

# CHROMOSOME NUMBERS OF COLEOPTERA \*

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THE present is a complete list of the chromosome numbers of Coleoptera. That in Makino's (1951) *An Atlas of the Chromosome Numbers in Animals* is replete with errors: not in the numbers themselves—almost without exception, these have been faithfully recorded from the originals—but in the spelling of the specific, generic, and family names, as well as in the nomenclature and systematic disposition of many of the species.† Considering the difficulties with which Makino was faced, the coverage of the literature is good, perhaps no more than 14 determinations by nine authors being omitted.

I had earlier intended to compile a list of some 160 chromosome determinations, which I have made as time permitted during the course of the past eight years, together with others that have appeared in print, and to publish them as a supplement bringing those given by Harvey (1916 and 1920) up to date, but it now appears that a complete revision of Makino's list is warranted. It is perhaps noteworthy that 11 families find themselves represented for the first time and that the total of cytologically known Coleoptera now reaches 340. According to Makino's tabulation, this number is surpassed among Insecta only in the Orthoptera and Heteroptera but in no other animal group, and constitutes approximately 10 per cent. of the species of animals whose chromosome numbers have been recorded. The distribution of species, genera, subfamilies, and families by haploid number of autosomes and by sex-chromosome type is given graphically in fig. 1.

In the accompanying tabulation it has been considered advisable to arrange the species not in alphabetical sequence under families (a procedure followed by Makino and by Harvey) but so far as is possible in phylogenetic sequence, since it is only through a logical grouping based on current concepts of taxonomic relationships that the full import of the cytological findings becomes evident. The systematic arrangement adopted herein is that devised by Leng (1920) on the basis of adult morphology, and his catalogue is also taken as

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† Thirty-three spelling mistakes occur among the total of 180 determinations tabulated; 45 species are retained in genera from which they are now, or were even at the time of first publication, removed; and a few, for example *Silpha perforata*, are listed under the incorrect family. The majority of these errors and all the obsolete names have been carried over from the original authors. It is regrettable that cytologists in general have been, and many still are, remarkably lax in their dealing with taxonomic nomenclature. But unfortunately many purely typographical errors have arisen *de novo* during the printing of both the original Tokyo and the first American editions.

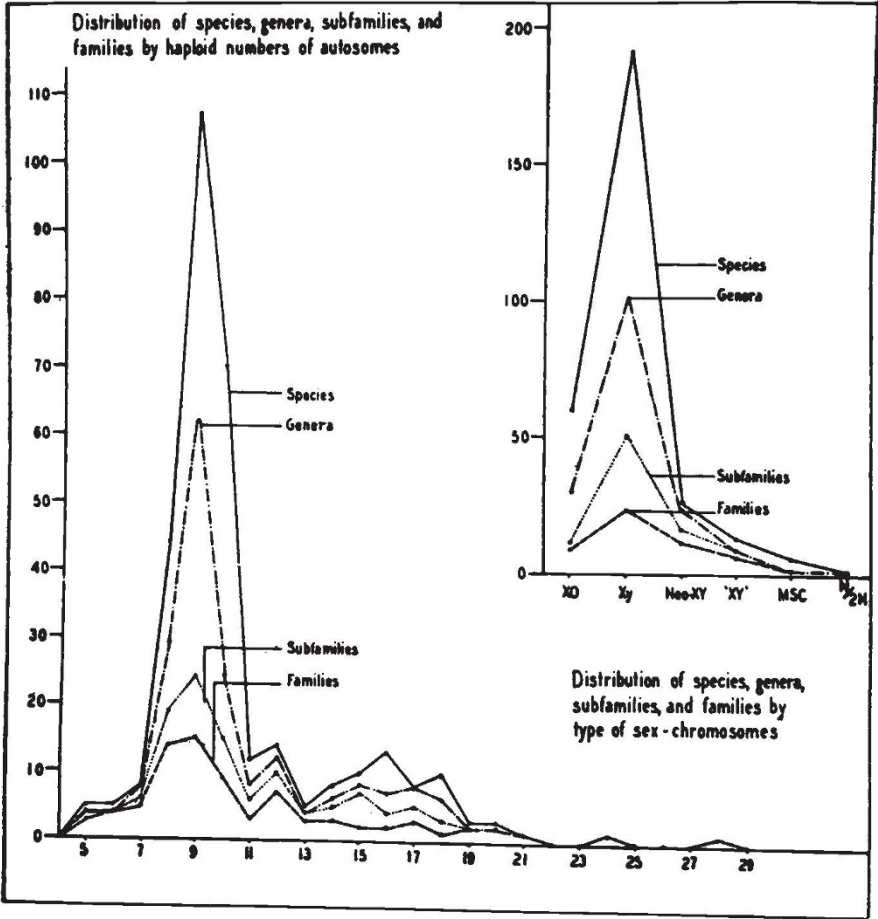


FIG. 1.

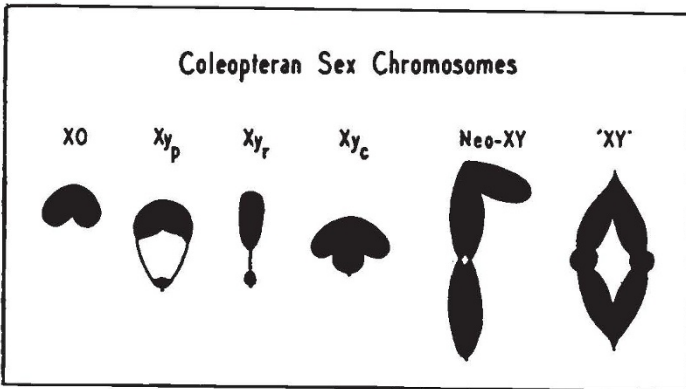


FIG. 2.

the authority for questions of nomenclature. Whereas Leng and his co-workers were concerned only with Coleoptera of America, north of Mexico, many of the species listed here occur only outside North America; the disposition and nomenclature of such exotic species are those given in the *Coleopterorum Catalogus*.

With but few exceptions all taxonomic determinations of my material were made by W. J. Brown, Systematic Entomology, Science Service; it is a distinct pleasure to record my debt of gratitude to him for these and for guidance in questions of synonymy.

#### GENERAL NOTES CONCERNING THE LIST

Papers preceding Stevens (1905) are largely in error or open to doubt; they have therefore, with the exception of a determination by Prowazek (see footnote 41), been omitted but are fully listed by Harvey (1916) and Makino (1951). It has not been possible to secure a few of the papers cited by Makino; references to these are placed in parentheses. Unless otherwise stated, undetermined species I have examined originated from the Lake Kipewa region in the Province of Quebec. Components marked with an asterisk are considered as parts of new families by Böving and Craighead (1931).

The first number column gives the somatic chromosomes according to sex, the second gives the number of autosomal pairs and the sex chromosomes.

The following symbols are used: "XY", indistinguishable or unidentified sex chromosomes; x and y, relatively small sex chromosomes; p, r, and c, parachute-, rod-, and centric-associations respectively; neo-XY, derivative, or complex, sex-determining mechanism (see text fig. 2); s, supernumerary chromosome; Parth., Parthenogenetic.

The list has been compiled up to April 1952.

#### LIST OF CHROMOSOME NUMBERS

##### I ADEPHAGA<sup>1</sup>: 1. CARABOIDEA

###### i CICINDELIDÆ<sup>2</sup>

###### CICINDELINI

<i>Cicindela purpurea</i>	. . . . .	22 ♂	10+Xx	Goldsmith '19
<i>ancocisconensis</i>	. . . . .	22 ♂, 24 ♀	10+Xx : XXxx	"
<i>repanda</i>	. . . . .	22 ♂	10+Xx	"
" Dej.	. . . . .	20 ♂	9+Xy <sub>c</sub>	Smith '50
<i>tranquebarica</i> <sup>3</sup>	. . . . .	{ 22 ♂	10+Xy <sub>c</sub> <sup>3</sup>	Stevens '09
		{ 22 ♂, 24 ♀	10+Xx : XXxx	Goldsmith '19
<i>pimeriana</i> <sup>4</sup>	. . . . .	20 ♂	9+Xy <sub>c</sub>	Stevens '06
<i>sexguttata</i>	. . . . .	22 ♂	10+Xx	Goldsmith '19
<i>s. sexguttata</i> Fab.	. . . . .	22 ♂	...	Smith unpub.
<i>punctulata</i>	. . . . .	22 ♂	10+Xx	Goldsmith '19
<i>scutellaris lecontei</i> Hald.	. . . . .	ca. 20 ♂	9+Xy <sub>c</sub>	Smith unpub.

## ii CARABIDÆ

CARABINÆ					
<i>Carabus serratus</i> Say	. . .	...	12 +Xy		Smith unpub.
HARPALINÆ-BISETOSÆ					
BEMBIDIINI					
<i>Bembidion carinula</i> Chaud.	. . .	...	11 +“XY”		”
<i>bifossulatum</i> Lec. <sup>5</sup>	. . .	...	11 +“XY”		”
PTEROSTICHINI					
<i>Euferonia coracina</i> Newm.	. . .	...	18 +X		”
<i>Pæcilus lucublandus</i> Say	. . .	...	17 +neoXY		”
AMARINI					
<i>Celia erratica</i> Sturm	. . .	...	15 ?+neoXY		”
<i>Amara impuncticollis</i> Say	. . .	...	17 +neoXY		”
AGONINI					
<i>Sericoda obsoleta</i> Say	. . .	...	17 +neoXY		”
<i>Agonum sinuatum</i> Dej. <sup>6</sup>	. . .	...	12 +neoXY		”
<i>extensicolle</i> Say <sup>6</sup>	. . .	...	18 ?+X		”
<i>cupripenne</i> Say <sup>6</sup>	. . .	...	17 +neoXY		Smith '50
<i>retractum</i> Lec. <sup>6</sup>	. . .	...	18 +X		Smith unpub.
<i>Platynus</i> sp. <sup>7</sup>	. . .	37 ♂	18 +X		(Yosida '51)
DRIPTINI					
<i>Galerita bicolor</i>	. . .	30 ♂	Xy		Stevens '06
LEBIINI					
<i>Dromius piceus</i> Dej.	. . .	25 ♂	12 +X		Smith unpub.
HARPALINÆ-UNISSETOSÆ					
CHLÆNIINI					
<i>Chlænus pennsylvanicus</i> <sup>8</sup>	. . .	...	9 +Xy <sup>8</sup>		Stevens '06
<i>tricolor</i> Dej.	. . .	...	18 +X		Smith unpub.
<i>pallipes</i>	. . .	37 ♂	18 +X		(Yosida '51)
<i>æstivus</i>	. . .	...	16 +Xy		Stevens '06
<i>laticollis</i> Say	. . .	...	18 +X		Smith unpub.
<i>Anomoglossuse marginatus</i>	. . .	...	18 +X		Stevens '06
HARPALINI					
<i>Harpalus erythropus</i> Dej.	. . .	...	15 +neoXY		Smith unpub.
<i>Agonoderus lecontei</i> Chaud.	. . .	...	(12 +X)?		”
ANTHINI					
<i>Anthia sexguttata</i>	. . .	35 ♂	17 +X		Asana <i>et al.</i> '42

## iii DYTISCIDÆ

COLYMBETINÆ					
<i>Agabus confinis</i> Gyll.	. . .	...	20+“XY”		Smith unpub.
<i>Colymbetes fuscus</i>	. . .	35-37 ♀	...		Günthert '10
DYTISCINÆ					
<i>Dytiscus marginalis</i> L.	. . .	$\left\{ \begin{array}{l} 36-41 \text{ ♂} \\ 38 \text{ ♂} \\ 40 \text{ ♀} \end{array} \right.$	$\left\{ \begin{array}{l} \dots \\ 18+“XY” \\ \dots \end{array} \right.$		Henderson '07 Schäfer '07 Debaisieux '09
<i>circumcinctus</i>	. . .	38 ♂	18+“XY”		Schäfer '07
sp.	. . .	38-40 ♀	...		Günthert '10

## 2. GYRINOIDEA

## GYRINIDÆ

<i>Dineutes americanus</i> Say	. . .	ca. 44 ♂	ca. 2I <sub>II</sub>		Smith unpub.
<i>horni</i> Rbts.	. . .	...	ca. 2I <sub>II</sub>		”

II POLYPHAGA : 1. HYDROPHILOIDEA

HYDROPHILIDÆ

<i>Hydrous acuminatus</i> . . . . .	30 ♂	14+Xy <sub>r</sub>	Asana <i>et al.</i> '42
<i>piceus</i> <sup>9</sup> . . . . .	30 ♂	15 <sub>II</sub>	Arnold '08
<i>triangularis</i> Say . . . . .	30 ♂	14+Xy <sub>p</sub>	Smith unpub.
<i>Tropisternus lateralis</i> Fab. . . . .	...	8+Xy <sub>p</sub>	"

2. SILPHOIDEA

SILPHIDÆ

<i>Necrophorus sayi</i> . . . . .	13 ♂	6+X	Stevens '09
<i>vespilloides</i> Hbst. . . . .	13 ♂	6+X	Smith '50
<i>Silpha surinamensis</i> Fab. . . . .	...	ca. 12+Xy <sub>p</sub>	Smith unpub.
<i>noveboracensis</i> Forst. . . . .	26 ♂	12+Xy <sub>r</sub>	"
<i>americana</i> . . . . .	40 ♂	19+Xy	Stevens '06
<i>perforata</i> <sup>10</sup> . . . . .	...	19+X	(Yosida '51)

3. STAPHYLINOIDEA

STAPHYLINIDÆ

STAPHYLININÆ

XANTHOLININI

<i>Nudobius cephalus</i> Say . . . . .	...	13+Xy <sub>p</sub>	Smith '50
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STAPHYLININI

<i>Staphylinus violaceus</i> . . . . .	...	21+Xy	Stevens '09
<i>Philonthus politus</i> L. . . . .	...	ca. 19+Xy <sub>r</sub>	Smith unpub.
<i>Ontholestes cingulatus</i> <sup>11</sup> . . . . .	26 ♂	12+Xy	Stevens '09
" " Grav. . . . .	...	12+Xy <sub>p</sub>	Smith unpub.
<i>Creophilus maxillosus villosus</i> Grav. . . . .	...	ca. 17+Xy	"

ALEOCHARINÆ

<i>Aleochara</i> sp. . . . .	...	8+neoXY	"
Unknown <sup>12</sup> " Rove beetle " . . . . .	28 ♂	14 <sub>II</sub>	Stevens '09

4. CANTHAROIDEA

i LAMPYRIDÆ <sup>13</sup>

LUCIDOTINI

<i>Lucidota californica</i> Mots. . . . .	...	9+X	Smith and Maxwell '53
<i>corrusca</i> <sup>14</sup> . . . . .	19 ♂	...	Stevens '06, '09
" L. . . . .	19 ♂, 20 ♀	9+X	Smith and Maxwell '53
sp., nr. <i>corrusca</i> L. . . . .	...	9+X	"

PHOTININI

<i>Pyractomena angulata</i> Say . . . . .	...	{ 9+X	"
<i>borealis</i> Rand. . . . .	...	{ 9+X+0-4 <sup>s</sup>	"
<i>Photinus consanguineus</i> <sup>15</sup> . . . . .	19 ♂, 20 ♀	9+X	Stevens '09
sp. . . . .	...	9+X	Smith and Maxwell '53

PHOTURINI

<i>Photuris pennsylvanica</i> <sup>16</sup> . . . . .	19 ♂, 20 ♀	9+X	Stevens '09
<i>pennsylvanica</i> complex . . . . .	...	9+X	Smith and Maxwell '53

## ii CLERIDÆ

<i>Thanasimus dubius</i> Fab.	. . . . .	8+Xy <sub>p</sub>	Smith '50
<i>Clerus nigripes rufiventris</i> Spin.	18 ♂	8+Xy <sub>p</sub>	Smith unpub.
<i>Trichodes nutalli</i> Kby.	. . . . .	8+Xy <sub>p</sub>	"

## 5. LYMEXYLOIDEA

MICROMALTHIDÆ<sup>17</sup>

<i>Micromalthus debilis</i> Lec.	. 10 ♂, 20 ♀	10 <sub>1</sub>	Scott '36
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## 6. MORDELLOIDEA

## i CEPHALOIDÆ

<i>Cephaloon lepturides</i> Newn.	. . . . .	8+Xy <sub>p</sub>	Smith unpub.
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ii MELOIDÆ<sup>18</sup>

## MELOINÆ

<i>Mylabris pustulata</i> <sup>19</sup>	. . . . . 22 ♂	10+Xy <sub>r</sub>	Asana <i>et al.</i> '42
<i>Melæ</i> sp.	. . . . . 20 ♂	9+Xy <sub>r</sub>	"

## LYTTINÆ

<i>Epicauta cinerea</i>	. . . . . 20 ♂	9+Xy	Stevens '09
<i>pennsylvanica</i>	. . . . . 20 ♂	9+Xy	"
<i>murina</i> Lec.	. . . . .	9+Xy <sub>p</sub>	Smith unpub.

## 7. ELATEROIDEA

## i ELATERIDÆ

## PYROPHORINÆ

## PYROPHORINI

<i>Adelocera rectangularis</i> Say	. 17 ♂	8+X	Smith unpub.
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## LEPTUROIDINI

<i>Limonius griseus</i> <sup>20</sup>	. . . . . 17 ♂	8+X	Stevens '09 <sup>20</sup>
<i>æger</i> Lec.	. . . . . 20 ♂	9+Xy <sub>p</sub>	Smith '50
<i>Ctenicera ochreipennis</i> Lec. <sup>21</sup>	. . . . .	10+Xy <sub>p</sub>	Smith unpub.

<i>hieroglyphica</i> Say	. . . . .	10+X	"
<i>propola propola</i> Lec.	. . . . . 21 ♂	10+X	"

<i>appressa</i> Rand.	. . . . .	10+Xy <sub>p</sub>	"
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<i>mediana</i> Germ.	. . . . .	10+Xy <sub>p</sub>	"
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<i>splendens</i> Zieg.	. . . . . 19 ♂	9+X	"
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<i>æripennis æripennis</i> Kby.	. . . . . 19 ♂	9+X	"
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<i>a. destructor</i> Brown	. . . . . 19 ♂	9+X	"
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<i>appropinquans</i> Rand.	. . . . . 19 ♂	9+X	"
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<i>semimetallica</i> Wlk.	. . . . .	9+X	"
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<i>nitidula</i> Lec.	. . . . .	8+X	"
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<i>rufopleuralis</i> Fall	. . . . .	8+X	"
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<i>arata</i> Lec.	. . . . .	8+X	"
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<i>inflata</i> Say	. . . . .	9+Xy <sub>p</sub>	"
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<i>Eanus maculipennis</i> Lec.	. . . . .	9+Xy <sub>p</sub>	"
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<i>estriatus</i> Lec.	. . . . .	9+Xy <sub>p</sub>	"
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ELATERINÆ

AGRIOTINI

*Agriotella bigeminata* Rand. . . . . 9+X Smith unpub.

ELATERINI

*Ampedus apicatus* Say . . . 19 ♂ 9+X ”  
*melshheimeri* Leng . . . . . 9+X ”  
*deletus* Lec. (?) . . . . . 9+X ”  
 sp., nr. *deletus* Lec. . . . . 9+X ”  
 ” . . . . . 10+X ”  
 sp., nr. *miniipennis* Lec. . . . . 9+X ”  
*fuscus* Lec. . . . . 9+X ”  
*luctuosus* Lec. . . . . 9+X ”  
 “*Elater* sp. I ” . . . 19 ♂, 20 ♀ 9+X Stevens '06  
 “*Elater* sp. II ” . . . 19 ♂ 9+X ”

MELANOTINI

*Melanotus castanipes* Payk. . . 18 ♂ . . . . . Smith unpub.  
*leonardi* Lec. . . . . 9+X ”  
 sp., nr. *communis* Gyll. . . 19 ♂ 9+X ”  
 sp. . . . . 18 ♂ . . . . . ”  
*trapezoideus* Lec. (?) . . 19 ♂ 9+X ”

CARDIOPHORINÆ

*Cardiophorus fenestratus* Lec. . . 22 ♂ 10+Xyp ”  
*gagates* Er. . . . . 10+Xyp ”  
*togatus* Horn . . . . . 10+Xyp ”  
*convexus* Lec. . . . . 10+Xyp ”

ii BUPRESTIDÆ

JULODINI

*Julodis whitthilli* . . . . . 24 ♂ 11+neoXY<sup>22</sup> Asana *et al.* '42  
*Sternocera nitidicollis* <sup>23</sup> . . . 26 ♂ 12+neoXY<sup>22</sup> ”  
*levigata* . . . . . 26 ♂ 12+neoXY<sup>22</sup> ”

CHALCOPHORINI

*Chalcophora lacustris* Lec. . . 21 ♂, 22 ♀ 10+X Smith unpub.  
*Euchroma gigantea* . . . . . 12+Xy Nichols '10

BUPRESTINI

*Dicerca prolongata* Lec. . . 20 ♂ 9+Xyp Smith unpub.  
*tenebrosa* Kby. . . . . 20 ♂ 9+Xyp ”  
*Buprestis fasciata* Fab. . . 20 ♀ . . . . . ”  
*Melanophila drummondi* Kby. 16 ♂ Xy ”  
*acuminata* DeG. . . . . 5+Xyp ”

CHRYSOBOTHRINI

*Chrysobothris dentipes* Germ. . . 16 ♂ 7+Xyp ”

AGRILINI

*Agrilus anxius* Gory . . . 22 ♂, 22 ♀ 10+Xyp : XX Smith '49  
*liragus* Barter and Brown . . 20 ♂, 20 ♀ 9+neoXY : XX ”  
 sp., nr. *pensus* Horn . . . . . Xyp Smith unpub.  
*politus pseudocoryli* Fish. . . . . 9+“XY” ”  
 sp. . . . . 9+neoXY ”

Unknown

“*Spruce borer* sp. I ” . . . . . 9+Xy Stevens '06  
 “*Spruce borer* sp. II ” . . . . . 10+Xy ”

## 8. BYRRHOIDEA

i *DERMESTIDÆ*

## DERMESTINI

<i>Dermestes talpinus</i> Mann.	. . . . .	8+Xy <sub>p</sub>	Smith unpub.
<i>lardarius</i> L.	. . . . .	8+Xy <sub>p</sub>	"
<i>signatus</i> Lec.	. . . . . 18 ♂	8+Xy <sub>p</sub>	"

## ANTHRENINI

<i>Anthrenus</i> sp.	. . . . .	8+Xy <sub>p</sub>	Smith '50
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ii *BYRRHIDÆ*

<i>Cytilus alternatus</i> Say	. . . . . 18 ♂	Xy	Smith unpub.
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## 9. CUCUJOIDEA

i *NITIDULIDÆ*

<i>Nitidula bipunctata</i> L.	. . . . .	9+Xy <sub>p</sub>	Smith '50
<i>rufipes</i> L.	. . . . .	9+Xy <sub>p</sub>	Smith unpub.

ii *CUCUJIDÆ*

<i>Oryzophilus surinamensis</i>	. . . . . 13-14 ♂	" 7 elements "	McMullen '28
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iii *EROTYLIDÆ*

<i>Triplax thoracica</i> Say	. . . . .	8+neoXY	Smith unpub.
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iv *COCCINELLIDÆ*

## COCCINELLINÆ

## HYPERASPINI

<i>Brachycantha ursina</i> Fab.	. . . . .	7+neoXY	Smith unpub.
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## SYNOYCHINI

<i>Synonycha grandis</i> Thunb.	. . . . . 20 ♂	9+Xy <sub>r</sub>	Yosida '44, '46
<i>Cælophora inæqualis</i> <sup>24</sup>	. . . . . 20 ♂	9+Xy <sub>r</sub>	(Yosida '49, '51)
<i>Aiolocaria mirabilis</i> <sup>25</sup>	. . . . . { 17 ♂ 20 ♀	8+X ...	(T. and Y. '37) (Yosida '49, '51)

## COCCINELLINI

<i>Coleomegilla maculata lengi</i> Timb.	20 ♂	9+Xy <sub>p</sub>	Smith unpub.
<i>Hippodamia tredecimpunctata</i> L.	20 ♀	...	Yosida '44
<i>t. tibialis</i> Say	. . . . . 20 ♂	9+Xy <sub>p</sub>	Smith '50
<i>Coccinella trifasciata</i> L.	. . . . .	9+Xy <sub>p</sub>	Smith unpub.
<i>transversoguttata</i> Fald.	. . . . .	9+Xy <sub>p</sub>	"
<i>bruchii</i> <sup>26</sup>	. . . . .	9+"XY"	(T. and Y. '37)
" Muls. <sup>26</sup>	. . . . . 18 ♂	8+Xy <sub>r</sub>	Yosida, '44
<i>crotschi</i> Lewis	. . . . . 20 ♂	9+Xy <sub>r</sub>	"
<i>axiridis</i> Pallas <sup>27</sup>	. . . . . 16 ♂	{ 7+Xy <sub>p</sub> 7+Xy <sub>r</sub>	Li '40 Yosida, '44
<i>Adalia bipunctata</i>	. . . . . 20 ♂	9+Xy	Stevens '06
" " L.	. . . . .	9+Xy <sub>p</sub>	Smith unpub.
<i>Cleis hudsonica</i> Csy.	. . . . . { 12 ♂ ...	5+"XY" 5+"XY"+ <sup>25</sup>	" "
<i>Anisocalvia duodecim-maculata</i> Gebl.	...	9+Xy <sub>p</sub>	"
<i>quatuordecimguttata</i> L.	. . . . . 20 ♂	9+Xy <sub>p</sub>	"
" " L. <sup>28</sup>	. . . . .	9+Xy <sub>r</sub>	Yosida '44
<i>Propylæa japonica</i>	. . . . .	9+Xy	(Yosida '49, '51)
<i>Anatis mali</i> auct.	. . . . . 18 ♂	8+neoXY	Smith unpub.



EPILACHNINÆ

<i>Epilachna borealis</i>	{ 18 ♂	8+Xy	Stevens '06
	{ 18 ♂, 18 ♀	...	Hoy '18
<i>nipponica</i> Lewis <sup>29</sup>	20 ♂	9+Xy <sub>r</sub>	Yosida '44
<i>vigintioctomaculata</i>	...	8+"XY"	(T. and Y. '37)
„ Mots. <sup>30</sup>	20 ♂	Xy	Yosida '48
<i>vigintioctopunctata</i> Fab.	18 ♂ <sup>31</sup>	Xy	„
<i>pustulosa</i> Kôno <sup>32</sup>	20 ♂	Xy	„
<i>chrysmelina</i> F. × <i>capensis</i> Thunb.	18 ♂	...	Strasburger '36
Unknown			
Various undetermined species	20 ♂	9+Xy	Stevens '09

10. TENEBRIONOIDEA

i ALLECULIDÆ

<i>Isomira quadristriata</i> Couper	20 ♂	9+Xy <sub>p</sub>	Smith '50, '52b
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ii TENEBRIONIDÆ

ERODIINÆ

<i>Erodium nitidicollis</i> Sol.	20 ♂	9+Xy <sub>r</sub>	Guénin '51b
<i>edmondi</i> Sol.	20 ♂	9+Xy <sub>r</sub>	„
<i>Leptonychus curvicornis</i> Peyer.	20 ♂	9+Xy <sub>r</sub>	„

TENTYRIINÆ

<i>Tentyria mucronata</i> Stev.	20 ♂	9+Xy <sub>r</sub>	Guénin '50
<i>subcosta</i> Sol.	20 ♂	9+Xy <sub>r</sub>	Guénin '51a
<i>Mesostema angustata præsa-</i> <i>hariana</i> Koch.	20 ♂	9+Xy <sub>r</sub>	„
Genus nr. <i>Hylocrinus</i> Csy. (Texas)	20 ♂	9+Xy <sub>p</sub>	Smith '52b
<i>Zopherus haldemani</i> Sallé <sup>33</sup>	16 ♂	7+Xy	Smith '52b, '53

ELENOPHORINÆ

<i>Elenophorus collaris</i> L.	26 ♂	12+Xy <sub>r</sub>	Guénin '50
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AKIDINÆ

<i>Akis bacarozzo</i> Schrank	16 ♂	7+neoXY	„
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PIMELIINÆ

<i>Pimelia bipunctata</i> Fab.	18 ♂	8+Xy <sub>r</sub>	„
<i>servilii</i> Sol.	18 ♂	8+Xy <sub>r</sub>	Guénin '51a
<i>aranacea</i> Sol.	18 ♂	8+Xy <sub>r</sub>	„
<i>grandis latesti</i> Sen.	18 ♂	8+Xy <sub>r</sub>	„
<i>angulata lestei</i> Peyer	18 ♂	8+Xy <sub>r</sub>	„
<i>subquadrata valdani</i> Guer.	18 ♂	8+Xy <sub>r</sub>	„
<i>Ocnera hispida</i> Forsk.	18 ♂	8+Xy <sub>r</sub>	„
<i>Prionochea coronata</i> Ol.	18 ♂	8+Xy <sub>r</sub>	„

BLAPTINÆ

<i>Blaps waltli</i> Seidl. <sup>34</sup>	34 ♂	15+3 XY	Nonidez '15
<i>lusitanica</i> Hbst.	{ 35 ♂	15+4 XY	Nonidez '14, '20
	{ 19 ♂, 20 ♀	8+2 XY : 4 X	Guénin '49
<i>gigas</i> L.	35 ♂, 38 ♀	15+4 XY : 8 X <sup>35</sup>	„
<i>mucronata</i> Latr.	36 ♂, 38 ♀	16+3 XY : 6 X <sup>35</sup>	„
<i>mortisaga</i> L.	36 ♂, 38 ♀ <sup>35</sup>	16+3 XY : 6 X	„
<i>lethifera</i> Marsh.	37 ♂, 38 ♀	17+2 XY : 4 X	„

PEDININÆ

<i>Opatrinus aciculatus</i> Lec.	20 ♂	9+Xy <sub>p</sub>	Smith '52b
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DIAPERINÆ

<i>Diaperis boleti</i> L.	14 ♂	6+neoXY	Guénin '50
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## ULOMINÆ

<i>Tribolium castaneum</i> Hbst.	. 20 ♂, 20 ♀	9+Xy <sub>p</sub> : XX	Smith '52a, b
<i>confusum</i> Duval	. 18 ♂, 18 ♀	8+neoXY: XX	"
<i>destructor</i> Uyttenb.	. 18 ♂, 18 ♀	8+neoXY: XX	"

## TENEBRIONINÆ

<i>Alobates pennsylvanica</i> DeG.	. 20 ♂	9+Xy <sub>p</sub>	Smith '52b
<i>Scotobates calceratus</i> Fab.	. ...	8+neoXY	"
<i>Upis ceramboides</i> L.	. 20 ♂	9+Xy <sub>p</sub>	"
<i>Tenebrio obscurus</i> Fab.	. 20 ♂	9+Xy <sub>r</sub>	Guénin '50
<i>molitor</i>	. 20 ♂, 20 ♀	9+Xy	Stevens '05 <sup>36</sup>
,, L.	. 20 ♂	{ 9+Xy <sub>r</sub> 9+Xy <sub>p</sub>	Guénin '50 Smith '50, '51 '52b
<i>picipes</i> Hbst.	. 20 ♂	9+Xy <sub>p</sub>	Smith '52b

## iii LAGRIIDÆ

<i>Arthromacra enea</i> Say	. 14 ♂	6+neoXY	Smith '50, '52b
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## iv MELANDRYIDÆ

## \*PENTHINI

<i>Penthe obliquata</i>	. 16 ♂	7+Xy	Stevens '09
,, Fab.	. ...	7+neoXY	Smith '52b

## MELANDRYINI

<i>Serropalpus substriatus</i> Hald.	. 20 ♂	9+Xy <sub>p</sub>	Smith '50, '52b
<i>Dircaea quadrimaculata</i> Say	. ...	9+Xy <sub>p</sub>	Smith '52b

## ii. SCARABÆOIDEA

## i SCARABÆIDÆ

## COPRINÆ

<i>Phanæus vindex</i> MacL. <sup>37</sup>	. 12 ♂	5+"XY"	Hayden '25
<i>igneus</i> MacL.	. 12 ♂	5+"XY"	"

## APHODIINÆ

## APHODIINI

<i>Aphodius fimetarius</i> L.	. ...	9+Xy <sub>p</sub>	Smith unpub.
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## EUPARIINI

<i>Atenius spretulus</i> Hald.	. ca. 20 ♂	...	"
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## \*GEOTRUPINÆ

<i>Geotrupes balyi</i> Jek.	. 22 ♂	Xy	"
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## MELOLONTHINÆ

## SERICINI

<i>Serica tristis</i> Lec.	. 20 ♂	9+Xy <sub>p</sub>	Smith '50
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## MELOLONTHINI

<i>Diplotaxis</i> sp. (Texas)	. 20 ♂	9+Xy <sub>p</sub>	Smith unpub.
<i>Phyllophaga gracilis</i> <sup>38</sup>	. 20 ♂, 20 ♀	9+Xy	Shaffer '20
<i>fusca</i> <sup>38</sup>	. 20 ♂, 20 ♀	9+Xy	"
<i>delata</i> <sup>38</sup>	. 20 ♂, 20 ♀	9+Xy	"
sp., <i>crenulata</i> group	. ca. 20 ♀	...	Smith unpub.
<i>tristis</i> <sup>38</sup>	. 20 ♂, 20 ♀	9+Xy	Shaffer '20

## RUTELINÆ

## ANOMALINI

<i>Popillia japonica</i> Newn. <sup>39</sup>	. 18 ♂	8+Xy	Yosida '49b
<i>Anomala corpulenta</i> Mots.	. 18 ♂	8+Xy	"
<i>rufocuprea</i> Mots.	. 18 ♂	8+Xy	"

RUTELINI			
<i>Pelidnota punctata</i> <sup>40</sup>	. . . . .	20 ♂, 20 ♀	9+Xy Shaffer '20
<i>Cotalpa lanigera</i>	. . . . .	20 ♂, 20 ♀	9+Xy "
DYNASTINÆ			
<i>Oryctes nasicornis</i> L. <sup>41</sup>	. . . . .	12 ♂	5+"XY" Prowazek '02
CETONIINÆ			
CETONIINI			
<i>Euphoria inda</i>	. . . . .	20 ♂	9+Xy Stevens '06
" " L.	. . . . .	...	9+Xyp Smith unpub.
<i>Glycyphana fulvitemma</i> Mots.	. . . . .	20 ♂	9+Xy Yosida '49b
TRICHIINI			
<i>Trichiotinus assimilis</i> Kby.	. . . . .	...	9+Xyp Smith unpub.
<i>Trichius fasciatus</i> L.	. . . . .	20 ♂	9+Xy Yosida '49b
ii LUCANIDÆ			
<i>Psalidoremus inclinatus</i> <sup>42</sup>	. . . . .	19 ♂	9+X (T. and Y. '37)
iii PASSALIDÆ			
<i>Popilius disjunctus</i> <sup>43</sup>	. . . . .	26 ♂, 26 ♀	12+Xy Shaffer '17
" " Ill.	. . . . .	26 ♂	12+neoXY Smith unpub.
12. CERAMBYCOIDEA			
i CERAMBYCIDÆ			
CERAMBYCINÆ			
ELAPHIDIONINI			
<i>Elaphidion</i> , prob. <i>parallelus</i>	. . . . .	...	9+Xyp Smith unpub.
Newn.			
LEPTURINI			
<i>Acmaeops proteus</i> Kby.	. . . . .	...	10+Xyp "
CLYTINI			
<i>Cyllene robinia</i> <sup>44</sup>	. . . . .	...	9+Xy Stevens '09
LAMIINÆ			
MONOCHAMINI			
<i>Monochamus notatus</i> Drury	. . . . .	...	9+Xyp Smith '50
<i>scutellatus</i> Say	. . . . .	...	9+Xyp Smith unpub.
<i>marmorator</i> Kby.	. . . . .	...	9+Xyp "
NIPHORINI			
<i>Pterolophia caudata</i>	. . . . .	20 ♂	9+Xy (Yosida '51)
GRAPHISURINI			
<i>Graphisurus obsoletus</i> Oliv.	. . . . .	...	9+Xyp Smith unpub.
PHYTŒCINI			
<i>Oberea tripunctata</i> <sup>45</sup>	. . . . .	...	Xy Stevens '09
" " Swed.	. . . . .	...	9+Xyp Smith unpub.
<i>mandarina</i> Fab.	. . . . .	...	9+Xyp "
<i>affinis</i> Leng	. . . . .	...	9+Xyp "
TETRAOPINI			
<i>Tetraopes tetrophthalmus</i> <sup>46</sup>	. . . . .	20 ♂	9+Xy Stevens '09
" "	. . . . .	20 ♂	9+XY <sup>47</sup> Snyder '34
" " Forst.	. . . . .	...	9+Xyp Smith unpub.
<i>femoratus</i>	. . . . .	20 ♂	9+XY <sup>47</sup> Snyder '34

## ii CHRYSOMELIDÆ

<b>*DONACIINÆ</b>			
<i>Donacia hirticollis</i> Kby.	. . .	13+Xy <sub>p</sub>	Smith unpub.
<i>subtilis</i> Kunze	. . .	13+Xy <sub>p</sub>	"
<b>*CRIOCERINÆ</b>			
<i>Lema trilineata</i>	. . . 32 ♂	15+Xy	Stevens '09
" " auct.	. . .	15+Xy <sub>p</sub>	Smith unpub.
<b>CRYPTOCEPHALINÆ</b>			
<i>Cryptocephalus venustus</i> Fab.	. ca. 22 ♂	ca. 12 <sub>II</sub>	"
<b>*EUMOLPINÆ</b>			
<i>Chrysochus auratus</i>	. . .	12+Xy <sub>r</sub>	Stevens '09
" " Fab.	. . .	12+Xy <sub>c</sub>	Smith unpub.
<b>*CHRYSOMELINÆ</b>			
<b>CHRYSOMELINI</b>			
<i>Labidomera clivicollis</i> <sup>48</sup>	. . .	16+Xy	Stevens '09
<i>Leptinotarsa signaticollis</i> <sup>49</sup>	. 33-34 ♂, 36 ♀	16+XX : 4 X	Wieman '10
<i>decemlineata</i> <sup>50</sup>	. . . 36 ♂	17+Xy	Stevens '06
" Stål.	. . . 35 ♂, 36 ♀	17+X : XX	Guénin and Scherler '52
" Say	. . .	17+X	Smith unpub.
<i>Calligrapha similis</i> <sup>51</sup>	. . .	11+X	Stevens '09
<i>philadelphica</i> L.	. . .	11+X	Smith unpub.
<i>multipunctata bigsbyana</i> Kby.	. . .	11+Xy <sub>p</sub>	"
<i>Chrysolina exanthematica</i> Wied. <sup>51</sup>	23 ♂	11+X	Yosida '44
<i>Chrysolina interrupta</i> auct. in part	34 ♂	16+Xy <sub>p</sub>	Smith unpub.
sp. . . . .	34 ? ♂	16+Xy <sub>p</sub>	"
<i>lapponica</i> <sup>52</sup>	. . .	16+Xy	Stevens '09
<i>tremula</i> auct.	. . .	16+Xy <sub>p</sub>	Smith unpub.
<i>Melasma ænea</i> <sup>53</sup>	. . .	16+Xy	(Yosida '51)
<i>populi</i> <sup>53</sup>	. . . 32 ♂	15+Xy <sub>r</sub>	"
<b>PHYLLODECTINI</b>			
<i>Phyllodecta americana</i> Schffr.	. 24 ♂	Xy	Smith unpub.
<i>variabilis</i>	. . . 24 ♂	11+Xy	Galán '31
<b>*GALERUCINÆ</b>			
<b>ATYSINI</b>			
<i>Trirhabda virgata</i>	. . . 28 ♂, 28 ♀	13+Xy	Stevens '06
<i>canadensis</i>	. . . 30 ♂, 30 ♀	14+Xy	"
" Kby.	. . . 30 ♂	14+Xy <sub>p</sub>	Smith unpub.
<i>Galerucella vaccinii</i> Fall	. . .	16+Xy <sub>p</sub>	"
<i>cavicollis</i> Lec.	. . .	16+Xy <sub>p</sub>	"
<i>nympheæ</i> L.	. . .	16+Xy <sub>p</sub>	"
<b>OIDINI</b>			
<i>Rhaphidopalpa femoralis</i> <sup>54</sup>	. . .	28+Xy	(Yosida '49, '51)
<b>DIABROTICINI</b>			
<i>Diabrotica duodecimpunctata</i> <sup>55</sup>	19, 20 ♂	9+X+0-4s	Stevens '08
<i>soror</i> <sup>56</sup>	. . . 19-21 ♂	9+X+0-4s	"
<i>Acalymma vittata</i> <sup>57</sup>	. { 21 ♂	10+X	"
	{ 21 ♂, 22 ♀	10+XX	Hoy '14, '18
<b>LUPERINI</b>			
<i>Luperus discrepans</i> Baly	. . .	15+neoXY	Yosida '44
<i>Luperodes præustus</i> Mots. <sup>58</sup>	. 32 ♂, 32 ♀	15+neoXY	" '49a
<b>AGELASTICINI</b>			
<i>Agelastica cærulea</i> Mots. <sup>59</sup>	. 24 ♂	11+Xy <sub>r</sub>	" '44

## HALTICINÆ

## BLEPHARIDINI

*Blepharida rhois* . . . . . 15+Xy<sub>p</sub> Stevens '06

## HALTICINI

*Haltica subplicata* Lec. . 23 ♂ 11+X Smith unpub.  
*chalybea* . . . . . 22 ♂ 10+X+y<sup>60</sup> Stevens '09  
*Argopus punctipennis*<sup>61</sup> . . . . . 24+Xy (Yosida '49, '51)

## \*HISPINÆ

*Anoplitis inæqualis* auct.<sup>62</sup> . . . . . 8+Xy<sub>p</sub> Smith '50  
*Chalepus dorsalis*<sup>62</sup> . . . . . 16 ♂ 7+Xy<sub>p</sub> Stevens '06

## \*CASSIDINÆ

*Chelymorpha cassidea*<sup>63</sup> . 22 ♂, 22 ♀ 10+Xy<sub>p</sub> "  
*Deloyala guttata*<sup>64</sup> . . . . . 18 ♂ 8+Xy Nowlin '06  
*Plagiometriona clavata*<sup>64</sup> . . 18 ♂ Xy Stevens '09  
*Agroiconota aurichalcea*<sup>64</sup> . . 22 ♂ 10+Xy Nowlin '06

## iii BRUCHIDÆ

## AMBLYCERINÆ

*Zabrotes subfasciatus* Boh. . 26 ♂, 26, 12+X+y : XX+s Minouchi '35  
 27 ♀

## BRUCHINÆ

*Callosobruchus maculatus*<sup>65</sup> . 19 ♂, 20 ♀ 9+X Braucr '28  
*Acanthoscelides obtectus* Say<sup>66</sup> 20 ♀ 9+"XY" Bushnell '36

## 13. CURCULIONOIDEA

## i PLATYSTOMIDÆ

*Euparius marmoreus* Oliv. . . . . 10+Xy<sub>p</sub> Smith '52c

## ii CURCULIONIDÆ

## OTTORHYNCHINÆ

## POLYDRUSINI

*Polydrusus pilosus* Gredl.<sup>67</sup> . . . . . 10+Xy Suomalainen  
 '40a, b  
*undatus* F.<sup>68</sup> . . . . . 10+XX Suomalainen  
 '40a  
*mollis* Ström. . . . . 22 ♀ 22<sub>1</sub> Parth. Suomalainen  
 '40a, b

## SCIAPHILINI

*Sciaphilus asperatus* Bonsd. . 33 ♀ 33<sub>1</sub> Parth. "

## THYLACITINI

*Strophosomus capitatus* DeG.<sup>69</sup> ca. 20 ♂, 22 ♀ 10+X : XX "  
*melanogrammus* Först. . 34 ♀ 31-35<sub>1</sub> Parth. "

## BARYNOTINI

*Barynotus mærens* F. . . . . 55<sub>1</sub> Parth. Suomalainen '47  
*obscurus* F. . . . . 44<sub>1</sub> Parth. Suomalainen  
 '40a, b

## BRACHYRHININI

*Brachyrhinus geniculatus* . . . . . 10+Xy : XX Suomalainen '47  
 Germ.<sup>70</sup>  
*inflatus* Gyll. . . . . 10+Xy "  
*i. salebrosus* Boh. . . . . 10+Xy Mikulska '49  
*arcticus* O.F. . . . . 22 ♂ 10+Xy : XX Suomalainen  
 '40a, '45

<i>armadillo</i> Rossi . . . . .	...	10+Xy : XX	Suomalainen '47
<i>bisulcatus</i> F. . . . .	...	10+Xy : XX	"
<i>fuscipes</i> Oliv. <sup>71</sup> . . . . .	{ 22 ♂	10+Xy	"
	{ ...	10+Xy	Mikulska '49
<i>morio</i> F. . . . .	...	{ 10+Xy <sub>p</sub> : XX	Suomalainen '47
		{ 10+Xy	Mikulska '49
<i>multipunctatus</i> F. <sup>72</sup> . . . . .	...	10+Xy	"
		{ 10+Xy : XX	Suomalainen '47
<i>niger</i> F. . . . .	...	{ 10+Xy	Mikulska '49
		{ 33 <sub>i</sub> Parth.	Suomalainen '47
<i>dubius</i> Ström. <sup>73</sup> . . . . .	...	44 <sub>i</sub> Parth.	Suomalainen
			'40a, b, '45
<i>repletus</i> Boh. . . . .	...	10+Xy	Mikulska '49
		33 <sub>i</sub> Parth.	Suomalainen
	{ 33 ♀		'45, '47
<i>scaber</i> L. . . . .	{ 44 ♀	42-44 <sub>i</sub> Parth.	Suomalainen
			'40a, b, '45, '47
<i>sensitivus</i> Scop. . . . .	...	10+Xy <sub>p</sub> : XX	Suomalainen '47
<i>austriacus</i> F. . . . .	...	10+XX	"
<i>corvus</i> Boh. . . . .	...	10+Xy	Mikulska '49
<i>equestris</i> Richt. . . . .	...	10+Xy	{ Suomalainen '47
			{ Mikulska '49
		{ 10+Xy : XX	Suomalainen '47
<i>gemmatus</i> Scop. . . . .	...	{ 33 <sub>i</sub> Parth.	"
<i>kollari</i> Gyll. . . . .	...	10+Xy	Mikulska '49
<i>obsidianus</i> Boh. . . . .	...	10+Xy	"
<i>obtusus</i> Boh. <sup>74</sup> . . . . .	...	10+Xy	"
<i>pupillatus</i> Gyll. . . . .	...	44 <sub>i</sub> Parth.	Suomalainen '47
<i>salicis</i> Ström. . . . .	...	{ 10+Xy <sub>p</sub> : XX	"
		{ 32 <sub>i</sub> Parth.	"
<i>singularis</i> L. . . . .	...	33 <sub>i</sub> Parth.	"
<i>sulcatus</i> F. . . . .	...	{ 34 <sub>i</sub> Parth.	"
		{ 33 <sub>i</sub> Parth.	Seiler '47
<i>ligustici</i> L. . . . .	ca. 30 ♀	33-35 <sub>i</sub> Parth.	Suomalainen
			'40a, b, '45
<i>ovatus</i> L. . . . .	33 ♀	30-34 <sub>i</sub> Parth.	"
<i>chrysops</i> Hbst. . . . .	...	10+XX	Suomalainen '47
<b>TRACHYPHLEGINI</b>			
<i>Trachyphleus bifoveolatus</i> Beck. . . . .	...	32-33 <sub>i</sub> Parth.	Suomalainen
			'40a, b
<b>EPISOMINI</b>			
<i>Episomus turritus</i> <sup>75</sup> . . . . .	...	9 <sub>ii</sub>	(T. and Y. '37)
<b>CURCULIONINÆ</b>			
<b>SITONINI</b>			
<i>Sitona lepidus</i> Gyll. <sup>76</sup> . . . . .	...	10+Xy <sub>p</sub>	Smith '50, '52c
<i>cylindricollis</i> Fähr. . . . .	...	10+Xy <sub>p</sub>	Smith '52c
<b>HYPERINI</b>			
<i>Hypera punctata</i> . . . . .	...	Xy	Stevens '09
<b>HYLOBIINI</b>			
<i>Hylobius abietis</i> L. . . . .	...	10+X	Suomalainen
			'40a, b
<i>congener</i> D.S. and M. . . . .	22 ♂	10+Xy <sub>p</sub>	Smith '52c
<b>CURCULIONINI</b>			
<i>Curculio obtusus</i> Blanch. . . . .	22 ♂	...	Smith unpub.

ANTHONOMINI			
<i>Anthonomus scutellatus</i> Gyll.	...	13+Xyp	Smith '52c
*CALENDRINÆ			
<i>Sitophilus granarius</i> L. <sup>77</sup>	12 ♀	5+"XX"	Inkmann '33
" "	24 ♂, 24 ♀	11+Xyp	Smith '52c
" "	12 ♀	5+"XX"	Tiegs and Murray '38
<i>oryza</i> L. <sup>77</sup>	11 ♂, 12 ♀	5+X:XX	Gunson '45
" "	22 ♂, 22 ♀	10+neoXY:XX	Smith '52c

SCOLYTOIDEA

SCOLYTTIDÆ

HYLESININÆ			
<i>Dendroctonus engelmanni</i> Hopk.	...	14+Xyp	Smith '52c
<i>Hylurgops pinifex</i> Fitch	...	14+Xyp	"
IPINÆ			
<i>Ips pini</i> Say	...	14+Xyp	"

Footnotes.—Quotations are from the original papers unless otherwise stated :

<sup>1</sup> Böving and Craighead (1931) regard this suborder as being logically considered most recent. <sup>2</sup> "Cicindellidæ" in Makino (1951). <sup>3</sup> "vulgaris"; not X<sub>1</sub>X<sub>2</sub>-Y♂, contra Makino (1951). <sup>4</sup> "primeriana". <sup>5</sup> Collected from the north shore of Lake Michigan, although it would not be expected east of Manitoba and Nebraska. <sup>6</sup> *Platynus sens* Leng. <sup>7</sup> "Palatinus" in Makino (1951). <sup>8</sup> "Chalenius" in Makino (1951); probably an incorrect determination (Smith, 1950). <sup>9</sup> Formerly placed in *Hydrophilus*. <sup>10</sup> Not in Carabidæ, contra Makino (1951). <sup>11</sup> "Listotrophus cingulatus". <sup>12</sup> Not necessarily genus *Staphylinus* (v. Makino, 1951). <sup>13</sup> All species listed have post-reductional division of the X-chromosome; not Cantharidæ, contra Makino (1951). <sup>14</sup> "Ellychnia". <sup>15</sup> "cansanguineus" (Makino, 1951). <sup>16</sup> "Photinus pennsylvanicus". <sup>17</sup> Böving and Craighead (1931), with other authors, consider this to be in a third, and most primitive, suborder, the Archostemata. The species listed has haploid parthenogenetic males. <sup>18</sup> *E. permogloanica* is not given in Stevens (1909), contra Makino (1951). <sup>19</sup> "Mylabris" (Makino, 1951). <sup>20</sup> "Limoneus" = "Linoneus" (Makino, 1951); not Stevens, '06, contra Makino (1951). <sup>21</sup> Species complexes in the genus *Ctenicera* separated according to Brown's arrangement as given in the supplements to Leng (1920). <sup>22</sup> "XO; X attached to an autosome". <sup>23</sup> "S. nitidicollis". <sup>24</sup> "Cælophola" (Makino, 1951). <sup>25</sup> "Ithone". <sup>26</sup> "bruckii" (Makino, 1951). <sup>27</sup> "Harmonia axyridis". <sup>28</sup> "Calvia 14-guttata L.". <sup>29</sup> "niponica". <sup>30</sup> " = nipponica" (Makino, 1951). <sup>31</sup> Contra Makino (1951). <sup>32</sup> "pusillosa". <sup>33</sup> Species has pre-metaphase stretch of autosomes and precession of sex chromosomes. <sup>34</sup> "walthi" of many cytologists, including Makino (1951). <sup>35</sup> Contra Makino (1951). <sup>36</sup> Not Stevens '06, contra Makino (1951). <sup>37</sup> "carnifex (L.)". <sup>38</sup> "Lachnosterna". <sup>39</sup> "Poppilia" (Makino, 1951). <sup>40</sup> "Pelidonata" (Makino, 1951). <sup>41</sup> Compare this complement with those of *Phaneus* spp. <sup>42</sup> "Paslidoremus" (Makino, 1951). <sup>43</sup> syn. *Passalus cornutus* Fab. <sup>44</sup> "Cylene robinia". <sup>45</sup> "Obera". <sup>46</sup> "tetraophthalmus". <sup>47</sup> Sex chromosomes as identified by Snyder are incorrect for the former species and, therefore, possibly for the latter. <sup>48</sup> "Doryphora clivicollis". <sup>49</sup> "signaticollis" in Makino (1951). <sup>50</sup> "Doryphora". <sup>51</sup> "Chrysomela". <sup>52</sup> "Lina laponica". <sup>53</sup> = *Chrysomela* L. <sup>54</sup> "Rhaphidopolpa" in Makino (1951). <sup>55</sup> This, the eastern subspecies, is *D. undecimpunctata howardi* Barber. <sup>56</sup> This, the western subspecies, is *D. u. undecimpunctata* Mann. <sup>57</sup> Formerly placed in *Diabrotica*. <sup>58</sup> = *Luperus* auct. = "Luperoides" (Makino, 1951). <sup>59</sup> "cærulea". <sup>60</sup> It is not improbable that this is an XO species, the "y" not associating with the X because it is a supernumerary chromosome. The generic name is alternatively *Altica*. <sup>61</sup> "A. orientalis". <sup>62</sup> Formerly placed in *Odontota* Chev. <sup>63</sup> syn. *C. argus* Licht. <sup>64</sup> "Coptyocyla". <sup>65</sup> "Bruchus quadrimaculatus". <sup>66</sup> Not in Curculionidæ, contra Makino (1951). <sup>67</sup> Suomalainen uses the European variant *Polydrosus*. <sup>68</sup> syn. *tereticollis* DeG. <sup>69</sup> syn. *Strophosomus rufipes capitatus* DeG. = *Strophosomus* in Makino (1951). <sup>70</sup> American authors refer to the genus as *Brachyrhinus*. Europeans use *Otiorrhynchus* (= "Otiorrhynchus"). <sup>71</sup> A variety of *clavipes* Bond. <sup>72</sup> syn. *irritans* Hbst. <sup>73</sup> syn. *nodosus* O. Müll. <sup>74</sup> syn. *graniventris* Mill. <sup>75</sup> "turtus" <sup>76</sup> = *flavescens* Marsh. nec. F. <sup>77</sup> syn. *Calandra*.

## SUMMARY AND ABSTRACT

Approximately 340 species and subspecies of Coleoptera are listed of which about one-half are determinations made by the author. The number of component genera totals 179, the number of families 33. The commonest sex-determining mechanisms are Xy, neo-XY, and XO as follows:—

Xy :	193	species	in	112	genera	in	24	families
neo-XY :	29	„		24	„		12	„
XO :	60	„		30	„		9	„

The distribution of species, genera, subfamilies, and families by haploid number of autosomes and by sex-chromosome type is given graphically. Parthenogenesis occurs in two families; compound sex chromosomes are found in a third and possibly a fourth.

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#### ADDENDUM

Since this list was compiled, reprints of three papers have been received: Virkki (*Ann. Zool. Soc. Zool. Bot. Fenn.* "Vanamo", 14, 1-104, 1951) provides information on 30 additional species in the Scarabæidae and new determinations for *Trichius fasciatus* L. ( $2n=19$ , *contra* Yosida herein) and *Oryctes nasicornis* L. ( $2n=18$  *contra* Prowazek, *v.* footnote 42 herein); Guénin (*Rev. suisse Zool.*, 59, 277-282, 1952) reports that four European species of *Cicindela* have XXXY:XXX/XXX sex-determining mechanisms; and Yosida (*Papers Co-ord. Comm. Res. Genet.*, 3, 41-49, 1952) gives determinations for another carabid and another chrysomelid, besides giving *Silpha perforata* Gebler as  $2n=20$  and 21 (*contra* Yosida, 1951, *v.* Makino, 1951).