON, '34
	(<i>Xiphophorus</i> sp.)	(48) spg	24 ♂ (I)	Prob. X-X ♂	RALSTON, '34a, '34b
	<i>Xiphophorus</i> × <i>Platypoecilus</i>	(48) spg	24 ♂ (I)	—	RALSTON, '34a, '34b
	<i>Xiphophorus</i> hell. × <i>Platypoecilus</i> mac.	(48) spg	24 ♂ (I)	—	FRIEDMAN & GORDON, '34
25	<i>Platypoecilus couchiana</i>	(48) spg	24 ♂ (I)	Prob. X-X ♂	RALSTON, '34a, '34b
	—	(48) spg	24 ♂ (I)	—	FRIEDMAN & GORDON, '34
26	<i>Platypoecilus maculatus</i>	(48) spg	24 ♂ (I)	Prob. X-X ♂	RALSTON, '34a, '34b
	—	(48) spg	24 ♂ (I)	—	FRIEDMAN & GORDON, '34
27	<i>Platypoecilus xiphidium</i>	(48) spg	24 ♂ (I)	—	FRIEDMAN & GORDON, '34
28	<i>Platypoecilus variatus</i>	(50) spg	25 ♂ (I)	—	FRIEDMAN & GORDON, '34
	<i>Platypoecilus couch.</i> × <i>P. maculatus</i>	(48) spg	24 ♂ (I)	—	FRIEDMAN & GORDON, '34
	<i>Platypoecilus xiph.</i> × <i>P. maculatus</i>	(48) spg	24 ♂ (I)	—	FRIEDMAN & GORDON, '34
	<i>Platypoecilus variat.</i> × <i>P. maculatus</i>	—	24, 25 ♂ (I)	—	FRIEDMAN & GORDON, '34
29	<i>Fundulus heteroclitus</i>	36 som	—	—	MOENKHAUS, '04
	—	45 som	—	—	PINNEY, '18
30	<i>Gambusia holbrooki</i>	36 spg	18 ♂ (I, II)	Doubtful sex-chrom.	GEISER, '24
	Gasterosteidae				
31	<i>Pungitius tymensis</i>	42 spg	21 ♂ (I, II)	Sex-chrom. unknown	MAKINO, '34a, '34b
32	<i>Pungitius pungitius</i>	(42) spg	21 ♂ (I, II)	Sex-chrom. unknown	MAKINO, '34a, '34b
	Atherinidae				
33	<i>Menidia notata</i>	36 som	—	—	MOENKHAUS, '04

(Continued)

No.	Species	Diploid number	Haploid number	Remarks	Author
	Osphromenidae				
34	<i>Betta splendens</i>	42 spg	21 ♂ (I, II)	Prob. X-X ♂ ; X = R ₁	BENNINGTON, '36
	Percidae				
35	<i>Perca fluviatilis</i> ('Perch ')	27 spg	—	—	TURNER, '19
	Labridae				
36	<i>Ctenolabrus</i> <i>adspersus</i>	38-48 som	—	—	PINNEY, '18
	Hexagrammidae				
37	<i>Hexagrammos octo-</i> <i>grammus</i>	(48) spg	24 ♂ (I, II)	—	MAKINO, '37a
	Cottidae				
38	<i>Cottus bairdii</i>	36-38 spg	18 ♂ (I)	—	HANN, '27
	Pholidae				
39	<i>Pholis pictus</i>	46 spg	—	—	MAKINO, '37a

III. AMPHIBIA

a. Apoda

	Coecilliidae				
1	<i>Ichthyophis gluti-</i> <i>nosus</i>	42 spg, 42 ♂ som	21 ♂ (I, II)	—	SESHACHAR, '36, '37

b. Urodela

	Proteidae				
2	<i>Proteus anguineus</i>	18 spg	9 ♂ (I, II)	—	STIEVE, '18, '20
3	<i>Necturus maculosus</i>	—	12 ♂ (I)	X or XY attached to an autosome in 1st div. ?	KING, '12
	Amphiumidae				
4	<i>Amphiuma (means)</i>	(24) spg	12 ♂ (I, II)	—	MCGREGOR, '99
	Cryptobranchidae				
5	<i>Cryptobranchus</i> <i>alleghehiensis</i>	ca. 56 som	—	—	SMITH, '29
	—	62 spg	31 ♂ (I, II)	—	MAKINO, '34b, '35b
6	<i>Megalobatrachus</i> <i>japonicus</i>	56-58 som	—	—	SUZUKI, '26

(Continued)

No.	Species	Diploid number	Haploid number	Remarks	Author
	<i>Megalobatrachus japonicus</i>	64 spg	32 ♂ (I, II)	Sex-chrom. unknown	IRIKI, '31, '32e
	Salamandridae				
7	<i>Triton alpestris</i>	—	12 ♀ (I, II)	—	CARNOY & LEBRUN, '99; LEBRUN, '01
	—	24 spg	12 ♂ (I, II) 12 ♀ (I, II)	—	JANSSENS, '00, '01, '02, '04
	—	18-24 spg	—	—	CHAMPY, '13
8	<i>Triton cristatus</i>	—	12 ♀ (I, II)	—	CARNOY & LEBRUN, '99
	—	24 spg	12 ♂ (I, II) 12 ♀ (I, II)	—	JANSSENS, '00, '01, '02, '04
	—	24 som	—	12 chroms. in regenerating blood cells	JOLLY, '04
	—	18-24 spg	—	—	CHAMPY, '13
	—	24 spg	12 ♂ (I, II)	—	MEEK, '13
	—	24 spg	12 ♂ (I, II)	Sex-chrom. unknown	GALGANO, '33b
9	<i>Triton palmatus</i>	18-24 spg	—	—	CHAMPY, '13
	—	12-16 som	—	—	RETZIUS, '81
	—	7-24 som	—	Number variable in merogonic fragments	FANKHAUSER, '34
10	<i>Triton punctatus</i>	24 spg	12 ♂ (I, II)	—	JANSSENS, '00, '01, '02, '04
11	<i>Triton taeniatus</i>	—	12-14 ♀ (I)	—	BORN, '94
	—	—	12 ♀ (I, II)	—	CARNOY & LEBRUN, '99
	—	24 som	—	—	PROKOFIEVA, '35
12	<i>Triton vulgaris</i>	18-24 spg	—	—	CHAMPY, '13
	—	12 som, parth	—	Sperm exposed to radium	HERTWIG, '13
	—	24 spg	12 ♂ (I, II)	Sex-chrom. unknown	GALGANO, '33b
13	<i>Triton (Molge) pyrrhogastra</i>	24 spg	—	—	MUCKERMANN, '13
	(<i>Triton</i> sp.)	24 som	—	—	RABL, '85
	(<i>Triton</i> sp.)	24 spg	12 ♂ (I)	—	MOORE & EMBLETON, '05; MOORE & ARNOLD, '05
14	<i>Geotriton (=Spelerpes) fuscus</i>	24 spg	12 ♂ (I, II)	—	TERNI, '10, '14
15	<i>Plethodon cinereus</i>	24 spg	12 ♂ (I)	—	MONTGOMERY, '03
16	<i>Anaides (=Autodax) lugubris</i>	28(23-30) spg	14 ♂ (I)	—	SNOOK & LONG, '14
17	<i>Salamandra atra</i>	16? spg	—	—	CHAMPY, '13

(Continued)

No.	Species	Diploid number	Haploid number	Remarks	Author
18	<i>Salamandra maculosa</i>	24 som	12 ♂ (I, II)	—	FLEMMING, '82, '87
	—	24 som	—	Ca. 16 chroms. in testis epithelium and egg follicle	RABL, '85, '89
	—	24 spg, 24 oog 24 som	12 ♂ (I, II)	—	VOM RATH, '93, '94
	—	24 spg, 24 oog 24 som	12 ♂ (I, II)	—	MEVES, '95, '97, '11
	—	24 spg	12 ♂ (I, II) 12 ♀ (I, II)	—	JANSSENS, '00, '01, '02, '04
	—	24 spg	12 ♂ (I, II)	—	SCHREINER, '07
	—	4-43 som (a) 19-27 som (b)	—	(a) Blood cells (b) Larval peritoneus	DELLA VALLE, '09, '11
	—	24 spg, 24 som	—	—	DEHORNE, '10, '11
	—	16? spg	—	—	CHAMPY, '13
	—	24 spg, 24 som	—	—	MUCKERMANN, '13
	— ('Salamander')	24 som	—	—	VON ERLANGER, '96
19	<i>Salamandrina perspicillata</i>	(24) spg	12 ♂ (I)	Sex-chrom. unknown	GALGANO, '33b
20	<i>Triturus (Diemyctilus) torosus</i>	—	10-12 ♀ (I, II)	—	LEBRUN, '02a, '02b
21	<i>Triturus (Diemyctilus) pyrrhogaster</i>	24 spg	12 ♂ (I, II)	Sex-chrom. unknown	IRIKI, '31, '32a, '32d
	—	24 spg	12 ♂ (I, II)	Sex-chrom. unknown	SATO, '32
22	<i>Triturus ensicauda</i>	24 spg	12 ♂ (I, II)	Sex-chrom. unknown	SATO, '34b
23	<i>Batrachoseps attenuatus</i>	24 spg	12 ♂ (I, II)	—	EISEN, '00
	—	24 som	12 ♂ (I, II)	—	JANSSENS & DUMEZ, '03; JANSSENS, '05
24	<i>Desmognathus fuscus</i>	(24) spg	12 ♂ (I, II)	—	KINGSBURY, '99, '02
	—	24 spg	12 ♂ (I)	—	MONTGOMERY, '03
25	<i>Amblystoma tigrinum</i> ('Siredon')	12 som	—	—	KÖLLIKER, '89
	— ('Axolotl')	ca. 16 som	4-10 ♀ (I), 8 ♀ (II)	—	FICK, '93
	— ('Axolotl')	ca. 30 som	14-16 ♀ (I, II)	—	JENKINSON, '04
	— ('Siredon')	24 som	—	—	MUCKERMANN, '13
	—	24 som	—	—	MACK, '14
	—	28 som	—	—	PARMENTER, '19

(Continued)

No.	Species	Diploid number	Haploid number	Remarks	Author
	<i>Amblystoma tigrinum</i>	28 spg	14 ♂ (I)	Sex-chrom. unknown	GALGANO, '33b
	—	28 spg	14 ♂ (I)	X-O ♂; X associated with an autosome?	CARRICK, '34
	—	24, 28 som	—	—	PROKOFIEVA, '35
26	<i>Pleurodeles waltlii</i>	(24) spg	12 ♂ (I)	Sex-chrom. unknown	GALGANO, '33b
	Hynobiidae				
27	<i>Hynobius lichenatus</i>	58 spg	—	—	MAKINO, '32c
28	<i>Hynobius retardatus</i>	40 spg	20 ♂ (I, II) 20 ♀ (I, II)	Sex-chrom. unknown	MAKINO, '32c, '33, '34c
29	<i>Hynobius tokyoensis</i>	56 spg	—	—	MAKINO, '32c
30	<i>Hynobius nigrescens</i>	56 spg	—	—	MAKINO, '32c
31	<i>Hynobius leechii</i>	56 spg	28 ♂ (I, II)	—	MAKINO, '34a, '34b
32	<i>Hynobius nebulosus</i>	56 spg	—	—	MAKINO, '34a, '34b
	—	56 spg	28 ♂ (II)	—	SATO, '35, '36a
33	<i>Hynobius dunni</i>	56 spg	—	—	MAKINO, '35a
	—	56 spg	—	—	SATO, '35, '36a
34	<i>Hynobius kimurai</i>	56 spg	—	20 V's + 36 r's	MAKINO, '35a
	—	60 spg	—	16 V's + 44 r's	SATO, '35, '36a
35	<i>Hynobius stejnegeri</i>	56 spg	—	—	MAKINO, unpublished
36	<i>Hynobius tsuensis</i>	56 spg	—	—	SATO, '35, '36a
37	<i>Pachypalaminus bouleengeri</i>	56 spg	—	—	SATO, '34a, '35, '36a
38	<i>Salamandrella keyserlingii</i>	62 spg	—	—	MAKINO, '32c

c. Anura³⁾

	Discoglossidae				
39	<i>Alytes obstetricans</i>	32 spg	16 ♂ (I)	—	JANSSENS & WILLEMS, '09
40	<i>Bombinator igneus</i>	—	6-7 ♀ (II)	—	LEBRUN, '01
41	<i>Bombinator pachypus</i>	24 spg	12 ♂ (I, II)	Sex-chrom. unknown	GALGANO, '33b

3) Anurans possess in general a large bivalent chromosome in the primary spermatocyte which can be differentiated from others by its shape. It is presumed by Iriki and Minouchi (Nos. 45, 56b, 61 and 64) as the bivalent resulting from the conjugation of two X-chromosomes without any positive proof.

(Continued)

No.	Species	Diploid number	Haploid number	Remarks	Author
42	<i>Bombina orientalis</i>	24 spg	12 ♂ (I, II)	—	SATO, '35
	Bufonidae				
43	<i>Bufo americanus</i>	(22) spg	11 ♂ (I, II)	X-Y ♂	WITSCHI, '33
44	<i>Bufo arenarum</i>	22 spg	11 ♂ (I, II)	Sex-chrom. unknown	SÆTZ, ROJAS & ROBERTIS, '34a, '34b, '36a, '36b
45	<i>Bufo bufo japonicus</i>	22 spg	11 ♂ (I, II)	X-X ♂; One diff. chrom. in ♂ (I) = X-bivalent	IRIKI, '29; MINOUCHI & IRIKI, '31
46	<i>Bufo calamita</i>	—	12 ♀ (I)	—	BATAILLON, '10
	—	22 spg	11 ♂ (I, II)	—	STOHLER, '27a, '27b, '28
47	<i>Bufo canorus</i>	(22) spg	11 ♂ (I, II)	X-Y ♂	WITSCHI, '33
48	<i>Bufo fowleri</i>	(22) spg	11 ♂ (I, II)	X-Y ♂	WITSCHI, '33
49	<i>Bufo lentiginosus</i>	24 spg 24 oog	12 ♂ (I, II) 12 ♀ (I, II)	—	KING, '01, '02, '05, '07, '08
	—	(22) spg	11 ♂ (I, II)	X-Y ♂	WITSCHI, '33
50	<i>Bufo quercicus</i>	(22) spg	11 ♂ (I, II)	X-Y ♂	WITSCHI, '33
51	<i>Bufo radderi</i>	22 spg	11 ♂ (I, II)	—	SATO, '36b
52	<i>Bufo sachalinensis</i>	22 spg	11 ♂ (I, II)	—	MAKINO, '30, '32b
53	<i>Bufo viridis</i>	22 spg, 22 oog	11 ♂ (I, II)	—	STOHLER, '26, '27a, '27b, '28
	—	22 spg	11 ♂ (I)	—	BECCARI, '26a, '26b
	—	22 spg	11 ♂ (I, II)	Sex-chrom. unknown	GALGANO, '33b
54	<i>Bufo vulgaris</i>	—	8-10 ♀ (I), 8 ♀ (II)	—	CARNOY & LEBRUN, '00; LEBRUN, '01
	—	18-24 oog	—	—	DELLA VALLE, '07
	—	—	8-9 ♀ (I)	—	BATAILLON, '10
	—	22 spg, 22 oog	11 ♂ (I, II)	—	STOHLER, '27a, '27b, '28
	—	22 spg	11 ♂ (I, II)	Sex-chrom. unknown	GALGANO, '33b
	—	22 spg, 24 som	—	—	POSKA-TEISS, '33
	Pelobatidae				
55	<i>Pelodytes punctatus</i>	—	6 ♀ (I)	—	BATAILLON, '10
	Hylidae				
56a	<i>Hyla arborea</i>	24 spg	12 ♂ (I, II)	Sex-chrom. unknown	GALGANO, '33b
56b	<i>Hyla arborea japonica</i>	24 spg	12 ♂ (I, II)	X-X ♂; One diff. chrom. in ♂ (I) = X-bivalent	IRIKI, '30, '32c, '32f
	Engystomidae				
57	<i>Cacopoides tornieri</i>	28 spg	14 ♂ (I, II)	—	SATO, '36b

(Continued)

No.	Species	Diploid number	Haploid number	Remarks	Author
	Ranidae				
58	<i>Rana catesbiana</i>	26 oog	—	—	SWINGLE, '17
	—	23 spg	14 ♂ (I)	Larval testes	SWINGLE, '21
59	<i>Rana esculenta</i>	24 som	—	—	SCHOTTLÄNDER, '88
	—	24 som	—	—	VOM RATH, '95
	—	16 spg	—	—	CHAMPY, '13
	—	ca. 25 spg	13 ♂ (I) 12, 13 ♂ (II)	X-O ♂	LEVY, '15
	—	12-28 som	—	<i>R. escul.</i> ♀ × <i>Bufo viridis</i> ♂	HERTWIG, G. u. P., '20
	—	30-38 som	—	Pseudohybrid egg fertilized with normal sperms	HERTWIG, G. u. P., '20
	—	13-39 som	—	Tadpoles developed gyno- and andro- genetically	DALCQ, '30, '32
	—	26 spg	13 ♂ (I, II)	Sex-chrom. unknown	GALGANO, '31a, '31b, '31c, '33a, '33b, '34, '35
60	<i>Rana limnocharies</i>	26 spg	13 ♂ (I, II)	—	SATO, '33, '34c
61	<i>Rana nigromaculata</i>	26 spg	13 ♂ (I, II)	X-X ♂; One diff. chrom. in ♂ (I) = X-bivalent	IRIKI, '28, '32b
62	<i>Rana palustris</i>	13, 26, 39 som	—	Parth. tadpoles	PARMENTER, '32, '33
63	<i>Rana pipiens</i>	25 spg, 26 oog	13 ♂ (I) 12, 13 ♂ (II)	X-O ♂	SWINGLE, '17
	— ('Leopard frog')	20 spg	—	Parth. tadpole	LOEB, '18
	—	26 spg, 26 oog	13 ♂ (I)	Parth. tadpoles	PARMENTER, '20, '25
	—	13, 26, 39 som	—	Parth. tadpoles	PARMENTER, '26, '32, '33
64	<i>Rana rugosa</i>	26 spg	13 ♂ (I, II)	X-X ♂; One diff. chrom. in ♂ (I) = X-bivalent	IRIKI, '28, '32b
65	<i>Rana tigrina</i>	26 spg	13 ♂ (I)	—	ASANA, unpublished
66	<i>Rana temporaria</i>	—	8 ♂ (I)	—	BERTACCHNI, '96
	—	—	8-10 ♀ (I) 10 ♀ (II)	—	CARNOY & LEBRUN, '00; LEBRUN, '01
	— (<i>R. fusca</i>)	24 spg	12 ♂ (I, II)	—	VOM RATH, '95
	— (<i>R. fusca</i>)	12 som	12 ♀ (I)	Parth. eggs	BATAILLON, '10
	— (<i>R. fusca</i>)	20 + som	—	Parth. tadpoles	BRACHET, '11
	—	8-24 som	—	Parth. tadpoles	LEVY, '13, '20
	— (<i>R. fusca</i>)	13-27 som	—	Parth. tadpoles	HOVASSE, '20, '22a, '22b
	—	26 spg	13 ♂ (I, II)	X-Y ♂; Sex- chrom. postred.	WITSCHI, '22, '24
	—	26 spg	13 ♂ (I, II)	—	MAKINO, '33b

(Continued)

No.	Species	Diploid number	Haploid number	Remarks	Author
	<i>Rana temporaria</i>	26 spg	13 ♂ (I, II)	Sex-chrom. unknown	GALGANO, '33b
	—	26 som	—	—	PROKOFIEVA, '35
	('Frosch')	16 som	—	Leucocytes	DEKHUYZEN, '91
	('Grenouille')	24 som	—	Parth. tadpoles	DEHORNE, '10
	(<i>Rana</i> sp.)	26 spg	13 ♂ (I)	Parth. frog	GOLDSCHMIDT, '20
67	<i>Polypedates buergeri</i>	26 spg	13 ♂ (I, II)	—	SATO, '34c
68	<i>Rhacophorus schlegelii</i>	26 spg	13 ♂ (I, II)	—	MAKINO, '32a

IV. REPTILIA⁴⁾

a. Chelonia

Testudinidae					
1	<i>Chrysemys cinerea</i>	—	25 ♂ (I)	—	GLASCOCK, '14
2	<i>Chrysemys marginata</i>	—	17 ♂ (I)	X-O ♂	JORDAN, '14
3	<i>Cistudo carolina</i>	—	16 ♂ (I)	X-O ♂	JORDAN, '14
4	<i>Clemmys japonica</i>	52 spg	26 ♂ (I)	X-X ♂*	NAKAMURA, '35
5	<i>Emys orbicularis</i> (<i>E. europaea</i>)	50 spg	25 ♂ (I)	X-X ♂*	MATTHEY, '30b, '31b
6	<i>Testudo graeca</i>	54-60 spg	—	—	MATTHEY, '31b
Pelomedusidae					
7	<i>Sternotherus odoratus</i>	50 spg	25 ♂ (I, II)	No heteropycnetic elements in auxocyte	RISLEY, '36
Trionychidae					
8	<i>Amyda japonica</i>	64 spg 63 oog	32 ♂ (I, II) 31+X ♀ (I)	X-X ♂, X-O ♀ ; X-r, identified in ♀ cells	OGUMA, '36, '37

b. Rhynchocephalia

9	<i>Sphenodon punctatum</i>	36 spg	18 ♂ (I, II)	—	KEENAN, '32
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4) Male homogamety in cases with an asterisk is not established directly by actual observation of sex-chromosomes, but is presumed to exist on the fact that all the chromosomes in the diploid complex (2n) seem to form homologous pairs.

(Continued)

No.	Species	Diploid number	Haploid number	Remarks	Author
c. Lacertilia					
	Geckonidae				
10	<i>Gekko japonicus</i>	38 spg	19 ♂ (I, II)	X-X ♂*	NAKAMURA, '31a, '32
	—	—	20? ♂ (I)	XX-O ♂	SU-HSUEN, '33
11	<i>Gymn. dactylus milliusi</i>	38 spg	19 ♂ (I, II)	X-X ♂*	MATTHEY, '32c, '32e, '33b
12	<i>Hemidactylus bowringii</i>	46 spg	23 ♂ (I, II)	X-X ♂*	NAKAMURA, '31a, '32
13	<i>Tarentola mauritanica</i>	42 spg	21 ♂ (I, II)	X-X ♂*	MATTHEY, '29c, '31b
	Eublepharidae				
14	<i>Eublepharis variegatus</i>	32 spg	16 ♂ (I, II)	X-X ♂*	MATTHEY, '32c, '32e, '33b
	Agamidae				
15	<i>Agama stellio</i>	36 spg	18 ♂ (I, II)	X-X ♂*	MATTHEY, '29c, '31b
16	<i>Japarula swinhonis</i>	46 spg	23 ♂ (I, II)	X-X ♂*	NAKAMURA, '31a, '35b
17	<i>Uromastix hardwickii</i>	36 spg	18 ♂ (I, II)	X-X ♂*	MATTHEY, '29c, '31b
	Iguanidae				
18	<i>Anolis carolinensis</i>	34 spg	17 ♂ (I) 16, 17 ♂ (II)	XX-O ♂	PAINTER, '21
	—	36 spg	18 ♂ (I, II)	X-X ♂*	MATTHEY, '29c, 31b
19	<i>Crotaphytus collaris</i>	36-38 spg	18? ♂ (I)	XX-O ♂	PAINTER, '21
20	<i>Holbrookia texana</i>	34? spg	18-19 ♂ (I)	X-O ♂	PAINTER, '21
21	<i>Sceloporus spinosus</i>	22 spg	11 ♂ (I)	XX-O ♂	PAINTER, '21
22	<i>Sceloporus undulatus consobrinus</i>	30? spg	14-17 ♂ (I)	XX-O ♂	PAINTER, '21
23	<i>Uta ornata</i>	30? spg	14-15 ♂ (I)	XX-O ♂	PAINTER, '21
	Anguidae				
24	<i>Anguis fragilis</i>	—	12 ♀ (I)	—	LOYEZ, '05
	—	36? som	18? ♀ (I)	—	TRINCI, '08
	—	ca. 43 spg	22 ♂ (I)	Prob. X-O ♂	DALCQ, '20a, '20b, '21
	—	43 spg	22 ♂ (I, II)	X-X ♂*; 1 r associated with 1 R resulting in spg with odd number	MATTHEY, '29c, '31a, '31b
25	<i>Gerrhonotus kingi</i>	45 spg	—	X-X ♂*; 1 V separated into 2R's resulting in spg with odd number	MATTHEY, '29c, '31a, '31b

(Continued)

No.	Species	Diploid number	Haploid number	Remarks	Author
26	<i>Gerrhonotus scinci-cauda</i> (= <i>G. caeruleus</i>)	44 or 45 spg	22 ♂ (I)	X-X ♂*; 1 V separated into 2R's resulting in spg with odd number	MATTHEY, '29c, '31a, '31b, '32b, '33b
27	<i>Ophisaurus ventralis</i>	30 spg	15 ♂ (I)	X-X ♂*	MATTHEY, '29c, '31a, '31b
28	<i>Pseudopus apus</i>	44 spg	22 ♂ (I, II)	X-X ♂*	MATTHEY, '29c, '31a, '31b
Zonuridae					
29	<i>Zonurus cataphractus</i>	46 spg	23 ♂ (I, II)	X-X ♂*	MATTHEY, '29c, '31a, '31b
Helodermatidae					
30	<i>Heloderma suspectum</i>	38 spg	19 ♂ (I, II)	X-X ♂*	MATTHEY, '31a, '31b
Varanidae					
31	<i>Varanus gouldi</i>	40 spg	20 ♂ (I, II)	X-X ♂*	MATTHEY, '31a, '31b
Xantusiidae					
32	<i>Xantusia henschawi</i>	42 spg	21 ♂ (I)	X-X ♂*	MATTHEY, '31a, '31b
Tejiidae					
33	<i>Ameiva surinamensis</i>	50 spg	25 ♂ (I)	X-X ♂*	MATTHEY, '33a, '33b
34	<i>Cnemidophorus gularis</i>	—	20 ? ♂ (I)	XX-O ♂	PAINTER, '21
35	<i>Cnemidophorus sexlineatus</i>	46 spg	23 ♂ (I, II)	X-X ♂*	MATTHEY, '32d, '32e, '33b
36	<i>Tupinambis teguixin</i>	36 spg	18 ♂ (I, II)	X-X ♂*; Giant spgs containing 72 and 144 chroms.	MATTHEY, '32d, '33a, '33b
Lacertidae					
37	<i>Lacerta agilis</i>	20-28 spg	10-15 ♂ (I)	—	TELLYESNIEZKY, '97
—	—	38 spg	19 ♂ (I, II)	X-X ♂*	MATTHEY, '29a, '31b
38	<i>Lacerta muralis</i>	38 spg	19 ♂ (I, II)	X-X ♂*	MATTHEY, '29a, '31b
39	<i>Lacerta stirpium</i>	24 oog	8-12 ♀ (I)	—	LOYEZ, '05
40	<i>Lacerta viridis</i>	38 spg	19 ♂ (I, II)	X-X ♂*	MATTHEY, '29a, '31b
41	<i>Lacerta vivipara</i>	38 spg	—	X-X ♂*	MATTHEY, '31b
—	—	36 spg	18 ♂ (I, II)	X-X ♂, X-O ♀; X = r	OGUMA, '34a, '34b
—	—	35 oog, ♀ som	—	—	—
—	—	(36) spg	18 ♂ (I)	Early accounts corrected	MATTHEY, '34
42	<i>Takydromus tachydromoides</i>	38 spg	19 ♂ (I, II)	X-X ♂*	NAKAMURA, '28b; '35a
43	<i>Takydromus formosanus</i>	38 spg	19 ♂ (I, II)	X-X ♂*	NAKAMURA, '31a, '35a
44	<i>Takydromus septentrionalis</i>	38 spg	19 ♂ (I, II)	X-X ♂*	NAKAMURA, '31a, '35a
45	<i>Tropidosaurus algirus</i>	38 spg	19 ♂ (I, II)	X-X ♂*	MATTHEY, '31b

(Continued)

No.	Species	Diploid number	Haploid number	Remarks	Author
	Geckonosauridae				
46	<i>Gerrhosaurus flavigularis</i>	36 spg	18 ♂ (I, II)	X-X ♂*	MATTHEY, '32c, '33b
	Scincidae				
47	<i>Eumeces latiscutatus</i>	26 spg	13 ♂ (I, II)	2 heteropycnotic elements in auxocytes represent 2X's	NAKAMURA, '31a, '31b
48	<i>Chalcides tridactylus</i>	(28) spg	14 ♂ (I)	X-X ♂*	MATTHEY, '29c, '31b
49	<i>Cryptobrephalus nigropunctatus</i>	28 spg	14 ♂ (I, II)	—	OGUMA, unpublished
50	<i>Scincus officinalis</i>	32 spg	16 ♂ (I, II)	X-X ♂*	MATTHEY, '29c, '31b
	Aniellidae				
51	<i>Aniella pulchra</i>	24 spg	—	X-X ♂*	MATTHEY, '31a, '31b
	Amphisbaenidae				
52	<i>Rhineura floridana</i>	46 spg	23 ♂ (I, II)	X-X ♂*	MATTHEY, '32c, '33b
53	<i>Trogonophis wiegmanni</i>	36 spg	18 ♂ (I, II)	X-X ♂*	MATTHEY, '31c, '32a
	Chamaeleontidae				
54	<i>Chamaeleon vulgaris</i>	24 spg	12 ♂ (I, II)	X-X ♂*	MATTHEY, '29c, '31b

d. Ophidia

	Colubridae (Ser. Aglypha)				
55	<i>Coronella austriaca</i>	36 spg	18 ♂ (I)	X-X ♂*	MATTHEY, '31b
56	<i>Dinodon rufozonatum</i>	46 spg	23 ♂ (I, II)	X-X ♂*	NAKAMURA, '35c
57	<i>Elaphe quadrivirgata</i>	36 spg	18 ♂ (I, II)	X-X ♂*	NAKAMURA, '27, '29, '35c
58	<i>Elaphe climacophora</i>	36 spg	18 ♂ (I)	X-X ♂*	NAKAMURA, '29, '35c
59	<i>Holarchus formosanus</i>	36 spg	18 ♂ (I)	X-X ♂*	NAKAMURA, '35c
60	<i>Macropistodon rudis carinatus</i>	46 spg	23 ♂ (I)	X-X ♂*	NAKAMURA, '35c
61	<i>Natrix tigrina</i>	40 spg	20 ♂ (I, II)	2 heteropycnotic elements in auxocytes represent 2X's	NAKAMURA, '27, '28a
62	<i>Thamnophis butleri</i>	37 spg	18 ♂ (I)	XX-Y ♂	THAYER, '22
63	<i>Tropidonotus natrix</i>	36 spg	18 ♂ (I)	X-X ♂*	MATTHEY, '31b
64	<i>Tropidonotus viperinus</i>	36 spg	—	X-X ♂*	MATTHEY, '31b
65	<i>Zamenis gemonensis</i>	36 spg	—	X-X ♂*	MATTHEY, '31b

(Continued)

No.	Species	Diploid number	Haploid number	Remarks	Author
66	<i>Zoacys nigrorginatus oshimai</i>	36 spg	—	X-X ♂*	NAKAMURA, '35c
67	<i>Coelopeltis lacertina</i>	42 spg	21 ♂ (I)	X-X ♂*	MATTHEY, '31b
68	<i>Tarbophis fallax</i>	36 spg	18 ♂ (·)	X-X ♂*	MATTHEY, '31b
(Ser. Proteroglypha)					
69	<i>Bungarus multicinctus</i>	36 spg	18 ♂ (I, II)	X-X ♂*	NAKAMURA, '35c
70	<i>Naja naja atra</i>	38 spg	19 ♂ (I, II)	X-X ♂*; 4n observed in auxocyte ♂	NAKAMURA, '35c
71	<i>Laticauda semifasciata</i>	38 spg	19 ♂ (I, II)	X-X ♂*	NAKAMURA, '35c
Viperidae					
72	<i>Agkistrodon acutus</i>	36 spg	18 ♂ (I)	X-X ♂*	NAKAMURA, '35c
73	<i>Agkistrodon halys blomhoffii</i>	36 spg	18 ♂ (I, II)	X-X ♂*	NAKAMURA, '27, '35c
74	<i>Trimeresurus mucrosquamatus</i>	36 spg	18 ♂ (I, II)	X-X ♂*	NAKAMURA, '35c
75	<i>Trimeresurus gramineus stejnegeri</i>	36 spg	18 ♂ (I, II)	X-X ♂*	NAKAMURA, '35c
76	<i>Vipera aspis</i>	42 spg	21 ♂ (I)	X-X ♂*; earlier accounts corrected in '31 and '33	MATTHEY, '28, '29b, '31b, '33b
77	<i>Vipera berus</i>	36 spg	18 ♂ (I, II)	—	OGUMA, unpublished

V. AVES

A. Ratitae

a. Struthioness

1	Dromiceidae <i>Dromiceius novae-hollandiae</i> ('Emu')	40-76 som	—	Number inconstant and variable in embryonal soma	SHIWAGO & PESCH-KOWSKAJA, '36
2	Rheidae <i>Rhea americana</i> ('Nandu')	42-68 som	—	Number inconstant and variable in embryonal soma	SHIWAGO & PESCH-KOWSKAJA, '36

(Continued)

No.	Species	Diploid number	Haploid number	Remarks	Author
B. Carinatae					
b. Passeres					
3	Turdidae <i>Turdus merula</i>	60-85 spg, oog, ♀, ♂ som	—	X-X♂, X-O♀; X = v (4th largest)	UNGER, '36
4	Fringillidae <i>Linota cannabina</i>	64-85 oog, ♂ som	—	X-X♂, X-O♀; X = v (5th largest)	UNGER, '36
c. Psittaci					
5	Psittacidae <i>Melopsittacus undulatus</i>	50-60 som	—	♀ hetero. ; X = V ₁	CREW & LAMY, '35
	—	42 spg 42 ♀, ♂ som	21 ♂ (I)	X-X♂, X-Y♀; X = R ₂ , Y = r	JENTSCH, '35
d. Anseres					
6	Anatidae <i>Anas boschas</i>	ca. 16 spg 48-49 ♀, ♂ som	8 ♂ (I, II) —	— X-X♂, X-O♀; X = R ₁	SCHÖNEBERG, '13 ALICHANIAN, '36
7	<i>Anas platyrhynchos domestica</i> ('Indian runner duck')	76 ♂ som 77 ♀ som	38 ♂ (I)	Z-Z♂, W _w -Z♀; W = J ₁ , Z = V ₁	WERNER, '25, '27
	— ('Khaki campbell')	34-62 ♀, ♂ som	—	X-X♂, X-O♀; X = R ₁	SOKOLOWSKAJA, '35
	— ('Aylesbury')	48-69 ♀, ♂ som	—	X-X♂, X-O♀; X = V ₁	CREW & KOLLER, '36
8	<i>Aythya ferina</i>	ca. 16 spg	8 ♂ (I, II)	—	SCHÖNEBERG, '13
9	<i>Cairina moschata</i>	ca. 16 spg 34-62 ♀, ♂ som	8 ♂ (I, II) —	— X-X♂, X-O♀; X = R ₁	SCHÖNEBERG, '13 SOKOLOWSKAJA, '35

(Continued)

No.	Species	Diploid number	Haploid number	Remarks	Author
	<i>Cairina moschata</i> (' Muscovy ')	-72 ♀, ♂ som	—	X-X♂, X-O♀; X = V ₁	CREW & KOLLER, '36
	<i>Cairina mos.</i> × <i>Anas platyrhynchos</i>	34-62 ♀, ♂ som	—	X-X♂, X-O♀; Similar in reciprocal cross	SOKOLOWSKAJA, '35
	—	54-70 ♀, ♂ som	—	X-X♂, X-O♀; X = V ₁ ; Abnormal divs. in ♂(I)	CREW & KOLLER, '36
10	<i>Lampronessa sponso</i>	ca. 16 spg	8♂ (I, II)	—	SCHÖNEBERG, '13
11	<i>Mareca penelope</i>	ca. 16 spg	8♂ (I, II)	—	SCHÖNEBERG, '13

e. Steganopodes

12	Phalacrocoracidae <i>Phalacrocorax carbo</i> <i>hanedae</i>	70 spg	35♂ (I)	—	OGUMA, '37
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f. Tubinares

13	Procellariidae <i>Oceanodroma leucorhoa</i> <i>leucorrhoea</i>	74 spg	37♂ (I)	—	OGUMA, '37
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g. Columbidae

14	Columbidae <i>Columba livia</i> <i>domestica</i>	16 spg	8♂ (I), 4♂ (II)	—	GUYER, '02
	—	16 som	8♀ (I, II)	—	HARPER, '04
	—	ca. 16 spg	8♂ (I), 4♂ (II)	—	SMITH, '12
	—	62 spg, ♂ som 61♀ som	31♂ (I, II)	X-X♂, X-O♀; X = V ₁	OGUMA, '27
	— (' Pigeon ')	50+ ♀, ♂ som	—	X-X♂, X-O♀; X = the largest chrom.	HANCE, '32
15	<i>Streptopelia risoria</i> (<i>Turtur risorius</i>)	16 spg	8♂ (I), 4♂ (II)	—	GUYER, '02
	— (' Dove ')	50+ ♀, ♂ som	—	X-X♂, X-O♀; X = the largest chrom.	HANCE, '32

(Continued)

No.	Species	Diploid number	Haploid number	Remarks	Author
h. Lari					
Laridae					
16	<i>Sternula albifrons sinensis</i>	66 spg	33 ♂ (I)	—	OGUMA, '37
17	<i>Larus argentatus vegae</i>	66 spg	33 ♂ (I)	—	OGUMA, '37
i. Alcae					
Alcidae					
18	<i>Brachyramphus marmoratus perdia</i>	50 spg	25 ♂ (I)	—	OGUMA, '37
19	<i>Lunda cirrhata</i>	50 spg	25 ♂ (I)	—	OGUMA, '37
j. Galli					
Phasianidae					
20	<i>Gallus gallus domesticus</i>	—	6? ♀ (I)	—	LOYEZ, '06
—	('Huhn')	—	12-16 ♀ (I)	—	SONNENBRODT, '08
—	—	12 parth. som	—	—	LECAILLON, '10
—	—	17-19 spg	9 ♂ (I), 4, 5 ♂ (II)	X-O ♂	GUYER, '09
—	—	18 spg, ♂ som	9 ♂ (I), 4, 5 ♂ (II)	X-X ♂, X-O ♀	GUYER, '16
—	('Gold campine fowl')	18-20 spg	8-10 ♂ (I)	—	CUTLER, '18
—	('Chicken')	ca. 32 spg	—	Miss STEVENS' figure	BORING, '23
—	('Chicken')	30-34 ♀, ♂ som	—	♀ hetero.; X = prob. V ₁	HANCE, '23, '24, '25
—	—	35-36 spg	—	X-X ♂, X-O ♀; X = V ₁	HANCE, '26c
—	—	35-36 ♀, ♂ som	—	♀ hetero.	HANCE, '26a, '26b
—	—	60-70 som (prophase)	—	—	—
—	—	35-40 som (metaphase)	—	—	—
—	('Chicken')	32 ♀, ♂ som	—	X-X ♂, X-Y ♀; X = R ₁ , Y = s	SHIWAGO, '24

(Continued)

No.	Species	Diploid number	Haploid number	Remarks	Author
	<i>Gallus gallus domesticus</i> (' Huhn ')	32 spg 30-44 ♀, ♂ som	—	X-X ♂; number variable in racial hybrids	AKKERINGA, '27
	—	—	—	2V's in ♂, 1V in ♀, prob. sex-chroms.	GOLDSMITH, '28
	— (' Haushuhn ')	74 spg, ♂ som 73 oog, ♀ som	37 ♂ (I, II)	X-X ♂, X-O ♀; X = v	SUZUKI, '30
	— (' Huhn ')	36-38 som	—	Tissue culture	KEMP, '30
	— (' Huhn ')	29-39 som	—	Tissue culture	SAGUCHI, '30
	— (' Chicken ')	66 ± 2 ♂ som 65 ± 2 ♀ som	33 ♂ (I)	X-X ♂, X-O ♀; X = V ₁	WHITE, '32
	— (' Haushuhn ')	60-70 ♀, ♂ som (prophase) 30-45 ♀, ♂ som (metaphase)	—	X-X ♂, X-O ♀; X = V ₁	POPOFF, '33
	—	32-71 spg, oog, ♀, ♂ som	—	X-X ♂, X-O ♀; X = v (5th largest chrom.); m-chroms. variable, M-chroms. constant in number (7 pairs)	SOKOLOW & TROFIMOW, '33; SOKOLOW, TINIAKOW & TROFIMOW, '36a, '36b
	—	44-61 spg, oog, ♀, ♂ som	—	X-X ♂, X-O ♀; X = v (5th largest chrom.); m-chroms. variable in number	UNGER, '36
21	<i>Phasianus colchicus</i>	40-63 spg, oog ♀, ♂ som	—	X-X ♂, X-O ♀; X = v (4th largest chrom.); M-chroms. constant in number (8 pairs)	TROFIMOW & TINIAKOW, '33; SOKOLOW, TINIAKOW & TROFIMOW, '36a, '36b
22	<i>Phasianus torquatus</i>	52-61 spg, oog	—	X-X ♂, X-O ♀; X = v (4th largest chrom.); m-chroms. variable in number	UNGER, '36
	(' Pheasant ')	20-22 spg	10-11 ♂ (I), 8 ♂ (II)	—	CUTLER, '18
	<i>Phasianus</i> × <i>Gallus</i>	18-20 spg	—	—	CUTLER, '18
23	<i>Meleagris gallopavo</i> (' Truthennen ')	46 ♂ som 46 ♀ som	—	X-X ♂, X-Y ♀; X = V ₁ , Y = s	SHIWAGO, '29
	— (' Domestic turkey ')	76 ♂ som 77 ♀ som	38 ♂ (I)	Z-Z ♂, W _w -Z ♀; W = J ₁ , Z = V ₁	WERNER, '31
	—	—	—	X-X ♂, X-O ♀; X = v (4th largest chrom.); m-chroms. variable, M-chroms. constant in number (8 pairs)	SOKOLOW, TINIAKOW & TROFIMOW, '34, '36a, '36b
24	<i>Numida meleagris domestica</i> (' Domestic guinea ')	17 spg	9 ♂ (I), 8, 9 ♂ (II)	X-O ♂	GUYER, '09

(Continued)

No.	Species	Diploid number	Haploid number	Remarks	Author
	<i>Numida meleagris domestica</i>	—	—	X-X ♂, X-O ♀; X-v (6th largest chrom.); m-chroms. variable, M-chroms. constant in number (8 pairs)	SOKOLOW, TINIAKOW & TROFIMOW, '36a, '36b
25	<i>Nycthemerus argentatus</i>	—	—	X-X ♂, X-O ♀; X-v (4th largest chrom.); m-chroms. variable, M-chroms. constant in number (8 pairs)	SOKOLOW, TINIAKOW & TROFIMOW, '36a, '36b
26	<i>Pavo cristatus</i>	—	—	X-X ♂, X-O ♀; X-v (5th largest chrom.); m-chroms. variable, M-chroms. constant in number (10 pairs)	TINIAKOW, '34; SOKOLOW, TINIAKOW & TROFIMOW, '36a, '36b
	Tetraonidae				
27	<i>Lyrurus tetrix</i> (<i>Tetrao tetrix</i>)	—	—	X-X ♂, X-O ♀; X-v (5th largest chrom.); m-chroms. variable, M-chroms. constant in number (10 pairs)	SOKOLOW, TINIAKOW & TROFIMOW, '36a, '36b

VI. MAMMALIA

A. Prototheria

a. Monotremata

1	<i>Echidna aculeata</i>	—	8-12 ♂ (I)	—	BENDA, '06
2	<i>Ornithorhynchus anatinus</i>	—	8-12 ♂ (I)	—	BENDA, '06

B. Eutheria⁵⁾—Didelphia

b. Marsupialia

3	Didelphyidae <i>Didelphys aurita</i>	—	12? ♀ (I, II)	—	HILL, '18
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5) This is the only group of Vertebrata in which the behaviour of sex-chromosomes is known with certainty during meiosis. They are separated prereductively generally, but postreductively in some instances (Nos. 67b, 69, 70a and 70b). Further, in some species, they separate in both these ways as shown in Nos. 51, 68, 71 and 57 by Koller and Darlington. For the sake of convenience, notes have been written in the column of remarks, against the last two cases only. The formula of sex-chromosomes without remarks, therefore, denotes the normal cases where prereduction occurs.

(Continued)

No.	Species	Diploid number	Haploid number	Remarks	Author
4	<i>Didelphys paraguayensis</i>	22 spg	—	X-Y ♂	SAEZ, '30, '31
5	<i>Didelphys virginiana</i>	17 spg, ♂ som	9 ♂ (I), 4, 5 ♂ (II)	X-O ♂	JORDAN, '11
	—	—	11 ♀ (I)	—	HARTMAN, '19
	—	22 spg, ♂ som 22 ♀ som	11 ♂ (I, II)	X-Y ♂	PAINTER, '21, '22a, '24a
	—	22 ♀, ♂ som	—	X-Y ♂, X-X ♀; 8n observed in spleen cells	HOY & GEORGE, '29
	Dasyuridae				
6	<i>Dasyurus maculatus</i>	14 spg	—	X-Y ♂	GREENWOOD, '23
	—	14 spg	7 ♂ (I, II)	X-Y ♂	KOLLER, '36a, '36b
7	<i>Sarcophilus ursinus</i>	14 spg, ♀ som	—	X-Y ♂, X-X ♀	GREENWOOD, '23
	—	14 spg	7 ♂ (I, II)	X-Y ♂	KOLLER, '36a, '36b
	Peramelidae				
8	<i>Perameles</i> sp.	—	8 ♂ (I)	—	BENDA, '06
9	<i>Isoodon obesulus</i>	14 spg	7 ♂ (I)	X-Y ♂	DRUMMOND, '33
	Phalangeridae				
10	<i>Petauroides volans</i>	22 spg	—	X-Y ♂	AGAR, '23
11	<i>Petaurus breviceps</i>	22 spg	—	X-Y ♂	DRUMMOND, '33
12	<i>Phascolarctus cinereus</i>	16 spg, ♀ som	8 ♂ (I, II)	X-Y ♂, X-X ♀	GREENWOOD, '23
	—	16 spg	8 ♂ (II)	X-Y ♂	KOLLER, '36b
13	<i>Phalangista</i> sp.	—	8 ♂ (I)	—	BENDA, '06
14	<i>Pseudochirus peregrinus</i>	20 spg, ♀ som	10 ♂ (I, II)	X-Y ♂, X-X ♀	ALTMANN & ELLERY, '25
	—	20 spg	10 ♂ (I)	X-Y ♂	KOLLER, '36b
15	<i>Trichosurus vulpecula</i>	20 spg, ♀ som	10 ♂ (I, II)	X-Y ♂, X-X ♀	ALTMANN & ELLERY, '25
	—	20 spg	10 ♂ (I, II)	X-Y ♂	KOLLER, '36b
	Macropodidae				
16	<i>Bettongia lesueuri</i>	22 spg	11 ♂ (I)	X-Y ♂	DRUMMOND, '33
17	<i>Bettongia penicillata</i>	28 spg	—	X-Y ♂	DRUMMOND, '33
18	<i>Macropus ualabatus</i>	12 spg, ♀ som	6 ♂ (I, II)	X-Y ♂; X-X ♀; X associated with an autosome in spg	AGAR, '23
19	<i>Macropus giganteus</i>	22 spg	11 ♂ (I)	X-Y ♂	BINDER, '27
20	<i>Macropus parryi</i>	16 spg	8 ♂ (I, II)	X-Y ♂	MATHEY, '34a, '36a
21	<i>Potorous tridactyla</i>	12 spg, ♀ som	6 ♂ (I, II)	X-Y ♂, X-X ♀	ALTMANN & ELLERY, '25
22	<i>Setonyx brachyurus</i>	22 spg	—	X-Y ♂; 4n observed in spg	DRUMMOND, '33

(Continued)

No.	Species	Diploid number	Haploid number	Remarks	Author
23	<i>Phascolomyidae</i> <i>Phascolomys mitchelli</i>	(14) spg	7♂ (I)	X-Y♂	ALTMANN & ELLERY, '25

C. Eutheria—Monodelphia

c. Chiroptera

24	<i>Rhinolophidae</i> <i>Rhinolophus hipposideros</i>	—	16♀ (I, II)	—	ATHIAS, '12
25	<i>Vespertilionidae</i> <i>Vesperugo noctula</i>	—	9-10♀ (I, II)	—	VAN der STRICHT, '10
26	<i>Vesperugo serotinus</i> (' Bat ')	24+ spg	15-22♀ (I) 18-24♀ (II)	—	ATHIAS, '12
	(' Bat ')	40? spg	—	X-O♂	JORDAN, '12
	<i>Molossidae</i> <i>Nyctinomus mexicanus</i>	48 som	—	♂ hetero. ?	HANCE, '17a
27				Prob. X-Y♂	PAINTER, '25a, '25b

d. Insectivora

28	<i>Erinaceidae</i> <i>Erinaceus europaeus</i> (' European hedgehog ')	48 spg	—	X-Y♂	PAINTER, '25a, '25b
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e. Edentata—Xenarthra

29	<i>Dasypodidae</i> <i>Tatusia novemcinctum</i> (' 9-banded armadillo ')	31? spg, 32 oog	14-19♀ (I)	Prob. X-O♂	NEWMAN & PATTERSON, '10; NEWMAN, '12
30	<i>Tatusia novemcinctum</i> (' Armadillo ')	60 ♀, ♂ som	—	Prob. X-Y♂	PAINTER, '25a, '25b

(Continued)

No.	Species	Diploid number	Haploid number	Remarks	Author
f. Rodentia					
a) Duplicidentata					
Leporidae					
31	<i>Lepus cuniculus</i> (' Kaninchen ')	24? som	—	—	FLEMMING, '98
	— (' Lapin ')	41-43 oog 36-46(42) som	—	—	WINIWARTER, '99, '00
	— (' Rabbit ')	28-36 spg	14-18 ♂ (I)	—	BARRETT, '07
	— (' Rabbit ')	22 spg	11-12 ♂ (I) 11 ♂ (II)	X-Y ♂	BACHHUBER, '16
	— (' Rabbit ')	44-54 spg	20+ ♂ (I)	X-O ♂	MASUI, '23
	— (' Rabbit ')	44 spg 44 ♀, ♂ som	22 ♂ (I)	X-Y ♂, X-X ♀; Chrom. number constant in amnion	PAINTER, '25a, '25b, '25c, '26a, '26b
	—	(44) spg	22 ♂ (I)	X-Y ♂	MINOUCHI & OHTA, '32
	—	44 spg	22 ♂ (I, II)	X-Y ♂	TATEISHI, '36
32	<i>Lepus formosus</i>	48 spg	24 ♂ (I, II)	X-Y ♂	TATEISHI, '36
b) Simplicidentata					
Sciuridae					
33a	<i>Sciurus carolinensis</i> <i>carolinensis</i>	48 spg	—	X-Y ♂	CROSS, '31b
33b	<i>Sciurus carolinensis</i> <i>leucotus</i>	28 spg	14 ♂ (I)	X-Y ♂	KOLLER, '36b
34a	<i>Sciurus niger rufi-</i> <i>venter</i>	62 spg	—	X-Y ♂	CROSS, '31b
34b	<i>Sciurus niger limitis</i> (' Ecoreuil ')	62 spg 24 som	— ca. 16 ♂ (I)	X-Y ♂ —	CROSS, '31b VAN MOLLE, '06, '07
35	<i>Glaucomys volans</i> <i>volans</i>	52 spg	—	X-Y ♂	CROSS, '31b
36	<i>Citellus columbianus</i> <i>columbianus</i>	32 spg, oog	—	X-Y ♂	WODSEDALEK, '29
37	<i>Citellus tridecem-</i> <i>lineatus arenicola</i>	50-54 spg	—	—	CROSS, '31b
Geomyidae					
38	<i>Geomys breviceps</i> <i>breviceps</i>	84? spg	—	X-Y ♂	CROSS, '31b
Heteromyidae					
39	<i>Dipodomys merriami</i> <i>merriami</i>	86? spg	—	X-Y ♂	CROSS, '31b

(Continued)

No.	Species	Diploid number	Haploid number	Remarks	Author
40	<i>Perognathus fallax fallax</i> Myoxidae	44 spg	—	X-Y ♂	CROSS, '31b
41	<i>Dyromys nitedula intermedius</i>	48 spg	24 ♂ (I)	X-Y ♂	MATTHEY & RENAUD, '36
42	<i>Eliomys quercinus</i>	—	16 ♀ (I, II)	—	ATHIAS, '09, '12
43	<i>Glis glis glis</i>	62 spg	31 ♂ (I)	X-Y ♂; sex-chrom. prob. postred.	MATTHEY & RENAUD, '36
44	<i>Muscardinus avelanarius</i> Muridae-Cricetinae	48 spg	24 ♂ (I)	X-Y ♂	MATTHEY & RENAUD, '36
45	<i>Peromyscus eremicus eremicus</i>	ca. 60 spg	—	—	CROSS, '31a
46	<i>Peromyscus boylei attwateri</i>	48 spg	—	X-Y ♂	CROSS, '31b
47	<i>Peromyscus californicus insignis</i>	48 spg	—	X-Y ♂	CROSS, '31a, '31b
48a	<i>Peromyscus maniculatus gambeli</i>	48 spg	—	X-Y ♂	CROSS, '31a, '31b
48b	<i>Peromyscus maniculatus hollesteri</i>	52 spg	—	X-Y ♂	CROSS, '31b
49	<i>Neotoma floridanus attwateri</i>	52 spg	—	X-Y ♂	CROSS, '31b
50	<i>Sigmodon hispidus texianus</i> Muridae-Microtinae	54 spg	—	X-Y ♂	CROSS, '31b
51	<i>Arvicola scherman exitus (Arvicola scherman terrestris)</i>	36 spg	18 ♂ (I)	X-Y ♂; sex-chrom. prered. or postred. in ratio 50:100	MATTHEY & RENAUD, '35
52	<i>Evotomys (Clethrionomys) bedfordiae</i>	55 spg	28 ♂ (I) 27, 28 ♂ (II)	X-O ♂	OGUMA, '35a, '35b
53	<i>Evotomys glareolus</i>	56 spg	28 ♂ (I, II)	X-Y ♂	MATTHEY & RENAUD, '35
54	<i>Microtus incertus</i>	—	28-34 ♀ (I, II)	—	ATHIAS, '12
55	<i>Microtus townsendii</i>	50 spg	—	X-Y ♂	CROSS, '31b
56	<i>Microtus montebelli</i> Muridae-Murinae	31 spg	16 ♂ (I)	X-O ♂	OGUMA, '37b
57	<i>Rattus norvegicus ('Rat')</i>	32 spg	16 ♂ (I)	—	MOORE, '93, '94; MOORE & ARNOLD, '05; MOORE & WALKER, '06
--	('Ratte')	—	12 ♂ (I)	—	LENHOSSEK, '98

(Continued)

No.	Species	Diploid number	Haploid number	Remarks	Author
	<i>Rattus norvegicus</i> (' Rat ')	20-30 spg	ca. 12 ♂ (I)	—	REGAUD, '01a, '01b, '09
	— (' Weiss Ratte ')	—	10-20 ♀ (I) 8-16 ♀ (II)	—	SOBOTTA & BURCKARD, '10
	— (<i>Mus decumans</i> ' albino ')	24 som	12 ♂ (I, II)	—	DUESBERG, '08a, '08b
	— (<i>Mus decumans</i> ' albino ')	24+ spg	16 ♂ (I, II)	—	VAN HOOF, '11
	— (' Albino ')	40 ♀	—	In pachytene of ♀ (I)	PRATT & LONG, '17
	— (' Albino ')	37 spg, ♂ som	19 ♂ (I)	X-O ♂	ALLEN, '18, '19
	— (<i>Mus decumans</i> ' albino ')	40 spg	—	—	RAUH, '25
	— (' Albino ')	42 spg	21 ♂ (I, II)	X-Y ♂	PINCUS, '27
	— (' Albino ')	42 spg	21 ♂ (I)	X-Y ♂	PAINTER, '26a, '28a
	— (' Albino ' × ' Wild ') (mixed rat strain)	62 spg	21 ♂ (I) 21, 31 ♂ (II)	Mating experiments between two strains with chrom. number 42 (normal) and 62	SWEZY, '28, '29a, '29b
		42 spg	21 ♂ (I) 21, 31 ♂ (II)		
		42 som			
		62 som			
		42 ♀ som	21 ♀ (I)		
		62 ♀ som	31 ♀ (I)		
	— (' Wild ')	62 spg	21 ♂ (I) 21, 31 ♂ (II)	—	SWEZY, '26, '28
		42 spg	21 ♂ (I) 21, 31 ♂ (II)		
	— (' Albino ')	42 spg	21 ♂ (I, II)	—	SWEZY, '26, '28
	— (' Albino ')	42 spg	21 ♂ (I, II)	X-Y ♂	MINOUCHI, '28a, '28b
	— (' Albino ')	42 spg	21 ♂ (I)	X-Y ♂	BRYDEN, '32, '33a, '35
	— (' Albino ')	42 spg	21 ♂ (I)	X-Y ♂; Sex- chrom. prered. in 90% and postred. in 10%	KOLLER & DARLINGTON, '34
	— (' Wild ')	42 spg	21 ♂ (I, II)	X-Y ♂; X with segmentary structure	OGUMA, '35a, '35b
	— (' Wild ')	42 spg	21 ♂ (I)	X-Y ♂	TATEISHI, '35
	— (<i>Epimys</i> <i>norvegicus</i>)	(42) spg	21 ♂ (I)	X-Y ♂	MATTHEY, '36a
	— (' Wanderratte ')	16 spg	8 ♂ (I, II)	—	VON EBNER, '99
58a	<i>Rattus rattus</i> (' Albino ')	—	8 ♀ (I, II)	—	MELISSINOS, '07
	— (' Albino ')	24+ spg	16 ♂ (I, II)	—	VAN HOOF, '11

(Continued)

No.	Species	Diploid number	Haploid number	Remarks	Author
	<i>Rattus rattus</i>	40 spg	20 ♂ (I, II)	X-Y ♂	PINCUS, '27
	— ('Wild')	42 spg	21 ♂ (I)	X-Y ♂; X with segmentary structure	OGUMA, '28, '35a, '35b
58b	<i>Rattus rattus alexandrinus</i>	40 spg	—	X-Y ♂	CROSS, '31b
58c	<i>Rattus rattus rufescens</i>	42 spg	21 ♂ (I)	X-Y ♂	TATEISHI, '35
59	<i>Rattus losea</i>	42 spg	21 ♂ (I, II)	X-Y ♂	TATEISHI, '33, '35
60	<i>Rattus coxinga</i>	42 spg	21 ♂ (I)	X-Y ♂	TATEISHI, '35
		46 spg	23 ♂ (I)		
61	<i>Rattus culturatus</i>	46 spg	23 ♂ (I)	X-Y ♂	TATEISHI, '35
62	<i>Bandicota nemoribaga</i>	44 spg	22 ♂ (I)	X-Y ♂	TATEISHI, '35
63	<i>Mus musculus</i>	20? som	20 ♀ (I, II)	—	TAFANI, '89
	— ('Maus')	—	16 ♂ (I)	—	HERMANN, '89
	— ('Grau Maus')	24? oog	—	—	HOLL, '93a, '93b
	— ('Weiss, grau, Tanz')	30 som	16 ♀ (I, II)	—	SOBOTTA, '95, '07
	— ('Souris blanche')	10-12 spg	12-16 ♂ (I, II)	—	LUKIANOW, '98
	— ('Mouse')	24 spg	—	—	MOORE & ARNOLD, '05
	—	—	12 ♀ (I, II)	—	GERLOCH, '06
	—	—	12 ♀ (I, II)	—	LAMS & DÖRME, '07
	— ('Albino')	—	8 ♀ (I, II)	—	MELISSINOS, '07
	— ('White mouse')	—	12-24 ♀ (I) 12 ♀ (II)	—	COE & KIRKHAM, '07; KIRKHAM, '07, '08
	— ('White, black, hybrid')	—	20 ♀ (I, II)	—	LONG, '08; LONG & MARK, '11
	— ('White mouse')	—	12-24 ♀ (I) 12-30 ♀ (II)	—	KINGERY, '14, '17
	— ('House mouse')	—	20 ♂ (I, II)	X postred.	YOCUM, '17
	— ('Domestic, wild')	40 spg	20 ♂ (I, II)	X-Y ♂	COX, '26
	— ('Weiss Maus')	24 oog	12 ♀ (I)	—	ZDENKO, '26
	—	40 spg	20 ♂ (I)	X-Y ♂	PAINTER, '28a, '28b
	— ('Maus')	32-36 (prob. 40) som	—	'Karzinomzelle'	GOLDSCHMIDT & FISCHER, '29
	— ('Maus')	21-44(40) som	—	Tissue culture; number inconstant	KEMP, '30
	—	21-175(36-40) som	—	'Teerkarzinome'	WINGE, '30
	—	ca. 36 oog	18 ♀ (I)	—	SCHACHOW, '30

(Continued)

No.	Species	Diploid number	Haploid number	Remarks	Author
	<i>Mus musculus</i> (' Albino ')	40 spg	20 ♂ (I, II)	X-Y ♂	CUTRIGHT, '32
	— (' Albino ')	40 ♀, ♂ som	—	X-Y ♂, X-X ♀	CREW & KOLLER, '32
	—	40 spg	—	—	BUTARIN, '35c
	—	40 spg	20 ♂ (I)	X-Y ♂	TATEISHI, '35
	—	40 spg	20 ♂ (I, II)	X-Y ♂; X and Y similar in form and size	MATTHEY, '36a
64	<i>Mus formosanus</i>	40 spg	20 ♂ (I)	X-Y ♂	TATEISHI, '35
65	<i>Mus molossinus</i>	40 spg	20 ♂ (I, II)	X-Y ♂	OGUMA, '35a, '35b
66	<i>Mus wagneri</i>	40 spg	20 ♂ (I, II)	X-Y ♂	MASUI, '23
	—	40 spg	20 ♂ (I, II)	X-Y ♂; GATES' non-disjunction (v-o) mouse	PAINTER, '27
	— (' Albino ')	40 spg	20 ♂ (I, II)	X-Y ♂	MINOUCHI, '28d
67a	<i>Apodemus agrarius</i>	(48) spg	24 ♂ (I, II)	X-Y ♂; Sex-chrom. postred.	MATTHEY, '36b
67b	<i>Apodemus agrarius ningpoensis</i>	50 spg	25 ♂ (I, II)	X-Y ♂; Sex-chrom. postred.	TATEISHI, '34, '35
68	<i>Apodemus flavicollis</i>	(48) spg	24 ♂ (I, II)	X-Y ♂; Sex-chrom. prerred. or postred.	MATTHEY, '36b
69	<i>Apodemus semotus</i>	48 spg	24 ♂ (I)	X-Y ♂; Sex-chrom. postred.	TATEISHI, '34, '35
70a	<i>Apodemus speciosus speciosus</i>	46 spg	23 ♂ (I)	X-Y ♂; Sex-chrom. postred.	TATEISHI, '34, '35
70b	<i>Apodemus speciosus ainu</i>	47 spg	24 ♂ (I, II) 23, 24 (tid)	X-O ♂; Sex-chrom. postred.	OGUMA, '34a, '34b, '37b
71	<i>Apodemus sylvaticus</i> (<i>Mus sylvaticus</i>)	—	—	Prob. X-O ♂	FEDERLEY, '19
	—	(48) spg	24 ♂ (I, II)	X-Y ♂; Sex-chrom. prerred. or postred.	MATTHEY, '36a, '36b
	—	48 spg	24 ♂ (I, II)	X-Y ♂; Sex-chrom. prerred. or postred.	RAYNAUD, '36
	Caviidae				
72	<i>Cavia cobaya</i> (' Meerschweinchen ')	16 spg	8 ♂ (II)	—	VON BARDELEBEN, '92
	— (' Meerschweinchen ')	24± som	—	—	FLEMMING, '98
	— (' Guinea-pig ')	32 spg	16 ♂ (I, II)	—	MOORE & WALKER, '06
	— (' Guinea-pig ')	56? spg	28 ♂ (I)	X-Y ♂	STEVENS, '11a, '11b
	—	16 som	8 ♀ (I, II)	—	LAMS, '13
	—	38 spg	19 ♂ (I, II)	X-Y ♂	HARMAN & ROOT, '26

(Continued)

No.	Species	Diploid number	Haploid number	Remarks	Author
	<i>Cavia cobaya</i>	60-64 spg	—	X-Y ♂	PAINTER, '26a
	—	65 spg	33 ♂ (I)	X-O ♂	MOLS, '28
	— ('Guinea-pig')	44, 55, 66 som	32, 33 ♂ (II)		
	—	62 ± 2 spg	31 ♂ (I)	X-Y ♂	LEAGUE, '28
	—	—	30+ ♂ (II)		
73	<i>Cavia porcellus</i>	—	24-23 ♀ (I)	—	ATHIAS, '12
	—	—	ca. 24 ♀ (II)		

g. Carnivora

	a) Fissipedia				
	Canidae				
74	<i>Canis familiaris</i>	64? som	—	—	VOM RATH, '94
	—	21 spg	11 ♂ (I)	X-O ♂	MALONE, '18
	—	22 ♀ som	10, 11 ♂ (II)		
	— ('Dog')	50+ spg	—	Prob. X-Y ♂	PAINTER, '25b
	—	78 spg, oog	39 ♂ (I, II)	X-Y ♂, X-X ♀	MINOUCHI, '28a, '28c
75	<i>Nyctereutes viverrinus</i>	42 spg	21 ♂ (I, II)	X-Y ♂	MINOUCHI, '28f, '29
76	<i>Vulpes fulvus</i>	42 spg	21 ♂ (I)	X-Y ♂	WODESDALEK, '31
	Felidae				
77	<i>Felis domestica</i>	35 spg	18 ♂ (I)	X-O ♂	WINIWARTER & SAINMONT, '09; WINIWARTER, '14, '19, '22, '34
	('Variété belge')	36 oog, ♀ som	17, 18 ♂ (II)		
	— ('Variété japonaise')	38 spg	19 ♂ (I, II)	X-Y ♂	WINIWARTER, '34
	— ('Chat')	—	12 ♀ (I)	—	VAN der STRICHT, '11
	—	—	14-17 ♀ (I, II)	—	LONGLEY, '11
	— ('Hauskatze')	38 oog	—	—	GUTHERZ, '18, '20
	—	38 spg, oog	19 ♂ (I, II)	X-Y ♂, X-X ♀	MINOUCHI, '28e, '28f; MINOUCHI & OHTA, '32b, '34a
	—	38 spg, oog	19 ♂ (I)	Prob. X-Y ♂; Sex-chrom. unable to identify	MATTHEY, '34b, '36a
	Viverridae				
78	<i>Mungos ichneumon</i>	—	ca. 24 ♂ (I)	Prob. X-O ♂	JORDAN, '14
	('Mongoose')				
	b) Pinnipedia				
	Otarridae				
79	<i>Callorhinus alascanus</i>	30 spg	15 ♂ (I, II)	X-Y ♂	STARKS, '28

(Continued)

No.	Species	Diploid number	Haploid number	Remarks	Author
h. Ungulata					
a) Artiodactyla					
Suidae					
80	<i>Sus scrofa</i> ('Pig')	18 spg, ♂ som 20 ♀ som	10 ♂ (I) 8, 10 ♂ (II)	XX-O ♂	WODESDALEK, '13a, '13b
	—	40 spg, 40-74 som	20 ♂ (I)	Variation of chrom. number in soma due to fragmentation	HANCE, '17b, '18
	— ('Schwein')	38 spg	19 ♂ (I)	Prob. X-Y ♂	KRALLINGER, '31
	— ('Pig')	38 spg	19 ♂ (I)	X-Y ♂	BRYDEN, '33b
81	<i>Pecari tajacu</i>	30 spg	15 ♂ (I, II)	Sex-chrom. unable to identify	KRALLINGER, '36
Bovidae					
82	<i>Bos taurus</i> ('Stier')	16 spg	—	—	VON BARDELEBEN, '92
	— ('Taureau')	20-25 spg	12 ♂ (I, II)	—	SCHOENFELD, '02
	— ('Taureau')	20-24 spg	12 ♂ (I)	—	VAN HOOFF, '13
	—	33 spg	17 ♂ (I) 16, 17 ♂ (II)	X-O ♂	MASUI, '19
	— ('Cattle')	37 spg, ♂ som 38 oog, ♀ som	19 ♂ (I) 18, 19 ♂ (II) ca. 19 ♀ (I)	X-O ♂, X-X ♀	WODESDALEK, '20
	— ('Rind')	60 spg	30 ♂ (I, II)	X-Y ♂	KRALLINGER, '27, '28, '31
83	<i>Poephagus grunniens</i> ('Yak')	62±2 spg	31±1 ♂ (I)	Prob. X-Y ♂	ZUITIN, '35
84	<i>Capra hircus</i>	60 spg	30 ♂ (I, II)	X-Y ♂	SOKOLOV, '30
	— ('Ziege')	60 ♂ som	—	X-Y ♂	SHIWAGO, '30, '31
	— ('Ziege')	60 spg	30 ♂ (I)	X-Y ♂	KRALLINGER, '31
85	<i>Ovis aries</i> ('Sheep')	33 spg, 34 oog	17 ♂ (I), 17 ♀ (I)	X-O ♂, X-X ♀	WODESDALEK, '22
	— ('Schaf, Hammel')	48-53 (prob. 54) ♂ som	—	X-Y ♂	SHIWAGO, '30, '31
	— ('Schaf')	60 spg	30 ♂ (I) prob. 30 ♂ (II)	X-Y ♂	KRALLINGER, '31
	— (Interracial hybrid)	60 spg	30 ♂ (I)	—	NOVIKOV, '35
86	<i>Ovis pollii karelini</i>	60 spg	30 ♂ (II)	—	BUTARIN, '35a, '35b
87	<i>Ovis steato pyga</i>	(60) spg	30 ♂ (I)	—	BUTARIN, '35a, '35b
	<i>Ov. pol. kar.</i> × <i>Ov. st. py.</i>	60 spg	30 ♂ (I)	—	BUTARIN, '35a

(Continued)

No.	Species	Diploid number	Haploid number	Remarks	Author
88	b) Perissodactyla				
	Equidae				
	<i>Equus caballus</i> ('Pferd ')	—	10-16 ♂ (I)	—	KIRILLOW, '12
	— ('Horse ')	37 spg	19 ♂ (I) 9, 10 ♂ (II)	X-O ♂	WODESDALEK, '14
	—	33-38 spg	19 ♂ (I) 18, 19 ♂ (II)	X-O ♂	MASUI, '19
	— ('Horse ')	57-60 spg	30 ♂ (I)	X-Y ♂	PAINTEK, '24c, '25b
89	—	60 spg	—	X-Y ♂	RANQUINI, '34
	'Mule' (<i>Eq. cab.</i> × <i>Eq. asinus</i>)	51 spg	34-49 ♂ (I)	Abnormal mitoses	WODESDALEK, '16
	<i>Equus asinus</i>	60 spg	30 ♂ (I)	—	MELADZE, '37

i. Primates

90	a) Simiae-Platyrrhina				
	Cebidae				
	<i>Cebus</i> sp. ('Brown Cebus ')	54 spg	27 ♂ (I)	X-Y ♂	PAINTEK, '22b, '24b
91	b) Simiae-Catarrhina				
	Cercopithecidae				
	<i>Rhesus macacus</i>	48 spg 48 ♀, ♂ som	24 ♂ (I)	X-Y ♂	PAINTEK, '24b
92	Hominidae				
	<i>Homo sapiens</i>				
	(a) Somatic cells				
	— ('Mensch ')	22-28 (prob. 24) som	—	Cornea	FLEMMING, '82, '98
	— ('Mensch ')	18-40 som	—	Normal tissue	HANSEMANN, '91
	— ('Man ')	33-38 som	—	Embryonal tissue	WIEMAN, '13
	— ('Mensch ')	30-50(47-48) som	—	Amnion	GROSSER, '21, '27
	— ('Mensch ')	32-48 som	—	Amnion, pleura ; chrom. number variable in soma	RAPPEPORT, '22
	— ('Homme ')	20+ som	—	—	MOLAS, '26
— ('Mensch ')	24 & 48 som	—	Chorion, decidual tissue ; 48 chroms. due to splitting	SCHACHOW, '26	
— ('Human ')	24± som	—	Embryonal tissue	ADAMSTONE, '29	

(Continued)

No.	Species	Diploid number	Haploid number	Remarks	Author
	<i>Homo sapiens</i> (' Mensch ')	30-64 som	—	Pleura, peritoneum: chrom. number in- constant in soma	KARPLUS, '29
	— (' Mensch ')	47-50 (prob. 48) ♀, ♂ som	—	Tissus culture: chrom. number constant in normal soma, inconstant in path. cells	KEMP, '28, '29, '30
	— (' Mensch ')	30-85(45-50) som	—	Tissue culture: chrom. number variable in soma	CAFFIER, '32
	— (' Human ')	52 som	—	Blood cell	CHRUSTSCHOFF & BERLIN, '35
	— (' Mensch ')	32-73 som	—	Embryonal soma; variable number due to abnormal mitoses, fragmen- tation, elimination and non-disjunc- tion	ANDRES & SHIW (JIV), '35, '36
	(b) Pathologic cells				
	— (' Human ')	40-50 (prob. 48) ♀ som	—	Tumor and can- cer	BELLING, '27
	— (' Homme ')	50-55 som	—	EVANS' prepa- ration	WINIWARTER & OGUMA, '30
	— (' Human ')	23-140 som	—	Cancer	PICON, '30
	— (' Mensch ')	24-136 (Primärtumor) 31-583 (Metastase)	—	—	ANDRES, '32
	— (' Mensch ')	96-98 spg	48 ♂ (I, II)	4n germ cells in normal testis	ANDRES, '33
	(c) Germ cells				
	— (' Mensch ' W)	8 spg	8 ♂ (I), 4 ♂ (II)	—	VON BARDELEBEN, '92, '97, '98
	— (' Man ' W)	—	15-19(18) ♂ (I)	—	WILCOX, '00
	— (' Mensch ' W)	32?	—	—	FICK, '05
	— (' Man ' W)	32 spg	16 ♂ (I)	—	MOORE & ARNOLD, '05; MOORE & WALKER, '06
	— (' Homme ' W)	ca. 24 spg	12 ♂ (I)	—	DUESBERG, '06
	— (' Man ' W)	22 spg	12 ♂ (I) 5, 7 ♂ (II)	XX-O ♂	GUYER, '10, '14
	— (' Homme ' W)	24 spg, som	ca. 12 ♂ (I) ca. 18 ♂ (II)	—	BRANCA '10a, '10b, '12, '21
	— (' Mensch ' W)	—	ca. 12 ♂ (I)	No sex-chrom.	GUTHERZ, '12, '22a
	— (' Man ' W, N)	—	12 ♂ (I) 10, 11 or 12 ♂ (II)	XX-O; Sex- chrom. prered. or postred.	MONTGOMERY, '11, '12
	— (' Man ' W)	24 spg	12 ♂ (I, II)	X-Y ♂	WIEMAN, '17

(Continued)

No.	Species	Diploid number	Haploid number	Remarks	Author
	<i>Homo sapiens</i> (' Man ' W)	—	12♂ (I)	Double X ?	JORDAN, '14
	— (' Mensch ' W)	24 spg	12♂ (I)	—	FRIEDENTHAL, '21
	— (' Homme ' W)	47 spg 48 oog	24♂ (I) 23, 24♂ (II)	X-O♂, X-X♀	WINIWARTER, '12, '21a, '21b, '23
	— (' Man ' J)	47 spg	24♂ (I)	X-O♂	OGUMA & KIHARA, '22, '23
	— (' Man ' W, N)	48 spg	24♂ (I, II)	X-Y♂	PAINTER, '23a, '23b, '24d
	— (' Homme ' W)	47 spg	24♂ (I) 23, 24♂ (II)	X-O♂	WINIWARTER & OGUMA, '25, '26
	— (' Human ' W, N)	48 spg 48 ♀, ♂ som	24♂ (I, II)	X-Y♂	EVANS & SWEZY, '28, '29
	— (' Man ' J)	48 spg	24♂ (I, II)	X-Y♂	MINOUCHI & OHTA, '32a, '34b
	— (' Mensch ' W)	48 spg	24♂ (I, II)	X-Y♂	SHIWAGO & ANDRES, '32a, '32b
	— (' Man ' W)	—	—	X-Y in ♂ (I)	GATENBY & BEAMS, '35
	— (' Man ' W)	—	24♂ (I)	X-Y♂	KING & BEAMS, '36
	— (' Man ' J)	—	24♂ (I)	X-Y♂	IRIKI, '36
	— (' Mensch ' W)	—	—	Various soma and germ cells; first 10 pairs of autosomes identified	ANDRES & NAVASCHIN, '36
	— (' Human ' J, M)	47 spg	24♂ (I)	X-O♂; Sex-chrom. with tripartite segmentary structure	OGUMA, '30, '36, '37
	— (' Human ' W)	48 oog	—	X-X♀	SWEZY & EVANS, '30
	— (' Human ' W)	—	16-18 (prob. 24) ♀ (I)	—	HOADLEY & SIMONS, '28
	— (' Human ' W)	—	Prob. 24 ♀ (I)	—	ALLEN, PRATT & NEWELL, '30
	— (' Mensch ' W)	48 oog	—	X-X♀; Abnormal mitoses in oog. div.	ANDRES & VÖGEL, '36

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The papers have been arranged primarily according to the classes of animals studied. Under each class appears a list of papers arranged according to the alphabetical order of the names of the authors. The year of publication follows the name of the author. If two papers were published by the same author in the same year, the small letter of alphabet, such as (Makino, S. 1934b; 'b' denoting the second paper of the author in 1934), indicates the order of appearance of the papers. For the sake of economy of space the titles of journals most often referred to have been abbreviated as shown below.

The list of abbreviations of the titles of journals.

A. A.,	Anatomischer Anzeiger.
A. A. M.,	Archives d'Anatomie microscopique.
A. B.,	Archives de Biologie.
A. Hf.,	Anatomische Hefte.
A. I. A. E.,	Archivio Italiano di Anatomia e di Embriologia (Firenze).
A. J. A.,	American Journal of Anatomy.
A. M. A.,	Archiv für mikroskopische Anatomie.
A. N.,	American Naturalist.
A. R.,	Anatomical Record.
A. Zf.,	Archiv für Zellforschung.
A. Z. E. G.,	Archives de Zoologie expérimentale et générale.
B. B.,	Biological Bulletin.
B. B. Fr. Bel.,	Bulletin Biologique de la France et de la Belgique.
B. Z.,	Biologisches Zentralblatt.
C. R. A. S.,	Comptes Rendus de l'Académie des Sciences (Paris).
C. R. S. B.,	Comptes Rendus des Séances de la Société de Biologie (Paris).
Cyt.,	Cytologia (Tokyo).
Genet.,	Genetics.
Jap. J. G.,	Japanese Journal of Genetics.
Jap. J. Z.,	Japanese Journal of Zoology.
J. E. Z.,	Journal of Experimental Zoology.
J. F. S. Hokkaido I. U.,	Journal of the Faculty of Science, Hokkaido Imperial University.
J. G.,	Journal of Genetics.
J. G. P.,	Journal of General Physiology.
J. M.,	Journal of Morphology.
J. S. Hiroshima U.,	Journal of Science of the Hiroshima University.

L. C.,	La Cellule.
M. C. S. Kyoto I. U.,	Memoirs of the College of Science, Kyoto Imperial University.
M. Z. Italiano,	Monitore Zoologico Italiano (Firenze).
P. I. A. (Tokyo),	Proceedings of the Imperial Academy (Tokyo).
P. R. S. London,	Proceedings of the Royal Society (London).
Q. J. M. S.,	Quarterly Journal of Microscopical Science.
R. Suisse Z.,	Revue Suisse de Zoologie.
Sci.,	Science, New York.
S. R. Tokyo B. D.,	Science Reports of the Tokyo Bunrika Daigaku.
Z. A.,	Zoologischer Anzeiger.
Z. A. E.,	Zeitschrift für Anatomie und Entwicklungsgeschichte.
Z. B. (Moskaw),	Zeitschrift für Biologie (Moskaw).
Z. I. A. V.,	Zeitschrift für induktive Abstammungs- und Vererbungslehre.
Z. M. (Japan),	Zoological Magazine (Dobutsugaku Zasshi) (Japan).
Z. M. A. F.,	Zeitschrift für mikros.-anatomische Forschung.
Z. W. Z.,	Zeitschrift für wissenschaftliche Zoologie.
Z. Z. M. A.,	Zeitschrift für Zellforschung und mikroskopische Anatomie.

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