DROSOPHILA

Information Service

40

January 1965

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Prepared at the
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UNIVERSITY OF OREGON
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- Wielen, P. van der Netherlands, Haren
- Wildermuth, H. Switzerland, Zürich
- Wilkerson, R. D. Oak Ridge, Tennessee
- Williams, C. R. Philadelphia, Pennsylvania
- Williams, G. Raleigh, North Carolina
- Williams, J. Raleigh, North Carolina
- Will, C. J. Berkeley, California
- Wilson, A. Raleigh, North Carolina
- Wilson, F. D. Austin, Texas
- Wilson, J. Riverside, California
- Wilson, L. P. Wellesley, Massachusetts
- Wilson, R. Salt Lake City, Utah
- Wilson, S. P. Lafayette, Indiana
- Wind, H. Germany, Münster
- Wing, M. Raleigh, North Carolina
- Wolf, E. Germany, Berlin
- Wolff, M. Washington, D. C.
- Wolff, S. Oak Ridge, Tennessee
- Wolstenholme, D. R. Germany, Tübingen
- Woodbury, L. Logan, Utah
- Woods, J. Lebanon, Beirut
- World, J. P. Madison, Wisconsin
- Wrathall, J. Salt Lake City, Utah
- Wright, C. P. Salt Lake City, Utah
- Wright, E. Y. Baltimore, Maryland
- Wright, T. R. F. Baltimore, Maryland
- Wu, I. S. Korea, Kwangju
- Würgler, F. E. Switzerland, Zürich
- Yamaguchi, E. Japan, Chiba-City
- Yamaguchi, H. Japan, Misima
- Yamazaki, T. Japan, Misima
- Yanders, A. F. East Lansing, Michigan
- Yang, H. L. Austin, Texas
- Yarbrough, K. Raleigh, North Carolina
- Yen, T. T. T. Chapel Hill, North Carolina
- Yoon, J. Austin, Texas
- Yoon, K. Austin, Texas
- Yoon, S. B. Madison, Wisconsin
- Yoshikawa, I. Japan, Chiba-City
- Yost, H. T. Amherst, Massachusetts
- Young, S. S. Y. Australia, Sydney
- Ytterborn, K. Sweden, Stockholm
- Yuki, S. Japan, Kobe
- Zambruni, L. Italy, Milano
- Zimmer, K. G. Germany, Karlsruhe
MATERIALS REQUESTED OR AVAILABLE

DuWayne C. Englert, Department of Zoology, Southern Illinois University, Carbondale, Illinois, would like to receive any reprints that are available in order to build up the departmental library.

C. A. Mourão, Departamento de Biologia Geral - Faculdade de Filosofia, Ciências e Letras, São José do Rio Prêto, São Paulo, Brasil, would be grateful to obtain reprints on speciation in Drosophila and reprints on systematics of Drosophila.

John C. Neeley, Oregon State University, would appreciate a triploid stock with free X-chromosomes from anyone with such a stock.

F. Mainx, Institut f. Allgemeine Biologie, University of Vienna, Wien IX, Schwarspanierstr. 17, would appreciate obtaining strains of Megaselia scalaris (=Aphiocella xanthina) from different places as well as strains of other species of Phoridae easily bred in the laboratory.

ANNOUNCEMENT

SEVENTH DROSOPHILA RESEARCH CONFERENCE: May 8 and 9, 1965

In accordance with the decision reached at the 6th (Madison, Wisconsin) Drosophila Conference, the next meeting will be held in Seattle, Washington. I have chosen May 8th and 9th as reasonable dates. However, there is still time to change, and I invite any suggestions and objections both as to date and as to the format of the meetings.

Any such suggestions may be sent to:

L. Sandler
Department of Genetics
University of Washington
Seattle, Washington
EVERY THOUGHTFUL STUDENT OF GENETICS
will want to add these works to their personal
permanent collections

GENETICS AND EVOLUTION
The selected papers of
A. H. Sturtevant
W. H. Freeman and Co., San Francisco 1961
334 pp., 40 illustrations, 113 tables; $7.50

STUDIES IN GENETICS
The selected papers of
H. J. Muller
Indiana University Press, Bloomington, 1962
618 pp. $4.95 paper; $10.00 clothbound

BIBLIOGRAPHY ON THE GENETICS OF DROSOPHILA
Part IV
I. Herskowitz
344 pp., 3305 references, 1957 through 1962
$4.95 hard cover edition
McGraw Hill Book Company
January 1965

Melanogaster - Stocks

40:9

AMHERST, MASSACHUSETTS: AMHERST COLLEGE

Wild Stocks

1 Oregon-R: generation 438 on 64i22, inbreeding
2 Oregon-R: mass culture, from $ #1 at generation 100
3 Oregon-R: mass culture, from $ #1 at generation 200
4 Oregon-R: mass culture, from $ #1 at generation 300
5 Oregon-R: mass culture, from $ #1 at generation 400
6 Oregon-R-C
7 Oregon-S
8 Samarkand 204: inbred for 204 generations; mass culture since 53h4
9 Samarkand 204-125: from $ #8, inbreeding, generation 125 on 64i22
10 Samarkand 204-100: mass culture, from $ #9 at generation 100

Chromosome 1

11 B
12 B Bx3/y w f:=
13 Basc
14 Basc/f:=
15 Bx
16 cm
17 cm ct 6
18 cm ct 6 sn 2
19 cm ct 6 sn 3
20 cm ct 6 sn 2 oc/y f:=
21 cm ct 6 sn 4 sn/y f:=
22 cm ct 6 sn y
23 cm ct 6 sn oc ptg/y f:=
24 cm ct 6 sn sn/y f:=
25 cm ct 6 sn/y f:=
26 cm ct 6 sn 36/4
27 cm ct 6 sn 36a/y f:=
28 cm ct 6 sn sn oc ptg/y f:=
29 cm sn 3
30 cm sn
31 cm sn ;Ubx 130 s /T(2;3)Xa
32 ct 6
33 ct 6 oc/y f:=
34 ct 6 oc/y f:=
35 ct 6 sn sn 2/y f:=
36 Ext/FM6
37 f car; Ubx 130 s /T(2;3)Xa
38 f od car
39 g
40 g2 sd
41 g2 pl
42 g3
43 g3 oc
44 g3 53d
45 g3 oc
46 g3 oc
47 g3
d
48 g3
d
49 g3
50 g3
d
51 g3
52 g3
53 g3
54 g3
55 g3
56 g3
57 g3
58 g3
59 g3
60 g3
61 g3
62 g3
63 g3
64 g3
65 g3
66 g3
67 g3
68 g3
69 g3
70 g3
71 g3
72 g3
73 g3
74 g3
75 g3
76 g3
77 v w
78 v w
79 v w
80 v
81 v
82 v
83 w+
84 w
85 w
86 w
87 w
88 w
89 w
90 w
91 w
92 w
93 w
94 w sd
95 y ct 6
96 y ct 33 ras 2 f
97 y g 53d sd/+:=
98 y ras 2 f
99 y ras 2 f/Basc
100 y ras 2 f/Basc
101 y ras 2 f/Basc
102 y ras 2 f/Basc
103 y ras 2 f/Basc

Chromosome 2

104 a px or
105 b
106 b vg bw 45a 2
107 B1/Cy, bw 45a sp or 45a
108 Bl/Roi, bw 45a sp or
109 Bl L2/Cy, sp
Inversions

* \( \text{In}(1) \text{AM} \) in stocks 54, 174
* \( \text{Ins}(1) \text{Basc} \) in stocks 13, 14, 99, 101
* \( \text{In}(1) \text{CLB} \) in stock 102
* \( \text{In}(1) \text{PM6} \) in stocks 36, 179, 180, 181, 182, 183, 184, 185, 186
175 \( \text{In}(1) \text{scJ1} \), sc
176 \( \text{In}(1) \text{sg}1 \); Del 84
* \( \text{Ins sc}^* \) \( \text{V1} \) sc in stock 60
* \( \text{In}(2) \text{bw}1 \) (Pm) in stocks 171, 172
* \( \text{Ins}(2) \text{Cy} \) in stocks 107, 109, 119, 122, 161, 171, 172, 177
177 \( \text{In}(2) \text{S}^* \) \( \text{660} / \text{Cy} \), E-S
* \( \text{Ins}(2) \text{L}t \), (2R)Cy in stocks 108, 123, 127, 128
* \( \text{Ins}(3) \text{DCxF} \) in stocks 149, 171
* \( \text{In}(3) \text{Mo}, \text{Sb} \) sr in stocks 171, 172
* \( \text{Ins}(3) \text{Payne(LVM)} \) in stocks 133, 135
* \( \text{Ins}(3) \text{TM1}, \text{D}^* \) \( \text{ri sbd}^* \) in stocks 153, 154, 155
* \( \text{Ins}(3) \text{Ubx}^* \) in stocks 31, 37, 134, 155, 173

Chromosome 4

157 \( \text{ci}_1 \) ey \( R \)
158 \( \text{ci}^*_2 \) /ey \( D \)
159 ey \( \text{pol} \)
160 spa \( \text{pol} \)

Multiple Chromosomes

161 ras \( 45a \) \( / y \) \( f=; \text{B1/Cy}, \)
162 \( \text{bw} \) \( 51h25 \) \( 50k \)
163 \( \text{bw} \) \( 51h25 \) \( 50k \) \( \text{pol} \)
164 \( \text{bw/e} \) \( \text{pol} \)
165 \( \text{bw/e} \) \( \text{spa} \)
166 \( \text{bw/e} \) \( 45a \)
167 \( \text{net} \) \( 45a \) \( \text{or} \) \( 50k \) \( \text{ru} \) \( \text{bv} \)
168 \( \text{vg} \) \( 51h25 \) \( \text{se} \) \( 50k \) \( \text{ru} \) \( \text{bv} \)
169 \( \text{vg} \) \( 51h25 \) \( \text{se} \) \( 50k \) \( \text{pol} \)
170 \( \text{vg} \) \( 2 \) \( \text{se} \) \( \text{spa} \)
171 \( \text{Cy}, \) \( \text{sp} / \text{Pm}, \) \( \text{dp} \) \( \text{b}; \text{DCxF}, \)
172 \( \text{Cy} \) \( \text{sp} / \text{Pm}, \) \( \text{dp} \) \( \text{b}; \text{H/Sb} \) \( \text{sr} \)
173 \( \text{Ubx}^* \) \( 50 \) \( \text{e}^* / \text{T(2;3)Xa} \)

Deficiencies

174 \( \text{Dr}(1) \) \( 1 \)
* \( \text{Dr}(2) \) \( \text{vg} \) \( ^* \) \( \text{D} \) in stock 122
* \( \text{Dr}(2) \) \( \text{vg} \) \( 1 \) \( \text{in stock 123} \)
Translocations

* T(y;")E in stock 112
* T(Y;2;3)E in stock 140
178 T(2;3)gl
* T(2;3)Xa in stocks 31, 37, 173

Triploids

179 cm ct 3 sn/FM6, y 31d sc 8 dm B & FM6
180 cm ct 3 sn/FM6, y 31d sc 8 dm B & FM6
181 ct sn/FM6, y 31d sc 8 dm B & FM6
182 ct sn/FM6, y 31d sc 8 dm B & FM6
183 y m/FM6, y 31d sc 8 dm B & FM6
184 vs cm/FM6, y 31d sc 8 dm B & FM6
185 wy 2 r/FM6, y 31d sc 8 dm B & FM6
186 wy 2 r 5sd/FM6, y 31d sc 8 dm B & FM6

URBANA, ILLINOIS: UNIVERSITY OF ILLINOIS
Behavior Genetics Laboratory, Department of Psychology

Forward Selection

1. Negative geotaxis - over 140 generations of selection for performance in mass screening maze.
2. Positive geotaxis - over 140 generations of selection for performance in mass screening maze.

Reverse Selection

3. Negative reverse - over 90 generations of reverse selection for performance in mass screening maze, beginning at Generation 52 of forward selection for negative geotaxis.
4. Positive reverse - over 90 generations of reverse selection for performance in mass screening, beginning at Generation 52 of forward selection for positive geotaxis.

Inbred (Brother-Sister)

5. Negative geotaxis - two separate lines with over 30 generations of inbreeding beginning at Generation 110 of forward selection for negative geotaxis.
6. Positive geotaxis - three separate lines with over 30 generations of inbreeding beginning at Generation 110 of forward selection for positive geotaxis.

CARBONDALE, ILLINOIS: SOUTHERN ILLINOIS UNIVERSITY
Department of Zoology

No change from Stock List in DIS 38:13 except for the following correction:

Stock No. 10 should read b vg bw instead of B
### Wild Stocks

1. Canton-S
2. Oregon-R

### Chromosome 1 (X)

<table>
<thead>
<tr>
<th>Gene</th>
<th>Chromosome 1 (X)</th>
</tr>
</thead>
<tbody>
<tr>
<td>11 B</td>
<td></td>
</tr>
<tr>
<td>12 g 2</td>
<td></td>
</tr>
<tr>
<td>13 pna</td>
<td></td>
</tr>
<tr>
<td>14 sc B</td>
<td></td>
</tr>
<tr>
<td>15 scSi Y/y sc a Y f; sc 8 2 X Y</td>
<td></td>
</tr>
<tr>
<td>16 sc B Ins w sc &quot;Basc&quot;</td>
<td></td>
</tr>
<tr>
<td>17 w</td>
<td></td>
</tr>
<tr>
<td>18 w &amp; f</td>
<td></td>
</tr>
<tr>
<td>19 X 2 Y y v bb</td>
<td></td>
</tr>
<tr>
<td>20 y ac sc pn &amp; Y f;</td>
<td></td>
</tr>
<tr>
<td>21 y w</td>
<td></td>
</tr>
<tr>
<td>22 y cv m f car &amp; y f;</td>
<td></td>
</tr>
<tr>
<td>23 y cv v f car</td>
<td></td>
</tr>
<tr>
<td>24 y Dp(y 3 sc 2 3 Y &amp; Y f;</td>
<td></td>
</tr>
<tr>
<td>25 y w sp</td>
<td></td>
</tr>
<tr>
<td>26 y 3 sc 2 Y Y In 49 Y 2 Y &amp; Y f;</td>
<td></td>
</tr>
<tr>
<td>27 y 3 sc 2 Y &amp; Y f;</td>
<td></td>
</tr>
<tr>
<td>28 y 3 sc 2 Y</td>
<td></td>
</tr>
<tr>
<td>29 y sp 6, sn 1 Y, 3 Y &amp; Y f;</td>
<td></td>
</tr>
<tr>
<td>30 y 1 Y</td>
<td></td>
</tr>
<tr>
<td>31 Y a W Y W</td>
<td></td>
</tr>
<tr>
<td>32 Y X In 49 ptg oc sn 5 Y &amp; Y ac n ptg car sn In 49 Y(no free Y)</td>
<td></td>
</tr>
<tr>
<td>33 &quot;(Tester-1&quot;) y ac pn w rb Wy 2 Y 2 &amp; Y f; = sc 2 / Cy</td>
<td></td>
</tr>
<tr>
<td>34 &quot;(Tester-2&quot;) y w 2 cm wy 2 Y &amp; Y f; = sc 2 / Cy</td>
<td></td>
</tr>
<tr>
<td>35 &quot;(Tester-3&quot;) y 2 cm ras 2 Y &amp; Y f; = sc 2 / Cy</td>
<td></td>
</tr>
</tbody>
</table>

### Sterilizer ("sz") Stocks (36-45)

<table>
<thead>
<tr>
<th>Gene</th>
<th>Sterilizer (&quot;sz&quot;) Stocks (36-45)</th>
</tr>
</thead>
<tbody>
<tr>
<td>36 &quot;(sz+w)&quot; Y L x y S</td>
<td></td>
</tr>
<tr>
<td>37 &quot;(sz w)&quot; Y L x y S</td>
<td></td>
</tr>
<tr>
<td>38 &quot;(sz bw)&quot; Y L x y S</td>
<td></td>
</tr>
<tr>
<td>39 &quot;(sz e)&quot; Y L x y S</td>
<td></td>
</tr>
</tbody>
</table>

### Chromosome 2

<table>
<thead>
<tr>
<th>Gene</th>
<th>Chromosome 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>61 b nub pr</td>
<td></td>
</tr>
<tr>
<td>62 bw</td>
<td></td>
</tr>
<tr>
<td>63 cn</td>
<td></td>
</tr>
<tr>
<td>64 cn bw</td>
<td></td>
</tr>
<tr>
<td>65 dp</td>
<td></td>
</tr>
<tr>
<td>66 dp</td>
<td></td>
</tr>
<tr>
<td>67 dp</td>
<td></td>
</tr>
<tr>
<td>68 dp t x s p cn bw s p 2 (1 2') Y x, Ins cn bw sp</td>
<td></td>
</tr>
<tr>
<td>69 dp L x b/SM5, al 1 Cy 1 2 s p</td>
<td></td>
</tr>
<tr>
<td>70 dp</td>
<td></td>
</tr>
<tr>
<td>71 dp v 2/SM5, al 1 2 Cy 1 2 s p 2</td>
<td></td>
</tr>
<tr>
<td>72 dp</td>
<td></td>
</tr>
<tr>
<td>73 M (2) s7 bw D/dp X Y, Ins pr cn 2 s p</td>
<td></td>
</tr>
<tr>
<td>74 vg</td>
<td></td>
</tr>
<tr>
<td>75 vg bw</td>
<td></td>
</tr>
</tbody>
</table>

### Chromosome 3

<table>
<thead>
<tr>
<th>Gene</th>
<th>Chromosome 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>81 e</td>
<td></td>
</tr>
<tr>
<td>82 st</td>
<td></td>
</tr>
<tr>
<td>83 tra/T(2;3) Me</td>
<td></td>
</tr>
</tbody>
</table>

### Chromosome 4

<table>
<thead>
<tr>
<th>Gene</th>
<th>Chromosome 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>91 Cat/ci</td>
<td></td>
</tr>
<tr>
<td>92 ci gvl ey R sv</td>
<td></td>
</tr>
<tr>
<td>93 spa</td>
<td></td>
</tr>
</tbody>
</table>

### Multiple Chromosomes

<table>
<thead>
<tr>
<th>Gene</th>
<th>Multiple Chromosomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>101 bw</td>
<td></td>
</tr>
<tr>
<td>102 sc</td>
<td></td>
</tr>
<tr>
<td>103 X</td>
<td></td>
</tr>
</tbody>
</table>

### Madison, Wisconsin: University of Wisconsin

Department of Zoology

Wild Stocks

- Canton-S
- Oregon-R

Chromosome 1 (X)

- B
- g 2
- pna
- sc B
- scSi Y/y sc & Y f; sc 2 X Y
- sc B Ins w sc "Basc"
- w
- w & f
- X 2 Y y v bb
- y ac sc pn & Y f;
- y w
- y cv m f car & Y f;
- y cv v f car
- y Dp(y 3 sc 2 Y & Y f;)
- y w sp
- y 3 sc 2 Y Y In 49 Y 2 Y & Y f; / Y sc 2 Y
- y 3 sc 2 Y Y & Y f;
- y 3 sc 2 Y
- y sp 6, sn 1 Y, 3 Y & Y f;
- y 1 Y
- Y a w Y W
- Y X In 49 ptg oc sn 5 Y & Y ac n ptg car sn In 49 Y(no free Y)
- "(Tester-1") y ac pn w rb Wy 2 Y 2 & Y f; = sc 2 / Cy
- "(Tester-2") y w 2 cm wy 2 Y & Y f; = sc 2 / Cy
- "(Tester-3") y 2 cm ras 2 Y & Y f; = sc 2 / Cy

Sterilizer ("sz") Stocks (36-45)

- Y L x y S
- Y L x y S
- Y L x y S
- Y L x y S & Y v f; = e

Multiple Chromosomes

- bw
- sc
- sm
- X / Y f; = ca K-pn

Sterilizer ("sz") Stocks (36-45)

- Y L x y S
- Y L x y S
- Y L x y S
- Y L x y S & Y v f; = e
Wild Stocks

1. Canton-S
2. Crimea
3. Oregon-R (Chicago)
4. Oregon-R (Madison)
5. Oregon-R-1
6. Oregon-R-1
7. Samarkand
8. Swedish-B
9. Urbana

Chromosome 1 (X)

b1 B
b2 br w ec rb+4/FM1, y+31d sc8 w lz B
b3 car
b4 cm
b5 cv f
b6 ec
b7 f
b8 ma
b9 ps/FM4, y+31d sc dm B
b10 pn
b11 sc cv v dwx/FM6, y+31d sc dm B
b12 sc cv v f B/y f:+

Chromosome 2

c1 al dp b pr c px sp/apl

c2 al dp b pr on vg c2a px bw mr sp/s2

Chromosome 3

d1 bx 34e

d2 cd

d3 e

d4 e w o ro

d5 Gl Sb/Ins LV1

d6 h

d7 Ly Dfd kar ry26/In(3)MRS, M34 ry2 Sb

d8 ru h th st cu sr e3 ca (rucuca)

d9 ry1

d10 ry2

d11 se

d12 ss

d13 st

d14 Ubx120/D-138

Chromosome 4

e1 btD/ciD

e2 Ce/spa

e3 ci eyK

e4 ey Cat D

e5 sp/a ci
Multichromosomal

f1  cv;In(3)MRS, M34 ry^2 Sb/ubx130 (1;3)
f2  sc cv f;In(3)MRS, M34 ry^2 Sb/ubx130 (1;3)
f3  v;tra/C(3)X(1;3)
f4  y f:=;ca K-pn(1;3)
f5  y f:=;ru h th s t cu sr e^s ca(1;3)
f6  sc InS00 sc ;Cy/Pm, ds^39k; Sb/ubx130 (1;3;2)
f7  v;cn;st(1;2;3)
f8  y;bw;e;ey(1;2;3)
f9  y f:=;bw;e;ci ey(1;2;3;4)
f10  bw;is(2;3)
f11  bw;is(2;3)
f12  cn bw;g(2;3)
f13  Cy, sp^2/Pm, dp.b;H/Sb sr(2;3)
f14  SM1, al^2 Cy sp^2/Pm, ds^39k;ubx130 / Sb(2;3)
f15  bw;e;ci ey(2;3;4)

Attached-XY

g1  Y^SX.Y^L, In(1)EN, Y^S B y.Y^L/pn

g2  Y^SX.Y^L, In(1)EN, Y^S B y.Y^L/
         \(y^2 su-w \ w^da \ bb\)

X with Y arm attached

h1  \(\frac{\chi^+}{\chi^+};y^{1/L};bw\)
h2  \(f \cdot Y^S/Y^L; \ & sc \ v f\)
h3  y ct^6 f;Y^L/Y^S and y f:=

Altered Y

i1  sc.Y.B(Y^S,Y^L;bb+Y^+);y v &
         \(y^2 su-w \ w^a \ bb\)

Attached 3

j1  A(3L)3, ri;A(3R)3, sr

Translocations

k1  T(1;3)9, cu kar ry^26 1 26 Sb Ubx/+ &
         y f:=
k2  T(1;3)9, cu kar ry^26 1 26 Sb Ubx/rh h
         th st cu sr e^s ca & y f:=;ru h th
         st cu sr e^s ca

Special Lethals (Amino Acid Mutants) See Novitski, DIS 37:51

x1  Alaful-1  x6  Glufultyrless-1  x11  Tyrproless-1
x2  Gluful-1  x7  Glufultyrless-2  x12  Tyrproless-2
x3  Gluful-3  x8  Glufultyrless-3  x13  Tyrproless-3
x4  Gluful-4  x9  Tyrrless-1  x14  Glufultyrproless-1
x5  Glufulproless-1  x10  Tyrrless-2  x15  Phenylfultyrless-1

The stock list remains essentially the same as that appearing in DIS 38:10, with the following changes:

Stock Additions

Corrections

Removed from List

Chromosome 1

31a  \(g^2 pl/FM3, y^{1/d} sc^8\)

DM B 1

Translocation

160  T(Y;2)C/pr en

NEW HAVEN, CONNECTICUT: YALE UNIVERSITY
Department of Biology
Note: Only stocks not commonly carried in other laboratories are listed.

Wild type

1 Chicago wild-type

Chromosome 1

2 Bx^3_{46}ma-1
3 Bx^3_{46}
4 fua^7a/PM-1J1
5 I(1)J1, sc^4/De1(1)24
6 li^x
7 p^x
8 p^x
9 p^x
10 sc^7a
11 sc^z1
12 sc^z2
13 sc^z3
14 sc^z^n
15 w^y bb^y f=:
16 y ac br pn w^e spl
17 y ac z ec ct
18 y^a

Chromosome 2

19 bw^z75
20 bw^z1
21 bw^z^2/Cy c^2_L^4 sp^2
22 In(2R)^w^m_{39} Cy/al dp B1 c px sp
23 In(2L)1^w^m_{29}
24 T(z;3)lt
25 pr ltd

Chromosome 3

27 ru h th st cu sr e^s ca

Chromosome 4

28 spa^c_D

Inversion-X

29 In(1)AM/M(1)o f
30 In(1)EN, y/y f=:
31 In(1)rs^t, y w^2 b^s/De1(0)29
32 In(1)sc^4, y sc^4 f v cv w^f/y w

Deficiencies - Duplications - X Chromosomes

33 Ins(1)sc^8^d, sc^4 dl-49 w^8
34 Ins(1)sc^8^S,y sc^4 B InS/sc^8 Y/y f=:
35 In(1)sc^8, sc^8
36 In(1)sc^260, sc^8
37 In(1)sc^8 S1 Y^8
38 Ins(1)sc^8, sc^8 car m^w sc^8
39 In(1)dl-49, y w^1z
40 In(1)w^6, w^6
41 In(1)y^y, y

Reversed Acrocentric

42 w^1/13 Vco
43 Df(1)^w^m_{13}, y w^e spl dm; Dp(1;3)Vco/y w^f
44 Df(1)^w^m_{12}, y w^1; Dp(1;3) Vco/y w^f
45 Dp(1;28)w^51b7, y w^1; Dp(1;3) w^f
46 Dp(1)^w^1 m264-58a, w y^+ Y^+ Y^+/sc^Y y^0
47 Dp(1)^w^1 m264-58a, Y/; y w^+ Y^+ Y^+/sc^Y
48 Dp(1)^w^1 m264-58a, Su-V/Su-V; Y^S w y^L y^+ Y^w
49 Dp(1)^w^1 m264-58a, Su-V^+ Su-V^+; X^S w y^L y^+ Y^w

Reversed Acrocentrogenic

50 B^S sc^8/Ins(1)sc^7 AM

Ring-X

51 X^c^1, y/sc^8 Y/y v f car
52 X^c^1, y v/y w f=:

Reversed Acrocentric

53 RA, y ac sc pn -- In(1)sc^8 Ig(1)sc^8
(C.O.J-3) y ac sc^8 w^1/sc^8 X, y

X with Y fragments Attached

54 FR-1, Y^S y/cv v/f/y f=:
55 y Hw/Y^L y/w^g
56 FR-1, Y^L y/cv v/f/sc^8 Y/y v f car
Attached X-Y; no free Y

57  \( y^2 su-w^L_w, w^L_y/y^L_y/0 \)
58  \( y w Y^L_y/y^L_y/0 \)
59  \( y w spl Y^L_y/y^L_y/0 \)

Altered Complete Y's

60  \( B^L_y/y^L_y/2 su-w^L_w, w^L_y/y^L_y; bw \)
62  \( y B Co/y^L_y/a \)
63  \( sc^L_y; bw y^L_y/y^L_y; bw \)

Y^L Fragments

64  \( Y^L_y/bw+bb/g^L_y/B^L_y/y^v_bb; bw \)
65  \( Y^L_y/g^L_y/B^L_y/y^f; = \)
66  \( Y^L_y/y^f+bb’s/g^L_y/B^L_y/y^v; bw \)
67  \( Y^L_y/y^f+bb’s/g^L_y/B^L_y/y^v_bb; bw \)
68  \( Y^L_y/y^f+bb’+g^L_y/B^L_y/y^v; bw \)
69  \( Y^L_y/y^f+bb’-g^L_y/B^L_y/y^v_bb; bw \)
70  \( Y^L_y/sc^L_y/y^f; = \)
71  \( Y^L_y/y^f_f; = \)
72  \( sc^L_y/y^v_bb^L_y/y^f; = \)

Multichromosomal

73  \( sc^L_y/y^L_y/ac^L_y/g^L_y/6 f^L_y/Y^L_y/y^f; = \)
74  \( sc^L_y/Y^L_y/2 f^L_y/Y^L_y/y^f; = \)
75  \( Y^L_y/y^f+g^L_y/Y^L_y/y^f; = \)
76  \( Y^L_y/y^f+g^L_y/Y^L_y/y^f; = \)
77  \( Y^L_y/y^f+g^L_y/Y^L_y/y^f; = \)

Rochester, New York: University of Rochester
Department of Biology

Wild Stocks

120 Canton stocks
Oregon-R (3 inbred strains)

Chromosome 1

ck
y w v
y ct f: 797
In(1)bb ‘ ‘ \( y^L_y/s^L_y/bb’-AM \)
In(1) ‘m ‘ ‘ \( y^L_y/w^L_y/m \)
In(1)sc ‘ ‘ In(1) ‘m
In(1)w
In(1)EN, y/y f; =
In(1)rst ‘ ‘ y rst ‘car bb
In(1)49, In(1) ‘ \( y^L_y/sc ‘ \)
 cu-X/PM ‘

Chromosome 2

L K
K L K
\( L K \)
Pm/Cy L
Ps Sco/Cy L
Sco/Cy L

Chromosome 3

Drop/Ins(3L)(3R)
Pr Drop/Ins(3L)(3R)
rucuca

Multichromosomal

y;bw
y v \( \delta^L_y/bw; bw \)
y;sc ‘ y;bw
y ct v;ru h

Translocations

T(1;2)K
T(1;3)K’ (1096)
T(1;3)K’ ru ca (1698)
T(1;3)K’ ru e s ca (1697)
T(1;3)K’ th st
T(1;3)K’ sc
T(2;3)’, C’/pm;Sb
T(2;3)’, c’/pm;Sb
T(3;4)(Dubinin 2)/DCXF
### STONY BROOK, NEW YORK: STATE UNIVERSITY OF NEW YORK
#### Department of Biological Sciences

#### Wild Stocks

<table>
<thead>
<tr>
<th>Chromosome 1</th>
<th>Chromosome 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>001 Oregon-R</td>
<td>201 al dp b pr cn c px sp/Cy sp</td>
</tr>
<tr>
<td>002 Swedish-B</td>
<td>202 al dp b pr cn c px sp/Cy pr cn sp</td>
</tr>
<tr>
<td></td>
<td>203 ap ^5/Cy</td>
</tr>
<tr>
<td></td>
<td>204 b vg</td>
</tr>
<tr>
<td></td>
<td>205 bw</td>
</tr>
<tr>
<td>101 w</td>
<td>206 dp</td>
</tr>
<tr>
<td>102 w</td>
<td>207 Ins(2L,2R)Cy bw ^2/al dp b pr cn c px sp</td>
</tr>
<tr>
<td>103 w m f</td>
<td>208 c px sp</td>
</tr>
<tr>
<td>104 y ct ras^2 f</td>
<td></td>
</tr>
<tr>
<td>105 f/¥6</td>
<td></td>
</tr>
<tr>
<td>106 ec ct 6/S1/ClB</td>
<td></td>
</tr>
<tr>
<td>107 Ins(1)sc^5 sc', B w^a</td>
<td></td>
</tr>
</tbody>
</table>

#### Chromosome 3

| 301 e |
| 302 se |
| 303 ru h th st cu sr e^g ca |
| 304 bar-3 |

#### Chromosome 4

| 401 ey |

#### Multichromosomal

| 501 Cy pr cn/Pm; H/Sb-C |
| 502 Cy sp/al dp b pr cn c px sp; ci ey^R |
| 503 dp;e |
| 504 pr cn;by |

#### Translocations

| 601 T(2;3)M/e/rh th st cu sr e^g Pr ca |
| 602 T(2;3;4)bw ^2/30k18/Ins(2LR)Cy |

### SYRACUSE, NEW YORK: SYRACUSE UNIVERSITY
#### Department of Zoology

#### Wild Stocks

| 34 strains each derived from a Syracuse wild inseminated female |
| 9 strains each derived from a South Lancaster, Mass., wild inseminated female |
| 3 Florida strains |

#### Polygenic crossveinless strains

10 strains selected directly from progenies of individual wild inseminated females from various places
6 strains selected indirectly (sensitivity to crossvein defect production at 36.5°C), then directly
det, selected
**EMPORIA, KANSAS: KANSAS STATE TEACHERS COLLEGE**

<table>
<thead>
<tr>
<th>Wild Stocks</th>
<th>v</th>
<th>vg</th>
<th>pol</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oregon-R</td>
<td>m</td>
<td>bw</td>
<td>L^2</td>
</tr>
<tr>
<td>Canton-S</td>
<td>s</td>
<td>al b c sp</td>
<td>b vg</td>
</tr>
<tr>
<td>Chromosome 1</td>
<td>f</td>
<td>Multichromosomal</td>
<td>v;tw</td>
</tr>
<tr>
<td>y</td>
<td>y g t</td>
<td>Sm;Cy/Pm;Ub x</td>
<td>130/Sb</td>
</tr>
<tr>
<td>w</td>
<td>w m</td>
<td>Attached-X</td>
<td>l^2/y f:</td>
</tr>
<tr>
<td>w_Bw</td>
<td>w m f</td>
<td>f fu/y f:</td>
<td></td>
</tr>
<tr>
<td>w_e</td>
<td>w s n</td>
<td>Translocations</td>
<td></td>
</tr>
<tr>
<td>w_h</td>
<td>w s et</td>
<td></td>
<td></td>
</tr>
<tr>
<td>w_sat</td>
<td>w v</td>
<td></td>
<td></td>
</tr>
<tr>
<td>w_37h</td>
<td>w b</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chromosome 2</td>
<td>dp</td>
<td></td>
<td></td>
</tr>
<tr>
<td>b</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>cn</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>en</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**EAST LANSING, MICHIGAN: MICHIGAN STATE UNIVERSITY**

<table>
<thead>
<tr>
<th>Wild Stocks</th>
<th>cm</th>
<th>pk cn</th>
<th>bw;e(2;3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oregon-R</td>
<td>g</td>
<td>SD</td>
<td>w;bw;st(1;2;3)</td>
</tr>
<tr>
<td>Urbana</td>
<td>f</td>
<td>b pr</td>
<td>Cy/Pm;H/In(3r)Mo, Sb,</td>
</tr>
<tr>
<td>Crimea</td>
<td>m</td>
<td>Chromosome 3</td>
<td>sr(2;3)</td>
</tr>
<tr>
<td>Samarkand</td>
<td>pn</td>
<td>ca</td>
<td>y;bw;e;ci ey^(1;2;3;4)</td>
</tr>
<tr>
<td>Swedish-B</td>
<td>rb</td>
<td>st se</td>
<td>Attached-XX</td>
</tr>
<tr>
<td>Canton-S</td>
<td>y</td>
<td>se e se</td>
<td>Y^2 w y^L y^+/0/y w^0</td>
</tr>
<tr>
<td>Chromosome 1</td>
<td>Bsc</td>
<td>Attached-X</td>
<td></td>
</tr>
<tr>
<td>m/FM3</td>
<td></td>
<td>Multichromosomal</td>
<td>y m f/y w f:=</td>
</tr>
<tr>
<td>Chromosome 2</td>
<td>bw</td>
<td>Closed-X</td>
<td>X^c1, y v/y w f:=</td>
</tr>
<tr>
<td>bw</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>dp</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>cn bw</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cy/Pm</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>vg</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**LINCOLN, NEBRASKA: UNIVERSITY OF NEBRASKA**

| Virus-caused CO_2 sensitivity: several stocks. |
| Dly (delayed recovery from CO_2 anesthesia, see McCrady and Sulerud, 1964): several stocks. |
### Wild Stocks

#### Naples, Italy: University of Naples

<table>
<thead>
<tr>
<th>Chromosome 1</th>
<th>Chromosome 2</th>
<th>Chromosome 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>B sc B InS w sc</td>
<td>b cn vg</td>
<td>cd</td>
</tr>
<tr>
<td>v</td>
<td>bw</td>
<td>Sb/+</td>
</tr>
<tr>
<td>a w bf</td>
<td>cl</td>
<td>Sb/In(3R)1(3)Na</td>
</tr>
<tr>
<td>w bl</td>
<td>cn bw</td>
<td>st</td>
</tr>
<tr>
<td>w co</td>
<td>Cy/Pm</td>
<td>st</td>
</tr>
<tr>
<td>w t</td>
<td>pr en</td>
<td>w;vg</td>
</tr>
<tr>
<td>y</td>
<td>vg</td>
<td></td>
</tr>
</tbody>
</table>

#### Lyon, France: Université de Lyon

<table>
<thead>
<tr>
<th>Chromosome 1</th>
<th>Chromosome 2</th>
<th>Chromosome 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oregon-R Lyon Champelères (inbred) Algérie</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Sydney, New South Wales, Australia: University of Sydney

<table>
<thead>
<tr>
<th>Chromosome 1</th>
<th>Chromosome 2</th>
<th>Chromosome 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>In2 rst3</td>
<td>b</td>
<td>e1</td>
</tr>
<tr>
<td>P b</td>
<td>b j</td>
<td></td>
</tr>
<tr>
<td>w</td>
<td>Cy/Pm</td>
<td></td>
</tr>
<tr>
<td>y</td>
<td>j</td>
<td></td>
</tr>
<tr>
<td>vg</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Multichromosomal**

Sc1 B InS w sc; Ins SM1, al; Cy Sp²/dp b Pm ds; Sb/Ubx 130 e¹; pol
TURKU, FINLAND: UNIVERSITY OF TURKU
Department of Genetics

Wild Stocks

1. Canton-S
2. Oregon-K
3. Oregon-R-S
4. Samarkand (Inbred)

Chromosome 1

101. B
102. bb
103. br w ec t g
104. br w ec t g
105. Bx
106. car
107. cm ct 6 sn
108. ct 6
109. cv
110. cv dx sn
111. cv lz/ClB
112. cv sn
113. cv sn lz/ClB
114. ec
115. ec ct v f
116. ec cv
117. f
118. f car
119. g
120. g
121. g f B & Y
122. g f sd
123. In(1)dl-49, y f a n
124. In(1)sc
125. In(1)sc
126. Ins(1)sc a, S, 8 R, 8 S, w B
127. In(1)J
128. liz/FM3, 31d 8
129. lz m/ClB
130. mg
131. m wy g
132. m wy g

Chromosome 2

133. ras
134. rz
135. rb cx
136. rsc & y f:
137. s
138. sc
139. sc cv
140. sc cv v f
141. sp ec cv ct 6 v
142. y f:
143. sd
144. sn
145. spl
146. t
147. v
148. w, ch
149. w wy
150. wy
151. y
152. y ac v
153. y cv
154. y In49 B &
155. y In49 f car
156. y sn bb
157. y w
158. y w cv
159. z
160. x c 2
161. cv f v/ClB
162. extra Y
163. In(1)w
164. In(1)w
165. In(1)w
166. In(1)w
167. In(1)w
168. In(1)w
169. In(1)w
170. In(1)w
171. In(1)w
172. In(1)w
173. In(1)w
174. In(1)w
175. In(1)w
176. In(1)w
177. In(1)w
178. In(1)w
179. In(1)w
180. In(1)w
181. In(1)w
182. In(1)w
183. In(1)w
184. In(1)w
185. In(1)w
186. In(1)w
187. In(1)w
188. In(1)w
189. In(1)w
190. In(1)w
191. In(1)w
192. In(1)w
193. In(1)w
194. In(1)w
195. In(1)w
196. In(1)w
197. In(1)w
198. In(1)w
199. In(1)w
200. In(1)w
201. In(1)w
202. In(1)w
203. In(1)w
204. In(1)w
205. In(1)w
206. In(1)w
207. In(1)w
208. In(1)w
209. N3, br m/Cy
210. pr cn ix/SM5, al 2 Cy l t sp
211. rl sp
212. stw
213. stw
214. vg

Chromosome 3

201. al 2 Cy, In49 l t 3/b pr Bl l t 3 cn 2
202. ap /Bwd, In2LR
203. Bl l t 3/Cy
204. bw 2
205. CyR 2g sp 2/InsNS px sp
206. dp 38k /Cy(2L), dp 2 b pr (Cy not present)
207. In(2L)Cy, al 2 ast 3 b pr (Cy not present)
208. In(2L)Cy, al 2 ast 3 b pr (Cy not present)
209. NS, br m/Cy
210. pr cn ix/SM5, al 2 Cy l t sp 2
211. rl sp
212. stw
213. stw
214. vg

Chromosome 3

301. Bd G/In(3R)C, 1(3)a
302. bv 34e
303. bx 1/121/1/TM1, Me ri sbd
304. ca by
305. D 2 Sb/InLP Dfd InRP ca
306. e
307. Gl Sh/LM
308. h th st cp in ri p s ss r e ca/In(3LR)
309. Ubx 1/1390, Ubx 1/1390 ("hinca")
310. In(3LR)Ubx 1/1, ri Ubx e/TM1, Me ri p s s bd
311. In(3LR)Ubx 1/1, ri Ubx e/TM1, Me ri p s s bd
312. In(3LR)FIA (homoygous)
313. Ms, InL Sh/ru h D InsCXF
314. Pc/T(2;3)Mé
315. (ru) h th st cp in ri p s ss r e ca/In(3LR)
316. ru h th st cu sr e ca/In(3LR)
317. ru h th st cu sr e ca/In(3LR)
318. Sb Ubx/T(2;3)Xa
319. Scx/TM1, Me ri sbd
320. se app
321. se rt th/Mé
322. st sr H ca/In(3R)F 1, st 1(3)W ca
January 1964

Melanogaster - Stocks

324 th st cp in ri p
325 th st cp in ri p bx sr e^5/TM1, M"ri p^sbd ("thrie")
326 th st cp in ri p^sbd sr e^5/TM1, M"ri p^sbd^sbd
327 W St/InsCXF

Chromosome 4

401 ci
402 ci
403 spa

Multichromosomal

501 bw; e
502 Cy/Pm; D/Sb (M) 503 In(3)T(2;3)Antp^1/ Cy; Sb

Deficiencies

601 Df(2)MS 4/SM1, al^2 Cy sp^2
602 Df(2)MS 8/SM1, al^2 Cy sp^2
603 Df(2)MS 10/SM1, al^2 Cy sp^2
604 Df(2)r 10a lt cn/Pm ds ^3^R

Translocations

701 T(Y;2)B/b ^3
702 T(Y;2)C/cn
703 bl T(Z;3)101 ru h D TA ss e^5/Payne
--- T(Z;3)Antp^1 (see 503)
704 al T(Z;3)101 sp^4 Cy L^4 sp
705 ru h T(Z;3)101 e^5 ro ca/Payne, Dfd ca
--- T(Z;3)101 (see 314, 317)
706 T(Z;3)101 (several stocks with different marker combinations)
--- T(Z;3)Xa (see 318, 322)

Triploid

801 y^2 sc w^2 ec/FM4, y^3 d^8 dm B;cn;h

KWANGJU, KOREA: CHUNNAM NATIONAL UNIVERSITY
Department of Biology

Wild Stocks

1 Chiri (Korea)
2 Kwangyang (Korea)
3 Kwangju (Korea)
4 Naju (Korea)
5 Oregon-s
6 Oregon-R
7 Tolsan (Korea)

Chromosome 1

1 B
2 cm
3 ec
4 rg
5 sc cv v f
6 svr

Chromosome 2

7 v
8 w^c
9 w
10 y
19 ex
20 pd
21 pr
22 rh
23 vg

Chromosome 3

11 b
12 b vg
13 bw
14 bw ba
15 Bl/Cy, b^45a
16 Bl L/SM a^2

24 aa h
25 ca
26 cv c sdb^2
28 D/gl
29 gl
30 h
31 ru
32 st
33 th
34 th st cp

Chromosome 4

35 bt
36 ci
37 ci gvl bt
39 ey
40 pol
41 spa

Attached-X

42 br ec/y^3^d

Inversions

43 sc^S1 B Ins w^a sc^8
VARANASI 5, INDIA: BANARAS HINDU UNIVERSITY
Department of Zoology

Wild Stocks
a) Canton-S
b) Oregon
c) Kerala
d) Cuttak
 e) Varanasi

Chromosome 3
se cu
se h
a
ss
Ly/D3
es
st

Chromosome 4
ey2
ciw

Multichromosomal
fs 13 - y+ ac+ sc 8/y B;bw D;st +
& y f=;bw q
102 - Y S X In EN InY9 y.LL;st (no free Y)

KALYANI, WEST BENGAL, INDIA: KALYANI UNIVERSITY
Department of Zoology

Wild Stocks
a1 Calcutta University (Originally from Oregon Stock)

Chromosome 1
b1 y
c1 vg
d1 se h
e1 ey2
b2 w
d2 ss
e2 ciw
b3 B
HOBART, TASMANIA: UNIVERSITY OF TASMANIA  
Botany Department

Wild Stock
Canton-S (strain from Tasmania)

Chromosome 1
2^61 g^y apr ec cv ct v f w B S1 B Ins w a 8
sc Sc B Ins w sc

Chromosome 2
fj wt/Xa, T(2;3) wi
b2 j^4 e3
rh
bw

Chromosome 4
2 ey

MULTICHROMOSOMAL

B 387 y snoct and y f:= P 42 sc .Y/ac

F 117 ("Y snoct") Y^Lc oc ptg Y^1 ct^1 oc ptg car^1
Y^1 ct^1 Ins49 sn x2 ?

F 266 sc 8 Y/snoct Y^1 oc ptg car x2 ?

F 267 sc 8 Y/snoct ^+ Y^1 oc ptg car x2

Special

VEPERY, MADRAS 7, INDIA: MADRAS VETERINARY COLLEGE  
Department of Animal Genetics

Wild Stocks
Oregon-K
Madras

Chromosome 1
1 m 51 a 8 2 sc B Ins w a 8
3 v
4 w
5 w m

Chromosome 2
6 b cn bw 2
7 Cy Bl L^2
8 dp b cn bw
9 vg

Attached X
11 sc 31 B Ins w a 8 8 & y v f:=
12 sc ct v f car & y v f:=

Multichromosomal

Chromosome 3
10 e

13 bw;st
14 vg;e 31
15 y sc 3 Ins49 sc 8;bw;st
MÜNSTER (WESTP.), GERMANY: INSTITUT FÜR STRAHLENBIOLOGIE DER UNIVERSITÄT

Wild Stocks

normal (Berlin wild)

Chromosome 1

\[8\text{ sc} \ast Y/\text{X}^{c2} \ast X_2^B \ast y f:=-\]
\[\text{In-49 v sn}^{+} B_2 \ast y f:=-\]
\[Y^S \ast X \text{ in EN v y}.Y'(\text{sc} \ast ? y) \text{ (no free Y)}\]

Chromosome 2

b pr vg

Multichromosomal

\[y \text{ sc}^{S_1} \text{ In-49 sc}^{8} \ast \text{bw;st}\]
\[y \text{ sc}^{S_1} \text{ In-49 sc}^{8} \ast \text{bw;st p}^{P}\]

TÜBINGEN, GERMANY: MAX-PLANCK-INSTITUT FÜR BIOLOGIE

Stocks listed in DIS 38:25 with the following numbers are no longer kept in culture:

2, 4, 6, 8, 10, 15, 16, 18.

New Stock: sc bb w 61a

SANTIAGO, CHILE: UNIVERSIDAD DE CHILE, DEPARTAMENTO DE GENÉTICA
Instituto de Biología "Juan Noé"

Wild Stocks

1 Chillán
2 Oregon R-C
3 Papel
4 Santiago
5 Swedish free of inv.
6 Valdivia

Chromosome 1

7 B
8 Bx
9 my
10 v

11 w
12 w m f
13 y

Chromosome 2

14 b
15 b vg
16 bw
17 dp
18 L2
19 L2/Cy
20 S/Cy;En-S
21 vg

Chromosome 3

22 D/Gl
23 e11
24 Gl Sb/LWM
25 se
26 st

Chromosome 4

27 ey2

Multichromosomal

28 dp;e11
29 w;vg
NEW DELHI, INDIA: INDIAN AGRICULTURAL RESEARCH INSTITUTE
Department of Botany

Wild Stocks
1 Oregon-K

Chromosome 1 (X)
1 B St B Ins w a sc
2 y St Ins w sc
3 y St Ins sc
4 y St Ins sc
5 y sc 1 B Ins9 ct n sc (Binsety)

Chromosome 2
1 vg
2 cn bw
3 b cn bw
4 dp b cn bw
5 dp b cn
6 Cy cn bw
7 bw
8 Cy/B1 L2
9 fes ms b cn Sp/Cyo
10 fes ms cn Sp/Cyo
11 fes Sp ms 1a cn mr(Crs)/Cyo
12 dp tx Sp ab1/S1 1a Cy, In(Cy)L
13 dp b 1a Fm1/dp tx1 Cy, g2 pr cn 2
14 ls dp Sp mg ta2 cn Crs/S1 Cy lt2 pr
Bl CN L Sp
15 dp tx Sp Cn bw Sp/S2 (ls) Cy In(L) cn bw Sp

Chromosome 3
1 e
2 st

Chromosome 4
1 ey

Multichromosomal
1 bw; st
2 y sc S1 Ins w sc 8; Cy/B1 L2
3 y sc S1 Ins w; bw; st
4 y sc S1 Ins w sc; cn bw
5 y sc S1 Ins w sc; vg
6 y sc S1 Ins sc; dp b cn bw
7 sc S1 B Ins w sc; Cyh
8 y sc In59, v sg 8; dp b bw/dp tx1 Cy P1
Bl cn L Sp
9 sc 3 Y/y B & y f:= Bw

Attached X
1 sc S1 B Ins w a sc 8 & y y f:=
2 sc S1 f In49 v w sc 8 & y f:=
3 y sc S1 f In49 v w sc 8 & y f:=

Altered Y with mutants in X-chromosome
1 l1 Y/l1 j1 sc j1(+) In49 v Ptg sc B1/y
sc 6 car odsy f g2 dy, v ras sn
ct cm rb ec w Pn sc (Maxy)

BAYFORDBURY, HERTFORD, HERTS, ENGLAND: JOHN INNES INSTITUTE

Wild Stocks
1 Bayfordbury
2 Hampton Hill
3 Samarkand
4 Teddington

Inbred Lines
5 Oregon (v marker), 229
6 b pr, 127

Chromosome 1
7 v
8 y w

Chromosome 2
9 b pr vg

Multichromosomal
10 Cy L4/Pm; H/Sb
**Wild Stocks**

- A1 Oregon
- A2 Marzì

Chromosome 1 (X)

- B1 B
- B2 car bb
- B3 sc InS w sc
- B4 pu
- B5 r/y f:
- B6 sc cv v f B/y f:
- B7 sc z ec
- B8 sw
- B9 w a
- B10 w bx
- B11 w cf
- B12 w cp
- B13 w r
- B14 w cf/y f:
- B15 w dy/y w:
- B17 en w/y f:
- B18 y 59
- B19 y
- B20 y ac sc pn/y f:
- B21 y cv v g/y f:
- B22 y fa
- B23 y sc w sp l f/in(1) rst3, rst3 f
- B24 y w sp l
- B25 y su w w bb/y w sp l
- B26 y ma l
- B27 y 5 id of a
- B28 y 3 of a
- B29 y 1259 su w a bb/ sc Y
- B30 XX/0; X-Y

Chromosome 2

- C1 b cn c bw
- C2 b cn v bw
- C3 Bl L/Cy
- C4 Bl L/SM5, al2 Cylt sp

C5 bw
- C6 bw
- C7 cn bw
- C8 Sp J L2 Pin/SM5, al2 Cy lt sp
- C9 Tft/Cy

**Inverted X Chromosomes**

- I 1 In(1)dl-49, vo f
- I 2 In(1)dl-49, w 12
- I 3 In(1)dl-49, y Hw m2/
- I 4 In(1)dl-49, y Hw m2 g /
- Df(1)NL 8 R 4+8
- I 5 In(1)sc 8 , sc- , y sc
- I 6 In(1)sc 8 , AM 8
- I 7 In(1)sc 8 , sc
- I 8 In(1)sc 8 , dl-49, y 31d a
- I 9 In(1)sc 8 , dl-49, y
- I 10 In(1)w t(2;3)Y f:
- I 11 In(1)w t(2;3)Y f:
- I 12 In(1)481(12E-F;14B)Y bb 5481/FM6, y 31d sc dm B/ sc Y

**Deficiencies & Duplications**

- L1 Df(1)N 8
- L2 Df(Y)t(2;3)Y
- L3 Dp(1;2R)w 51b7
- L4 Dp(1;2R)h 5

**X Chromosomes with A Y Arm Attached**

- M1 X-Y(L-C-2), y cv v f car
- M2 X-Y(L-4), sc cv v y
- M3 Ys(X-FR-1), Ys y cv v f
- M4 Ys(Y-P-7), In(1)EN, Ys y f

**Attached - XY**

- N1 Ys(X-P-7), Ys
- N2 Ys(Y-P-7), Ys
- N3 Ys(Y-P-7), Ys
- N4 Ys(Y-P-7), Ys

**Translocations**

- H1 T(1;4)B S(16 Al), y2 cv
- H2 T(2;3)bw , bw /Cy

**Triploid**

- G1 y1259/FM6, w f/FM4, w f

**T(1;4)B S(16 Al), y2 cv**

- v B S car v f

**T(2;3)bw , bw /Cy**

- w Ys YL y
January 1965

Melanogaster - Stocks

BLINDERN, NORWAY: UNIVERSITY OF OSLO

Institute of General Genetics

Wild Stocks

1. Amherst iso-
2. Canton-S
3. Florida 26-24
4. Florida 10
5. Formosa, Japan
6. Lausanne-S
7. Oregon
8. Oregon R-C
9. Oregon iso-
10. Oslo
11. Samarkand
12. Swedish-b-6
13. Woodbury

Altered Y's

14. Bx³
15. ec ot 6 v g³/ClB
16. f
17. fa
18. f B od car & y f:=
19. f od sy car

Chromosome 1

Blindern, Norway: University of Oslo

Institute of General Genetics

Wild Stocks

1. Amherst iso-
2. Canton-S
3. Florida 26-24
4. Florida 10
5. Formosa, Japan
6. Lausanne-S
7. Oregon
8. Oregon R-C
9. Oregon iso-
10. Oslo
11. Samarkand
12. Swedish-b-6
13. Woodbury

Altered Y's

14. Bx³
15. ec ot 6 v g³/ClB
16. f
17. fa
18. f B od car & y f:=
19. f od sy car

Chromosome 1

Chromosome 2

Chromosome 3

Deficiencies and Translocations

BUENOS AIRES, ARGENTINA: UNIVERSIDAD DE BUENOS AIRES

Facultad de Ciencias Exactas y Naturales, Laboratorio de Genética I

The same stocks as in the Laboratory of Genetics of the Argentine Atomic Energy Commission.
### Drosophila Species - Stocks

**CHICAGO, ILLINOIS: UNIVERSITY OF CHICAGO**

<table>
<thead>
<tr>
<th>D. americana</th>
<th>7 Texmelusan</th>
<th>19 tb</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>8 w4012</td>
<td>20 tb gp</td>
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<tr>
<td></td>
<td>9 w40a</td>
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<td></td>
<td>10 y40a dy</td>
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<td>Wild Stocks</td>
<td>Chromosome 1</td>
<td>Chromosome 4</td>
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<tr>
<td>1 Independence</td>
<td>40e</td>
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<td>2 Anderson</td>
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<tr>
<td>Others</td>
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<td></td>
<td>37 b;sv t tb gp2;cd pe</td>
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<td>38 b;sv t tb gp2;pe</td>
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<tr>
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<td>44 &quot;scut&quot;(II);pe m3</td>
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<td>45 S/+;B+pe</td>
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<td>47 v48s;pe</td>
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<td>Wild Stocks</td>
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<td>5 New Orleans</td>
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<td>47 v48s;pe</td>
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<td>Wild Stocks</td>
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<td>6 Pasadena lethal-free</td>
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<td>15 S/+</td>
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<tr>
<td>20 tb gp</td>
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**SYRACUSE, NEW YORK: SYRACUSE UNIVERSITY**

**Department of Zoology**

<table>
<thead>
<tr>
<th>D. subobscura</th>
<th>D. simulans</th>
<th>Additional Wild Strains</th>
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<tbody>
<tr>
<td>wild strain C from A. Prevosti</td>
<td>6 wild strains from Florida</td>
<td>D. funebris</td>
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<tr>
<td>crossveinless polygenic strain</td>
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<td>D. hydei</td>
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<tr>
<td>v.t.i. from A. Prevosti</td>
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<td>D. pseudoobscura</td>
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<td>2 wild strains from Florida</td>
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<td>D. virilis</td>
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<tr>
<td>D. willistoni</td>
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<td>D. willistoni</td>
</tr>
</tbody>
</table>

**Baltimore, Maryland: Johns Hopkins University**

| a1 D. funebris | a4 D. simulans, La-3 | a8 D. simulans, New Orleans |
| a2 D. hydei | a5 D. simulans, La-4 | a9 D. simulans, South Africa |
| a3 D. simulans | a6 D. simulans, Lima, Peru, a | a10 D. virilis |
| a7 D. simulans, Lima, Peru, a | | |
EAST LANSING, MICHIGAN: MICHIGAN STATE UNIVERSITY
Department of Zoology

D. robusta: East Lansing 1964
D. melanica: East Lansing 1964
D. immigrans: East Lansing 1964
D. virilis: California

D. virilis: Yale
D. pseudoobscura: Yale
D. pseudoobscura: Rochester
D. funebris: Yale

NEW YORK CITY, NEW YORK: COLUMBIA UNIVERSITY
Department of Zoology

D. equinoxialis
Trinidad (2)
Venezuela (2)
Orinocan race
British Guiana (4)
Panama (2)
Venezuela (2)

Wild Strains: geographical
Brazil (3 strains)
British Guiana (2)
Mexico (1)
Puerto Rico (1)
Trinidad (2)
Venezuela (4)

Andean-Brazilian race
Brazil (12)
Colombia (3)

Sex-Ratio
Puerto Rico (1)

D. paulistorum

Calypso race
British Guiana (1)
Trinidad (1)

Panama (1)

D. persimilis
Wild: 3 strains

D. pseudoobscura

Wild: 3 strains

D. willistoni

Wild Strains, geographical
Centro-American race
Panama (1)

Amazonian race
Brazil (4)
Puerto Rico (1)

Sex-Ratio

British Guiana (1)

Panama (1)

Lexington, Kentucky: University of Kentucky
Department of Zoology

D. affinis: Lexington, Kentucky
D. putrida: Lexington, Kentucky
D. robusta: Lexington, Kentucky

D. busckii: Lexington, Kentucky
D. hydei: Lexington, Kentucky
ST. LOUIS, MISSOURI: WASHINGTON UNIVERSITY
Department of Zoology

D. robusta

Notation of arrangements as in Carson, H. L., 1953 Genetics 38:168.

Stocks homozygous for gene arrangement

<table>
<thead>
<tr>
<th>Stock designation</th>
<th>X</th>
<th>2</th>
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<th>Stock origin</th>
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<td>New York</td>
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<td>BF-5</td>
<td>11</td>
<td>3S</td>
<td>SS</td>
<td>Big Fish Lake, Minnesota</td>
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<tr>
<td>TA</td>
<td>32</td>
<td>11</td>
<td>S1</td>
<td>Lake Tsala Apopha, Florida</td>
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<tr>
<td>St e-17</td>
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<td>1S</td>
<td>SS</td>
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<tr>
<td>C-66 (R1-C)</td>
<td>1S</td>
<td>3S</td>
<td>SS</td>
<td>Chadron, Nebraska</td>
</tr>
</tbody>
</table>

Other Species

D. americana Meramec Standard
D. buzzatii (various)
D. carsoni Bridgewater, Vt. 1957
D. colorata Petoskey, Mich.
D. crucigera Mt. Tantalus, Oahu, Hawaii
D. euronotus (various)
D. immigrans (various)

D. lacertosa UTL No. 25313, Sapporo, Japan
D. micromelanica (various)
D. melanica (various)
D. melanura (various)
D. mercatorum (various)
D. nigromelanica (various)
D. paramelanica (various)
D. repleta (various)
D. stalkeri (various)

LONDON, ENGLAND: UNIVERSITY COLLEGE LONDON
Department of Zoology

D. subobscura

Inbred Lines

<table>
<thead>
<tr>
<th>Lines</th>
<th>Chromosome 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>B, K &amp; NFS (structurally homozygous) &amp; several others</td>
<td>pl pp pt sj otp pl pp</td>
</tr>
</tbody>
</table>

Wild Stocks

<table>
<thead>
<tr>
<th>Chromosome 2</th>
<th>Chromosome 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Edinburgh Galilee</td>
<td>ch ar ch cu ch/Ba ant ch/Ba st ch kk2/Ba rn</td>
</tr>
<tr>
<td>Standard order</td>
<td>+/-gs nt</td>
</tr>
</tbody>
</table>

D. hydei vg
D. simulans Jer +
Drosophila Species - Stocks

SYDNEY, NEW SOUTH WALES, AUSTRALIA: UNIVERSITY OF SYDNEY
Department of Animal Husbandry

D. ananassae (as in DIS 39:67)
D. montium (as in DIS 37:58)
D. nebulosa " "
D. persimilis (as in DIS 37:58)
D. pseudoobscura " "
D. simulans " "

OSAKA, JAPAN: OSAKA UNIVERSITY
Medical School, Department of Genetics

D. virilis

Wild Stocks

1 Kaidema (Japan)
2 Pasadena (USA)

Chromosome 1

4 v
4 w
5 y
6 eb
7 cn
8 cd

Chromosome 2

9 st B^3 pe
10 st es

Chromosome 3

Multichromosomal

11 v;es (1;5)

D. simulans

Wild Stocks

1 A (USA)
2 B (USA)

Chromosome 1

3 v
4 y w
5 net
6 net b yy sd pm
7 jv se
8 jv st se
9 H^3 pe

Chromosome 2

Lyon, FRANCE: UNIVERSITÉ DE LYON
Faculté des Sciences

D. funebris
D. basckii

SÃO JOSÉ DO RIO PRÊTO, SÃO PAULO, BRAZIL: GOVERNO DO ESTADO DE SÃO PAULO
Faculdade de Filosofia, Ciências e Letras, Dept^2 de Biologia Geral

D. sturtevanti - Jamaica, Cuba, Porto Rico, Quadalupe, Santa Lúcia, Trinidad, Colômbia,
Peru, Mexico, Honduras, Panama, Guiana Britânica, Brazil (Amazonas,
Pará, Maranhão, Espírito Santo, Guanabara, Paraná, Rio Grande do Sul,
Mato Grosso, Goiás).
SANTIAGO, CHILE: UNIVERSIDAD DE CHILE
Instituto de Biología "Juan Noé", Departamento de Genética

D. busckii: Chile (La Serena)
D. camaronensis: Chile (Azapa)
D. funebris: Chile (La Serena, Valdivia, Tierra del Fuego y Punta Arenas)
D. gasici: Chile (Arica), Bolivia (Cochabamba), Colombia (Bogotá)
D. gaucha: Brazil (M. Capoes, C. de Jordan and Taimbas), Argentine (Córdoba)
D. hydei: Chile (Camarones, and El Tabo), Bolivia (Cochabamba)
D. immigrans: Chile (El Tabo and Valdivia)
D. mercatorum: Chile (Arica)
D. mesophragmatica: Bolivia (La Paz), Perú (Machu-Picchu, Cuzco)
D. pavani: Chile (Copiapó, Vallenar, La Serena, El Tabo, Viña del Mar Olmué, Bellavista, Arrayán, Los Alpes, Colbún, Los Quenes, Chillán), Argentine (Mendoza)
D. simulans: Perú (Lima), Chile (Arica)
D. viracochi: Perú (Machu-Picchu), Colombia (Bogotá)
D. virilis: Chile (Santiago)

SAPPORO, JAPAN: HOKKAIDO UNIVERSITY
Faculty of Science, Department of Zoology

D. auraria: race A; Sapporo(1), Okoppe(1), Oshoro(1), Fuyushima(1)
D. lutea: Sapporo(1)
D. virilis: Sapporo(3), Okushiri(1)
D. immigrans: Sapporo(1)
D. funebris: Sapporo(2), Akan(1)
D. brachynephros: Sapporo(1), Nopporo(1)
D. unispina: Sapporo(1)
D. nigromaculata: Sapporo(2), Uryu(1)
D. testacea: Naebutoro(1), Uryu(1)
D. busckii: Sapporo(1)
D. histrioides: Sapporo(2)
D. histrio: Sapporo(1), Fuyushima(1)
D. anamassae: India(1)
D. sordidula: Sapporo(15)
D. sp. like sordidula: Nopporo(1), Doya(1)
D. lacertosa: Sapporo(2), Fuyushima(5), Doya(2)
D. moriwakii: Nopporo(1), Yamada-Onsen(1)
D. sp. like okadai: Nopporo(1)
Parascaptomyza pallida: Yamada-Onsen(2)

KWANGJU, KOREA: CHUNNAM NATIONAL UNIVERSITY
Department of Biology

D. auraria: Type C (5 strains)
D. rufa
D. brachynephros
D. angularis
D. immigrans
D. suzukii
D. bizonata
D. virilis
D. nigromaculata
D. busckii

BAYFORDBURY, HERTFORD, HERTS, ENGLAND: JOHN INNES INSTITUTE
Department of Genetics

D. simulans
TURKU, FINLAND: UNIVERSITY OF TURKU
Institute of Genetics

D. simulans
Wild Stocks
Chromosome 3

VARANAS, INDIA: BANARAS HINDU UNIVERSITY
Department of Zoology

Wild Stocks

<table>
<thead>
<tr>
<th>Stock</th>
<th>Chromosome 2</th>
<th>Chromosome 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>D. bipectinata (Calcutta)</td>
<td>cu b se</td>
<td>px pc stw</td>
</tr>
<tr>
<td>D. ananassae (Howrah)</td>
<td>cu se</td>
<td>px pc stw</td>
</tr>
<tr>
<td>(Andhra)</td>
<td>b se</td>
<td>stw px</td>
</tr>
<tr>
<td>(Kerala)</td>
<td>cu b</td>
<td></td>
</tr>
<tr>
<td>(Mughalsarai)</td>
<td>ic b</td>
<td>px</td>
</tr>
<tr>
<td>(Bhalpur)</td>
<td>ic se</td>
<td>pc</td>
</tr>
</tbody>
</table>

Mutants of D. ananassae

<table>
<thead>
<tr>
<th>Chromosome 1</th>
<th>Chromosome 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>y vs v</td>
<td>cu</td>
</tr>
<tr>
<td>y, a</td>
<td>y, a</td>
</tr>
<tr>
<td>w</td>
<td>w</td>
</tr>
</tbody>
</table>

CHANDIGARH, PUNJAB, INDIA: PANJAB UNIVERSITY
Department of Zoology

D. melanogaster (4 strains)
D. suzukii
D. takahashii
D. malerkotliana (2 strains)
D. kikkawai
D. ananassae (3 strains)
D. nepalensis
D. bipectinata (2 strains)
D. jambulina
D. pansuiensis
D. immigrans

BERLIN-DAHLEM, GERMANY: UNIVERSITÄT BERLIN
Institut für Genetik der Freien

72 D. funebris - wild
73 D. busckii - wild
74 D. hydei - wild
75 D. simulans - v
76 D. virilis - wild
KALYARI, WEST BENGAL, INDIA: KALYARI UNIVERSITY
Department of Zoology, Genetics Laboratory

D. ananassae

Wild Stocks
1 Kalyani (Kln Cp)  3 Ranaghat (Rgt)  5 Dhakuria (Dka)
2 Ichapur (I Pr)  4 Calcutta (Cal po)  6 Sahaganj (Sgnj)

OSAKA, JAPAN: OSAKA UNIVERSITY
Medical School, Department of Genetics

D. ananassae (USA)  D. funebris (Japan)  D. hydei (Japan)

TUBINGEN, GERMANY: MAX-PLANCK-INSTITUTE FÜR BIOLOGIE

For complete list, see DIS 39:73.

The following species listed in DIS 39 are no longer kept in culture: D. miranda  D. paulistorum

New Species

D. bifurca  D. fulvimacula  D. nigrohydei  D. repleta, glass

Mutant stocks of D. hydei listed in DIS 39 with the following numbers have been lost or discarded: 14, 15, 16.

New Stocks of D. hydei

Chromosome 1

1 cherry-tomato
2 cherry-tomato-2
3 forked
4 forked-2: In(1)
5 miniature-63i
6 miniature-63j
7 prune
8 tomato
9 tomato-2
10 tomato-rood
11 vermilion-Tubingen-3
12 white-mottled-1: Tp(1)
13 white-mottled-2: In(1)
14 white-mottled-3: In(1)
15 Notch-Tubingen-1: Df(1)
16 Notch white-deficiency: Df(1)
17 yellow-Tubingen-2
18 tube-proximal
19 tube-distal

LOUVAIN, BELGIUM: THE UNIVERSITY
Janssens Laboratory for Genetics

D. americana  D. subobscura (Klünnacht)(Standard Homozygous)
D. subobscura (Belgium)  D. virilis
NEW MUTANTS

Report of P. T. Ives

60h : ebony 60h Ives, 60h. Arose spontaneously in the vg;se stock and has a medium strong phenotype.

63d29 : glass 63d29 Ives, 63d29. Induced simultaneously with and not yet separated from a T(2;3) by Cobalt-60 gamma rays. Eye much reduced in size, nearly colorless with a typically glassy surface. The developmental viability of homozygous T(2;3)63d29 is generally low when in competition with heterozygotes but is very good in pure culture.

Report of B. H. Judd

zm : white-zeste mottle The description of this mutant in DIS 39:60 stated that the white locus change is located left of w; this is incorrect. Fine structure analysis shows that the change in the white locus is located right of w and probably right of wch.

zl : white-zeste light Fine structure analysis of this mutant shows the change to be located to the right of w and probably also to the right of wch. The description in DIS 39:60 stating that the change is left of w is incorrect.

Report of Kalyani University

held out Spontaneous from wild stock collected from Kalyani after 4th generation. Wings held out horizontally. Recressive; linkage group not yet established.

Report of G. H. Mickey

61j : vesiculated 61j Mickey 61j10. 1-16.3. Arose from wild type male treated with radio frequency energy. Uniform expression in both males and females. Originally reported as bw 61j (DIS 38:28) and symbol changed to bu-w 61j (DIS 39:58). Determined as allele of vesiculated by M. J. Fahmy (personal communication) RK2.

Report of H. J. Muller

spx, In:spreadex Chromosome 1; derived from X-rayed spermatozoon; recessive; wings spread widely apart and often directed somewhat downwards, as in Dichaete; abdomen of female tends to be narrow and shrunken but usually has sufficient fertility for maintenance as homozygous stock; arose simultaneously with inversion that is judged by its crossing over properties to be similar in length to In49 but with both of its breaks somewhat to the right of those of In49. Existing stocks, transmitted to Oster, consist of spx, In alone and y spx, In f car.

Tul: Turned-up-like Of spontaneous origin, chromosome 1; heterozygote with wings like those of heterozygous Tu, that is, slightly but usually definitely turned up near ends but not twisted; hemizygote and homozygote more extreme, viable and fertile, with wings usually wrinkled, also as in Tu, and sometimes held somewhat apart; not located exactly but between g and f at about 50 (±3). By a curious coincidence our stock "Maxy-Tu" (f36 of our DIS 31 11st), which was constructed with the intention of having Tu in the non-multiple-recessive X and which was thought to have been so made, was much later found not to have Tu as planned but to mimic this result by reason of having Tul, unknown previously to the tests in question, in the homologous chromosome.
**We**: Wedge eye Of spontaneous origin, chromosome 3; lethal when homozygous; viability, fertility and classifiability good when heterozygous. Eye reduced to a small vertical wedge with the point downwards, much smaller than homozygous Bar. Location one to several units to the right of claret, i.e. near right end of III, so as to cross over fairly often from Dichaete when that is associated with CXF Inversion complex. Exists in well-balanced form in stock containing In3RC e 13e in chromosome homologous to its own.

**gy**: gouty legs Of spontaneous origin, chromosome 4; recessive, viable, fertile, and usually classifiable as homozygote; shortening and thickening of the legs, more especially of the metatarsi of the hind legs, which are often swollen. This mutant behaves as an allele of a previously undetected recessive feature of Dominant-eyeless, inasmuch as the compound of the latter with gy manifests the gy phenotype in at least as extreme form as that of homozygous gy. It is therefore very probable that gy is located close to the point in IV, identified by Bridges, at which the break occurred into which the transposed section of chromatin associated with Dominant-eyeless was inserted.

Report of H. L. Plaine and Sister M. Baptista Aubele

**ove**: overetherized Plaine and Aubele, 1964b. Recessive on second chromosome; not localized. Spontaneous in one male of Swedish-b erupt strain; recovered in isogenic progeny derived from this male. Wings held perpendicular to longitudinal axis of body, giving the appearance of flies which have been overetherized. Wings of newly emerged flies expand to normal position within one hour ($\bar{x} = 45.8$ min., standard error = 2.08); permanently elevated to perpendicular position within thirty minutes to one hour after expansion ($\bar{x} = 36.9$ min., standard error = 1.13). Flies capable of weak wing vibrations but incapable of flight. Lack of coordination of first two pairs of legs apparent from time of emergence; morphology of legs apparently normal. Completely penetrant; uniform expression in both sexes. Mutant viable; females fertile; males successful in mating with mutant females but lack or have lowered mating ability with females of wild-type and other mutant strains. Maintained in homozygous condition in Swedish-b erupt background and in heterozygous state balanced over $dp^{Lx1} Cy$, Ins50 pr cn.

Report of J. B. Spofford

**Su-V**: Suppressor of Variegation Spofford, 61c. 3-41.3 Pub. 1962, Genetics 47: 986-987. Isolated from Dp(1;3) $w^{264a}$ stock. Reduces mutant effect (sometimes completely) of w, rst, fa, spl, nd and dm variegation of the corresponding loci within Dp(1;3) $w^{264a}$. Also reduces w variegation of $In(1)w^W$, and rst variegation of $In(1)rst$. Enhances sc variegation of $In(1)sc^a$ and y variegation of $In(1)y^a$. Semi-cominant, heterozygotes distinct. Maternal effect, Su-V/+ offspring of Su-V/Su-V clearly distinguishable from Su-V/+ offspring of Su-V/+ mothers and the latter clearly distinguishable from +/Su-V offspring of +/+ mothers. Slightly less fertile as homozygotes. Viable in both sexes.

Report of Ruby M. Valencia

**fw**: furrowed Valencia, 1959 1-38.3. The mutant described in DIS 33:100 as wr: wrinkled has been found to be an allele of furrowed.
sd
spa : scalloped-spatula Valencia, 1959 1-51.5 The mutant described in DIS 33:99 as spa: spatula has been found to be an allele of scalloped. Interacts with Bx when both are in heterozygous condition. Cytological examination showed chromosome probably normal, although there was an undefinable "disturbance" around the locus.

En-sd: Enhancer of scalloped Valencia, 1963 When sd
spa (spatula) females were mated to Beadex (Philadelphia stock b 16), a few of the sons were found to be almost wingless, while the rest were typical spatula. When these wingless males were mated to attached-X females, one-half of the sons were wingless, thus indicating an autosomal dominant enhancer of scalloped. The autosomal has not yet been identified. En-sd does not enhance Bx or Bx

DROSOPHILA SPECIES

NEW MUTANTS

hydei

Report of O. Hess and M. M. Green

to: tomato Hess 63g4 1-48.0 (locus by Green). Eye color bright reddish orange darkening to dull brown with age. Phenotype inseparable from that of previously described ch (1-115) of Spencer. X-ray induced as single ♂. RK1

to: tomato-2 Green 63k5 1-48.0. Inseparable from to. X-ray induced as single ♂. RK1

to: tomato-3 Green 63k7 1-48.0. Inseparable from to. X-ray induced as single ♂. RK1

to: tomato-4 Gloor 62g 1-48.0. Inseparable from to. X-ray induced as single ♂. RK1

pn: prune Green 63j31 1-13.4. Dark maroon eye color. Possible homologue of pn in D. melanogaster. X-ray induced as single ♂. RK1

f: forked Gloor 64c 1-86± (locus by Green). Bristles twisted and gnarled as in f of D. melanogaster for which it is good homologue. X-ray induced in as single F1♂. RK1

f: forked-2 Green 63l1 In(1). Bristles forked; phenotypic allele of f. Crossing over between m and ch reduced to about 16%; expected 50%. Crossing over to left of m nearly normal. Homozygous ♀ inviable. X-ray induced as single ♂. RK2 Lost.

f: forked-3 Green 63l5 In(1). Bristles forked; phenotypic allele of forked. Crossing over reduced over entire X. Between m and ch crossing over reduced to 3-5%; expected 50%. To left of m, crossing over rare, only occasional doubles found. X-ray induced as single ♂. RK2

Sp: Spread Green 63j25 1-?. Wings held at angle from body. Occasionally overlaps wild-type. Probably localized to right of m. X-ray induced as single ♂. RK2
Drosophila Species - New Mutants

\[ w^1: \text{white-mottled-1} \] Green 6318 Tp(1) Eye color dark red mottled. X-ray induced as single \( w^{1/2}/w \) female. Salivary cytology (by A. S. Mukherjee) suggests X heterochromatin including NOR inserted into section 17A (Berendes Map).

\[ w^2: \text{white-mottled-2} \] Green 63112 In(1) Eye color yellow-orange mottled. Strongly modified toward wild by additional Y. \( w^{1/2}/w \) low viability, very late hatching. X-ray induced as single \( w^{2/2}/w \) female. Salivary cytology (by A. S. Mukherjee) suggest pericentric inversion with one break in heterochromatin, one break just after doublet 17A,2. Also includes an insertion of heterochromatin at 9A,B.

\[ w^3: \text{white-mottled-3} \] Green 64b12 Tp(1) Eye color of heterozygous \( w^3/w^3 \) between that of \( w^{1/2}/w \) and \( w^{2/2}/w \). Homozygous females and hemizygous males phenotypically nearly normal. X-ray induced as single \( w^{3/2}/w \) female. Salivary cytology (by A. S. Mukherjee) shows insertion of heterochromatin at 17A as in \( w^2 \).

\[ 631 \] \( \text{white-631} \) Green 63112 1-19 Eye color snow white. Malpighian tubules and testes sheath also \( w \). X-ray induced as single \( \delta \). RK1. Lost.

\[ 64a \] \( \text{white-64a} \) Green 64a1 1019. Inseparable from \( 631 \). Recovered as single \( w^{1/2}/w^{1/2} \) from X-rayed wild-type \( \delta \). RK1. Discarded.

\[ 64b \] \( \text{white-64b} \) Green 64b2 1-19. Inseparable from \( 631 \). Recovered as single \( w^{1/2}/w^{1/2} \) from X-rayed wild-type \( \delta \). RK1. Discarded.


\[ \text{Df(1)w, N: white Notch Deficiency} \] Hess 64g25 Df(1) Notch phenotype inseparable from \( N^{1/2} \); \( N/w^{1/2} \) show phenotype of white, indicating that the deficiency also includes locus of white. Homozygous and hemizygous lethal. X-ray induced, irradiation of \( +/+ \) which was crossed with \( w/Y^d \). Recovered as single \( F_1 \) female. Salivary cytology (by A. S. Mukherjee) shows loss of bands from 16C-17A inclusive (Berendes' map).

\[ \text{ch: cherry-tomato} \] Hess 63b22 1-115.7. Inseparable from \( \text{ch} \). X-ray induced as single \( \delta \). RK1

\[ \text{ch2: cherry-tomato-2} \] Green 63k4 1-115.7. Inseparable from \( \text{ch} \). X-ray induced as single \( \delta \). RK1

\[ 63k \] \( \text{garnet-63k} \) Green 63k7 1-32.5. Inseparable from \( g \). X-ray induced as single \( \delta \). RK1. Discarded.

\[ \text{vt1: vermilion-Tübingen-1} \] Hess 62b20 1-7.4. Inseparable from \( v \). X-ray induced as single \( \delta \). RK1

\[ \text{vt2: vermilion-Tübingen-2} \] Hess 63c6 1-7.4. Inseparable from \( v \). X-ray induced as single \( \delta \). RK1

\[ \text{vt3: vermilion-Tübingen-3} \] Green 63k30 1-7.4. Inseparable from \( v \). X-ray induced as single \( \delta \); homzygous \( gg \) inviable, possibly In(1). RK1
m: miniature-63i Green 63i31 1-59.6. Inseparable from m. X-ray induced single 
\[ \sigma^+ \text{ RK1.} \]

m: miniature-63j Green 63j31 1-59.6. Inseparable from m. Complementary with 
m and m3j. m3j/m3j near but separable from wildtype. \( \sigma^+ m/m^+ \) gave no m 
crossovers in 1594 progeny indicating m not dy allele. X-ray induced as single \( \sigma^+ \). RK1.

y: yellow-Tübingen-1 Hess 621 1-38.8. Inseparable from y. Homologue of y1 of 
D. melanogaster, i.e. yellow body and bristles. X-ray induced as single \( \sigma^+ \). RK1

y: yellow-Tübingen-2 Hess 62j30 1-38.8. Inseparable from y. X-ray induced as 
single \( \sigma^+ \). RK1.

y: yellow-64a Green 64a30 1-38.8. Inseparable from y. X-ray induced as 
single \( \sigma^+ \). RK1. Discarded.

y: yellow-64b Green 64b6 1-38.8. Inseparable from y. X-ray induced single 
\( \sigma^+ \). RK1. Discarded.

y: yellow-dark bristle Green 63j30 1-39.0. Yellow body color somewhat darker 
than that of ydb and black bristles. Equivalent to lt of D. hydei and y of D. melano-
gaster. \( \sigma^+ y/y^+ \) and \( \sigma^+ y^+ y^+ \) are \( y^+ \) in phenotype; therefore \( y^+ \) functional allele of 
both y and lt. \( \sigma^+ y/y^+ \) gave 2 y/4, 152 progeny with y localized to the right of y, 
presumably allelic to lt. RK1. Lost.

subobscura

Report of A. Pentzos-Daponte

Cherry mutants in a wild population of Drosophila subobscura in Northern Greece. 
During the course of a study the aim of which was the genetic analysis of the chromo-
somal polymorphism of D. subobscura in the wild, flies of a vernal and autumnal popu-
lation had been trapped on the Sheikh-Sou hill (altitude 120 m), in the outskirts of 
Thessaloniki. Among the captured flies there were few individuals the eye-color of 
which was "cherry-like". These flies were isolated and cultured for several generations. 
Subsequently, virgin females from the "cherry-like" cultures were mated with males of a 
cherry stock. Neither the F1 nor the F2 of these crosses have shown any sign of segre-
gation; hence it is assumed that the originally captured "cherry-like" flies were genuine 
cherry mutants.
Kaneko, A. Hokkaido University, Japan. Differences in the shape of spermatheca of robusta group species in Japan. With one text-figure.

The identification of closely related species may be made by careful examinations of slight differences of external characters. A study of the male genitalia is to be the most satisfactory way to separate the closely related species, while the structure of female ovipositor varies to some extent. The differences in shape of the spermatheca sometimes help in identification of species.

In Japan, Drosophila belonging to robusta group had been divided into the following four species: D. sordidula, D. lacertosa, D. moriwakii and D. okadai. Kaneko, Tokumitsu and Takada separated D. sp. like sordidula from D. sordidula as a new species. Although the two species were very similar in external characters and genitalia, they were different in both karyotypes and sexual isolation. More recently, one more species very close to D. okadai was found by Kaneko, as a new member of robusta group. It is not always possible to identify accurately female members of robusta group, namely D. okadai and D. sp. like okadai, some of D. sordidula and D. sp. like sordidula and D. lacertosa, on the bases of external characters and egg-guide. The shapes of spermathecae in the six species of robusta group as mentioned above, varied remarkably from one another, as shown in the Figure. In living and alcohol-fixed specimens, the degree of transparency in spermathecae of these six species is to be arranged in descending order: 1) D. sp. like sordidula 2) D. sordidula, 3) D. moriwakii, 4) D. sp. like okadai, 5) D. lacertosa and 6) D. okadai. However, the spermatheca of D. okadai is not always transparent. Of course, after preparation (boiling the abdomen in 10% sodium hydroxide, clearing in phenol, soaking in oil of creosote, mounting by balsam), the spermathecae of all species became very pellucid and the internal structure can be easily observed. No apical round hollows were found in D. okadai, D. moriwakii and D. sp. like sordidula. Such differences in spermathecal shape as described above are helpful in identifying the female in robusta group in Japan.

Figure: showing spermathecae of six species in robusta group

Norton, I. L. and J. I. Valencia. Oak Ridge National Laboratory, Tenn. Genetic extent of the deficiencies formed by combining the left end of In(1)\(y^4\) with the right end of In(1)sc.

The salivary gland chromosome break points of In(1)\(y^4\) are between 1A8 and 1B1 on the left and between 18A3 and 4 on the right (i.e. = In(1)1A8-1B1;18A3-4). In(1)sc is broken between 1B2 and 3 on the left and between 18B8 and 9 on the right (i.e. = In(1)1B2-3;18B8-9). Thus, the recombinant, In(1)\(y^4\)L,sc9R is deficient for salivary bands 1B1 and 2 as well as 18A4 through 18B8. This recombinant is \(y^4d\) or \(y^4d\) and acdef, but it survives in combination with 1(1)J-1. To check the genetic extent of the proximal deficiency, In(1)\(y^4\)L,sc9R was made heterozygous to the following mutants: fu and fu\(^\text{9}\) (59.3), hdp (59.5), bkl (59.9), obl (60.1), crk (60.1), ton (60.1), bk\(^\text{2}\) (60.6), thl (60.7) sby-61 (60.8), pph-61 (61.0), smd (61.1), coc (61.5) and meg (61.9). Mutant phenotypes were obtained only with sby-61, smd, and coc. Thus Df(1)18A4-B8 is approximately one unit long; furthermore the relative position of pph-61 is in error. We wish to express our gratitude to M. G. and O.S. Fahmy for generously supplying us with the selection of mutants that so completely cover this region.
Hess, Oswald. Max-Planck Institut für Biologie, Germany. Mutation and localization studies in the Y chromosome of *D. hydei*.

During the growth stage of the primary spermatocytes five sites of the Y chromosome of *D. hydei* form loops, which in principle are organized in the same way as the loops of lambrush chromosomes in Amphibian oocyte nuclei. According to their different morphology the five loops are called threads (F), pseudonucleolus (P), clubs (K), tubular ribbons (T), and noose (S).

For the localization the long arm of the Y chromosome is divided into ten equal segments which are designated 1-10 starting at the kinetochore. The loci of the loops have been mapped as follows (fig. 1): threads in segment 10 or 9, pseudonucleolus in segment 9 or 8, tubular ribbons in segment 2 or 3, clubs in segment 1, and noose on the short arm.

By X irradiation the following X.Y-translocation chromosomes have been induced:

- a) T(X,Y), 340/7: Y(S,K,T), w lt
- b) T(X,Y), 340/2: Y(S,K), w lt
- c) T(X,Y), 290/1: Y(S), w lt
- d) T(X,Y), 340/10: w lt.Y(P)

The four translocation chromosomes possess a complete euchromatic arm of the X which is marked by white light; the heterochromatic arm is lost. The translocated Y chromosome fragments differ in respect to the loops which they possess. Translocations a, b, and c have kinetochores from the Y chromosome, translocation d from the X chromosome. Males and homozygous females have normal viability; males without an additional complete Y chromosome are sterile.

Besides these X.Y-translocations one Y-autosome translocation and one Y fragment have been induced by X rays:

- e) T(Y,A), vermilion-1: Y(S,K,T), A and A.Y(P,F)
- f) Y(S,K,T)

The translocation chromosomes of the autosomal translocation segregate independently, because the autosomal break point lies next to the kinetochore. Both translocation chromosomes of this reciprocal translocation can, therefore, be crossed into other stocks. The Y fragment includes segments carrying the organizers for the tubular ribbons, the clubs, and the noose. The distal part of the long arm containing organizers of threads and pseudonucleolus are lost.

In addition, two mutants of one of the loops, the threads, have been induced by X-irradiation (fig. 2). In the first mutant, called "tube-proximal", the normally compact proximal sections of the threads are changed into tubes, whereas the distal diffuse sections are unchanged (fig. 2b). In the second mutant, "tube-distal", the distal sections are changed into two knots of narrow tubes and the proximal compact sections are not altered (fig. 2c). It has proved possible to build up stocks in which all the males have Y chromosomes carrying the mutation tube-proximal, and stocks in which all the males have the mutation tube-distal.

Fig. 1: Diagram of the Y chromosome of *D. hydei*, showing the loci of the five spermatocyte loops. Explanations: S, noose; K, clubs; T, tubular ribbons; P, pseudonucleolus, F, threads; YS, YL, short and long arm.
Fig. 2: Loops in the spermatocyte nucleus of normal (a), tube-proximal (b) and tube-distal, (c) male. Explanations: ddF, diffuse distal (normal), dsF, tubular distal sections (tube-distal) of the threads; pkF, proximal compact (normal), psF, proximal tubular sections (tube-proximal) of the threads; N, nucleolus. For other abbreviations, see fig. 1.

Pelecanos, M. University, Thessaloniki, Greece. The mutagenic effect of the duration of treatment with diethyl sulphate on previously starved adult males.

Previous communications have shown the importance of diethyl sulphate as a mutagenic agent. (Pelecanos 1962, Pelecanos and Alderson, 1963). Moreover, the mutagenic activity of above mentioned chemical has been studied in detail by the same workers and the data obtained are already in press.

The present report describes the results of some preliminary experiments the aim of which was twofold:

1. Study the effect of the duration of treatment upon the yield of mutations induced by the feeding of diethyl sulphate.
2. Assess whether a prior starvation treatment of the adult males would alter the frequency of induced mutations.

In all our previous experiments, newly emerged Oregon-K males were treated immediately after collection, while in the present two series of experiments, they have been either fed for 24 hours in an ordinary medium, or starved for 24 hours before the treatment. The same diethyl sulphate solution has been used throughout each experiment despite the different rate of hydrolysis over the different periods of treatment. The method used for feeding the flies has been described elsewhere (Pelecanos and Alderson 1963). After the treatment the males were tested for sex-linked recessive lethal mutations by the Muller-5 method. Each male was individually mated to two females for three days; only the first brood is recorded here.

The results are gathered in Tables I and II.

Table I shows that when a 24 hour starvation preceded the treatment, there was essentially a linear relation between the duration of treatment and the mutagenic effect. On the contrary, when newly emerged males have been fed for 24 hours in an ordinary laboratory food medium
before treatment, the data obtained (Table II) are entirely different. There is no sign of linearity as regards the relation between the treatment's duration and the yield of mutations induced; furthermore, the frequency of mutations itself is significantly lower in all three cases where data so far available, allow comparisons. (For 12 hr, 24 hr, and 36 hr treatments, the $X^2$ values and the probabilities are respectively: $X^2=4.25$ $P<0.05$, $X^2=6.6$ $P<0.01$, $X^2=12.9$ $P<0.001$).

Table I. The mutagenic response to adult feeding of diethyl sulphate, when newly emerged males have been starved for 24 hours before treatment.

<table>
<thead>
<tr>
<th>Duration of Treatment</th>
<th>No. of chromosomes tested</th>
<th>No. of lethals</th>
<th>lethals per cent</th>
</tr>
</thead>
<tbody>
<tr>
<td>12 hours</td>
<td>1,079</td>
<td>68</td>
<td>6.30</td>
</tr>
<tr>
<td>Concentration of D.E.S. 0.5%</td>
<td>743</td>
<td>84</td>
<td>11.30</td>
</tr>
<tr>
<td>24 hours</td>
<td>567</td>
<td>117</td>
<td>20.63</td>
</tr>
<tr>
<td>36 hours</td>
<td>1,040</td>
<td>282</td>
<td>27.10</td>
</tr>
<tr>
<td>48 hours</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table II. The mutagenic response to adult feeding of diethyl sulphate, when newly emerged males have been fed in an ordinary medium for 24 hours before treatment.

<table>
<thead>
<tr>
<th>Duration of Treatment</th>
<th>No. of chromosomes tested</th>
<th>No. of lethals</th>
<th>lethals per cent</th>
</tr>
</thead>
<tbody>
<tr>
<td>12 hours</td>
<td>786</td>
<td>17</td>
<td>2.16</td>
</tr>
<tr>
<td>Concentration of D.E.S. 0.5%</td>
<td>1,141</td>
<td>33</td>
<td>2.89</td>
</tr>
<tr>
<td>24 hours</td>
<td>1,141</td>
<td>85</td>
<td>8.61</td>
</tr>
<tr>
<td>36 hours</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: D.E.S. stands for diethyl sulphate (ethyl sulphate).

The most likely explanation appears to be that when previously fed, the flies do not eat enough from the treatment medium which obviously they dislike. It is also reasonable to assume that flies resist better to hunger when the treatment's duration is shorter; our results are clearly in favor of such an explanation. Thus, a previous to the treatment starvation appears to be an important factor which has to be considered when using diethyl sulphate as a mutagen by the adult feeding method.


Narda, R. D. Panjab University, India. The role of various male stimuli during mating and insemination in D. malerkotliana Parshad and Pika, 1964.

The direct observations on the courtship behavior of males in Drosophila malerkotliana reveal that the male approaches the female, taps the tarsi of her middle-leg with that of his fore-leg, vibrates his wings, circles in the case of non-receptive female and poses at her rear end. To study the extent of the role played by each act in preparing the female for coition, as well as to find out the effect of light, experiments were designed eliminating the various factors one by one. Ten four-day old virgin females and 10 males of the same age but either without fore-leg tarsi or wings were kept for 48 hours in a half-pint milk bottle with standard Drosophila food at 25 ± 1°C in a room with fluorescent tube lighting. The light was eliminated by running the experiment in closed cardboard boxes which were early checked for the purpose. Ten trials for each set of experiment along with a control were run simultaneously. After the required period the females were checked for insemination through the presence of sperms in their spermathecae and ventral receptacles. Whereas the normal males inseminated 42% females in light, only 7.293% were fecundated in total darkness. Further, since the percentage insemination again increased to 39.796 when 1/4 pint milk bottles were used the possibility of vision as a major stimulant is ruled out. It rather helps in bringing the mates together. The removal of fore-leg tarsi in males decreased the insemination to
29.348% as against 44.706% in the control. The wingless males fecundated only 7.071% females as compared to 39.175% in the control. Again, when tarsiless and wingless males were kept with the normal females, not even a single was fecundated. These studies indicate that tapping and wing vibration of the male, of which the latter seems to be more important, are the essential factors to stimulate the female for copulation. The other acts like sight, circling and posturing seem to be of accessory nature.


Collections of Drosophilidae made from three places, viz., Srinagar, Pahalgam and Gulmarg, in the Kashmir Valley from June 18, 1963 to July 22, 1963, revealed twenty species, two belonging to the genus Scaptomyza and eighteen to Drosophila. Of the latter, one each belonged to the subgenera Dorsilopha and Pholadoris, eleven to the subgenus Sophophora and the remaining five to the subgenus Drosophila. Three out of these, D. (Pholadoris) ebonata, D. (Sophophora) epiobscura and D. (Drosophila) pentaspina are novo while Scaptomyza pallida, S. graminum, D. busckii, D. helvetica, D. pulchrella, D. brachynephros, D. testacea and D. curviceps are being reported for the first time from India. The frequency distribution of the various species at the three places is given in Table 1.

Table 1. Frequency distribution of the various species of Drosophilidae in the Kashmir Valley

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Name of the species</th>
<th>Frequency distribution at</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Srinagar</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5300 ft.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>above sea level</td>
</tr>
<tr>
<td>1.</td>
<td>Scaptomyza pallida</td>
<td>-</td>
</tr>
<tr>
<td>2.</td>
<td>Scaptomyza graminum</td>
<td>-</td>
</tr>
<tr>
<td>3.</td>
<td>D. busckii</td>
<td>-</td>
</tr>
<tr>
<td>4.</td>
<td>D. ebonata sp. novo</td>
<td>5</td>
</tr>
<tr>
<td>5.</td>
<td>D. helvetica</td>
<td>-</td>
</tr>
<tr>
<td>6.</td>
<td>Drosophila epiobscusa sp. novo</td>
<td>-</td>
</tr>
<tr>
<td>7.</td>
<td>D. bifasciata</td>
<td>-</td>
</tr>
<tr>
<td>8.</td>
<td>D. melanogaster</td>
<td>111</td>
</tr>
<tr>
<td>9.</td>
<td>D. neapalensis</td>
<td>7</td>
</tr>
<tr>
<td>10.</td>
<td>D. suzuki</td>
<td>20</td>
</tr>
<tr>
<td>11.</td>
<td>D. pulchrella</td>
<td>-</td>
</tr>
<tr>
<td>12.</td>
<td>D. anassae</td>
<td>-</td>
</tr>
<tr>
<td>13.</td>
<td>D. kikkawai</td>
<td>28</td>
</tr>
<tr>
<td>14.</td>
<td>D. rufa</td>
<td>-</td>
</tr>
<tr>
<td>15.</td>
<td>D. fambulina</td>
<td>-</td>
</tr>
<tr>
<td>16.</td>
<td>D. brachynephros</td>
<td>-</td>
</tr>
<tr>
<td>17.</td>
<td>D. curviceps</td>
<td>-</td>
</tr>
<tr>
<td>18.</td>
<td>D. immigrans</td>
<td>37</td>
</tr>
<tr>
<td>19.</td>
<td>D. testacea</td>
<td>-</td>
</tr>
<tr>
<td>20.</td>
<td>D. pentaspina sp. novo</td>
<td>1</td>
</tr>
</tbody>
</table>

Grand total 209 349 530 2522 145 291 884 3162
Bochnig, V., H. J. Belitz and H. Nöthel
Institut für Genetik der Freien Universität Berlin. Increase in frequency of a detrimental in a laboratory wild stock.

The Berlin wild-stock of D. melanogaster has been reared in our laboratory for more than 30 years. In 1958 we derived from this stock some sublines which have since been kept in mass cultures. All of them had good viability. At that time we found in one of these sublines 3 out of 21 males tested to have a detrimental in heterozygous condition in the second chromosome. Of these 3 males, 8 balanced stocks (1/Cy) were established, 6 of them behaved as lethals and 2 as semilethals. These 8 factors were allelic. But in the 28 combinations necessary to test the allelism the frequency of surviving compounds varied greatly, and was in most cases higher than expected, even in crosses between lethals. The survivors were entirely sterile, however. As these and further experiments suggest (Belitz, in preparation), the genetic background seems to determine whether the factor in question acts as a lethal or as a semilethal and whether or not the fitness of the heterozygotes is high. Beginning in 1961, fecundity, fertility, viability and sterility in the same stock decreased, giving at last a stock with extreme low viability. A new genetic analysis yielded the following results: 85 males were tested for second-chromosome detrimentals. In 83 males each second chromosome contained a semilethal, in the other 2 one second chromosome had a lethal, the other one a semilethal. These factors, so far tested, proved to be allelic to the detrimentals found in 1958. But the newly isolated homozygous animals are fertile in some cases. Third-chromosome detrimentals were looked for in 57 males, but no one was found.

Krimbas, C. B. College of Agriculture, Greece. Further data on inversion polymorphism of D. subobscura in Greece.

Some data suggested the possibility of seasonal changes in frequencies of structural types of chromosome E in Parnes population (Greece) of D. subobscura (Krimbas, 1964, Evolution-in press). In order to investigate this point it has been decided to study big samples of this population in spring and late summer. An important sample (N=216) has been studied by analyzing the males' genotype, crossing them to homozygous females for Standard order in all their chromosomes.

In chromosome A, A2 showed a net increase in frequency compared to the preceeding years. J3+4 was not found this time. The chromosome E frequencies were similar to the late summer ones of last year, in this way disproving a cyclical seasonal change. In chromosome U, UI+2+7 showed a net increase in frequency, while in chromosome 0, OST decreased.

Chromosomes A2 seem to have size decreasing capacities in regard to AST. Also UI+2+4 seem to be size increasing, while UI+2+7 size decreasing. These differences are still not statistically significant to the 5% level. Only the genotypes for chromosome U showed a net departure from Hardy-Weinberg (0.01< P< 0.001) in having heterozygotes more than expected and less homozygotes. The differences have been estimated (ratio between observed and expected) for the six main genotypes: UI+2/UI+2=0.42, UI+2+4/UI+2+4=0.78, UI+2+7/UI+2+7=0.25, UI+2+4/UI+2+4=1.21, UI+2+7/UI+2+4=1.05, MMM UI+2+7/UI+2+7 = 1.46. A fitness surface has been constructed with these values, which showed a maximum at the point UI+2 freq=0.35; UI+2+4 freq=0.40 and UI+2+7 freq=0.25, W=0.9962. The actual population lies quite near to the maximum (UI+2 freq=0.32; UI+2+4 freq=0.48; UI+2+7 freq=0.20, W=0.9929). This shows that our fitness estimates are not very far from reality.

Fujii, S., Kanehisa, I. and Ohnishi, M. Kobe University, Japan. Biochemical analysis of "Freckled-type melanotic tumor" inducible fraction.

After the co-working of Kanehisa with Prof. Barigozzi and co-workers, Universita Di Milano, the 0.3 M NaCl-eluted fraction which can induce "Freckled-type tumor", from D.E.A.E. cellulose column-chromatography, was tested for the presence of nucleic acids. This fraction has a maximum adsorption at around 280 mμ and minimum at 260 mμ. So far from the fraction from 15 gr. wet weight flies, purified by some organic solvents, DNA or RNA could not be found in this fraction. There is no incorporation of P32 in this fraction, though the other two fractions from the chromatography incorporate this isotope.

Collections were made during the period July to August, 1964 in five different localities of Hokkaido: Esan, Doya, Nisama, Gunna and Toikanbetsu, and in two localities of Aomori prefecture: Okuyagen and Imabetsu. A total of 7,188 specimens were collected by the use of fermented banana, at one hour intervals from sunrise to sunset for three successive days. They were represented by 37 species as given in the accompanying table. Among them, new species designated as Drosophila sp. like sordidula and Drosophila sp. like okadai were found to occur in robusta group. Remarkable was the fact that D. lacertosa constituted 80.9 per cent of all flies collected in Toikanbetsu, the northern part of Hokkaido.

Numerical data of Drosophila species collected in seven localities of Hokkaido and Aomori prefecture, summer 1964.

<table>
<thead>
<tr>
<th>Species</th>
<th>Localities</th>
<th>Imabetsu</th>
<th>Okuyagen</th>
<th>Esan</th>
<th>Gunnai</th>
<th>Doya</th>
<th>Nisama</th>
<th>Toikanbetsu</th>
<th>Total</th>
</tr>
</thead>
<tbody>
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<td>Mriiota variegata</td>
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<td>5</td>
<td>1</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>8</td>
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<tr>
<td>Leucophenga</td>
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<td>-</td>
<td>-</td>
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<td>-</td>
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<tr>
<td>quadripunctata</td>
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<td>-</td>
<td>-</td>
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<td>L. sp.</td>
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<td>-</td>
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<tr>
<td>Chymomyza sp.</td>
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<td>-</td>
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<tr>
<td>Parascaptomyza pallida</td>
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<td>-</td>
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<td>Drosophila alboralis</td>
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<td>D. coracina</td>
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<tr>
<td>D. auraria race A</td>
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<td>D. auraria race B</td>
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<td>2421</td>
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<tr>
<td>D. brachynephros</td>
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<td>-</td>
</tr>
<tr>
<td>D. nigromaculata</td>
<td>10 2</td>
<td>100</td>
<td>91</td>
<td>304</td>
<td>19</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>526</td>
</tr>
<tr>
<td>D. testacea</td>
<td>24 15</td>
<td>1</td>
<td>21</td>
<td>23</td>
<td>68</td>
<td>18</td>
<td>170</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>D. histrio</td>
<td>4 21</td>
<td>- 4</td>
<td>- 2</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>31</td>
<td>-</td>
</tr>
<tr>
<td>D. funebris</td>
<td>-</td>
<td>-</td>
<td>- 9</td>
<td>-</td>
<td>5</td>
<td>-</td>
<td>-</td>
<td>14</td>
<td>-</td>
</tr>
<tr>
<td>D. pengi</td>
<td>-</td>
<td>-</td>
<td>- 1</td>
<td>2</td>
<td>13</td>
<td>16</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>D. ezoana</td>
<td>-</td>
<td>-</td>
<td>- 1</td>
<td>2</td>
<td>13</td>
<td>16</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>D. sordidula</td>
<td>-</td>
<td>3</td>
<td>6</td>
<td>2</td>
<td>-</td>
<td>-</td>
<td>11</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>D. lacertosa</td>
<td>36 59</td>
<td>5 259</td>
<td>110</td>
<td>12</td>
<td>2043</td>
<td>2524</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>D. moriwakii</td>
<td>12 109</td>
<td>- 49</td>
<td>119</td>
<td>12</td>
<td>127</td>
<td>428</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>D. okadai</td>
<td>- 2</td>
<td>68</td>
<td>- 62</td>
<td>132</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>D. sp. like sordidula</td>
<td>8 6</td>
<td>- 1</td>
<td>- 2</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>14</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>D. sp. like okadai</td>
<td>-</td>
<td>-</td>
<td>- 29</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>29</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>D. sp. I</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>D. sp. II</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>D. sp. III</td>
<td>-</td>
<td>-</td>
<td>- 2</td>
<td>-</td>
<td>2</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>D. sp. IV</td>
<td>-</td>
<td>-</td>
<td>3</td>
<td>-</td>
<td>3</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>D. sp. V</td>
<td>-</td>
<td>-</td>
<td>- 1</td>
<td>1</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Total</td>
<td>276 345</td>
<td>156</td>
<td>1252</td>
<td>1688</td>
<td>1095</td>
<td>2376</td>
<td>7188</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>
Solima-Simmons, Angela and Howard Levene. Columbia University. Effect of age and temperature on matings of Drosophila paulistorum.

Previous experiments (Malogolowkin, Solima-Simmons and Levene, in press) led us to check on the effect of temperature and age on sexual isolation. The experiment was performed using Ellens (1957) Chambers with two strains (Simla H and Elena L) of the Amazonian and one (Apoteri Y) of the Orinocan race, all tested against Bahia 6 (Andean-Brasilian) kept for several years in the laboratories.

The flies were aged 5, 10 or 20 days and tested at 20°C and 25°C. The percentages of heterogamic matings are:

<table>
<thead>
<tr>
<th>Days</th>
<th>Simla H</th>
<th>Elena L</th>
<th>Apoteri Y</th>
</tr>
</thead>
<tbody>
<tr>
<td>temp.</td>
<td>5</td>
<td>10</td>
<td>20</td>
</tr>
<tr>
<td>20°C</td>
<td>2</td>
<td>0</td>
<td>13</td>
</tr>
<tr>
<td></td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>21</td>
<td>33</td>
<td>36</td>
</tr>
</tbody>
</table>

There seems to be little effect of age but lower isolation at lower temperature.

Previous values obtained in the experiment cited above (ca. 10 days, 25°C) were 0, 3, 10 percent respectively.

For the actual percentage of total matings (heterogamic and homogamic) there is comparatively little effect of age and temperature.

A comparison of the total matings of both the new and the old data give the following percentages:

<table>
<thead>
<tr>
<th></th>
<th>Simla H vs Bahia 6</th>
<th>Elena L vs Bahia 6</th>
<th>Apoteri Y vs Bahia 6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Previous</td>
<td>20</td>
<td>18</td>
<td>37</td>
</tr>
<tr>
<td>Present</td>
<td>58</td>
<td>63</td>
<td>69</td>
</tr>
</tbody>
</table>

The results could be explained by a better adaptedness of the Orinocan and especially the Amazonian flies to laboratory conditions. Their mating activity is now closer to the older Bahia 6 strain.

Research supported by NSF Grant NSF-GB-1906.

Miller, Dwight D., Ralph L. Sulerud and Neal Westphal. University of Nebraska. Determinations of D. athabasca Y chromosome types from new localities.

As pointed out by Miller and Roy (1964), D. athabasca has three widespread Y chromosome types: large J-shaped Type 1, medium near-V Type 2, and large V-shaped Type 3 (with X1 and X2). Compared with the X-chromosome of this species, which in primary spermatocytes has segments in ratio of about 5:1:4 (Miller and Stone, 1962), Type 1 may be described as having a segment ratio of 5:1:2, 5:3, or 5:2; Type 2 as 3:1:2 or 3:3; and Type 3 as essentially 5:1:4 (like the X). Recent collections of our own, supplemented by those of others who have kindly provided us with specimens and cultures, have made it possible to extend observations of Y chromosome types in this species (for new material we are grateful to Miss Judith Barkley and Dr. Edward Novitski, University of Oregon; Professor Th. Dobzhansky and Mrs. Olga Pavlovsky, Rockefeller Institute; and Dr. Philip T. Ives, Amherst College). The widespread, generally western Type 1 has now been determined from additional western localities: British Columbia (Okaneghan, Victoria), Idaho (Boise), Minnesota (Hallock, Halstad), New Mexico (Raton Pass), Oregon (Eugene, Siuslaw National Forest), and Washington (Mt. Baker National Forest, San Juan Islands). Type 2 has been encountered at Amherst, Massachusetts, and Northfield, Minnesota. A new type, designated Type 5, has been found in material from Seguim Bay, Washington (Olympic Peninsula). This is a nearly V-shaped chromosome intermediate between Types 2 and 3 (segment ratio 4:1:3 or 4:4).

In view of the role of small molecules in enzyme induction and the relationship of gene activation to enzyme induction and to puffing, we have been investigating the effects of amino acids on puffing in D. melanogaster salivary chromosomes. Glands are excised from third-instar larvae grown at 18° and incubated separately in Ringer's solution containing the test substance and in plain Ringer's solution. After a given interval, puffing patterns are compared. The production of a puff with 0.03M tryptophan at site 68D on III-L has been reported (Biol. Bull. 127, in press). Puffing at 68D is never observed in controls. It was also reported that methionine and tyrosine appear to have no effects. A study of the comparative effects of d- and l-tryptophan also showed differences. However, although one might expect that a puff would appear either regularly or not at all, d-tryptophan causes smaller and less frequent puffs (20% vs. 85% of nuclei observed) than l-tryptophan. In the case of both methionine and tryptophan there appears to be an increase in the frequency and extent of puffing at site 50F on II-R; this puff, however, shows relatively high variability, and some uncontrolled factor may be involved. In similar experiments, l-histidine produced no significant changes in the puffing pattern. The results are summarized in table below.

<table>
<thead>
<tr>
<th>Amino acid added</th>
<th>Concentration (moles/liter)</th>
<th>Hours in Ringer's</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-histidine</td>
<td>0.05</td>
<td>1</td>
<td>No significant change</td>
</tr>
<tr>
<td></td>
<td>0.10</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>1-methionine</td>
<td>0.06</td>
<td>1</td>
<td>50F ?</td>
</tr>
<tr>
<td></td>
<td>0.20</td>
<td>1</td>
<td>50F ?</td>
</tr>
<tr>
<td>1-tryptophan</td>
<td>0.03</td>
<td>1/2</td>
<td>No change</td>
</tr>
<tr>
<td></td>
<td>0.03</td>
<td>1</td>
<td>Puff at 68D (50F ?)</td>
</tr>
<tr>
<td>d-tryptophan</td>
<td>0.03</td>
<td>1</td>
<td>Small puff observed at 68D occasionally</td>
</tr>
<tr>
<td>1-tyrosine</td>
<td>0.0022</td>
<td>1</td>
<td>No significant change</td>
</tr>
</tbody>
</table>

These results are differential results: immersion in Ringer's solution for the durations noted produced a variety of changes in the puffing pattern. Only those ascribable to the amino acids are reported. Absence of visible puffing does not, of course, imply the absence of local changes in rates of RNA synthesis. The present survey continues in an attempt to learn more about the turning on and off of genes. (Work supported by NSF Grant G-24023 and NSF Undergraduate Research Participation Project).


Slizynska found that in regard to the effects of irradiation there was a profound heterogeneity between males as well as between the germ cells of individual males in brood. Heterogeneity between the males would arise if at the time of treatment some males have more spermatogonial mitoses than the others. Heterogeneity between the germ cells of individual males can be reduced to the fact that in the testis some spermatogonial cells are in a susceptible stage (metaphase) while the majority of cells are in a resistant stage. The question was studied cytologically and the following results were obtained.

Among 129 2-3 days old males of y w stock there were 25 males in which there were no mitotic divisions in the testes, 23 males had mitoses in the apex cells and 81 males had spermatogonial mitotic divisions in the cysts. Among the males of this last category there were 51 with 4 or less dividing spermatogonial cells, 14 males with 5-7 divisions per testis, and 16 males with 8-16 divisions of spermatogonial cells per testis. Thus the highest sensitivity to treatment in brood is expected to occur in about 12% of males. This figure will be doubled if two last classes of frequency of mitoses are taken as resulting in high sensitivity.

During the Drosophila Research Conference at Madison, Wisconsin (1964), Dr. R. Hillman of Temple University called Kojima's attention to an article in DIS (Tsukamoto; DIS No. 38:91-93). The article deals with an estimation procedure of recombination fractions in three-point test with a low penetrance gene. Dr. R. Hillman applied Tsukamoto's method to his data, and obtained an uninterpretable result.

An algebraic examination starting from the tables in Tsukamoto's article leads his four formulae to the following results:

$$\text{Formula (1)} = \frac{100}{1 + \sqrt{\frac{R_1}{100-R_1}}}, \text{ instead of } R_1,$$

$$\text{Formula (2)} = \frac{100}{1 + \sqrt{\frac{R_2}{100-R_2}}}, \text{ instead of } R_2,$$

$$\text{Formula (3)} = 50\%, \text{ instead of } R_1,$$

and

$$\text{Formula (4)} = \frac{100}{1 + \sqrt{(100-R_1)(100-R_1+yR_1)}} \frac{100y + R_1 - yR_1}{R_1}, \text{ instead of } R_2.$$ 

Thus, it seems that the four formulae by Tsukamoto do not give the estimates of recombination fractions as intended. The rest of this note will deal with a correct procedure for estimating two recombination fractions and one penetrance value in three-point test. The formulae for approximate sampling variances of the estimates will be given.

Consider a stock with mutants a, b, and x at three loci. The x is assumed to have a low penetrance. Denoting their wild-type alleles by '+'s, an F1 hybrid of this stock with a wild stock is a/+, b/+ and x/+, and its phenotype is of wild type. When the F1 (the sex of this individual must be female in the case of Drosophila) is backcrossed to the triple mutant stock, segregation occurs at the three loci. There are eight phenotypic classes. The first problem is to determine whether locus x is located between the a and b loci or at the outside of the a-b segment. A test for this distinction can be performed by the following procedure.

As in Table 1, pool the observed numbers of animals according to four paired phenotypic classes. The difference, YU-ZX, is expected to be zero when the order of the loci is x-a-b and a positive value when the order is a-x-b. The magnitude of the latter value is given at the bottom of Table 1, and the symbols used will be defined later. The departure of YU-ZX may be tested by the following $X^2$ statistic with one degree of freedom:

$$X_1^2 = 4(YU - 1/2 M)^2/M$$

where $M = YU + ZX$.

After the order of the three loci is determined, one can proceed to estimate the values of recombination fractions and penetrance. Symbols to be used are as follows:

- $p$: the recombination fraction between the left-most and center loci.
- $q$: the recombination fraction between the center and right-most loci.
- $y$: the fraction of x/x individuals which appear as wild type (penetrance index).
x-a-b arrangement:

All phenotypic classes, their expected and observed numbers are given in Table 2. Compute the following:

\[
A = \frac{n_1 + n_2 + n_3 + n_4}{N}, \quad B = \frac{n_1 + n_2 + n_5 + n_6}{N}, \quad Q = \frac{n_2 + n_4 + n_6 + n_8}{N}
\]

The expected values of these quantities are

\[
E(A) = p(1-y) + 1/2 y \\
E(B) = q \\
E(Q) = 1/2 (1 + y)
\]

Thus, the estimates are given by

\[
\hat{y} = 2Q - 1 \\
\hat{p} = (2A - \hat{y})/2(1 - \hat{y}) \text{ for the x-a segment} \\
\hat{q} = B \text{ for the a-b segment}
\]

In other words, \( y \) and \( q \) can be estimated directly, and the estimate of \( p \) is compounded with the estimate of \( y \). The sampling variances for the \( \hat{q} \) and \( \hat{y} \) are computed by

\[
\text{Var}(\hat{q}) = \frac{B(1-B)}{N} \\
\text{Var}(\hat{y}) = \frac{4Q(1-Q)}{N} \
\]

The sampling variance for \( p \) is more complicated, but approximately given by

\[
\frac{1}{N(1-y)^2} \left[ A(1-A) + \frac{(1-2A)^2}{(1-y)^2} \cdot Q(1-Q) - 2(1-2A) \frac{(n_2 + n_4)(n_2 + n_4)}{N^2} - \frac{(n_6 + n_6)(n_1 + n_1)}{N^2} \right]
\]

a-x-b arrangement:

As in the case of x-a-b, the phenotypic classes, their expected and observed numbers are given in Table 3 for this case. Compute the following:

\[
A = \frac{n_1 + n_2 + n_3 + n_4}{N}, \quad B = \frac{n_1 + n_2 + n_5 + n_6}{N}, \quad Q = \frac{n_2 + n_4 + n_6 + n_8}{N}
\]

Their expected values are

\[
E(A) = p(1-y) + 1/2 y \\
E(B) = q(1-y) + 1/2 y \\
E(Q) = 1/2(1 + y)
\]

In this case, the estimates of both \( p \) and \( q \) are compounded with the estimate of \( y \), and they are

\[
\hat{y} = 2Q - 1 \\
\hat{p} = (2A - \hat{y})/2(1 - \hat{y}) \text{ for the a-x segment} \\
\hat{q} = (2B - \hat{y})/2(1 - \hat{y}) \text{ for the x-b segment}
\]

The sampling variance of \( \hat{y} \) is given by \( 4Q(1-Q)/N \), and the approximate sampling variances of \( \hat{p} \) and \( \hat{q} \) are
\[
\frac{1}{N(1-y)^2} \left[ \frac{A(1-A) + (1-2A)^2}{(1-y)^2} \cdot Q(1-Q) \cdot \frac{2(1-2A)}{(1-y)} \left\{ \frac{(n_5+n_7)(n_2+n_4)}{N^2} - \frac{(n_6+n_8)(n_1+n_3)}{N^2} \right\} \right]
\]
and
\[
\frac{1}{N(1-y)^2} \left[ \frac{B(1-B) + (1-2B)^2}{(1-y)^2} \cdot Q(1-Q) \cdot \frac{2(1-2B)}{(1-y)} \left\{ \frac{(n_3+n_5)(n_2+n_6)}{N^2} - \frac{(n_4+n_8)(n_1+n_5)}{N^2} \right\} \right],
\]
respectively.

(This work was partly supported by Public Health Research Grant GM 11546 from the Division of General Medical Sciences. The junior author is a member of the European Atomic Energy Community).

**Table 1. x-a-b or a-x-b**

<table>
<thead>
<tr>
<th>Paired</th>
<th>x++</th>
<th>x+b</th>
<th>xa+</th>
<th>xab</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phenotypes</td>
<td>and</td>
<td>and</td>
<td>and</td>
<td>and</td>
<td>Total</td>
</tr>
<tr>
<td>observed numbers</td>
<td>X</td>
<td>Y</td>
<td>Z</td>
<td>U</td>
<td>N</td>
</tr>
</tbody>
</table>

\[ E(YU-ZX) = 0 \text{ for } x-a-b \]

\[ E(YU-ZX) = p(1-p)(1-2q)(1-y)N^2 \text{ for } a-x-b \]

**Table 2. x-a-b arrangement**

<table>
<thead>
<tr>
<th>Phenotypes</th>
<th>Expected Numbers</th>
<th>Observed Numbers</th>
</tr>
</thead>
<tbody>
<tr>
<td>x + b</td>
<td>( \frac{1}{2} pq(1-y)N )</td>
<td>( n_1 )</td>
</tr>
<tr>
<td>+ a +</td>
<td>( \frac{1}{2} pq N + \frac{1}{2} q(1-p)yN )</td>
<td>( n_2 )</td>
</tr>
<tr>
<td>x + +</td>
<td>( \frac{1}{2} p(1-q)(1-y)N )</td>
<td>( n_3 )</td>
</tr>
<tr>
<td>+ a b</td>
<td>( \frac{1}{2} p(1-q)N + \frac{1}{2} (1-p)(1-q)yN )</td>
<td>( n_4 )</td>
</tr>
<tr>
<td>x a +</td>
<td>( \frac{1}{2} q(1-p)(1-y)N )</td>
<td>( n_5 )</td>
</tr>
<tr>
<td>+ + b</td>
<td>( \frac{1}{2} q(1-p)N + \frac{1}{2} pq yN )</td>
<td>( n_6 )</td>
</tr>
<tr>
<td>x a b</td>
<td>( \frac{1}{2}(1-p)(1-q)(1-y)N )</td>
<td>( n_7 )</td>
</tr>
<tr>
<td>+ + +</td>
<td>( \frac{1}{2}(1-p)(1-q)N + \frac{1}{2} p(1-q)yN )</td>
<td>( n_8 )</td>
</tr>
<tr>
<td>Total</td>
<td>( N )</td>
<td>( N )</td>
</tr>
</tbody>
</table>
Table 3. a-x-b arrangement

<table>
<thead>
<tr>
<th>Phenotypes</th>
<th>Expected Numbers</th>
<th>Observed Numbers</th>
</tr>
</thead>
<tbody>
<tr>
<td>+ x +</td>
<td>$\frac{1}{2} \ pq(1-y)N$</td>
<td>$n_1$</td>
</tr>
<tr>
<td>a + b</td>
<td>$\frac{1}{2} \ pq \ N + \frac{1}{2}(1-p)(1-q)yN$</td>
<td>$n_2$</td>
</tr>
<tr>
<td>+ x b</td>
<td>$\frac{1}{2} \ p(1-q)(1-y)N$</td>
<td>$n_3$</td>
</tr>
<tr>
<td>a + +</td>
<td>$\frac{1}{2} \ p(1-q)N + \frac{1}{2} \ q(1-p)yN$</td>
<td>$n_4$</td>
</tr>
<tr>
<td>a x +</td>
<td>$\frac{1}{2} \ q(1-p)(1-y)N$</td>
<td>$n_5$</td>
</tr>
<tr>
<td>+ + b</td>
<td>$\frac{1}{2} \ q(1-p)N + \frac{1}{2} \ p(1-q)yN$</td>
<td>$n_6$</td>
</tr>
<tr>
<td>a x b</td>
<td>$\frac{1}{2} \ (1-p)(1-q)(1-y)N$</td>
<td>$n_7$</td>
</tr>
<tr>
<td>+ + +</td>
<td>$\frac{1}{2} \ (1-p)(1-q)(1-y)N + \frac{1}{2} \ pq \ yN$</td>
<td>$n_8$</td>
</tr>
</tbody>
</table>

Total | $N$ | $N$ |

Spiess, E. B. University of Pittsburgh. During July, 1964, persimilis was collected from the Redwoods Forest of Humboldt County, California (town of Weott). With 188 chromosomes identified the frequencies of arrangements from chromosome III are as follows: Klamath 78.2%, Mendocino 13.8%, Humboldt* 3.8%, Standard 1.1%, Cowichan 1.5%, Whitney 1.1%, and Unknown* 0.5%. We are tentatively designating the more common arrangement of two heretofore rare or unknown arrangements as "Humboldt" since we discovered it first in our cultures, took photographs with its heterozygote KL/HU*, and corresponded with Professor Dobzhansky (Rockefeller Institute) as to the arrangement's identity with that described by him (with C. Epling, 1944, Carnegie Institute Washington Publ. #554). Professor Dobzhansky agreed that this arrangement was likely to be his Humboldt arrangement. The exact banding pattern will be reported soon, but briefly it is an independent inversion of the Standard sequence of approximately the same length as the well known KL but displaced more proximally by about 15 bands than KL. The "Unknown*" arrangement however is a single step inversion from KL (overlapping) and had not been observed at the time of our correspondence with Dobzhansky, so that the correct naming may be decided later. In fact this latter "Unknown*" may well be identical with Dobzhansky's Humboldt and the arrangement we designated above as "Humboldt*" may be a new arrangement. In either case, the frequency of the latter is much higher than observed before (3.8%); if it is truly a newly formed arrangement, it can hardly be ephemeral to the population.

Whitten, M. J. University of Tasmania. Factors affecting penetrance of an eye mutant in D. melanogaster. Penetrance of witty (DIS 38:31) in the homozygous state depends both on background modifiers and the environment. A novel method, involving the truncated normal distribution, and utilizing the fact that asymmetric flies are produced, has been applied to measure the genetic and environmental contributions to penetration. Initially it was thought that wi arose spontaneously in a Cy j stock. However the evidence suggests that all individuals in the stock were homozygous for wi and that penetrance was reduced to near zero by the large complement of modifiers reducing the activity of wi.

Removal of certain modifiers on the same linkage group as wi results in the dominant form. Penetrance of this form is then dependent on modifiers on Chromosome 3 and 1 and (or) 4.

It is believed that wi first occurred as a dominant in a natural population and a system of modifiers (dominance modifiers) was selected to reduce it to recessivity. Subsequently the penetrance of wi was reduced to near zero by the accumulation of further modifiers (penetrance modifiers). It has not yet been determined whether the two classes of modifiers are mutually exclusive.
Carmody, George. Columbia University. Two new strains of the D. willistoni sibling species group have been found that provide a potential bridge between the gene pools of D. equinoxialis and D. paulistorum. The first strain was collected near Girardot, Colombia. It produces fertile offspring with the following three strains of D. paulistorum: Angra (Andean-South Brazilian Race), Maranguape (Andean South-Brazilian Race), and Salvador (Centro-American Race). This last cross produces fertile offspring only when Girardot females are mated with Salvador males; the reciprocal cross produces no offspring at all. No offspring are produced in crosses of Girardot with 13 geographical strains of D. equinoxialis. However, crosses with three other D. equinoxialis strains (Belém O, Içana, and Puerto Rico) produce offspring which are sterile - both males and females.

The second strain, called Belem K, was collected in Belem, Northeastern Brazil. It is completely interfertile with the Girardot strain. Belem K produces fertile offspring with at least six geographical strains of D. equinoxialis: Belém O, Içana, Puerto Rico, Simla I, Skeldon, and Tefé. Crosses of Belém K with ten other strains of D. equinoxialis give no offspring. Belém K is interfertile with only one strain of D. paulistorum: Maranguape. No other cross between Belém K and D. paulistorum produces even sterile offspring.

Preliminary sexual isolation data that was gathered using the "male choice" method shows both strains about as isolated from D. paulistorum as from D. equinoxialis, with the Girardot strain slightly more highly isolated from D. equinoxialis than from D. paulistorum and the Belem K strain slightly more isolated from D. paulistorum than from D. equinoxialis. This high sexual isolation together with the fact that these two strains are geographically separated suggests that those crosses which can be obtained in the laboratory almost certainly do not occur in nature.

The salivary chromosomes of these two strains show polymorphism for inversions in chromosomes II and III. The banding pattern of chromosome III is unique in each of these two strains and both are different from that of either D. paulistorum or D. equinoxialis. In addition the salivary chromosomes of the hybrids have many inversions in all three chromosomes. Chromosome pairing in these hybrids is good, with only short regions apparently unpaired.

Mapping of the inversions and unpaired sections is currently in progress.

Research supported by NSF Grant GB-1906 to Prof. Howard Levene and NIH Grants 2TI-GM216-05 and 5TI-GM216-06.

Mukai, T. National Institute of Genetics, Japan. Position effect of spontaneous mutant polylgenes controlling viability in D. melanogaster. Spontaneous polygenic mutations affecting viability were accumulated under the minimum pressure of natural selection in 104 second chromosomes which were derived from a single second chromosome. In Generations 25, 32, 52, and 60, homozygous viabilities of these chromosome lines were estimated. In addition the viabilities of flies carrying random combinations of these chromosomes were estimated and the correlation coefficient between the sum of homozygote viabilities and the corresponding heterozygote viability was calculated for each generation. The estimated values were positive and highly significant.

On the other hand, in Generations 32 and 60, the viabilities of heterozygotes between these experimental chromosomes and a chromosome supposed to be identical to the original chromosome were estimated and the correlation coefficient between homozygote and heterozygote viabilities was calculated for each generation. The results showed significantly negative values. From these results it can be said that newly arising mutant polylgenes clearly show overdominance in homozygous genetic background when the chromosomes carrying them are combined with the original normal chromosome, but are heterozygously deleterious in trans-phase heterozygotes. These phenomena are significant in clarifying the mechanism by which natural populations carry genetic variation.

The results are highly reliable because those conclusions were drawn on the basis of counting approximately 3 million flies. (This work has been supported by PHS grants GM-7836 and RH-34).

It has been demonstrated by Poulson and Sakaguchi (1961) that the infectious agents responsible for the maternally transmitted "sex-ratio" condition (SR) in D. willistoni and D. nebulosa are minute spirochetes, presumably Treponema.

In order to investigate the form, fine structure and life cycles of the SR agents, the SR spirochetes, electron microscopical observations are now underway. The results so far obtained may be briefly described.

Females of SR strains of D. willistoni and D. nebulosa were used as a source of the SR spirochetes. The hemolymphs taken from the females were either diluted with Drosophila Ringer or treated with 27 phosphotungstic acid (for negative stain). The diluted hemolymphs were placed on grids and then fixed by osmium tetroxide vapor.

The forms of the SR spirochetes are very variable; the two species of the spirochetes cannot be clearly distinguished (Figure 1). The size of the spirochetes can be estimated to be of the order of about 8 to 16 microns in length and 0.15 to 0.08 microns in diameter. In most instances the spirochetes show irregular undulations running along the filaments, as represented in the photographs. A striking morphological feature is a vesicle ranging from 0.8 to 1.2 microns in diameter. These vesicles may occur at any point along the filament. Furthermore, they form one to four minute granules (buds) which may develop into young spirochetes. It is suggested that the vesicles play an important role in the cycle of duplication.

It is interesting that the filaments are occasionally branched. This feature has so far been found in no other spirochete species. In some spirochetes treated with 2% ammonium sulfate the filament appeared to be double coiled, each coil approximately 5 millimicrons thick.

(This work has been supported by Grant GM-10238 from U. S. National Institute of Health).
Kessler, Seymour. Columbia University. 

Mating speed and mating preference in two species of *Drosophila*.

Mating speed and mating preference in two species of *Drosophila* is believed to result from an interaction between two factors: sexual drive and mating discrimination (Mayr, 1946; Spieth, 1951); the exact nature of the relationship between these two factors, however, has never been clearly understood. It has been supposed by Mayr (1963, p. 101) and others that flies, particularly females, that are slow to mate would exercise greater discrimination in mate selection than fast ones. This implies that an inverse relationship may exist between mating speed and discriminatory ability. This position has been tested by means of multiple-choice sexual isolation tests utilizing mutant strains of *D. pseudoobscura* (gl) and *D. persimilis* (or) that have been selected both for slow and fast mating speed.

Preliminary results show no support for this position; the isolation indices for tenth generation flies being 0.97 for the fast line, 0.89 for the slow line and 0.86 for controls. Further studies are currently in progress. Research supported by NSF Grant NSF-GB-1906 to Professor Howard Levene and NIH Grants 2T1-GM216-05 and 5T1-GM216-06.


Kitagawa, O. Tokyo Metropolitan University. Japan. Heterozygous effect of induced recessive lethals accumulated on second chromosomes of *D. melanogaster*.

More than sixty lethal free second chromosomes were extracted from the heterozygous population of *D. melanogaster* which was maintained for six months. Male flies with normal viability when homozygous were irradiated by 500 r of X-rays. Thirty four second chromosomes carrying induced recessive lethals were obtained. Double and triple lethals were accumulated in cis-phase on second chromosomes through recombination of females with two or more lethals in trans-phase. In this experiment, 40 normal, 34 one, 15 double and 9 triple lethal strains were used. Viability of wild phenotype flies were determined by the *Cy*/*Pm* technique. Following results are obtained:

<table>
<thead>
<tr>
<th>No. of lethals per zygote</th>
<th>No. of crosses</th>
<th>Mean no. of flies per cross</th>
<th>Preadult viability (Cy/Pm = 1.0000)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>64</td>
<td>417.7</td>
<td>1.0100±0.01924</td>
</tr>
<tr>
<td>1</td>
<td>108</td>
<td>702.6</td>
<td>.9942±0.01587</td>
</tr>
<tr>
<td>2</td>
<td>122</td>
<td>364.7</td>
<td>.9842±0.01379</td>
</tr>
<tr>
<td>3</td>
<td>102</td>
<td>465.2</td>
<td>.9728±0.01352</td>
</tr>
<tr>
<td>4</td>
<td>51</td>
<td>523.3</td>
<td>.9580±0.01839</td>
</tr>
<tr>
<td>5</td>
<td>20</td>
<td>494.4</td>
<td>.9377±0.02934</td>
</tr>
<tr>
<td>6</td>
<td>6</td>
<td>632.7</td>
<td>.9177±0.06658</td>
</tr>
</tbody>
</table>

Hand in hand with the increase of the number of lethals per zygote, the viability decreased rapidly. This synergistic interaction between lethals is very relevant to the problem of the maintenance of genetic loads in natural populations.

Banks, J. L. The Ohio State University. Surface sterilization of *D. melanogaster* eggs.

Surface sterilization of *D. melanogaster* eggs is necessary. A technique similar to that of Mitsuhashi and Maramorosch, 1963, using 0.1% Hyamine solution for a period of time up to 5 min. does not interfere with embryonic development.

Plaine, H. L. and Sister M. Baptista
Aubele. Ohio State University. Occurrence of the erupt effect in the Su-er tu bw; er\(^+\) Su-tu\(^+\) strain of D. melanogaster.

Three series of eggs and larvae of the Su-er tu bw; er\(^+\) Su-tu\(^+\) strain were collected over a twenty-four hour period on the surface of cornmeal-dextrose media and exposed to X-irradiation at ±12 hours of age. The disks of media containing irradiated eggs and larvae were placed on the surface of the same type of media in standard size milk bottles and incubated at 25±1°C. Eyes of adult flies were scored upon emergence as extreme erupt, weak erupt, or normal.

Irradiation was carried out with a Norelco MG 150/10 industrial X-ray unit having a 2.5 mm beryllium window and a maximum output of 150 kV. The delivered dose in air for all series was 1000 r (±57) at 140 kV, 5 ma, distance 36 cm. Series 1 and 2 received 108-116 r/min, with additional filtration of 0.019 mm aluminum, while series 3 was irradiated inside a lucite chamber with no additional filtration at a dose rate of 37-39 r/min.

Evidence of the phenotype characteristic of extreme erupt was found consistently in all of the irradiated series (Table 1), while all series subjected to X-irradiation differed significantly from the non-irradiated controls of the same strain. Further studies as to the nature of this erupt response are in progress.

Table 1: The erupt eye effect in irradiated and non-irradiated series of the Su-er tu bw; er\(^+\) Su-tu\(^+\) strain.

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Total</th>
<th>Normal (%)</th>
<th>Extreme erupt (%)</th>
<th>Total erupt</th>
</tr>
</thead>
<tbody>
<tr>
<td>X-irradiated</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>series 1</td>
<td>1027</td>
<td>74.6</td>
<td>5.4</td>
<td>25.4</td>
</tr>
<tr>
<td>X-irradiated</td>
<td>series 2</td>
<td>594</td>
<td>74.1</td>
<td>5.2</td>
</tr>
<tr>
<td>1000 r</td>
<td>series 3</td>
<td>1087</td>
<td>75.8</td>
<td>6.2</td>
</tr>
<tr>
<td>non-irradiated controls</td>
<td>1511</td>
<td>99.7</td>
<td>0</td>
<td>0.3</td>
</tr>
</tbody>
</table>

Taira, T. National Institute of Genetics, Japan. Soluble nucleotides in Drosophila.\(^*\)

An attempt was made to make a map of soluble nucleotides more complete as a function of stage of development. Among many analytical techniques previously tested, the following combination technique was found to be best: hot 50% alcohol for an extraction, charcoal as an adsorbant for fractionation and paper chromatography and electrophoresis for separation and identification. The treatment with a charcoal adsorbant was done in the cold. A final quantity of nucleotides of at least 0.1 micromoles is required for a clear identification.

In the course of development of Oregon-R, the total relative amounts of nucleotides per dry weight in larvae, pupae and adults are given as 293, 39 and 336 respectively. For convenience the total density units of total extracts at each stage of development is expressed as: \((E_{260} - E_{310}) \times (\text{total volume}) / E_{\text{extinct}}\) as being equal to the relative total quantity of nucleotides. As for the individual nucleotides, uridine diphosphate acetyl-glucosamine is detected in pupae and adults, but not in larvae. Oligonucleotides are found at stages from larvae to mid-pupae, but not in adults. Nucleosides, such as uridine and inosine, are detectable in larger amounts in larvae than in adults, but are not found in pupae. Soluble nucleotides in larvae are scarcely detectable. Therefore, it is clear that the value 293 in larvae is represented mostly by non-nucleotide substances, namely the nucleosides described above and other nucleosides in small quantities. On the contrary, in adults soluble nucleotides represent the majority of the value 336. These results suggest: (1) soluble nucleotides in Drosophila begin to appear in pupae but are not found in larvae, and (2) the correlation between the appearance of uridine diphosphate acetyl glucosamine and the disappearance of oligonucleotides in pupae may be very close to cell differentiation of adult organs. In the near future these data and those of typical mutant strains of Drosophila will be published as a map of soluble nucleotides.

\(^*\)Editing was required to make this paper more readable in English.
Lucchesi, J. C., S. Mills and R. Rosenbleeth. University of Oregon. Relative frequencies of induced TM and RA compound X chromosomes in D. melanogaster females. Lindsley (1958) has proposed that in males pairing and subsequent (spontaneous) exchange involving X and Y heterochromatin "are conditioned by non-homologous but heterochromatin-specific forces." On the other hand, Lucchesi (1964) has offered arguments supporting the view that in females pairing and subsequent (induced) exchange involving an attached-X and Y chromosomes are conditioned by homology. The present experiment was undertaken to further investigate pairing affinities of X and Y heterochromatin.

Females of the following constitution were obtained:

Ia. \( X^L \), In(1)sc^{8L}, EN^{R}, y^{+}cv y^{L}/X Y^{S}.Y^{L}, y Y^{S}.Y^{L} B^{S}

b. " /X Y^{L}.Y^{S}, y Y^{L}.Y^{S} y

IIa. Y^{S}X.Y^{L}, In(1)EN, Y^{S} B^{+}v w y^{L} y^{+}/ XY^{S}.Y^{L}, y Y^{S}.Y^{L} B^{S}

b. " / XY^{L}.Y^{S}, y Y^{L}.Y^{S} y

These were treated with 3000r of X-irradiation, mated to suitable males, and brooded for five 3-day broods. TM chromosomes would result from breaks in the centric heterochromatin of each homologue; RAs would most likely involve a break in the distal X-heterochromatin (I) or in the Y^{S} arm (II) of the inverted chromosomes and a break in the centric region of their homologues (Novitski, 1954).

In order to determine the true number of compounds formed, corrections have to be effected that will take into account those compounds which were induced and then lost due to meiotic crossing over. The observed frequencies of TMs and RAs in broods 1 and 2 represent 13% and 15% of the actual number of compounds induced in oocytes, respectively. In broods 3, 4, and 5, the observed frequencies of TMs and RAs represent 16% and 30% of the compounds actually induced in oogonia. These figures were calculated using the tetrad analyses of Novitski (1951) and Sandler (1954) for compounds and our own tetrad analyses for inversion heterozygote tetrads in which the events producing a compound were superimposed on crossing over. In addition, the assumptions that the tetrad distribution in the inversion heterozygotes and in the TMs is \( E_0=0.05 \), \( E_1=0.60 \), and \( E_2=0.35 \), whereas in the RAs it is \( E_0=0.44 \), \( E_1=0.12 \), and \( E_2=0.44 \), were made. The results of the experiment are given in the following table:

<table>
<thead>
<tr>
<th></th>
<th>P</th>
<th>TM ( \ast )</th>
<th>RA ( \ast )</th>
<th>N ( \ast \ast )</th>
<th>Freq. TM</th>
<th>Freq. RA</th>
<th>Ratio TM/RA</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>a.</td>
<td>21</td>
<td>74</td>
<td>109,100</td>
<td>192x10^{-6}</td>
<td>678x10^{-6}</td>
<td>.284</td>
</tr>
<tr>
<td></td>
<td>b.</td>
<td>121</td>
<td>54</td>
<td>61,312</td>
<td>1973</td>
<td>880</td>
<td>2.241</td>
</tr>
<tr>
<td>II</td>
<td>a.</td>
<td>22</td>
<td>6</td>
<td>213,180</td>
<td>103</td>
<td>28</td>
<td>3.666</td>
</tr>
<tr>
<td></td>
<td>b.</td>
<td>152</td>
<td>61</td>
<td>262,464</td>
<td>579</td>
<td>232</td>
<td>2.492</td>
</tr>
</tbody>
</table>

\( \ast \) corrected (see text)

\( \ast \ast \) corrected (x4)

Fully realizing that an uncomfortable number of assumptions were made to obtain the tabulated figures, we maintain that some trends are still worthy of notice: (1) The frequency of TMs is greater in those cases where the non-inverted chromosome was \( XY^{L}.Y^{S} \) (Ib and IIb). This may indicate that \( Y^{L} \) of the inversion folds back and preferentially pairs with \( Y^{L} \) of the non-inverted chromosome and/or that \( Y^{S} \) of the non-inverted chromosome folds back and preferentially pairs with X-heterochromatin to the left of the centromere of the inverted chromosome. In the case of Ia and IIa, the same preferential pairing relationships would make the formation of TMs more difficult. (2) The frequency of RAs is greater when the distal heterochromatin on the inverted chromosome is that of sc^{8L}. This observation cannot readily be explained on the basis of homology and may reflect a greater breakability of X vs. Y-heterochromatin. (3) The higher frequency of RAs induced in IIb than in Iib may be a function of the longer heterochromatic segment available to the left of the centromere of the non-inverted chromosome in IIb. This physical difference apparently masks the fact that \( Y^{S} \) may have greater pairing affinity for \( Y^{S} \), in the case of IIa, than it would have for \( Y^{L} \), in the case of IIb. The same trend is seen in Ib vs. Ia. Here, the lesser degree of difference indicates that X-heterochromatin (of sc^{8L})
pairs more readily with \( Y^S \) than \( Y^S \) would with \( Y^S \). This may not be as peculiar as it may seem if one considers that in normal situations, the \( X \) and \( Y \) are pairing partners.

This research was performed in Prof. E. Novitski's laboratory and was supported by the NSF URP program.

Lucchesi, J. C. University of Oregon.

The presence among the Eugene stocks of a large number of tandem metacentric (TM) lines, synthesized for other purposes by Drs. E. Novitski and W. J. Peacock, has afforded the opportunity to study the influence of pericentric heterochromatin on the crossing over properties of ring chromosomes. The TM lines had been obtained by irradiating females of the constitution \( XY^2s u w^a y^S y^L y^S(y^S(Parker)/X^{YL}, \text{In}(l)sc^4-sc^{8L}, \text{EN}^R, y f v (or m) cv y^S y^L + \). Two different inverted chromosomes, derived from two separate stocks of \( \text{In}(1)\text{EN} \), had been used. TM's bearing one or the other of these inverted chromosomes will be referred to as \( (A) \) or \( (B) \) in the following presentation (series 17- and 19- of Novitski and Peacock).

Virgin females from each of 5 \( (A) \) and 9 \( (B) \) TM lines (all heterozygous for the markers \( y, cv, v \) (or m) and \( f \)) were crossed to males bearing the fertility tester \( Y \)-chromosomes of Brosseau; the fertility of ring-bearing sons with each of the various \( Y \)-testers determined the amount of \( Y \) heterochromatin present in a given TM (and, therefore, in the ring \( X \)-chromosomes derived from it), measured in terms of fertility factors. Using the representation for a normal \( Y + + + + + + + + + c + + \), where the first five + signs indicate \( \text{kl-5 through kl-1} \), \( c \) is the centromere and the next two + signs are \( \text{ks-1 and ks-2} \), the following distribution was obtained:

\[
\begin{align*}
\text{C - - - - - - - -} & \quad 3, \\
\text{- - - - - - - c} & \quad 5, \\
\text{- + + - + c -} & \quad 1, \\
\text{+ + + + + c - -} & \quad 5.
\end{align*}
\]

Ring chromosomes from each of the above four types were used in the following crosses:

\( X^{L}(\text{from TM (A) or (B)}, \text{y cv v (or m) / f x sc cv v f B / Y}. \)

Each cross consisted of 12 or 24 pair matings, brooded for three 3-day broods. Care was taken concerning uniformity in age of females and temperature. The results are presented in the following table:

<table>
<thead>
<tr>
<th>Ring Type* (kl-1 tokl-5)</th>
<th>Rod c.o.</th>
<th>Rod n.c.o. % c.o.</th>
<th>Ring c.o.</th>
<th>Ring n.c.o. % c.o.</th>
<th>Pat. c.o.</th>
<th>Pat. n.c.o. % c.o.</th>
<th>( \Omega )</th>
<th>( \Omega )</th>
</tr>
</thead>
<tbody>
<tr>
<td>(A) - - - - - - - - -</td>
<td>87</td>
<td>4.6</td>
<td>32</td>
<td>2.3</td>
<td>77</td>
<td>3405</td>
<td>2.3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1785</td>
<td></td>
<td>1340</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>+ - - - - - - - - -</td>
<td>187</td>
<td>10.3</td>
<td>55</td>
<td>4.1</td>
<td>85</td>
<td>3447</td>
<td>2.5</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1635</td>
<td></td>
<td>1300</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(B) - - - - - - - -</td>
<td>169</td>
<td>9.3</td>
<td>36</td>
<td>2.7</td>
<td>87</td>
<td>3127</td>
<td>2.8</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1637</td>
<td></td>
<td>1302</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>+ - - - - - - - - -</td>
<td>124</td>
<td>12.0</td>
<td>20</td>
<td>3.3</td>
<td>70</td>
<td>1681</td>
<td>4.2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>910</td>
<td></td>
<td>590</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>+ - - - - - - - -</td>
<td>94</td>
<td>9.6</td>
<td>24</td>
<td>3.8</td>
<td>67</td>
<td>1683</td>
<td>4.0</td>
<td></td>
</tr>
<tr>
<td></td>
<td>883</td>
<td></td>
<td>612</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Refers to the number of \( Y^L \) factors present in the pericentric heterochromatin of the ring chromosome.

The results of crosses involving rings derived from type \( (A) \) TM chromosomes suggest that an increase in pericentric heterochromatin results in an increase in the frequency of crossing over. Furthermore, this increase is of greatest magnitude in region IV which, significantly perhaps, is the region adjacent to heterochromatin in both the ring and the rod chromosomes. Rings derived from type \( (B) \) TM's show an increase in crossing over with added heterochromatin of a much lower level of magnitude. The following table presents recombination frequencies for each individual region studied; the rings containing no \( Y^L \) fertility factors are used as the reference base; the Table also includes a comparison of one of the \( (B) \) rings with the \( (A) \) series.
The difference in the results obtained with type (A) and type (B) rings may be explained in the following manner. By chance, or because of the use of different inverted chromosomes in the original TM synthesis, the (B) rings may have a segment of unspecified X or Y heterochromatin large enough to render them less sensitive to additional heterochromatin. This working hypothesis may be tested by a systematic search among type (A) TM's for rings which lack all of the Y fertility factors, yet yield high crossing-over values (of the order of 10%); and conversely, among type (B) TM's for rings yielding low crossing-over values (of the order of 4 or 5%). Cytological estimates of relative size may be useful to determine the presence of unspecified X or Y heterochromatin.

(XyL)c chromosomes will be sent to the Drosophila Stocks Center of the Institute for Cancer Research, Philadelphia, from where they would be available to anyone who might want to use them as balancers for special stocks.

This research was supported by PHS grant 5T1 GM 373-05 and NSF grant GB 1332.

Zambruni, L. University of Milan.

Preliminary chromatographic analysis of the "brown spots" character in Drosophila melanogaster.

Owing to the peculiar manifestation of the bsp character, it seemed useful to investigate if differences in free-ninhydrin-positive substances could be correlated with the changes of metabolic pattern in the female following copulation.

According to the method described by Fox et al. (1959), two-dimensional chromatograms of virgin and mated females (5 days old) were obtained. The quantitative analysis of the free-ninhydrin reacting components showed that the tyrosine amount does not change after mating in bsp females, while an increase occurs in the Sevelen females (control). This finding points to a correlation between tyrosine and brown spots formation, because it can be suspected that part of this substance is utilized for the formation of brown pigment.

Holt, Th. K. H., and H. D. Berendes.

Genetisch Laboratorium, The Netherlands.

Experimental puffs in D. hydei polytene chromosomes, induced by temperature shocks.

During the entire third larval instar abnormal puffs can be induced in the salivary gland chromosomes by transferring the larvae from 25 to 35°C for 1 hour. These abnormal puffs (located at 32A, 36A, 48C, 58B, 81B and 85B respectively, according to the cytological map of Berendes, 1963), are also induced in cells of the stomach, midintestine and Malpighian tubules. Also, in salivary glands transplanted from early third instar larvae into the abdomen of adult females, abnormalities in the puffing pattern are induced by temperature shocks. After 3 days of implantation, the flies were shocked for 1 hour, and after 3 weeks of implantation for 1/2 hour. Both experiments revealed the same abnormal puffs as found after treatment of normal larvae.
Momma, E. Hokkaido University, Japan. The variability of abundance and sex-ratio in natural population of D. nigromaculata.

A preliminary note on a survey of Drosophila population in the University Botanical Gardens investigated during ten successive years from 1953 to 1962 are presented here. Monthly collections except in three years, 1953, 1955, and 1959 were routinely carried out by the same methods with the use of banana traps during seasons. Flies were collected on three successive days near the end of each month. On each day of collection, flies were collected at one-hour intervals from sunrise to sunset. During seven years, 20,820 flies representing 38 species were collected.

D. nigromaculata was one of the two abundant species, of which the other was D. auraria, showing the rate of 26.36%. Sex-ratio of this species was 129. The results are presented in Table 1.

Data in Table 1 seem to indicate that the variability of sex-ratio shows no relation to annual activities. In general, this species showed a trimodal seasonal activity with three peaks in May, July and September. Sex-ratio showed seasonally low in inactive periods between the three peaks. A bimodal diurnal activity with two peaks in the morning and in the evening was observed in this species. In inactive periods between the three active ones, the male diurnal activity decreased especially toward evening.

Table 1: Percentage frequencies of abundance and sex-ratios of D. nigromaculata in Drosophila populations sampled from the University Botanical Gardens at Sapporo during the seven years.

<table>
<thead>
<tr>
<th>Year</th>
<th>No. of flies of nigromaculata</th>
<th>Frequency in a given period</th>
<th>Relative frequency</th>
<th>Sex-ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>1954</td>
<td>1209</td>
<td>52.4</td>
<td>22.0</td>
<td>126</td>
</tr>
<tr>
<td>1956</td>
<td>846</td>
<td>22.5</td>
<td>15.4</td>
<td>97</td>
</tr>
<tr>
<td>1957</td>
<td>503</td>
<td>15.4</td>
<td>9.2</td>
<td>114</td>
</tr>
<tr>
<td>1958</td>
<td>682</td>
<td>35.4</td>
<td>12.4</td>
<td>137</td>
</tr>
<tr>
<td>1960</td>
<td>586</td>
<td>27.3</td>
<td>10.7</td>
<td>132</td>
</tr>
<tr>
<td>1961</td>
<td>1109</td>
<td>24.2</td>
<td>20.2</td>
<td>153</td>
</tr>
<tr>
<td>1962</td>
<td>554</td>
<td>19.6</td>
<td>10.1</td>
<td>147</td>
</tr>
<tr>
<td>Total</td>
<td>5489</td>
<td>26.4</td>
<td>-</td>
<td>129</td>
</tr>
</tbody>
</table>

Sex-ratios during a day

<table>
<thead>
<tr>
<th>Month</th>
<th>Morning</th>
<th>Noon</th>
<th>Evening</th>
</tr>
</thead>
<tbody>
<tr>
<td>May</td>
<td>1215</td>
<td>45.8</td>
<td>22.1</td>
</tr>
<tr>
<td>June</td>
<td>288</td>
<td>11.6</td>
<td>5.3</td>
</tr>
<tr>
<td>July</td>
<td>1149</td>
<td>20.4</td>
<td>20.9</td>
</tr>
<tr>
<td>August</td>
<td>633</td>
<td>11.1</td>
<td>11.5</td>
</tr>
<tr>
<td>September</td>
<td>1830</td>
<td>47.4</td>
<td>33.3</td>
</tr>
<tr>
<td>October</td>
<td>374</td>
<td>31.8</td>
<td>6.8</td>
</tr>
</tbody>
</table>


In a stock of y^2 su- w^a w^a spl; T(2;3)Xa, E-spl/+ (Welshons, 1956, DIS 30:157) a y^2 su- w^a w^a spl; E-spl non-Xa male was found and a stock was established. E-spl is homozygous viable and appears wild type in the absence of spl. Matings of spl/spl females by spl; +/-SM1, Cy; E-spl/Ub^x^30 males indicated that the mutant is on chromosome 3. A further attempt to localize the mutant was made by crossing spl; E-spl females to ve h th cu bx e^8 ro ca males (stock from R. F. Grell). spl/+; ve h th cu bx e^8 ro ca/E-spl virgins were then backcrossed to homozygous marker males, and non-spl crossover males were selected and crossed individually to homozygous spl virgins. The progeny were examined for the presence or absence of E-spl. These results indicate that E-spl is close to ro on the linkage map. Ten crossovers between e^8 and seven crossovers between ro and ca included no crossovers between ro and E-spl.
A somatic exchange will produce a twin spot in the eye consisting of tissue next to a patch of echinus tissue, these spots being located by visual inspection, its general outline is obvious. The areas of different pigmentation can be delimited quite precisely. The ambiguities in the outline of the echinus area prevented the full utilization of the experimental design, which had incorporated the homozygosis for \( Y^5 \) in the white member of the twin spot, to see if there was a sector effect of additional heterochromatin when the variegated tissue partially covered both members of the twin spot.

A series of eyes similar to the one pictured have provided the critical evidence that the pigments of different mutants and species of *Drosophila*, and to select for faster and slower running of the eyes. In preliminary experiments involving the mutant orange (or) of *D. persimilis*, it was found that some 93% of the flies ran the maze in a 24 hour test period. In the case of the mutant glass (gl) of *D. pseudoobscura*, some 99% of the flies ran the maze in the same time interval. Data gathered at two hour intervals show that for the or flies, some 90% of the flies that ran the maze did so in the first eight hours. When using gl flies, only some 60% did so during the same period of time.

Selection for fast and slow running of the maze have been initiated. It has been possible to select for increased speed of running the maze in both or and gl flies. However, only in the case of gl flies was the total percent of flies completing the maze in the test period also increased. Results of selection for slow running have not thus far been fruitful. The pattern and percent of running the maze appears to be stable despite six generations of selection.

Experiments are now in progress to test the maze running characteristics of wild populations of these two species and the hybrids between them.

Research supported by NSF grant GB-1906 to Professor Howard Levene of Columbia University.
van Breugel, F. M. A. Genetisch Laboratorium, The Netherlands. Experimental puffs in D. hydei salivary gland chromosomes observed after treatment with CO, CO₂, and N₂.

Third instar larvae of D. hydei were treated with sublethal doses of carbon monoxide (3 hours in 100 percent CO at 25°C). Salivary glands from treated larvae were inspected for changes in puffing pattern. No changes were found immediately after treatment. However, subsequent exposure to air produced six large puffs not appear after 15 minutes, attain rapidly their maximum size and revert to normal slowly within several hours under aerobic conditions. They are located at 32A, 36A, 48C, 58B, 81B, and 85B following the chromosome map by Berendes (Chromosoma 14, 1963).

In an attempt to find out whether these puffs are induced by lack of oxygen, larvae were similarly kept for 3 hours in pure (commercial quality) O₂, N₂, or CO₂, or submerged in Ringer solution (30-40 larvae in 1 ml in hermetically sealed container). Whereas pure oxygen had no effect on the puffing pattern either during or after treatment, the remaining agents induced exactly the same puffs in the same manner as CO, i.e., the puffs became visible shortly after exposure to air following treatment. Furthermore, if 3 hours of CO₂ was immediately followed by N₂ (1/2 hour), the puffs did not begin to form until some time after removal from the N₂ atmosphere.

In larvae deprived of oxygen for a shorter time (under 3 hours), these "recovery" puffs will be present for a shorter period also. Tentatively, it may be concluded that these special puffs are somehow connected with respiration. The fact that the same puffs are obtained also by temperature shock (Holt and Berendes, DIS 40) suggests that temperature treatment may act via the respiratory system (cf. Ritossa 1964, Exp. Cell Res. 35).


In an experiment in which chromosomes 2 and 3 from nature were made homozygous with the aid of the Cy-Oster and the Me inversions, the classes (Cy/2; Me/3), (Cy/2; 3/3), (2/2; Me/3) and (2/2; 3/3) were expected to be present in a 4:2:2:1 ratio in the absence of any viability mutations. In about 1500 such tests, one case was found in which only the first and last classes were present. The latter appeared to have the normal wild phenotype. This was inconsistent with the presence of a recessive lethal on either or both chromosomes, but suggested instead a translocation or some type of epistasis. Testing for a translocation, by crossing Cy/2; Me/3 with cn bw; e, yielded negative results. Other such testcrosses, using instead the non-Cy, non-Me sibs as parents, unexpectedly gave rise to Cy progeny. Twenty-four such "wild-type" males, bred individually, gave 778 Cy to 771 non-Cy offspring. The 1:1 ratio suggested that the wild-type flies belonged, in fact, in the Cy, non-Me class, their phenotype being suppressed by a recessive gene on the 3rd chromosome. This agreed with the observation of a nearly 2:1, rather than a 4:1, ratio of Cy:non-Cy progeny in repetitions of the original inbreeding cross, Cy;Me x Cy;Me. The actual counts from 9 such tests were 257 Cy;Me to 119 "wild type." When the 3rd chromosome was extracted from the original stock and made homozygous in the presence of Cy-Oster/Pm from another stock, the Cy phenotype was again suppressed. This test showed, furthermore, that the original 2nd chromosome from nature was not required for the effect.

A recessive lethal in chromosome 2 was shown to be responsible for the absence of the non-Cy genotypes in the original culture. Such lethals occur with a frequency of about 25 percent in nature.

Therefore the flies originally classified as wild type were in fact of the composition Cy/lethal 2; suppressor-Cy/suppressor-Cy. They are of good viability and can be kept in stock in the above form.
Lee, William R. The University of Texas.
A modified "Maxy" stock that produces only females of the proper type.

The "Maxy" stock (Muller and Schalet, 1957, DIS 31:144) used for detection of specific-locus mutations in the X-chromosome regularly produces only one type of female and male. In experiments where sperm are treated with a mutagenic agent, males of the F1 generation are useless except to detect the absence of a marked Y as is possible in a modified "Maxy" stock described by Lee (1963, DIS 38:87-88). Therefore, for some experiments it is desirable to produce only females of the proper type to increase the efficiency of scoring and to provide virgins for the crosses necessary to make a balanced stock for testing for X-chromosome lethals in the F2 and succeeding generations.

To accomplish this a stock was made with the following composition: sc8.Y.B5/L1 scJ1(+)
In49 Fl g BM1, In/"Multiple from the Maxy Stock of Muller and Schalet (1957)." When virgins from this stock are crossed with males of the composition, In49 v ptg oc Fl BM1In, the unwanted class of females is killed by Fl being homozygous and all males are killed either by L1 or the 1 in "Multiple Maxy Chromosome." It was feared that the use of both L1 and Fl would greatly reduce the viability; however, this stock has been found to have good viability in our laboratory and gives a normal ratio of males to females. Fl is known to act as a dominant or semidominant in some stocks (Muller and Zimmering, 1960, Genetics, 45:1001-1002); however, in the stocks reported here (as a result of selection by the author when these stock were initiated) it acts as a recessive.

Non-disjunction produces sterile vermilion males and garnet females. The latter can readily be distinguished from vermilion garnet females produced by a garnet mutation in the treated chromosome. The v in the treated chromosome also makes the scoring for other eye colors more objective. The possibility of fertile males in the F1 generation being produced by non-disjunction from a female that has a Y is eliminated by using sc8.Y.B5 in the parental stock and discarding any B5 females when collecting virgins.

The modified "Maxy" stock described in this report has also been useful in our laboratory in producing automatic virgins for the scheme described by Lee (1963) of detecting loss of either the X or Y chromosome in combination with detecting mutations at specific loci.

In both the breeding scheme reported here and the one previously reported (Lee, 1963), mutations are induced in the In49 v ptg oc Fl BM1 chromosome. The spontaneous rate of recessive lethals for this chromosome has been found to be 0.15% (9,155 chromosomes tested) and only 2 visibles have been found in 20,900 F1 females.

This investigation was supported by Public Health Service Research Grant GM11449-02 from the National Institute of General Medical Sciences).


A gap of the 4th vein is one of the features of H. This interruption responds easily to a temperature change when the vein is almost complete, but with larger interruptions changing the expression by temperature becomes increasingly difficult. The same character in cид is very difficult to change when the 4th vein is nearly complete, but can easily be altered at more extreme expression (Scharloo, 1962). In preliminary experiments it was found that selection for more extreme 4th vein interruption in H leads to accumulation of modifiers which cause a 4th vein interruption even in the absence of H ("assimilation" of the mutant character). Assimilation never occurred in long term selection for cид fourth vein expression (Scharloo, 1962 and DIS 38). With the purpose of testing whether the assimilation of the H 4th vein interruption is a property associated with the H mutant, 4 selection experiments were done. H and the new mutant H7C (obtained from H. Gloor) were introduced in the backgrounds of the Pacific and Kaduna cage populations. All lines responded rapidly to selection for larger 4th vein interruption. The first assimilated flies appeared in all lines between generations 4-6, but the speed of further increase in frequency and expression differed widely. Introduction of chromosomes with dominant markers showed that factors on both large autosomes are involved. The frequency distributions of H expression show large variability in the first generations of the experiments when expression still overlaps with wild type, and very low variability when more extreme expression is reached. This confirms the conclusion of the temperature experiments that change is relatively easy in the neighbourhood of wild type. The introduction of chromosomes with dominant markers revealed that differences in modifiers also have larger effects when the 4th vein is almost complete.
Watson, J. E., E. Scheinberg, and L. A. Dittmar, Purdue University. Effects of ether on fitness traits.

We were interested in assessing the effects of etherization on the fitness of very young D. melanogaster imagos, so the following experiment was run: Two wild-type strains of D. melanogaster were chosen; (1) W1O1 is a laboratory wild stock which had been subjected to etherization periodically since 1955 and (2) WSB is a strain derived in 1963 from a collection in the wild and had never been exposed to ether, having been maintained by mass adult transfer. The ether treatment consisted of a 15-20 second uniform exposure to males and females at ages of 3-4 hours. Four types of matings were made: 1-9 and 9 non-etherized (N.E.), 2-9 and etherized (E.), 3-9 (N.E.) and 9 (E.), 4-9 (E.) and 9 (N.E.).

Twenty single pair matings for each strain x mating were made. The females laid eggs on caps spread with a charcoal media while in inverted 1/2 pint milk bottles. Each 48 hours the caps were replaced until 4 successive broods had been isolated from each parental pair. The experiment was thus analyzable as a 2 x 4 x 4 factorial experiment with 20 observations per cell.

A cursory look at the analysis of variance yields the following information - Eggs laid: There is no significant difference between (or among) strains or matings in the total number of eggs laid. The brood fraction of the variance is highly significant which is what one expects due to the known maternal-age-effect on number of eggs laid. It appears that etherization has a stimulatory effect on the onset of egg lay for although the differences are not significant (at α=.05) in the crosses where one or both of the parents were etherized the mean number of eggs laid is 2 to 3 times that of the control value. This holds true, however, only for the first 48 hours, after which an adjustment in the respective means occurs such that the 8 day totals for each strain x mating are essentially equal.

Egg hatchability: A significant difference in percent hatch was obtained between W101 and WSB. W101 had an overall hatch percent of 90.1% while the non-previously etherized strain yielded 85.2%. That this difference was not due to undetected and unanalyzed lethals present in this "natural" wild strain can be supported by the observation that the unetherized control matings of each strain yielded essentially the same hatch percentages. The significant difference arose because in the Number 4 matings (only 9 etherized) of the WSB strain, the hatch percentages were noticeably lower than those obtained for W101. This holds across all four broods. This result is of interest and will be studied further. Also, the fourth brood percentages of the WSB strain are lower than those for W101, in both etherized and control matings. This could be due to the non-acclimatization of this strain to laboratory conditions.

Sex Ratio: In a sub-analysis of this experiment no significant differences were detected in the sex ratios of the progeny obtained.

A more detailed analysis of this data is in progress. (We wish to acknowledge the use of the facilities of Dr. A. E. Bell and the Population Genetics Institute).

Barigozzi, C. University of Milan, Italy. New Data of the transmission of Freckled.

New data have been collected proving that Frd behaves erratically as a non entirely mendelian unit.

New investigations have been brought about to know more precisely its localization, and, provisionally, it can be taken that its locus may be between brown (104.5) and speck (107.0), thus near the right tip of the 2nd chromosome. The localization, on the other hand, in some crosses is not possible, owing to unexpected facts.

Besides several cases of backcrosses of the type: ++ Frd x +++, where there is a low recombination between the markers and Frd in the female, and no recombination in the male, several others have been found, which can be classified as follows: a) considerable or very high frequency of recombination in males, even in proportions of 50 and 100%, giving rise to symmetrical complementary classes; b) recombinations in the male in presence of inversions on the homologous chromosome (Cy L and Pm), sometimes with statistically significant differences between the complementary classes; c) complete lack of one of the complementary classes, which often denotes lethality of the chromosomes originally carrying Frd; d) loss of Frd in offspring of crosses, where its presence was expected in the 50% of the individuals; e) sudden changes in expressivity and penetrance of Frd, followed by loss of the unit. All these phenomena have been found in both sexes. The findings point to a peculiar behaviour of Frd, interpretable as a changing relationship between Frd and the carrier chromosome.
Gugler, H. D., W. D. Kaplan, and K. Kidd. City of Hope Medical Center, California.

The displacement of first-mating by second-mating sperm in the storage organs of
the female.

From a second mating. Although the fecundity of twice-mated females did not significantly exceed that of once-mated females, the majority of their progeny derived from sperm of the second mating.

By means of females mated first to one-day old untreated Canton-S males and secondly to Canton males whose sperm had been labeled with tritiated deoxycytidine we were able to observe directly the displacement of the unlabeled by the labeled sperm in the spermathecae and ventral receptacles of the females. The sperm were labeled by placing 16-hour old larvae upon food containing a total activity of 200 mc from the presence of tritiated deoxycytidine. The sperm utilized by these males for their first matings contained about 90% labeled sperm bundles.

Virgin females, 24-hours old, were mated with 24-hours old non-labeled virgin males, the time of mating was observed and immediately thereafter, without etherization, the female was removed to another vial and presented with a virgin labeled male. The interval between the first and second mating was noted. After observing the second mating the females were taken and squash preparations were prepared of the spermathecae and ventral receptacles. Radioautographs were prepared from these squashes from which the presence of labeled and non-labeled sperm could be noted.

Precise timing of first and second matings was obtained in three cases of a total of 30 females with which the study was started. In all those cases more than half of the sperm of the spermathecae and ventral receptacles appeared to be from the second mating. The shortest interval between the second mating and fixation of the female reproductive tract was 20 minutes. It, therefore, may be concluded that within 20 minutes sperm from the second mating can replace first-mating sperm in both these storage organs.

The accompanying figure shows the ventral receptacle of the female killed 20 minutes after the second mating.

Legend:

Ventral receptacle from female inseminated first with unlabeled and secondly with labeled sperm (a, tissue level; b, level of photographic film).
Mather, Wharton B. University of Queensland, Australia. The metaphase chromosomes of D. rubida.

In DIS 34, E. B. Lewis and Linda Smith Riles described and illustrated a technique, modified from mammalian chromosome methods, for preparing D. melanogaster metaphase plates from the larval brain. The great advantage of this technique is that preparations with many metaphase plates are obtained and the position of the centromere in each chromosome is pinpointed because the sister chromatids tend to separate. Thus, V chromosomes appear as X-shaped bodies and rod chromosomes as V-shaped bodies. With this technique metaphase plates have been obtained which clearly show that the chromosome number of the tropical Australasian species D. rubida of the immigrans group consists of 1 pair of V's, 2 pairs of rods and 1 pair of dots. In the photograph only one of the dots is split into two chromatids.

Barker, J. S. F. University of Sydney, Australia. A new parasite of laboratory Drosophila.

In April, 1963, some small Hymenoptera were observed in our laboratory. The numbers rapidly increased, and they were then found to be present in a number of population cages. Examination of empty pupal cases from these cages showed a proportion to have a small circular hole in the operculum, indicating that they had been parasitized. Parasitized pupae were found in cages containing D. melanogaster, D. simulans, D. pseudoobscura, and D. nebulosa. In an attempt to control the infestation, adult Drosophila of stock populations were transferred to clean population cages. While removing the media jars during cleaning of the old cages, individual Hymenoptera females were observed apparently ovipositing in newly formed pupae. Three such pupae were taken after the female moved away, and were placed individually in small vials at 25°C, 65-70% relative humidity. 29 days later, one adult Hymenoptera emerged from each of two of these pupae. There was no emergence from the third.

G. E. J. Nixon, Commonwealth Institute of Entomology, London, kindly identified the parasites as Hymenoptera; Proctoterupoidea - Spilomicrus spp. Species of this genus have not, I believe, previously been recorded as parasites of Drosophila. Adult Spilomicrus showed strong positive phototaxis, and the infestation was readily controlled by the use of light traps. It is assumed that the parasites entered the laboratory from a natural population, but there has been no re-infestation this year.


Eggs or pre-third instar larvae were analyzed for soluble protein by mean of electrophoresis and D.E.A.E. column-chromatography. A remarkable increase of Albumen fraction was found in the tumor strain (tu st). This fraction from tumor individual, comparing to a control (Oregon R), has a unique part eluted by NaCl 0.1M. Further, a remarkable decrease of a fraction which has a maximum adsorption at 260 μM was clarified in the alkalien-soluble fraction of PH 4.5 precipitates from the Albumen fraction above mentioned which showed a qualitative difference by Tiselius-electrophoresis.
Hochman, Benjamin. The University of Tennessee. A note on the salivary chromosome 4 in D. melanogaster.*

I am presently occupied with the salivary chromosome analysis of a substantial number of spontaneous and induced lethals situated on the fourth chromosome of D. melanogaster. Genetic evidence indicates that several of these lethals chromosomes of some of them lack one or more of the bands found on a normal fourth chromosome. Through the use of these aberrations it is hoped to eventually map most or all of the lethal loci, as well as the visibles, that have been detected on chromosome 4.

While the literature contains a few drawings of the fourth chromosome as it appears in salivary gland cells (e.g. Bridges, 1935 and Slizynski, 1944), I have been unable to locate a published photomicrograph of 4 that bears sufficient resemblance either to the aforementioned drawings or to what can be observed with the microscope. Utilizing (with some modifications) the method of Dr. J. Schultz as described by Nicoletti (DIS 33:181-182), I have obtained preparations that exhibit the banding details shown on the accompanying photograph.

If this picture is compared with the commonly reproduced Bridges’ drawing (J. Heredity 26: 60-64) a close agreement in banding pattern is readily discerned. Most of the darker lines in Slizynski’s drawing (J. Heredity 35:322-324) of a greatly stretched fourth chromosome can also be matched to those appearing in the photograph.

In the illustration shown nearly all of the right arm of 4 can be seen extending from the chromocenter (at the left). (The proximal region of another chromosome is also in view). Additional chromocentric material may be observed adhering to the distal part of 4R (right, top). Unless the squash pressure is adequate both ends of 4R may remain embedded in the chromocenter giving the chromosome a C-shape and making cytological work virtually impossible. Although the left arm of 4 is not visible in this cell, it is seen frequently in our preparations. Its general appearance is much like that noted by Slizynski.

The arrows (A-F) superimposed on the photograph indicate the doublet bands that mark the beginning of each of the six subdivisions of the 102 division namely 102A1,2, B1,2,...F1,2. The two arrows labeled 101 point to the last dark band in division 101 (F1,2 ?). A closer inspection of the figure reveals that one of the homologues lacks 102A1,2. The genotype of the dissected larva was M(4)63a/ci. This Minute is viable over ciD and it also uncovers ci.

One may tentatively conclude that the Minute and cubitus interruptus (recessive) loci are in or near band 102A1, 2. Dr. M. J. Fahmy, in whose laboratory M (4)63a was discovered, reports that the chromosome in question is deficient for bands 101 F6,7 and 102A1,2 (pers. comm.).

*work supported by U.S. Public Health Service Research Grant GM 11627-02

Legend: The moderately stretched right arm of salivary chromosome 4 from a larva with the genotype M(4)63a/ci.
The present investigation was carried out to get information about the mode of action of hetero- and homozygous X-Chromosome inversion on crossing-over when both the homologues of the second chromosome are normal and when they are heterozygous for inversion. A complex X-Chromosome inversion (sc8 In-S sc8) obtained from O1 stock, having a recessive yellow body, has been used throughout the study. Two types of experiments were conducted. The females were with either hetero- or homozygous X-Chromosome (O1) inversion, whereas for the second chromosome the genetic constitution of the females was + + + L2 +/dp b cn + bw in the first experiment, Cy + + +/dp b cn bw in the second experiment respectively. Cy, a wing marker gene is associated with two long inversions, i.e., Cy Ins (2L+2R). These females were mated separately with the dp b cn bw/dp b cn bw males.

It is evident from table 1 which includes data from the first experiment that there is a significant increase over control in crossing-over in the presence of hetero- as well as homozygous inversion, but spite of involving the whole or arm of the chromosome, it is restricted only in certain regions, mainly region b-cn, centromeric region. The difference between the cross-over value of hetero- and homozygous inversions is not statistically significant. In the second experiment when 2nd chromosome was having Cy Ins (2L+2R), no cross-over in the case of control (X-Chromosome without inversion) has been observed, but it is clear that the centromeric region viz. b-cn, shows an increase in cross-over value in the presence of both hetero- and homozygous O1 inversion (table 2).

The results obtained (a) cross-over increase in only certain regions of the chromosome (b) enhancement in cross-over frequency in the presence of homozygous inversion, argues against the "mechanical hypothesis" proposed for interchromosomal effect.

### Table 1. Analysis of the single cross-over in the cross + + + L2 +/dp b cn bw X dp b cn bw/dp b cn bw

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Treatment (X-Chromosome)</th>
<th>Total No. scored</th>
<th>dp-b Mean of cross over%</th>
<th>b-cn Mean of cross over%</th>
<th>cn-L2 Mean of cross over%</th>
<th>L2-bw Mean of cross over%</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>+/+ (control)</td>
<td>2226</td>
<td>18.00±0.975</td>
<td>3.65±0.314</td>
<td>6.39±0.573</td>
<td>15.33±1.408</td>
</tr>
<tr>
<td>2.</td>
<td>y sc1 In-S sc8/+</td>
<td>2310</td>
<td>17.39±0.863</td>
<td>7.84±0.657</td>
<td>10.19±0.665</td>
<td>14.06±1.569</td>
</tr>
<tr>
<td>3.</td>
<td>y sc1 In-S sc8/</td>
<td>1084</td>
<td>16.31±1.407</td>
<td>7.15±0.721</td>
<td>9.94±1.528</td>
<td>14.16±1.582</td>
</tr>
</tbody>
</table>

### Table 2. Analysis of crossing-over in the cross Cy/dp b cn bw X dp b cn bw/dp b cn bw

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Treatments</th>
<th>Parental types</th>
<th>Recombined types</th>
<th>Cross-over%</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Cy ++++/dp b cn bw</td>
<td>dp b cn bw</td>
<td>dp b ++/dp b cn bw</td>
</tr>
<tr>
<td>1.</td>
<td>+/+ (Control)</td>
<td>712</td>
<td>655</td>
<td>-</td>
</tr>
<tr>
<td>2.</td>
<td>y sc1 In-S sc8/+</td>
<td>1538</td>
<td>1201</td>
<td>22</td>
</tr>
<tr>
<td>3.</td>
<td>y sc1 In-S sc8/</td>
<td>821</td>
<td>612</td>
<td>10</td>
</tr>
</tbody>
</table>

On April 12 and 26, 1964, *D. pseudoobscura* males were collected from four different elevations and habitats in the Santa Catalina Mountains near Tucson and crossed to laboratory virgin females containing the Standard (ST) gene arrangement kindly supplied by Dr. Th. Dobzhansky. A total of 100 pair matings were made from each locality and an attempt was made to analyze both homologues of chromosome III by scoring at most six larvae from each pair. Thus, the ideal number of chromosomes from each locality is 200; the table shows that all pair matings were not successful. Soldiers Trail is at 3000' in the Lower Sonoran Desert of paloverde and sahuaro. Molino Basin is at 4500' in the Upper Sonoran Chaparral of juniper, pinon pine and scrub oak. Windy Point is at 6000' in the Upper Sonoran Oak-Pine Woodland. Organization Ridge is at 7200' in the Transition Zone of almost pure Ponderosa pine. April 12 at Windy Point and Organization Ridge was the earliest possible collecting date for 1964. There is no significant difference of inversion frequencies between dates within any locality and there is no significant difference between adjacent elevations. However, the inversion frequencies in every other elevation are significantly different at the 5% level using a 4 x 2 contingency test. The Arrowhead (AR) and Chiricahua (CH) inversions both steadily increase in frequency with increase in elevation and at 7200 feet they do so at the expense of Pikes Peak (PP) which was also increasing in the same direction. The elevations of greatest diversity of genotypes are also the areas probably most ecologically diverse for *pseudoobscura*, Molino Basin and Windy Point, the Pikes Peak gene arrangement being the indicator.

<table>
<thead>
<tr>
<th>Location</th>
<th>N</th>
<th>AR</th>
<th>ST</th>
<th>CH</th>
<th>PP</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Soldiers Trail</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>April 12</td>
<td>106</td>
<td>77.35</td>
<td>16.04</td>
<td>4.72</td>
<td>1.99</td>
</tr>
<tr>
<td>April 26</td>
<td>92</td>
<td>80.44</td>
<td>11.94</td>
<td>5.44</td>
<td>2.18</td>
</tr>
<tr>
<td>Total</td>
<td>198</td>
<td>78.79</td>
<td>14.14</td>
<td>5.05</td>
<td>1.01</td>
</tr>
<tr>
<td><strong>Molino Basin</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>April 12</td>
<td>142</td>
<td>82.41</td>
<td>8.44</td>
<td>6.33</td>
<td>2.82</td>
</tr>
<tr>
<td>April 26</td>
<td>56</td>
<td>83.93</td>
<td>7.14</td>
<td>5.36</td>
<td>3.57</td>
</tr>
<tr>
<td>Total</td>
<td>198</td>
<td>82.82</td>
<td>8.08</td>
<td>6.06</td>
<td>3.03</td>
</tr>
<tr>
<td><strong>Windy Point</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>April 12</td>
<td>64</td>
<td>85.96</td>
<td>1.56</td>
<td>7.80</td>
<td>4.68</td>
</tr>
<tr>
<td>April 26</td>
<td>116</td>
<td>85.34</td>
<td>2.58</td>
<td>7.76</td>
<td>4.32</td>
</tr>
<tr>
<td>Total</td>
<td>180</td>
<td>85.56</td>
<td>2.22</td>
<td>7.78</td>
<td>4.44</td>
</tr>
<tr>
<td><strong>Organization Ridge</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>April 12</td>
<td>44</td>
<td>86.34</td>
<td>2.28</td>
<td>11.38</td>
<td>-</td>
</tr>
<tr>
<td>April 26</td>
<td>130</td>
<td>89.23</td>
<td>2.31</td>
<td>8.46</td>
<td>-</td>
</tr>
<tr>
<td>Total</td>
<td>174</td>
<td>88.51</td>
<td>2.30</td>
<td>9.19</td>
<td>-</td>
</tr>
</tbody>
</table>


In order to examine the karyotype and its intraspecific variation, a number of strains of several different species of Korean *Drosophila* were investigated. Larval ganglion smear method were used for the determination of the metaphase chromosome configuration.

5 species were checked, among which *D. immigrans* Sturtevant (Kwangju strain) is quite similar to type 1 reported by Clayton and Ward (1954), but differs from it in having J-shaped chromosome instead of V-shaped chromosome. The karyotype of *D. brachynephros* Okada (Chiri strain) consists of 5 pairs of rod-chromosomes and a pair of dot-chromosomes, and this is the same configuration of *D. transversa* Fallen. The remaining 3 species, *D. melanogaster* Meigen, *D. auraria* Peng, *D. virillos* Sturtevant were identical with the karyotypes reported by previous workers.
Mukherjee, A. S. Max Planck Institut für Biologie, Germany. Cytological localization of the white locus in D. hydei.

Analysis of the salivary gland chromosomes of white-mottled-1 (w^m-1), white-mottled-2 (w^m-2) and white-mottled-3 (w^m-3) shows that although the three mutants differ phenotypically from each other in their extent of mottling, the distal break is, in every case, between 17A3 and 17A4 (numbering of bands and segments is according to Berendes, Chromosoma, 14, 1963). This breakpoint is close to a heavy doublet, the 17A(1-2).

While the w^m-1 and w^m-3 are cases of transposition of the heterochromatic arm of the X chromosome and nucleolar organizer into the region of the distal break (17A3-17A4), the w^m-2 involves a compound double inversion. Other breakpoints are given below:

w^m-1 and w^m-3: Proximal break is in the heterochromatin most likely at the end of the euchromatic arm between the centromere and the band segment 1A (in hydei one arm of the X is wholly heterochromatic: Figure 1). The difference between the two mutants may be the consequence of differential transposition of the heterochromatin.

w^m-2: Set I: Distal break same as above; proximal break is between 1A and the centromere; Set II: Break 1= between 9A4 and 9B1; Break 2 in the heterochromatic arm; this last break shifts the centromere to the region 9A4-9B1 and perhaps splits the nucleolar organizer (Figure 2).

Frequent heterochromatinization is observed extending from the break to about 16D4 on the one hand, and 17A6 on the other. Whenever heterochromatinization is found the 17A (1-2) is always involved.

These results, together with the finding that white-deficiency (w^df-686) shows a deletion for the bands from 16D3 to 17A(1-2), strongly suggest that 17A(1-2) is the white locus. The doublet nature of the white locus and the Notch phenotype of the deficiency (w^df-686, male lethal), suggests a homology between this region in this species and that in D. melanogaster.

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Figure 1: X-chromosomes of w/w^m-1. Arrow indicates the suggested white locus.

Figure 2: X-chromosomes of w^m-2/w^m-2.
Somatic pairing and crossing-over in Drosophila have been known and studied for a long time. However, little or no information is available concerning somatic synapsis in structural heterozygotes. The nature of pairing of structurally dissimilar homologues should give additional insight into the mechanism of somatic pairing and permit comparisons with meiotic pairing. Neuroblast squash preparations from larvae bearing chromosomal aberrations were examined to determine how well these chromosomes would pair somatically. No counts were made and relatively few (15-30) figures of each type were studied. Three different heterozygotes were examined: Ins(2L+2R)Cy/B1, In(3LR)Ubx1/TP(3:3)Vno and T(2:3)Xa/In(3LR)Ubx30. In general, somatic synapsis was fairly regular in all of the structural heterozygotes when compared to the control (Oregon R), although some incomplete synapsis and even asynapsis was observed. Incomplete synapsis was never seen in the Oregon R preparations. Pairing was least complete in T(2:3)Xa/Ubx, although it was fairly good here also. The chromosomes always paired as "bivalents," never as a multivalent. A bivalent with one arm paired and the other unpaired was often seen; pairing was usually complete in the other bivalent in these cells. Complete asynapsis of one bivalent was occasionally seen. It is, of course, impossible to identify chromosome arms in these preparations and thus to determine which arms are paired with each other; however, it does seem apparent that a good deal of nonhomologous pairing must be occurring.

Pairing in the inversion heterozygotes appeared to be quite good, however, without any indication of inversion loops as would have been found in the salivary gland chromosomes. Thus nonhomologous pairing is the rule with inversion heterozygotes. As in the case of the translocation, some incomplete synapsis and asynapsis was observed. Although specific chromosomes are difficult to identify, in the Ubx/Vno heterozygote a shift in the position of heterochromatin has occurred and thus it was possible to see in a few favorable prophase figures that when incomplete synapsis occurred, it is the normal 2nd chromosomes which are paired and the aberrant 3rd chromosomes which are experiencing difficulty in synapsis. When the inversions pair, they show the typical somatic "chiasmata." No indication was found that somatic synapsis occurs best or preferentially in heterochromatin.

While these observations do not comprise a thorough analysis of the somatic pairing of structurally dissimilar chromosomes, they should be of interest to workers interested in somatic crossing over and related phenomena. It seems clear that somatic synapsis in neuroblast cells (and presumably other mitotically active somatic cells) is very different from meiotic synapsis or even pairing in salivary gland chromosomes. Extrapolations from knowledge concerning pairing in these latter cells to account for various events occurring in mitotic cells should be made with caution. (Supported by USPHS Grant RG 06508-05).

Brosseau, G. E., Jr. University of Iowa. The sequence of loci on BSY+ and y+Y.

BSY+ was obtained by crossing over between B5Y and bwY+, which in turn is derived from y+Y by the transfer of y+ from YL to YS. B5Y was originally derived from an induced detachment of an attached-X, followed by the introduction of T(1:4)B5 by crossing over and subsequently deleting the euchromatin between B5 and the proximal heterochromatin. Thus this very useful marked Y chromosome has a history of several induced and spontaneous alterations. It would be useful to know, therefore, whether the sequence of the known Y-linked loci (the fertility factors and bb') has been altered by any of these changes. While the exact sequence of these loci has never been determined for a normal Y chromosome, it is known for y+Y. The sequence of Y chromosome loci can be ascertained by analyzing exchange products between the X and Y chromosomes recovered as detachments of the attached-X. If the sample of detachments includes an array of exchange points along the length of the Y, an unequivocal ordering of the loci can be made by means of standard tester stocks. A number of detachments (115) involving exchange with B5Y+ was available from another study. Analysis of these detachments reveals the following sequence: B5, k1-5, k1-4, k1-3, k1-2, k1-1, bb', ks-1, ks-2, y+. The position of the centromere cannot be determined by this technique: however, it is assumed to lie between bb' and K1-1. This sequence is identical to that of y+Y except that in y+Y, y+ is distal to k1-5 and Y5 has no X derived terminal marker. Therefore, it seems likely that the various alterations which occurred in going from y+Y to B5Y+ were restricted to the regions of the Y distal to the fertility gene complexes. Supported by USPHS Grant RG 06508-05.
SD in a natural population of D. melanogaster in Japan.

From the beginning of July, 1963, wild flies of D. melanogaster from a natural population in Ohdate City were collected periodically till the end of November, 1963, when fly collection became impossible because of the cold temperature. The City of Ohdate, Akita Prefecture, is located in the northern part of the Mainland of Japan (Honshu), about 400 miles to the north of the Genetics Institute in Mishima. A person residing in Ohdate City had been engaged in fly collections since July, 1963, but the earliest time when D. melanogaster appeared in that area was the end of August. Males collected from the Ohdate population (constitution: \(t^1/t^2\) for the second chromosome) were individually mated with virgin cn bw females. From the F\(_1\) progeny of each cross, five males were collected and mated individually to cn bw females. In the F\(_2\) generation we expect the ratio of phenotypically cn bw to wild flies to be 1 : 1 if the \(t^1\) and \(t^2\) chromosomes behave normally. In fact, this was so for about 600 tested males. However, there were 8 exceptional cases. In these exceptional males some of the wild second chromosomes behaved as if they carried the segregation-distorter (SD) locus, i.e., they revealed extreme excess of + flies in the F\(_2\) generation (practically 100\% instead of its expected value of 50\%). The number of tested males, SD-carrying males and the time of fly collections are presented in Table 1. As can be seen, SD-carrying males were found throughout the season. Some of the SD\(^+\) chromosomes in the Ohdate population were insensitive to the action of SD, or there were systems suppressing SD-action. Salivary gland chromosome examination revealed that all of the 8 SD-bearing chromosomes carry two overlapping inversions, one involving the sections from 52A to 56F and the other from 55E to 60E. (These are approximate; exact determinations have not yet been made.) The former inversion is identical to that found in SD-72 and SD-5. This inversion is also fairly commonly found in natural populations of D. melanogaster and is called Nova Scotia (In (NS)). One hundred and ninety-three wild, SD\(^+\), second chromosomes from the Ohdate population were examined as to whether they carried any inversions. Only 11 were found to carry In (NS), and the remaining 182 were free of any inversions. Many genetic tests are in progress in the author's laboratory, and it is hoped that the present investigation will give a hint on the origin and evolutionary history of SD, as well as on the mechanism of SD action.

Kikkawa, H. Osaka University, Japan. An electrophoretic analysis of amylase gene in D. simulans.

By using an agar-gel electrophoresis which was improved by Ogita (DIS 37:142), there were found two types of amylase isozymes, viz., \(A_m\) and \(A_m^S\) among eight strains of D. simulans. A genetic analysis showed that these amylase isozymes are controlled by allelic and co-dominant genes located near plum gene on the second chromosome of this species.
Inseminated females of a strain of D. melanogaster homozygous for dumpy were exposed in three sets of 100 each to 30,000 rads of 50 Mev protons, a week after eclosion and three days following mating. Each set was transferred to a separate bottle immediately following treatment, and two hours later all the flies were parceled out into nine vials. These F₁ were transferred to fresh food about every three days. Some were remated after three days to compare the fertility of females having fresh sperm to those having only the original irradiated sperm.

The flies were very lethargic after the irradiation but recovered in a few hours. While many eggs were laid in the early broods, only four hatched. Neither the flies with fresh sperm nor those with treated sperm produced any larvae after the third day, indicating heavy damage to the oocytes and oogonia. Three larvae from the second brood of one set pupated, but these died before eclosion. One larva from the first (two hour) brood of another set produced a phenotypically normal female which eclosed much later than normal. This single F₁ offspring when mated to untreated males gave 49 F₂ males and 50 F₂ females. All four expected classes were present in the second generation in roughly equal numbers, and no evidence for radiation induced mutation was found.

It is extremely unlikely that the irradiation was so non-uniform that any of the flies escaped the high dose of 30,000 rads. The proton beam was scattered by 1/8" of carbon to produce a nearly constant flux over a circle of diameter 1 1/2", and only the central 1" disk was used. In addition, the beam was oscillated rapidly (several hundred cps) to smooth out any minute irregularities. The dose delivered corresponds to approximately 1260 protons per square micron, so that each chromosome should have received multiple hits.

The median life of the flies after this dose of protons was shorter than normal, half dying in 18 days compared to the shortest period of 21 days observed for virgins under similar crowded conditions. Fourteen days after eclosion 222 of the original 300 were alive, 172 lived 17 days, 121 lived 20 days and 3 were alive at an age of 32 days. The food was rather damp and since this dumpy strain gets stuck easily, the environmental conditions may have affected the life-time more than the radiation. Consequently we conclude from this series only that the sterilizing effect was virtually complete.

Degenerative effects associated with high radiation doses were evident in five flies sacrificed for histological studies. Two flies dissected 17 days after treatment had degenerate ovaries and their oogonia were vacuolated and necrotic. Live motile sperm were seen in the seminal receptacle of the fly taken from a vial with mates, while no sperm were found in one which had been without mates for a week. The three flies which lived 32 days were dissected, and showed more advanced degeneration of the ovaries and the oogonia than the younger pair. No sperm were seen in these flies, which had been without mates for 10 days. Further work with lower doses has suggested other non-reparable damage produced by protons, and some biochemical effects on the brain of adults are being investigated.

Scharloo, W. Genetisch Laboratorium der Rijksuniversiteit, The Netherlands. Temperature sensitive periods in ci.D. Scharloo and Nieuwenhuis (DIS 37 and 1964) reported that the temperature sensitive period (T.S.P.) of ci.D lies after puparium formation, and they found no evidence for an influence of the genetic background. However, new experiments with two long inbred ci.D lines having oppositely directed temperature reactions revealed that the genetic background can affect the localization of the T.S.P. in development. Unpigmented prepupae were transferred from 27.5° to 17.5°. In both lines the T.S.P. for the 4th vein interruption ended before puparium formation. A further experiment on an inbred line related to the H-stock of our earlier experiments showed again a T.S.P. starting several hours after puparium formation. The T.S.P. for the 5th vein interruption was invariably located after puparium formation in all lines.

It is perhaps relevant that the 5th vein had an interruption of about the same size at 27.5°, and was complete at 17.5°, in all lines. Further, both strains with a 4th vein T.S.P. before puparium formation, show a change of expression in that part of the scale where expression and temperature have a linear relation. In both stocks with the T.S.P. after puparium formation, the expression is less extreme and is changed through the expression range where a marked facilitation of change occurs (see Scharloo 1962).
A comparison was made of the frequencies of sex-linked recessive lethal mutations induced in mature sperm by (a) X rays, (b) two alkylating agents and (c) a post-irradiation 30 minutes after administration of the chemicals. The alkylating agents used, a nitrogen mustard (NITROMIN) and a polyethylene-imine (THIO TEPA) were injected intra-abdominally in a 0.4% saline solution and the irradiation dose was 800 r in all cases.

For the experiments, one day old Oregon-R males were treated and 24 hours later mated to "Basc" females, left for one day and then discarded. The females were allowed to oviposit for two additional days. Standard recessive lethal tests were made with the F_1 females. The results obtained in the F_2 are shown in the table. Taking into consideration these results, as well as others from combined treatments carried out at different intervals, the effect of combined treatments with alkylating agents and X-rays is at least additive with the nitrogen mustard but not with the polyethylene-imine, in which case no combined treatment has ever induced a recessive lethal frequency as high as that induced by the chemical alone.

<table>
<thead>
<tr>
<th>Alkylating agent</th>
<th>X rays</th>
<th>Alk. a. X rays</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No. chrom. %let.</td>
<td>No. chrom. %let.</td>
</tr>
<tr>
<td>NITROMIN ((7 \times 10^{-2} \text{M}))</td>
<td>788</td>
<td>1.14</td>
</tr>
<tr>
<td>THIO TEPA ((3 \times 10^{-2} \text{M}))</td>
<td>983</td>
<td>12.00</td>
</tr>
</tbody>
</table>

An attempt is being made to establish the frequency of dominant lethals induced in mature or nearly mature oocytes of females treated with various combinations of X-rays and chemical mutagens, in the hope of elucidating previous data on recessive lethals induced by these agents. Individual females were mated in vials containing a special medium for egg counts (see note in this issue DIS) and were allowed to lay eggs for 36 hours (this time had to be used since it was the period used previously for the recessive lethal tests). It was found that a variable proportion of the females did not lay eggs at all during the 36 hour period (though most of them did finally lay eggs later). This was true of all groups including the controls.

In addition, there was an extreme variation in the number of eggs laid by the individual females, again in all groups. In some treatments, the range was from 1 to 100, in others 1 to 50, etc. and the distribution of egg number was rarely a normal one.

In a recent review, the observation was made that although insect organs have been cultured in hanging drops and on solid media for in vitro differentiation studies, there has been no report in the literature of using the rayon raft technique for this purpose, the latter being a very common practice in vertebrate organ culture (M. Martignoni in Insect Physiology, Oregon State Univ. Press, 1963).

This technique was attempted a number of times in culturing D. melanogaster organs (cephalic ganglia with attached eye-antennal discs, salivary glands, testes and ovaries) using not only rayon rafts but also rafts of nylon monofilament cloth, perforated cellophane and millipore filters. Regardless of the material which served as the raft, the end result was unsatisfactory. Except for testes and ovaries from young third instar larvae, all the above-mentioned
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organs, whether from third instar larvae, prepupae, or pupae, immediately flattened out when placed on such rafts. After 24 hours in culture most organs were so distorted that it was difficult to visualize their original outlines. None of the organs survived as long as their controls in hanging drops, nor was there, with few exceptions, any significant differentiation. Millipore filter rafts had one further disadvantage in that it was extremely difficult to see the explants against the solid white background. Placement of Drosophila organs at an air interface within the culture chamber should therefore be avoided since such an arrangement promotes neither long survival nor extensive differentiation and as such is decidedly inferior to complete submersion of explants in a liquid medium.

Ayala, Francisco J. Columbia University. Development of incipient sexual isolation between laboratory populations.

Two strains of D. birchii from Cairns, Australia, and from Popondetta, New Guinea (Ayala, 1965a), were crossed in both directions. Two populations were started with 150 pairs of F₁ hybrids each, one being maintained at 25°C and the second at 19°C. The technique of maintaining the populations has been described elsewhere (Ayala, 1965b). After 48 weeks of "natural" selection (about 16 generations at 25°C and 10 generations at 19°C) samples were taken from both populations, and crossed to each of the parental strains in the two possible directions. The test was made by placing 10♀ and 10♂♂ together in a 1/2 pint bottle for 10 days, and then the females were dissected and examined for presence of sperm. The results are given in table 1. (The control crosses give 90% or more insemination). The two hybrid populations show a similar moderate degree of sexual isolation with the Popondetta parental strain. However, their behavior with the Cairns parental strain is strikingly different, the 25°C population showing fairly high isolation and the 19°C very little. The difference in isolation of the 25°C and 19°C populations with Cairns is highly significant (χ²=30, P<.001), and the difference between the behavior with Cairns and with Popondetta is significant at P<.01 for the 25°C hybrid population and at P<.05 for the 19°C population. The two populations have, then, evolved different degrees of sexual isolation with respect to the parental strains. Since the populations were kept completely separated, sexual isolation has evidently arisen as a by-product of genetic divergence.

Table 1: Sexual preferences between two hybrid experimental populations and their parental strains.

<table>
<thead>
<tr>
<th>Cross</th>
<th>♂♂ tested</th>
<th>♂♂ inseminated</th>
<th>Per cent inseminated</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hybrid population 25°C x Cairns</td>
<td>64</td>
<td>14</td>
<td>22</td>
</tr>
<tr>
<td>Hybrid population 25°C x Popondetta</td>
<td>57</td>
<td>26</td>
<td>46</td>
</tr>
<tr>
<td>Hybrid population 19°C x Cairns</td>
<td>55</td>
<td>40</td>
<td>73</td>
</tr>
<tr>
<td>Hybrid population 19°C x Popondetta</td>
<td>60</td>
<td>31</td>
<td>52</td>
</tr>
</tbody>
</table>


Ayala, Francisco J. Columbia University. Improvement of fitness in experimental populations.

Two experimental populations, one maintained at 25°C and the second at 19°C, were started with 150 pairs of founders taken from mass culture stocks of the Popondetta strain of D. serrata. The technique of maintaining the populations has been described elsewhere (Ayala 1965), the relevant factor being that strong competition exists
both between the adults and during the immature stages of development. The populations reached equilibrium between the 8th and the 15th week, and thereafter oscillated around the same level. After 52 weeks samples were taken from both populations and from the original mass culture stocks, and a new generation was produced at 25°C under uncrowded conditions. From this progeny different amounts of flies were placed in 1/2-pint culture bottles, and transferred regularly to fresh bottles (3 times a week at 25°C, twice at 19°C). A total of 10 transfers were made at 25°C for each level of parental density, and 6 transfers at 19°C. The mean number of flies produced per bottle are presented in Table 1. In all the six cases studied the flies

Table 1: Mean number of flies produced per food unit by two experimental populations and their parental stocks.

<table>
<thead>
<tr>
<th>Number of Parents</th>
<th>25°C Experimental Population</th>
<th>25°C Control</th>
<th>Difference</th>
<th>19°C Experimental Population</th>
<th>19°C Control</th>
<th>Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>100</td>
<td>396</td>
<td>363</td>
<td>33</td>
<td>233</td>
<td>208</td>
<td>25</td>
</tr>
<tr>
<td>300</td>
<td>423</td>
<td>381</td>
<td>42</td>
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<tr>
<td>1000</td>
<td>513</td>
<td>495</td>
<td>18</td>
<td>477</td>
<td>379</td>
<td>98</td>
</tr>
<tr>
<td>1500</td>
<td>543</td>
<td>497</td>
<td>46</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

from the experimental populations produced more progeny than the controls. It seems likely that, under the action of strong natural selection, new genotypes have been selected in the experimental populations which improved their fitness, as measured by the number of progeny produced per food unit.


Thompson, Peter E. Iowa State University. The killing and resorption of eggs after injection of Drosophila females with actinomycin-D.

In the course of tests of the effect of actinomycin-D on crossing-over, females were injected with about 0.25 microliter of dissolved material at concentrations of 10 and 50 microgram/mliliter. Injection was via the thorax. Neither concentration had a marked effect on survival under sterile conditions. While the 10-gamma solution did not reduce fertility, the 50-gamma solution invariably led to a permanent or temporary cessation of egg laying.

In the 50-gamma series, females were inseminated during their first imaginal day and injected at 1 1/2 days. Each female laid 2-5 eggs soon after treatment, after which oviposition ceased for at least 6-7 days. Following this lapse, roughly one-third (37/124) of the females showed a recovery of fertility. The pattern of crossover effect after recovery was comparable in its time scale to effects of the 10-gamma treatment, heat treatments, etc., as if no marked retardation of surviving oocytes were involved. This included the observation of multiple rare exchanges, presumably gonial in origin, in individual females from the tenth day on.

Females examined early in the sterile period show degeneration of all advanced egg stages, and the ovary is distended with decomposition products. At day 6 (about 4 1/2 days after injection) most of this debris has been resorbed and oocytes up to about stage 3 or 4 can be seen. Again, the rate of development of these surviving oocytes must be nearly normal, for their maturation is complete in some females within another two days, at the return of fertility. A more thorough treatment of this aspect is projected, hopefully to establish a time scale of oogenesis similar to that found by Welshons and Russell (PNAS 1957) in their irradiation of Drosophila males. (Research supported by U.S.P.H.S. Grant GM 09912).
Stromnes, Skistein and Ingerid Kvelland
University of Oslo, Norway. Radiosensitivity of sperm ejaculated within 12
hours after irradiation.

Unmated D. melanogaster males from an Oslo wild-type stock were irradiated with 3000 r of X-rays
when the males were either 12, 24 or 72 hours old, and then mated individually to virgin M5
(Muller-5) females. All matings were observed

and recorded. Copulating females were immediately isolated and after impregnation transferred
to egg laying tubes. Thus, the frequency can be calculated of sex-linked recessive lethals in
individual sperm ejaculates.

Analysis of the data (Table 1) indicate that the frequency of sex-linked lethals increase
with age of males at time of irradiation. This is in agreement with previous findings.

Table 1: The frequency of sex-linked recessive mutations in successive ejaculates after irrad-
ination.

<table>
<thead>
<tr>
<th>Series</th>
<th>First</th>
<th></th>
<th>Second</th>
<th></th>
<th>Third</th>
<th></th>
<th>Total</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1/N</td>
<td>%</td>
<td>1/N</td>
<td>%</td>
<td>1/N</td>
<td>%</td>
<td>1/N</td>
<td>%</td>
</tr>
<tr>
<td>24 A</td>
<td>1356/16563</td>
<td>8.19</td>
<td>422/6795</td>
<td>6.21</td>
<td>117/2277</td>
<td>5.14</td>
<td>1918/26067</td>
<td>7.36</td>
</tr>
<tr>
<td>72 A</td>
<td>795/9259</td>
<td>8.58</td>
<td>286/3635</td>
<td>7.86</td>
<td>61/603</td>
<td>10.11</td>
<td>1145/13523</td>
<td>8.47</td>
</tr>
</tbody>
</table>

It can also be seen from the table that all age groups of males have a lower frequency of
lethals in their second ejaculate than in the first ejaculate. The data are not consistent in
the third mating for the three age groups of males. The 24 hour old males (Series 24 A) exhib-
it a further lowering in the frequency of lethals from the two previous matings; while the
younger as well as the older males (Series 12 A and 72 A) have a higher frequency of lethals in
their third ejaculate than in their second ejaculate. The data for 12 and 24 hour old males
(Series 12 A and 24 A) are in agreement with previous findings, while we have no data directly
compatible with those obtained in Series 72 A.

The data have not been analyzed in detail yet, but a preliminary examination of the data
suggests that for the youngest age group of males (Series 12 A) the frequency of lethals in the
first ejaculate depends on the time after irradiation. Thus, first ejaculates available for
fertilization the first eight hours after irradiation exhibit a higher frequency of lethals than
do first ejaculates available for fertilization eight to twelve hours after irradiation.


The action of an autosomal modifier on the
pteridine of the mutant, white-blood (w^bl). The action of an autosomal recessive factor
(Clancy, 1964, DIS 39:65) which affects the pro-
duction of the pteridine eye pigments (Clancy,
1962, Gen. 47:948-949) in Drosophila is being
studied with respect to the mutant, white-blood
(w^bl), a temperature sensitive allele of the white series. Preliminary experiments involving
comparative measurements of the fluorescing pigments resolved by paper chromatography (Hadorn
& Mitchell, 1951) reveal that at both 25°C and 18°C all of the pteridines are significantly re-
duced in w^bl when homozygous for the modifier. A similar result is obtained with a stock ho-
mozygous for the modifier, but otherwise wild type in appearance and constitution.

Comparative measurements have also been made at both temperatures on the compounds of w^bl
with vermillion (v) and scarlet (st), genetic blocks to ommochrome formation. The pattern of
action of the modifier is not the same with these two compounds, nor is it the same as that
found with w^bl alone. The above patterns are quite consistent in flies from five to sixteen
days of age.

All measurements were made on head pigments of male flies derived from stocks in which the
female parents were attached-X and wild type with respect to w^bl. Preliminary experiments in-
volving males derived from stocks in which the mothers were also w^bl have given results which
indicate the possibility of a maternal effect with respect to the interaction of the pteridine
modifier and the eye color mutant. (Work supported by training grant No. 5T1-GM-373 and re-
search grant GM09802, USPHS).
Bateman, A. J. Christie Hospital, Manchester, U. K. An attempt to induce ND of chromosome 2 by X-raying.

(dp b cn bw/b pr vg d'd were irradiated with 1000 and 1500 rad and mated to 2L dp.2R px g, daily for 12 days. The matings were very infertile: 4000 mated g produced only 68 progeny. Expected ND phenotypes in the progeny were dp px (from nullo-2 sperm) and bpx (from diplo-2 sperm). Only 4 such flies were found among a total of 68. It would seem that nullo-2 and diplo-2 sperm is non-functional. Moreover, no progeny have been produced from irradiated sperm with the normal complement from which chromosome 2 has then been lost at first cleavage. Perhaps the 4 expected gametic classes are not formed at meiosis in 2L.2R eggs, or are formed in unequal proportions so that nearly all haploid egg nuclei are 2L or 2R. This would explain the moderate yield of progeny (17 proven) with one paternal iso-2, all from X-raying pre-meiotic stages.

Of the remaining 47 progeny, 7 were proved to contain a (spontaneously reconstituted) dp px chromosome. Of the remainder the majority were proven triploids, and were produced with equal readiness from pre- or post-meiotic irradiation of sperm. It seems an open question whether these are due to spontaneously produced diploid eggs or to dispermy in a 2L.2R egg with loss of one paternal chromosome 2.

Watson, J. E. and Allan B. Burdick. Purdue University. The effects of selected background rearrangements on the v to g region in D. melanogaster.

In studies dealing with the nature of crossing-over in the miniature-dusky region on the X-chromosome the data presented in Table 1, showing the interchromosomal effects of the listed rearrangements, was derived. These data show the alteration effect on the recombination distances between v, dy² and g and are presented here for the information of others working in this and other adjacent regions of the X-chromosome. Of interest also is the effect the several rearrangements have on the mean number of offspring produced by a single female.


Table 1. Recombination data derived from v dy² g/+ ++ females

<table>
<thead>
<tr>
<th>Rearrangement</th>
<th>Progeny</th>
<th>v-dy²</th>
<th>dy²</th>
<th>Coef. of coincidence</th>
<th>Mean no. of progeny per female</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>14,199</td>
<td>3.08 ± .15</td>
<td>6.59 ± .21</td>
<td>.034</td>
<td>237</td>
</tr>
<tr>
<td>In(2LR)Ryd</td>
<td>5,029</td>
<td>3.09 ± .25</td>
<td>6.16 ± .34</td>
<td>.209</td>
<td>93</td>
</tr>
<tr>
<td>In(2R)MoK</td>
<td>3,206</td>
<td>3.34 ± .32</td>
<td>6.36 ± .34</td>
<td>.103</td>
<td>146</td>
</tr>
<tr>
<td>In(2LR)dp</td>
<td>3,584</td>
<td>2.93 ± .28</td>
<td>6.86 ± .43</td>
<td>.139</td>
<td>63</td>
</tr>
<tr>
<td>In(2L)NS</td>
<td>12,599</td>
<td>4.17 ± .18</td>
<td>6.83 ± .23</td>
<td>.084</td>
<td>238</td>
</tr>
<tr>
<td>In(2LR)Gla</td>
<td>5,706</td>
<td>4.45 ± .28</td>
<td>7.12 ± .34</td>
<td>.387</td>
<td>114</td>
</tr>
<tr>
<td>Ina(2L+2R)NS</td>
<td>5,885</td>
<td>4.23 ± .26</td>
<td>7.34 ± .34</td>
<td>.164</td>
<td>101</td>
</tr>
<tr>
<td>SM5</td>
<td>7,061</td>
<td>4.32 ± .24</td>
<td>8.10 ± .33</td>
<td>.000</td>
<td>126</td>
</tr>
<tr>
<td>In(3L)D</td>
<td>5,451</td>
<td>3.17 ± .24</td>
<td>6.13 ± .33</td>
<td>.094</td>
<td>99</td>
</tr>
<tr>
<td>In(3R)Hu</td>
<td>11,766</td>
<td>3.66 ± .17</td>
<td>6.37 ± .23</td>
<td>.269</td>
<td>294</td>
</tr>
<tr>
<td>In(3LR)Cx101</td>
<td>6,471</td>
<td>3.54 ± .22</td>
<td>7.48 ± .33</td>
<td>.058</td>
<td>175</td>
</tr>
<tr>
<td>In(3LR)UbX</td>
<td>7,301</td>
<td>3.48 ± .22</td>
<td>7.96 ± .32</td>
<td>.495</td>
<td>183</td>
</tr>
<tr>
<td>In(3L)Me'</td>
<td>5,475</td>
<td>4.24 ± .27</td>
<td>7.32 ± .36</td>
<td>.235</td>
<td>140</td>
</tr>
<tr>
<td>TM3</td>
<td>10,956</td>
<td>4.58 ± .20</td>
<td>7.67 ± .26</td>
<td>.078</td>
<td>288</td>
</tr>
<tr>
<td>Ina(3L+3R)P</td>
<td>4,660</td>
<td>4.06 ± .29</td>
<td>8.37 ± .40</td>
<td>.063</td>
<td>83</td>
</tr>
<tr>
<td>(2L+2R)NS-TM3</td>
<td>4,383</td>
<td>4.02 ± .33</td>
<td>9.54 ± .43</td>
<td>.049</td>
<td>115</td>
</tr>
<tr>
<td>SMS-Ubx101</td>
<td>1,727</td>
<td>4.17 ± .48</td>
<td>10.42 ± .74</td>
<td>.000</td>
<td>69</td>
</tr>
<tr>
<td>SMS-Cx</td>
<td>1,375</td>
<td>5.45 ± .61</td>
<td>11.05 ± .85</td>
<td>.000</td>
<td>65</td>
</tr>
<tr>
<td>SMS-TM3</td>
<td>1,706</td>
<td>5.80 ± .57</td>
<td>10.79 ± .77</td>
<td>.094</td>
<td>11</td>
</tr>
<tr>
<td>SMS-P</td>
<td>3,873</td>
<td>5.55 ± .37</td>
<td>12.14 ± .52</td>
<td>.077</td>
<td>76</td>
</tr>
<tr>
<td>(2L+2R)NS-P</td>
<td>8,961</td>
<td>5.65 ± .24</td>
<td>12.39 ± .35</td>
<td>.096</td>
<td>172</td>
</tr>
</tbody>
</table>

The underlined values differ significantly from the control at α = .05.
Bateman, A. J. Christie Hospital, Manchester, U. K. X-irradiation of heterozygous attached-X.

The attached-X used had arisen in progeny from sc ec cv/ct v g ?? which had been irradiated. It was homozygous for sc ec and cv, and heterozygous for ct v and g. ?? were irradiated with 4000 rad or kept as unirradiated controls. The progeny of eggs laid on days 7-11 after irradiation were scored for homozygosis for ct v and g, with the following results:

<table>
<thead>
<tr>
<th>Homozygous for</th>
<th>Total ??</th>
<th>ct</th>
<th>v</th>
<th>g</th>
<th>Detachments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control as %</td>
<td>1167</td>
<td>81</td>
<td>80</td>
<td>39</td>
<td>None</td>
</tr>
<tr>
<td></td>
<td></td>
<td>6.9</td>
<td>6.9</td>
<td>3.3</td>
<td></td>
</tr>
<tr>
<td>4000 rad as %</td>
<td>534</td>
<td>38</td>
<td>81</td>
<td>56</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td></td>
<td>7.1</td>
<td>15.2</td>
<td>10.5</td>
<td></td>
</tr>
</tbody>
</table>

Increase over Control 0.2 8.3 7.2

It is seen that 4000 rad produces a 3-fold increase in c-o between g and the centromere. The increase in homozygosis for v is the same as for g, meaning that there has been no change in c-o between v and g. The absence of any change in homozygosis for ct means that c-o between ct and v must have decreased by an amount equal to the increase proximal to g. These results confirm those presented in DIS 37:68 in respect of segments ct - v - g and add the additional information that X-rays enhance c-o near the centromere (to the right of g). The controls show relatively low homozygosis for ct. This is in all probability due to some parental attached-X ?? being homozygous +ct.

Bateman, A. J. Christie Hospital, Manchester, U. K. ND of chromosome 2, production of iso's, and reconstitution of normals from iso's by X-irradiation of ??.

dp + PX (egg with 2R iso) and b PX (egg with 2L iso). The greatest yields were obtained over the first 8 days of laying after doses of 2-6 K rad. Nullo-2 eggs accounted for 66% of all progeny and diplo-2 eggs for 9%. This is the ratio found for X-ray induced ND of the X chromosome. We were surprised to find 25% of all progeny were from iso-2 eggs (50/50 2L and 2R). Triploid progeny were very rare. These induced iso's are homologous to attached-X, which however are rarely produced by irradiation. Of the diplo-2 eggs, only 5% were homozygous at the centromere. By contrast, 25% of the iso's were homozygous at the centromere. It is concluded that 25% of the iso's arise by misdivision of the centromere (sensu lato) and 75% by centric fusion (sensu lato).

Reciprocal matings, with irradiation of 2L dp.2R px ??, freely produced flies of constitution dp px/b. Thus a normal second chromosome has been reconstituted from two iso's. The reconstituted chromosome does not appear to be deleterious. The heterozygotes are fertile and the homozygotes viable and fertile. The ease of reconstitution is suggestive of a close association between the centromeres of the iso's (which are of course homologous) with X-ray induced c-o within the centromeric zone.

The recently demonstrated lampbrush-like modifications of the Y chromosome within the genus Drosophila are both phase and species specific (Hess and Meyer, 1963; Meyer, 1963) and can, therefore, be used as a reliable taxonomic criterion. Numerous representatives of several subgroups have been examined and the results demonstrate the strict species specific evolution of the Y heterochromatin in primary spermatocytes. For observation of the functional structures of the Y chromosome in living spermatocytes testes are dissected in Drosophila Ringer (also last instar larvae can be used), transferred into a drop of Drosophila Ringer on a slide and covered with a cover glass. Surplus Ringer is then removed by filter paper until the gonad ruptures and spermatocytes flow out. No strong pressure should be applied to the cover glass in order to prevent severe mechanical damage of the cell nuclei. Observations are made with a phase contrast microscope. It could be demonstrated that even closely related species such as D. melanogaster and D. simulans or D. hydei and D. neohydei can be easily distinguished by the cytological method described above. The figures demonstrate some species specific functional structures of the Y chromosome in the hydei subgroup and the usefulness of this "cytotaxonomical" method even for routine work.

References:
Meyer, G. F.: Chromosoma (Berl.) 14:207 (1963)

Legend for figures:
Functional structures of the Y chromosome in primary spermatocytes. A) D. bifurca, B) D. nigrohydei, C) D. neohydei, D) D. hydei.


Experiments have been undertaken in order to investigate if the manifestation of the bsp character (caused in the female by copulation) depends on the spermatic fluid. bsp females have been operated inserting into the vagina paragonia homogenate, other inactive substances, or no fluid at all, but the needle only. These females never showed spots, but a similar phenotype consisting of brown masses spread throughout the body. Matings of bsp etherized females produced a significant decrease in the frequency of brown spots. Copulations interrupted before the beginning of ejaculation caused the appearance of brown spots. These observations emphasize the existence of a mechanical stimulus correlated with the copulatory act, independently of the spermatic fluid.
Kurokawa, H. Tokyo Metropolitan University. Variability in the genitalia of Drosophila auraria found in nature. Extensive Drosophila surveys have been made during last summer in some localities on Hokkaido. Among the flies collected, a few females of D. auraria produced many F₂ offspring showing variable characteristics in male genitalia. Almost all of the F₂ males have many bristles, ranging from 11 to 16 in number, on their 6th sternites. Submedian process with a median notch of the novasternum is apparently different in shape from those of three races, A, B and C. The size of this part is considerably greater than in race A, but smaller than in race B. In many cases it has been found that the flies show asymmetry (or irregularity) in this shape. In some flies, an apical spine is found in either tip of the bifurcated process, and no spine is found in the others. The aedeagus is very similar in shape to that of race A. It is conjectured that the flies first collected in Hokkaido might be interracial hybrid.

Ohba, S. and Y. Kataoka. Tokyo Metropolitan University. The behavior of a recessive gene, cn, in artificial populations of D. virilis. In four experimental populations of bottle type, the frequencies of a recessive eye color gene, cn, have now been followed for more than 80 weeks. The mutant used occurred spontaneously in a wild D. virilis strain (Tokyo) in 1961 and was kept together with its wild allele in the same vial as a mixed stock. In experimental populations all live flies, both old and newly emerged, were etherized and classified for sex and eye color, then transferred to a new bottle twice a week. Two kinds of culture media, 20% and 10% yeast medium, were used for each pair of populations. At the beginning the gene frequency of cn and of its wild allele was equal, 50%. After 80 weeks, the cn frequency exhibits no remarkable decrease or increase. At a glance, it seems to be in equilibrium at the level of 50-60% (20% yeast medium) or 40% or so (10% yeast medium), though some fluctuations occur from time to time. Furthermore, precise examination indicates that regular rhythmic changes may occur in all populations, and that the cycle of these rhythmic changes coincides with generation intervals in each population. Another experiment in which populations have been kept in a plastic cage for more than 40 or 60 weeks gives similar results. Using 10% yeast medium, we can find a slow decrease in the cn frequency (less than 1% per generation) in the cages of high initial frequency (75%), but no significant change if initial frequency is low (10%). In populations with an intermediate initial frequency (50% or 25%) only doubtful changes were observed.

Okada, T. Tokyo Metropolitan University. Negative correlation between the development of hooked scaly bristles and of sex-combs. As reported in DIS 38:38, the males of the species belonging to the suzuki, takahashii, and ficushila species subgroup of the melanogaster species group and also the males of Drosophila (Tanigasterella) gracilis Duda possess a special kind of hooked scaly bristles on the tibia and/or on the metatarsus of the middle leg. Applying R-technique of finding relationship between two characters over all species examined, it was estimated that the development of this special kind of bristles is negatively correlated with that of the sex-combs on male fore legs. The correlation coefficient calculated, classifying each character in three classes, is -0.64 (p<0.05), for the species of the melanogaster group and D. (T.) gracilis. Simultaneous occurrence in a species of both characters, which are similar secondary sexual characters, seems to be a homeotic expression of sex-combs on the homonymous organs. Furthermore, it can be assumed that the high development of sex-combs on the fore legs prevents the expression of the homeotic effect upon middle legs to produce scaly bristles through the phenomenon of enantiomorphism or compensation of body materials.
With the aim of clarifying the mechanism through which deleterious genes are retained in natural populations, viabilities of heterozygotes for lethal genes were examined under different temperatures. Three hundred fifty-five second chromosomes were extracted at random from a laboratory population which had been kept in a constant temperature room at 25°C for about one year before the experiment. Cy/Pm viability test showed that of these 355 chromosomes 15.5 percent were lethal, 8.7 percent semi-lethal, 9.9 percent subvital and 65.9 percent normal. The allelic rate of the lethal chromosomes was 8.8 percent and the number of nonhomologous lethal chromosomes was 24.

Pre-adult viabilities of lethal heterozygotes relative to normal heterozygotes were tested at three different temperatures (17°C, 25°C and 29°C) by using the 24 lethals obtained and 31 normal chromosomes taken at random. Every lethal chromosome was tested in combination with 10 different normal chromosomes. The testing scheme employed is as follows:

P  Cy/1kq  Nj/Ni  Cy/Njqq  Ni/Ni
F1  Cy/Ni  1k/Ni  Cy/Ni  Nj/Ni

Frequency (1-q)  q  (1-q')  q'

1: lethal chromosome  N: normal chromosome
k = 1,2, ..., 24. j = 1,2, ..., 15. i = 1,2, ..., 10.

The relative viability (v) of a lethal heterozygote is estimated by q(1-q')/q'(1-q) and the selection coefficient for viability by 1-v.

The mean selection coefficients obtained for 17°C, 25°C, and 29°C were 0.0245, 0.0253 and -0.0148 respectively. These figures indicate that lethal heterozygotes are at a selective disadvantage at 17°C and 25°C, but they are selectively favoured at 29°C on the average.

From the result of analysis of variance for selection coefficient, it can be seen that the effect of temperature is significant at the 5% level. The effect of interaction between lethals and temperatures is also significant. These results show that the degree of dominance of lethal genes are highly dependent on the temperature at which flies are cultured.


The effects of experimental sympathy involving the sibling species D. arizonensis and D. mojavensis baja were studied. Five population cages were analyzed. Cages 1 through 4 were initiated with equal numbers of males and females of both species. Cage 5 was initiated with male and female interspecific F1 hybrids. Cages 1, 2, and 5 were analyzed cytologically using salivary gland chromosomes, and Cages 3 and 4 were analyzed by use of mutant eye markers.

In Cages 1 through 4 both species coexisted for the duration of the experiment (approximately 11 generations). Only in Cage 1 did a trend toward replacement seem imminent. The dominant species was baja, which represented 90.8% of the population.

Interspecific F1 hybrids and recombinant backcross types were produced in low frequencies in the mixed populations, even though a choice of mates was available. However, a hybrid swarm was not produced. This is attributed to a lack of luxuriance in the hybrids. Hence, a non-co-adapted hybrid complex was in competition with the coadapted complexes of the parental species. This non-coadapted hybrid complex obviously had a lower adaptive value than either parental complex.

In Cage 5 a "hybrid" population flourished for more than 12 generations. It is hypothesized that heterosis exists in certain recombinant types which, once formed, constitute the initiators of a hybrid swarm such as that demonstrated by Mettler (1957) using different races of the same two species.

Sterility and semi-sterility were found to exist among the males of F1 hybrids. This reduced reproductive capacity is no doubt a contributing factor to the low adaptive value of the hybrids when they are competing with the parental species.
It is further hypothesized that the heterosis which would lead to the production of a hybrid swarm is functional only in those recombinant types which do not also contain poorly adapted combinations in other parts of the genotype (such as factors affecting fertility). As a result, the probability of obtaining "good" male and female recombinant types in a population consisting predominantly of the parental species is very low. This is thought to be due to (1) the low frequency of interspecific hybrids (2-3% of the population), (2) the low adaptive value bestowed upon these types by their non-coadapted gene complex, and (3) the greatly reduced fertility of hybrid males.

Thus, a reproductive barrier exists between the parental species beyond the one dealing with the initial production of F₁ hybrids. If the second barrier (production of highly fit heterotic recombinants) is hurdled, the production of a hybrid swarm, or more correctly an introgressed population, would result.


Twenty-nine lethal genes extracted from Korean natural populations were localized by use of three recessive marker genes. The distance between marker genes and lethal genes was adjusted by Kosambi formula. The results are as follows:

<table>
<thead>
<tr>
<th>Collection</th>
<th>Non-allelic loci</th>
<th>Distribution</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Left</td>
<td>Middle</td>
</tr>
<tr>
<td>S62</td>
<td>17</td>
<td>4</td>
</tr>
<tr>
<td>K62</td>
<td>12</td>
<td>2</td>
</tr>
</tbody>
</table>

It can be seen that the lethal genes of S62 population are distributed in the central region \(X^2 = 10.0, \text{d.f.} = 2, P = 0.01 - 0.001\). However, the lethals of K62 population seem to be randomly distributed \(X^2 = 1.5, \text{d.f.} = 2, P = 0.3 - 0.5\).


Males of Muller's Maxy stock were treated with X-rays, quinacrine mustard and azaserine and individually mated (in vials) to Maxy females (2 to 3 per male). The males were transferred to new food vials with fresh virgins every third day for several such broodings. The dose of X-rays was 3000r or 5000r and that of the quinacrine sufficient to give a 2 to 3% lethal rate in mature sperm. The azaserine was weakly mutagenic (about 1% lethal inducing). In the present experiments, the X-rays produced a drastic drop in fertility in the third brood (8-10 days after treatment) from which there was a large measure of recovery in the fourth brood. In the case of chemical treatments, there was no such definite brood pattern. The effect of the three agents on the fertility of the Maxy males is shown in the following table:

<table>
<thead>
<tr>
<th>Agent</th>
<th>Brood (and days)</th>
<th>No. (\sigma^\prime)</th>
<th>No. Fertile Cultures</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>X-rays</td>
<td>1 (1-4)</td>
<td>763</td>
<td>739</td>
<td>93</td>
</tr>
<tr>
<td></td>
<td>2 (5-7)</td>
<td>748</td>
<td>633</td>
<td>85</td>
</tr>
<tr>
<td></td>
<td>3 (8-10)</td>
<td>712</td>
<td>208</td>
<td>29</td>
</tr>
<tr>
<td></td>
<td>4 (11-14)</td>
<td>635</td>
<td>470</td>
<td>74</td>
</tr>
<tr>
<td>Quinacrine</td>
<td>1</td>
<td>721</td>
<td>332</td>
<td>46</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>507</td>
<td>201</td>
<td>40</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>279</td>
<td>127</td>
<td>46</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>191</td>
<td>109</td>
<td>57</td>
</tr>
<tr>
<td>Azaserine</td>
<td>1</td>
<td>432</td>
<td>241</td>
<td>55</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>388</td>
<td>237</td>
<td>61</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>252</td>
<td>202</td>
<td>80</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>214</td>
<td>74</td>
<td>35</td>
</tr>
</tbody>
</table>
These results might indicate that the reduced fertility of the males after the chemical treatments is due to a toxic effect on their soma (reducing their life span and fitness to mate), rather than a sterilization of the germ cells at a sensitive stage (as in the case of X-rays), since the viability of the cultures undergoes considerable reduction from one brood to the next after the chemical treatments. With the X-rays, there is no such drastic drop in the viability.

Narise, Takashi. University of Chicago. The migration of *Drosophila ananassae* under competitive conditions.*

It is probable that the mode of migration of flies in a heterogeneous population is quite different from the mode of migration in homogeneous population, even though the strains in the former population have their own migratory activity genetically as shown by Sakai et al. (1958) and Narise (1962). From this point of view, an experiment was conducted with four strains of *D. ananassae* in order to find out the mode of migration under competitive conditions.

Two of four strains were so called light *ananassae* which have yellow body color and collected in Pogo Pogo (L-pp), Tutuila, American Samoa, and Majuro (L-maj), Marshall Islands. The other two strains were so called dark *ananassae* having black body color, and collected in Pogo Pogo (D-pp) Tutuila, American Samoa, and Rarotonga (D-rar), Cook Islands.

Two kinds of experiments were conducted: 1) migratory activity of light and dark *ananassae* in a mixed population, and 2) the mode of migration in dark and light *ananassae* in a mixed population. In the experiments, four migration tubes were connected with each other radially in the former experiment, and eleven radially in the latter experiment. All experiments were conducted in $25^\circ \pm 1^\circC$ in a dark room.

From the results in the first experiment, the following conclusions have been drawn: 1) the migratory activity in light *ananassae* was stimulated by dark *ananassae*, while the activity in dark *ananassae* decreased under the mixed condition; 2) in some combinations, for example D-rar and L-pp, the migratory activity of those strains depends on the relative frequency of both strains in the original tube into which the flies were introduced at the beginning of the experiment, but in other combinations the activity has no connection with the relative frequency in the original tube; and 3) the rate of increasing or decreasing of the activity due to mixing in a strain is quite different, depending on the combination of two strains. In this connection, it is of interest to find that the migratory activity of D-rar strain is stimulated by mixing with L-pp, while it loses activity when coexisting with L-maj.

In the second experiment, it was found that light *ananassae* dominated in all tubes in the combinations D-pp and L-pp as well as D-pp and L-maj. However, light *ananassae* dominated in central tubes, but dark *ananassae* in the surrounding tubes in the combination D-rar and L-maj as well as between D-rar and L-pp, although the total number of migrant flies in light *ananassae* is greater than in dark *ananassae*.

From those two experiments, it is expected that light *ananassae* should be widely distributed in natural populations and dark *ananassae* should occupy marginal populations or isolated populations. It is also clear that the migratory activity of a strain is affected by other strains in the population and the mode of migration is determined by what kinds of strains coexist in a heterogeneous population.


An electron microscopic investigation of the pole cells of *D. melanogaster*, *D. virilis* and *D. willistoni* has revealed, beside the polar granules, the presence of other organelles, the epsilon granules. Polar granules are spherical and lack a bounding membrane. Each consists of a granular, electron opaque cortex surrounding a less dense core.

Epsilon granules are ovoid or dumb-bell shaped organelles, bounded by a delicate double membrane. Within a fibrous matrix ill-defined spaces occur. The functions and interrelationships of the polar and epsilon granules is still obscure.

Preliminary observations suggest that the epsilon granules arise late in oogenesis, from convolutions of the oocyte plasmalemma.
Gregg, T. G. and J. Day. Miami University. A further note on ovoviviparity in Drosophila.

It has been observed (King and Sang, DIS 32) that fertilization can, on rare occasion, take place in the ovariole of melanogaster females. It has also been observed (Gregg and Day, DIS 37) that there is considerable variation between strains in the extent to which adult, virgin melanogaster females retain and store mature oocytes.

King (DIS 38) has suggested that egg retention and ovariolar fertilization are two conditions that are necessary for the development of ovoviviparity. He further suggested that the interstrain variation in egg retention in melanogaster virgins gives some indication of the genotypes available in Drosophila for the establishment of high egg retention, and the development of ovoviviparity.

It may be pointed out that, indeed, not only are the genotypes available in Drosophila for the establishment of high egg retention, but that there is at least one species, D. hydei, where a type of egg retention has been established. Furthermore, this retention occurs not only in virgin females aged beyond the normal mating time, or in females under adverse conditions, but in mated, laying females as well. In melanogaster virgins egg retention results because the females abstain from laying while eggs continue to be produced. In hydei, a large species with a long life cycle, a large surplus of eggs is built up prior to the onset of laying while the female is maturing. After the onset of laying the rate of production of new eggs approximately equals the rate of oviposition. Thus, even in the ovaries of laying females there is a large number (100-150) of fully developed eggs. At the rate of oviposition generally encountered under optimum conditions in the laboratory (40-60 eggs/female/day) a newly produced mature oocyte will remain in the ovary, on the average, two to three days before it is laid. Under adverse conditions the retention time would undoubtedly be increased.

Thus far, ovariolar fertilization has not been observed in this species during the course of dissecting approximately 500 females.

The retention of eggs in hydei probably explains the capacity that these females have for laying prodigious numbers of eggs in short bursts, since retention would result in a reserve that could be drawn on in times of peak egg laying. It is easy to imagine that such a capacity would be selected for in a species where females routinely lay eggs in environments that are suboptimal for egg deposition, with occasional opportunities arising for the deposition of eggs in choice environments.

Most of the data on egg retention in hydei have been obtained from a mutant (w lt) lab stock, but a wild-type lab stock has also been checked. One hundred virgins (one day old) from the w lt stock were separated into two groups of fifty each, and individually placed in vials. The females in one group were mated (i.e. placed with males), and the females in the second group were not. Each females was transferred to a fresh vial every day, and the eggs laid on the previous day were counted. Also, each day several females in each group were sacrificed to determine the number of mature oocytes present in the ovaries, the number of ovarioles present, and whether the female had been inseminated. Females in the mated group were mated to males of approximately the same age, and insemination usually occurred on the seventh day after the eclosion of the female, but never sooner. There is some indication from other experiments that the use of older males can speed the process of insemination by a day or two.

An ovariole count of 148 ovaries of various ages showed an average of 21 ovarioles per ovary. There does not appear to be any increase or decrease in the number of ovarioles with age. The average number of mature oocytes present in a three day old female is about twelve. Mature oocytes continue to accumulate until the seventh day when each female contains an average of 125. The average number of eggs laid by twenty-nine females for an eight day period, from day seven to day fifteen, was 58 eggs/female/day. In seven day old females, even if they have been inseminated, most of the ovarioles contain three mature oocytes. However, some of the peripheral ones contain only two, while some of the central ones contain as many as six. The typical ovariole from an inseminated laying female from the ninth to the fifteenth day continues to contain two or three mature oocytes. The appearance of the ovarioles in the virgin females parallels very closely that in the mated females with the exception that since the virgins are laying very few eggs, there is no turnover of eggs in these ovaries.
after the initial accumulation. After fifteen days, the number of mature oocytes in the ovaries becomes more variable. The fact that the females were kept in separate vials makes it possible to assert with certainty that females that were laying fertile eggs were also retaining eggs. There appeared to be an inverse correlation between the number of eggs laid in a day and the number of mature oocytes present in the ovaries at the end of the day, but the data were not sufficient to establish this point. It may also be pointed out that the type of egg retention exhibited by *hydei* is not necessarily characteristic of large flies with long life cycles. In *D. virilis* which is very similar to *hydei* in these two respects, the number of mature oocytes in the ovaries of a seven day old virgin is very small, averaging less than one per ovariole.

Average egg retention for several kinds of *hydei* females are shown in the accompanying table.

<table>
<thead>
<tr>
<th>Egg Retention in <em>hydei</em> females</th>
</tr>
</thead>
<tbody>
<tr>
<td>7 day old virgins</td>
</tr>
<tr>
<td>W 1t</td>
</tr>
<tr>
<td>wild Type</td>
</tr>
</tbody>
</table>

Edwards, J. W. and J. R. Simmons. Utah State University. Optic asymmetry and the absence of somatic crossing-over in *D. melanogaster* in 1936. He found that the frequencies of mosaicism in heterozygotes varied from 0.0 to 6.0 percent in the head-thorax and from 4.6 to 20.0 percent in the abdomen. The presence of minute factors increased the frequencies by 0.0 to 22.3 percent in the head-thorax and by 8.0 to 36.6 percent in the abdomen.

DeMarinis (Genetics 44:1101-1111) reported that, barring the less common events such as somatic mutations and somatic crossing-over, the same genetic constitutions occurred on corresponding sides of bilaterally symmetrical organisms. He concluded that, consequently, asymmetry must have resulted from differences in external and internal environmental factors. Somatic crossing-over is an established phenomenon, however, and genetic factors have been shown to increase its frequency. Also Baron (J. Exp. Zool. 70:461-490) had stated that sets of modifiers were present on all chromosomes, particularly the second and third in flies homozygous for ey^2_. Thus, it seemed desirable to test critically for the possible occurrence of the "less common" phenomenon of somatic crossing-over. If this were occurring, structural optic asymmetry would result from nuclear differentiation by means of somatic crossing-over. Further, although all nuclei were homozygous for the eyeless genes, the recombination of genetic modifiers in the second and third chromosomes (and in the X-chromosomes of females) would yield asymmetrical phenotypes.

To test this possibility, the second and third chromosomes were marked with bw and st genes. Six kinds of experimental crosses (all progeny were homozygous for ey^4_) and two kinds of control crosses (progeny were ey^4_+ or ey^4_+/+ ) were made. The following genotypes resulted:

1. bw/+;st/+;ey^4_/ey^4_ (2) bw/bw;st/+;ey^4_/ey^4_ (3) bw/+;st/+;ey^4_/ey^4_ (4) bw/+;st/+;ey^4_/+ (5) bw/+;st/+;+/. Only white ommatidia were scored.

The experimental crosses produced 2593 flies. Six had mottled pigmentation (white ommatidia) in one eye. Of a total of 1396 flies produced from the control crosses, one female was observed to have white ommatidia in one eye. Thus, the observed frequencies of mosaicism in the experimental and control groups were 0.23 percent and 0.07 percent, respectively. No simple objective method for accurately measuring asymmetry has been devised; however, by using the frequency of flies with ommatidia on one side of the head, a minimum estimate was possible. Of the 155 progeny so scored, 35 or 22.6 percent had asymmetrical eye structure. Consequently, the conclusion seems justified that somatic crossing-over probably does not play
a role in the production of structural optic asymmetry in eyeless Drosophila. Furthermore, if somatic crossing were an active factor, asymmetry should not occur in an isogenic strain of eyeless flies. Spofford, however, (Genetics 41:938-959) found that the right-left correlation in an isogenic ey^4/ey^4 strain was negligible (coefficients of +0.08 for males and -0.22 for females). Thus, nuclear differentiation by means of somatic crossing-over is not responsible for optic asymmetry in eyeless Drosophila melanogaster.

Mottram (1930) found that there was an increase in the rate of non-disjunction when D. melanogaster females were treated with CO₂. The present experiments were an attempt to learn if anoxia was causing the increase in the rate of non-disjunction.

In these experiments yellow apricot virgin females, 12-36 hours old, were exposed to Linde highest purity nitrogen for 1 hour. The treated and control groups of females were mated to yellow; sc^8,Y males. Experiment I was limited to a control group to serve as a pilot experiment. In experiments I and II the females were mated singly in shell glass culture vials and in experiments III and IV fifteen pairs were mated in 1/4 pint milk bottles. In all experiments the flies were mated on cornmeal, molasses and agar food medium. The flies were transferred to fresh culture bottles every 2 days for a ten day period. Only transfers 1, 4 and 5 (days 0-2, 6-8 and 8-10) were examined. The expected classes of offspring from this mating are yellow females and apricot males, whereas the exceptional flies produced by maternal non-disjunction are apricot females and yellow males, and a double non-disjunctional event would be detected by the presence of yellow apricot females or wild-type males.

A total of 32,701 offspring from treated females were compared to 29,488 offspring from control flies, and the results indicate that there is no significant difference in the rate of non-disjunction in the 2 groups, and there was no difference between the tested 2 day broods. The ratio of nullo-X non-disjuncts to double-X is in agreement with that found by other workers.

<table>
<thead>
<tr>
<th>EXPERIMENT</th>
<th>GROUP</th>
<th>NORMAL</th>
<th>EXCEPTIONS</th>
<th>TOTAL</th>
<th>PERCENTAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>σ'</td>
<td>y'</td>
<td>y/apr</td>
<td></td>
</tr>
<tr>
<td>I</td>
<td>Control</td>
<td>5,234</td>
<td>5,297</td>
<td>2</td>
<td>0/2,912</td>
</tr>
<tr>
<td></td>
<td>Treated</td>
<td>1,703</td>
<td>1,722</td>
<td>1</td>
<td>4/3,424</td>
</tr>
<tr>
<td>II</td>
<td>Control</td>
<td>1,467</td>
<td>1,445</td>
<td>2</td>
<td>0/2,912</td>
</tr>
<tr>
<td></td>
<td>Treated</td>
<td>1,703</td>
<td>1,722</td>
<td>2</td>
<td>4/3,424</td>
</tr>
<tr>
<td>III</td>
<td>Control</td>
<td>4,541</td>
<td>4,473</td>
<td>2</td>
<td>7/9,014</td>
</tr>
<tr>
<td></td>
<td>Treated</td>
<td>7,075</td>
<td>7,166</td>
<td>3</td>
<td>9/14,241</td>
</tr>
<tr>
<td>IV</td>
<td>Control</td>
<td>3,429</td>
<td>3,602</td>
<td>2</td>
<td>2/7,031</td>
</tr>
<tr>
<td></td>
<td>Treated</td>
<td>7,627</td>
<td>7,408</td>
<td>4</td>
<td>6/15,035</td>
</tr>
<tr>
<td>Total</td>
<td>Control</td>
<td>14,671</td>
<td>14,817</td>
<td>10</td>
<td>13/29,488</td>
</tr>
<tr>
<td></td>
<td>Treated</td>
<td>16,405</td>
<td>16,296</td>
<td>11</td>
<td>4/17,32,701</td>
</tr>
</tbody>
</table>

A total of one hundred and five recessive lethal chromosomes of various origins (64 chromosomes isolated from Kofu-Katsunuma natural populations, 18 chromosomes isolated from Suyama-Juriki natural populations and 23 chromosomes obtained by Dr. Mukai as spontaneous lethals) was tested to determine the locus of individual lethal genes on the second chromosome by crossing with the balanced dominant marker Sp Bl L/Cy strain.

Five kinds of inversions (In A, B, K on the left arm; In C on the right arm; a pericentric inversion D) were detected in natural lethal chromosomes.

Seventy natural lethals and all spontaneous lethals were found to be single lethal genes on the second chromosome. The remaining 12 lethal chromosomes seemed to have double, multi-locus and synthetic lethals.

If the lethal genes from natural populations are grouped according to their location on the chromosome by the three regions (left 0-40; middle 40-70; right 70-108), the distribution found was 18 in the left, 36 in the middle and 16 in the right region. This concentration of lethal genes in the central region is similar to that of recessive visible mutant genes on the genetic map of the second chromosome. On the other hand, spontaneous lethal genes seemed to be distributed randomly; 6 in the left, 7 in the middle and 10 in the right region. This distribution of spontaneous lethal genes may be similar to that reported for natural lethals by Paik (1960) and Seto (1963).

Table 1. Comparison of autosomal inversions and their locations, that have been found in natural populations of Japan and other countries, as well as in laboratory stocks.

<table>
<thead>
<tr>
<th>Chromosome</th>
<th>Natural populations in Japan</th>
<th>Natural populations in U. S., Mexico and Hawaii (Warters)</th>
<th>Laboratory stocks (Bridges)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 L</td>
<td>In(2L)A: 26A-33E In(2L)B: 22D-34A In(2L)K: 22D-26B</td>
<td>In(2L): 22D-34A</td>
<td>In(2L)t: 22D-34D</td>
</tr>
<tr>
<td>2 R</td>
<td>In(2R)C: 52A-56F In(2R)D: 36F-49B</td>
<td>In(2R): 51D-56F</td>
<td>In(2R)NS: 52A-56F</td>
</tr>
<tr>
<td>2 LR</td>
<td></td>
<td>In(2LR)D: 36F-49B</td>
<td></td>
</tr>
<tr>
<td>3 L</td>
<td>In(3L)E: 63A-74C In(3L)F: 66C-71B</td>
<td>In(3L)A: 63B-72E</td>
<td>In(3L)P: 63C-72E</td>
</tr>
<tr>
<td>3 R</td>
<td>In(3R)C: 89D-96A In(3R)H: 92D-100F In(3R)I: 93D-98F In(3R)J: 96E-98F</td>
<td>In(3R)B: 89E-96A</td>
<td>In(3R)C: 92E-100F</td>
</tr>
</tbody>
</table>

Table 2. Types of inversions and their frequencies in Japanese natural populations.

<table>
<thead>
<tr>
<th>Population</th>
<th>Suyama</th>
<th>Katsunuma</th>
<th>Kofu</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Frequency (%)</td>
<td>Frequency (%)</td>
<td>Frequency (%)</td>
</tr>
<tr>
<td>2L (standard)</td>
<td>84.5</td>
<td>68.0</td>
<td>67.0</td>
</tr>
<tr>
<td>In(2L) A</td>
<td>0.5</td>
<td>0.0</td>
<td>0.5</td>
</tr>
<tr>
<td>In(2L) B</td>
<td>15.0</td>
<td>32.0</td>
<td>32.5</td>
</tr>
<tr>
<td>2R (standard)</td>
<td>100.0</td>
<td>79.0</td>
<td>73.0</td>
</tr>
<tr>
<td>In(2R) C</td>
<td>0.0</td>
<td>21.0</td>
<td>27.0</td>
</tr>
<tr>
<td>3L (standard)</td>
<td>97.5</td>
<td>89.5</td>
<td>92.0</td>
</tr>
<tr>
<td>In(3L) E</td>
<td>2.5</td>
<td>8.5</td>
<td>6.5</td>
</tr>
<tr>
<td>In(3L) F</td>
<td>0.0</td>
<td>2.0</td>
<td>1.5</td>
</tr>
<tr>
<td>3R (standard)</td>
<td>82.0</td>
<td>61.0</td>
<td>63.5</td>
</tr>
<tr>
<td>In(3R) G</td>
<td>2.5</td>
<td>18.0</td>
<td>11.0</td>
</tr>
<tr>
<td>In(3R) H</td>
<td>15.5</td>
<td>10.0</td>
<td>14.0</td>
</tr>
<tr>
<td>In(3R) I</td>
<td>0.0</td>
<td>11.0</td>
<td>11.0</td>
</tr>
<tr>
<td>In(3R) J</td>
<td>0.0</td>
<td>0.0</td>
<td>0.5</td>
</tr>
</tbody>
</table>
Halfer, C. University of Milan, Italy. 
Different degree of compatibility in several stocks of Drosophila melanogaster, tested with ovary grafting. 

A different degree of compatibility between genotypically different stocks of D. melanogaster, tested using the method of ovary grafting, has been already observed in the first series of experiments (DIS 37).

In a later investigation, I took into consideration, as recipients, not only the two wild tumorous stocks: tuA2 and tuB3, but also the wild stock Varese, which is completely tumourless and the almost tumourless mutants vermilion and yellow white. In this way I obtained, besides the combinations between the different genotypes, as donors and as recipients, also combinations between donor and recipient of the same genotype. Only the larval survival after grafting and the percentage of graft attaching has been considered.

tuA2 (28-45%) and vermilion (39-82%) yielded consistently high rates of survival, irrespective of the genotype acting as donor, while the other three stocks: tuB3 (1-12%), Varese (2.7-9%) and yellow white (0-2.8%) showed a very low survival in almost all cases. From these considerations it is quite clear that this is a case of host specificity, where the host genotype only is important in these grafting experiments, being the genotype of the donor of no influence. The graft attaching was always good, even in the cases of genotype showing a poor compatibility with the graft. Grafting experiments were carried out also with heterozygotes obtained from reciprocal crosses between the stock vermilion (with a high rate of survival) and the three stocks: tuB3, Varese and yellow white (with a low survival). They showed always a rather good survival rate (about 40%).

The different behaviour of homozygotes and heterozygotes supports the view that the host specificity is genetically controlled.

Peterson, G. V. and E. J. Gardner. Utah State University. Melanotic tumor associated with failure to pupate in the tumorous head stock of D. melanogaster.

Over a period of years it was observed that large abdominal melanotic tumors appeared in mature larvae of one tumorous head stock of D. melanogaster. These tumors were rarely, if ever, seen in the adults. The melanotic tumors first became visible 102-125 hours after hatching. Normal time of puparium formation was found to be approximately 102 hours. Some larvae from the strain carrying melanotic tumors and the lethal factor lived 200 hours or longer but never pupated. About half of all larvae that failed to pupate did not develop visible melanotic tumors.

The lethal effect was observed in about 33 percent of the larvae when the abnormal condition was first observed. It decreased at each generation with the proportion of tumorous larvae remaining between 35 percent and 65 percent of the total number of lethals.

Crosses with a stock bearing inversions on the second and third chromosome have indicated that both chromosomes from the tumorous head stock are associated with lethal or low viability effects. The third chromosome is mainly responsible for the failure of pupation, however. No indication of sex linkage has been found.

Crosses with other tumorous-head stocks and wild stocks indicated that melanotic tumor development was not influenced by either of the major genes (tu-1 on the first chromosome and tu-3 on the third chromosome) associated with tumorous head. However, crosses between parents, both of which expressed the tumorous head phenotype and crosses in which neither parent expressed the phenotype did show a significant difference. When they both expressed the tumorous head phenotype, the progeny showed 12.5 percent lethal and 6.5 percent with melanotic tumors compared to 6.0 percent lethal and 1.9 percent with melanotic tumors for the other parental
group. This may indicate that a modifier gene increased the penetrance of the tumorous head trait as well as influencing or being responsible for the lethal effect. Because only a certain proportion of the lethal larvae developed melanotic tumors, it seems probable that the tumor formation is a secondary characteristic resulting from a ring gland defect.

Sokoloff, A. University of California at Berkeley. A possible maternal effect on quantitative characters in D. pseudoobscura. In a previous report (DIS 33:162-165) comparison was made between measurements of length and width of wing and length of tibia derived from flies whose progenitors had been reared deliberately under different conditions. The statistical tool was the t-test, taking one character at a time in flies reared, say at 24°C, but whose mothers had been reared at 16°C and 24°C and vice versa. It was reported that this test failed to show any maternal effect on the three characters mentioned. Recently, in analyzing some data demonstrating geographic variation in D. pseudoobscura, it became evident that differences between populations derived from different localities (some as close as six miles) cannot be demonstrated if one takes one character at a time but, if one takes two characters, significant differences are easily found when Fisher's Discriminant Function method is applied. In the light of this finding the problem of maternal influence on quantitative characters has been re-examined, applying this, more powerful, statistical method. The technical details can be found in the above reference. A summary of the history of the flies measured is given at the bottom of Table 1, and the results of the statistical analysis can be seen in Table 2. Although not all the possibilities were tested, the conclusions from this analysis are as follows:

1. Flies reared in bottles differ significantly from those reared in vials at both temperatures (compare A-B and F-G variance ratios), even though attempts were made to avoid crowding.

2. As expected, a period of starvation in the larval stages results in flies which are smaller than flies well fed for the whole larval stage (comparisons E-F). In turn, their progeny differ, even though they were reared under identical, non-crowded conditions (comparisons C-D).

3. The temperature prevalent during the development of the progenitors appears to influence the body characters of the next generation when the latter flies are reared at the higher temperature (compare F-G), the bigger mothers producing generally bigger offspring but the reverse situation (B-D) appears to have no effect.

These experiments omitted some combinations, owing to time limitations. However, the results suggest that, in studies involving quantitative characters, the history of the preceding generation of D. pseudoobscura, particularly if the flies are reared at 24°C, must be known and specifically stated.

(This investigation was supported by Research grant 4501 from the National Science Foundation, and in part by grants RG 7842 and RG 8942 from the U. S. Public Health Service).

Table 1. Means, variances and covariances of wing length (x) and tibia length (y) from D. pseudoobscura derived from Grand Canyon, Arizona. Upper block: flies reared at 16°C.; lower block: flies reared at 24°C. (for each sample N=50).

<table>
<thead>
<tr>
<th>Sex</th>
<th>m_x</th>
<th>s^2x</th>
<th>m_y</th>
<th>s^2y</th>
<th>cov xy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Females</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A</td>
<td>65.924</td>
<td>0.7998</td>
<td>23.612</td>
<td>0.2096</td>
<td>1,588.60</td>
</tr>
<tr>
<td>B</td>
<td>63.692</td>
<td>1.181</td>
<td>23.100</td>
<td>0.2502</td>
<td>1,501.60</td>
</tr>
<tr>
<td>C</td>
<td>63.308</td>
<td>1.080</td>
<td>22.896</td>
<td>0.1604</td>
<td>1,479.34</td>
</tr>
<tr>
<td>D</td>
<td>63.372</td>
<td>1.022</td>
<td>23.052</td>
<td>0.1351</td>
<td>1,490.85</td>
</tr>
<tr>
<td>Males</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A</td>
<td>59.184</td>
<td>0.9108</td>
<td>22.312</td>
<td>0.2010</td>
<td>1,347.54</td>
</tr>
<tr>
<td>B</td>
<td>57.324</td>
<td>4.2365</td>
<td>21.808</td>
<td>0.7608</td>
<td>1,277.19</td>
</tr>
<tr>
<td>C</td>
<td>57.208</td>
<td>0.7935</td>
<td>21.872</td>
<td>0.1824</td>
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</tr>
<tr>
<td>D</td>
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<td>0.5878</td>
<td>21.988</td>
<td>0.1067</td>
<td>1,294.23</td>
</tr>
<tr>
<td></td>
<td></td>
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</tr>
<tr>
<td>--------</td>
<td>--------</td>
<td>--------</td>
<td>--------</td>
<td></td>
<td></td>
</tr>
<tr>
<td>E</td>
<td>56.984</td>
<td>0.9789</td>
<td>21.660</td>
<td>0.2322</td>
<td>1,259.71</td>
</tr>
<tr>
<td>F</td>
<td>57.352</td>
<td>0.9012</td>
<td>21.484</td>
<td>0.1569</td>
<td>1,257.44</td>
</tr>
<tr>
<td>G</td>
<td>57.832</td>
<td>1.398</td>
<td>21.788</td>
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<td>1,285.94</td>
</tr>
<tr>
<td>H</td>
<td>58.036</td>
<td>0.8633</td>
<td>22.164</td>
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</tr>
<tr>
<td>E</td>
<td>51.640</td>
<td>1.322</td>
<td>20.560</td>
<td>0.1845</td>
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</tr>
<tr>
<td>F</td>
<td>51.972</td>
<td>1.089</td>
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<td>0.1849</td>
<td>1,073.74</td>
</tr>
<tr>
<td>G</td>
<td>52.260</td>
<td>0.7465</td>
<td>20.672</td>
<td>0.1253</td>
<td>1,102.48</td>
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<tr>
<td>H</td>
<td>52.400</td>
<td>1.037</td>
<td>20.764</td>
<td>0.2118</td>
<td>1,110.53</td>
</tr>
</tbody>
</table>

A = F₁ of single females reared in bottles at 16°C.
B = F₂ from A reared in vials at 16°C.
C = F₂ from E reared in vials at 16°C.
D = F₂ from F reared in vials at 16°C.
E = mass F₁ reared at 24°C.
F = F₁ of single females reared in bottles at 24°C.
G = F₂ from F reared in vials at 24°C.
H = F₂ from A reared in vials at 24°C.

Table 2. Results of the analysis of the data.

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
</tr>
</thead>
<tbody>
<tr>
<td>Females at 16°C</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A</td>
<td>---</td>
<td>66.88</td>
<td>138.36</td>
<td>131.08</td>
</tr>
<tr>
<td>B</td>
<td>62.72</td>
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<td>0.126</td>
<td>.0235</td>
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<tr>
<td>C</td>
<td>90.23</td>
<td>2.72</td>
<td>---</td>
<td>2.069</td>
</tr>
<tr>
<td>D</td>
<td>87.80</td>
<td>1.17</td>
<td>2.51</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Males at 16°C</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
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</thead>
<tbody>
<tr>
<td>A</td>
<td>---</td>
<td>4.96</td>
<td>56.40</td>
<td>26.67</td>
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<tr>
<td>B</td>
<td>17.07</td>
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<td>.0136</td>
<td>.0146</td>
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<tr>
<td>C</td>
<td>57.59</td>
<td>.895</td>
<td>---</td>
<td>3.3257</td>
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<tr>
<td>D</td>
<td>39.62</td>
<td>.928</td>
<td>4.03</td>
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</table>

<table>
<thead>
<tr>
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<th>E</th>
<th>F</th>
<th>G</th>
<th>H</th>
</tr>
</thead>
<tbody>
<tr>
<td>E</td>
<td>---</td>
<td>.825</td>
<td>.982</td>
<td>7.281</td>
</tr>
<tr>
<td>F</td>
<td>6.97</td>
<td>---</td>
<td>5.746</td>
<td>6.267</td>
</tr>
<tr>
<td>G</td>
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<tr>
<td>H</td>
<td>20.69</td>
<td>35.81</td>
<td>12.91</td>
<td>---</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Males at 24°C</th>
<th>E</th>
<th>F</th>
<th>G</th>
<th>H</th>
</tr>
</thead>
<tbody>
<tr>
<td>E</td>
<td>---</td>
<td>2.34</td>
<td>.361</td>
<td>.652</td>
</tr>
<tr>
<td>F</td>
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</tr>
<tr>
<td>H</td>
<td>6.19</td>
<td>17.16</td>
<td>.6369</td>
<td>---</td>
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</tbody>
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Glassman, E. and E. C. Keller, Jr., University of North Carolina. The maternal effect of ma-1<sup>+</sup>: The effect of hypoxanthine; the effect of lxd.

The maroon-like (ma-1) eye color mutant lacks detectable amounts of xanthine dehydrogenase, pyridoxal oxidase (pyridoxal-pyridoxic acid), and the ma-1<sup>+</sup> complementation factor. When ma-1 flies are derived from female parents that carry an ma-1<sup>+</sup> gene, their eye colors are wild-type and xanthine dehydrogenase activity can be detected, especially in early development (Glassman and Mitchell, Genetics 44:547, 1959; Glassman and McLean, Proc. Nat. Acad. Sci. 48:1712, 1962).

The maternally-affected eye color is observed only in adults that emerge in the early days of hatching. Those that emerge in older bottles have the usual mutant ma-1 eye color. This loss of the maternal effect is not due to the age of the mothers, and must be ascribed to changes in the food (Glassman and Mitchell, loc. cit.). Either a substance is being used up or an inhibitor is accumulating. We believe that the latter explanation is true, and that the purines which accumulate in the food are inhibiting the low amounts of xanthine dehydrogenase in the maternally-affected ma-1 flies so that little pteridine eye pigment is synthesized.

To test this we crossed y f<sup>+</sup>; m, ru males to m, ma-1; ru females and allowed eggs to be laid on three different media: a) the usual Drosophila medium (devised by E. Lewis), b) the usual medium containing 0.17% hypoxanthine, and c) the usual medium containing 0.17% uric acid.

In these experiments the maternal effect did not diminish on the control medium until 10 and 12 days (replicate experiments) had elapsed. On the other media, the maternal effect diminished by 2 and 4 days (replicate hypoxanthine experiments) and by 7 and 9 days (replicate uric acid experiments). Thus, hypoxanthine (and perhaps uric acid) accelerates the disappearance of the maternal effect. Whether these compounds accumulate to a sufficient extent in the food to account for the loss regularly observed, and whether the mechanism is through inhibition of the small amounts of xanthine dehydrogenase remains to be shown.

The mutant, lxd, lacks the ma-1<sup>+</sup> complementation activity as well as the pyridoxal oxidase activity. Since these are also lacking in ma-1, we tested the effect of lxd on the maternal effect as follows:

A. The cross y f<sup>+</sup>; ru lxd by females x v f Bx<sup>3</sup> ma-1 males produced v f Bx<sup>3</sup> ma-1; ru lxd by/+ males all of whom (94 in the first three days) were maternally affected. Thus, homozygous lxd in the mother has no influence on the maternal effect in the progeny.

B. The cross, v f Bx<sup>3</sup> ma-1; ru lxd by/TSS x ru lxd by/D, produces three types of males which were classified and counted during the first three days of emergence. These were:

<table>
<thead>
<tr>
<th>genotype</th>
<th>phenotype (number maternally affected)</th>
</tr>
</thead>
<tbody>
<tr>
<td>v f Bx&lt;sup&gt;3&lt;/sup&gt; ma-1; ru lxd by</td>
<td>Only 1 out of 41</td>
</tr>
<tr>
<td>v f Bx&lt;sup&gt;3&lt;/sup&gt; ma-1; ru lxd by/TSS (or D)</td>
<td>56 out of 56</td>
</tr>
<tr>
<td>v f Bx&lt;sup&gt;3&lt;/sup&gt; ma-1; TSS/D</td>
<td>22 out of 22</td>
</tr>
</tbody>
</table>

Thus, homozygous lxd in the progeny completely abolishes the maternal effect.

We interpret these results as follows: The maternal substance responsible for the maternal effect is the product only of the ma-1<sup>+</sup> locus. The lxd locus is not involved and thus lxd mothers can have progeny that are maternally affected. This is also true for the ry locus (Glassman and Mitchell, loc. cit.). However, for the maternal effect to be expressed in the progeny, enough product of the lxd<sup>+</sup> locus must be available for production of sufficient xanthine dehydrogenase for eye color synthesis to proceed normally. If lxd is in the progeny, then the maternal effect is abolished.

This interpretation is in accord with the idea that the lxd<sup>+</sup>, ry<sup>+</sup>, and ma-1<sup>+</sup> loci code for polypeptides (L, R, and M, respectively) that polymerize with each other. In this scheme, the maternal substance is, or is composed of, only the M subunit; the ma-1<sup>+</sup> complementation factor and the pyridoxal oxidase (these may be identical) are composed of M and L subunits;
while xanthine dehydrogenase is composed of M, L, and R subunits. The proof of this theory must await purification of these substances, although finding electrophoretic variants of xanthine dehydrogenase associated with each locus would indicate that all three are structural genes for this enzyme. We are currently analyzing three electrophoretic variants which we have found.

The idea that the ma-1 maternal substance is a stable template would also explain the effect of lxd on the maternal effect. This possibility is also being tested by analyzing the amount of the ma-1 complementation factor during the development of maternally affected flies.

Mittler, S. Northern Illinois University. A re-examination of the problem (Mittler and Hampel DIS 38) of whether AET has any effect upon radiation induced crossing-over in male D. melanogaster indicates that AET does afford significant protection to 9-12 day brood after irradiation. Adult males 2-16 hr. old heterozygous for ru h th st cu sr e^5 ca were injected with 1 X 10^-1 l. of 30 mg. AET/10ml buffered to pH of 7 and irradiated with 2000r and then backcrossed to homozygous "rcucuca" females at ratio of 1 male to 3 females. The males were transferred to new group of females every 3 days.

<table>
<thead>
<tr>
<th>Number</th>
<th>9-12 day brood</th>
<th>12-15 day brood</th>
</tr>
</thead>
<tbody>
<tr>
<td>Males</td>
<td></td>
<td></td>
</tr>
<tr>
<td>120 Treated</td>
<td>57</td>
<td>8,502</td>
</tr>
<tr>
<td>101 Control</td>
<td>49</td>
<td>5,025</td>
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</tbody>
</table>

Glassman, E. University of North Carolina. Interaction of ma-1 and lxd in the synthesis of pyridoxal oxidase and xanthine dehydrogenase.

The maroon-like (ma-1) and rosy (ry) eye color mutants lack detectable amounts of xanthine dehydrogenase. A strain which is mutant at a third locus (lxd) has only 20 to 25% normal amounts of this enzyme. Analysis of lxd flies reveals that the level of CRM (the suspected product of the ry^+ locus) is the same in lxd as in wild type, while pyridoxal oxidase (the suspected product of the ma-1^+ locus) is absent in lxd. Complementation tests in vitro are in agreement with these findings; thus there is no ma-1^+ complementation factor in extracts of lxd ry flies while the ry^+ complementation factor seems to be present in normal amounts in ma-1, lxd.

It seems evident that lxd is deficient in those molecules which are also specifically deficient in ma-1 (such as pyridoxal oxidase and the ma-1^+ complementation factor) while the molecules missing in ry (such as CRM) seem to be present in normal amounts in lxd. Thus, the normal production of the ma-1^+ complementation factor and pyridoxal oxidase must be due to the interactions of the lxd^+ and the ma-1^+ loci. The paradox of the presence of substantial, though less than normal, amounts of xanthine dehydrogenase in lxd in spite of the absence of the product of the ma-1^+ locus can be resolved by various hypotheses. One can postulate that the ry^+, the ma-1^+, and the lxd^+ loci code for three different polypeptide chains, designated R, M, and L, respectively. These polypeptides produce different enzyme activities by polymerizing with each other in different ways. Thus, a polymer of the M and L polypeptides will have pyridoxal oxidase activity, while any polymer containing R polypeptides will have CRM activity. Only a polymer containing R, M, and L polypeptides will have xanthine dehydrogenase activity. On this basis, the in vitro complementation reaction between ma-1 and ry extracts would be visualized as an interaction between two large polymers containing ML and R subunits, respectively. The deficiencies observed in lxd flies would be due to a defective L polypeptide which can still react in vivo to yield some xanthine dehydrogenase activity, but which is too defective to yield active ML polymers (pyridoxal oxidase). It is of interest that pyridoxal oxidase has a molecular weight almost as great as that of xanthine dehydrogenase (about 250,000).
Alternatively, one can view the lxd gene as a regulator of the activity of either the ma-l gene or its product. In this case, the pyridoxal oxidase would be a polymer composed of only M polypeptides, CRM would again be any polymer containing R polypeptides, while xanthine dehydrogenase activity would be a polymer of M and R polypeptides. Another possibility is that only the ry+ locus codes for a subunit of xanthine dehydrogenase, while the products of the ma-l and lxd loci are regulators or activators, not only of the R polypeptide which forms xanthine dehydrogenase, but also of other polypeptides which form pyridoxal oxidase and other unknown enzymes.

Muller, H. J. Indiana University. An improved stock, "vix," for scoring visible mutations that arise at specific loci in the X of the female.

The fertile females of this stock have X-chromosomes of the same composition as those of the "Maxy-v" stock (number f30 of the 1957 Bloomington stock list in DIS 31), except that in this stock the recessive genes ptg and oc and the dominant B are in the X-chromosome having most of the recessive mutants, while the balancing X-chromosome is supplied with lz+y instead of ptg oc. Moreover, the fertile females contain a Y-chromosome, of normal type. The X-chromosome of the fertile males has the composition y oc ptg lz f. As in the stocks "jynx" and "plond" (f72 and f88, respectively, of DIS 31), but even more so because of the additional pressure of the pM1 inversion in one X, the combination of heterozygous inversions in the presence of a free Y causes a high frequency of non-disjunction of the X's, with resultant matroclinous daughters, bearing both the mother's X's, that can be scored for visible mutations arising in the originally wild-type loci of the non-multiple-recessive X, while at the same time the only fertile sons (in this case, in fact, the only viable sons) are patroclinous. One kind of disjunctionally produced daughter, of phenotype y oc ptg B f, is sterilized by oc, while the other kind, of phenotype lz B+, is rendered highly infertile by the lz/lz5 combination and, if it should breed, would produce virtually no crossovers of a kind that would disturb the genetic system.

The reproducing individuals are as follows:

males: Y+/y oc ptg lz f
females: Y+/Jj1 scJ1(+) In49 y lz+y oc ptg B f, In

Any mutant or suspected mutant daughter arising non-disjunctionally can be bred with her brothers for verification and for establishing a balanced stock. The phenotypes of the disjunctionally arising daughters present combinations of peculiarities that keep them from being mistaken, even at first sight, from mutant daughters of non-disjunctional origin.

The "vix" stock not only has the advantage over "jynx" and "plond" of giving no disjunctial males. Its normal Y gives rise to more non-disjunction of the X's (more than half of the daughters being non-disjunctional) than does the ring-Y (YLC) of "jynx". Moreover, the Y+, unlike the y+ of "plond", leaves uncovered the deficiency of the left end of the X that arises when, occasionally, the X's undergoacrocentric attachment with one another, or when one of them exchanges with the Y (see the Valencias and Muller in DIS 23:99-103); it thereby results in the death of these exceptions which when viable are difficult to recognize for what they really are. It is also to be noted that the homozygosity for vermilion of the parental and non-disjunctionally produced females, which was recommended by Altenburg, makes the other eye color mutants here in question more conspicuous. That is, it sensitizes the observer, as it were, to these changes, and although the locus of vermilion is thereby sacrificed so far as the finding of mutations to v is concerned, more is gained than lost by the greater ease and reliability of the scoring for these other loci.
The loci in the non-multiple-recessive X-chromosome of the "vix" stock in which it is practicable to recognize mutants and test them genetically fall into the following phenotypic categories: eye color, 7 (car, g, ras, cm, rb, w, pn); eye form, 3 (sy, B, ec, although B makes sy and ec more difficult); wing conformation, 3 (od, dy, ct); body color, 1 (y, although pti might perhaps be used also); in addition an extreme "minus" mutation in sc° could be recognized, and dominants such as N, Bx, Sc, Minutes, Tu and Tul (see my "New Mutants" report in this issue of DIS) would also be detectable. For comparison with visible mutations arising at specific loci in the X of the male, the above mentioned "Maxy-ermilion" stock provides a close counterpart to "vix".

In some of the work on specific-locus mutations it is desirable to know how many lethals are arising at the same time, so that the results may be calibrated to a given standard of spontaneous or induced mutation frequency, as was done in earlier work by the Valencias and myself and by Schaeit. The "vix" stock lends itself to such tests by merely crossing the females (whose mothers should have been derived by random sampling from the same cultures as supplied the flies for the specific locus tests) to males that have a Y of the type lJ1.Y or sc°.Y, in order to "cover" the lJ1 of the X-chromosome to be tested and thus allow another lethal to be recognizable by the absence of sons having the X under investigation. Of course the mothers of the females thus tested should have been bred individually, so as to prevent pre-existing lethals from being confused with the newly arising ones that are to be scored.

Abrahamson, Seymour and Helen U. Meyer. University of Wisconsin. Use of Minute to facilitate studies of mutations in second chromosomes.

Abrahamson, Seymour and Helen U. Meyer. The most laborious step when breeding for autosomal mutations is the collection of virgin females in the F2 generation to cross with brothers of the same, balanced genotype. A new and rather simple method facilitates this step by having the unwanted type of F2 heterozygous for Minute while the class needed for inbreeding is non-Minute. Due to the fact that the Minute flies have a considerably longer period of development than the desired type of non-Minute, Curly flies, only the latter are present in the F2 cultures during the first 2-3 days of hatching. By taking advantage of this period one eliminates the need for getting Curly virgin females. Mrs. Gloria Daniels of our laboratory has recently demonstrated that raising the F2 cultures at 16-19°C further extends the difference in developmental time between the Minute and the non-Minute flies. The stock used for this purpose ("M") has the composition S M(2)S7 b w D/dptd Cy,InsO pr cn sp and is of good viability. It is not necessary to have special second chromosomes in the P1 generation; wild type or marked chromosomes may be used.

The simplest procedure is to cross the P1 generation to the M stock, select Curly F1 males and then cross these again, individually, to 2-3 virgin females from the M stock. Parents should be removed. In F2, one should use offspring from the first 2-3 days of hatching. These are usually all of the desired, Curly type, although occasionally a Minute, brown fly may already be present. However, their offspring can readily be identified by these markers when scoring for lethals in F3.

We prefer to use a somewhat more elaborate scheme and combine this method with H. J. Muller's scheme of "criss-crossed" second chromosome lethals, S, Cy, dptX, and Sp. (Sp is now being incorporated into the "M" stock). The P1 generation is first crossed to a stock dpTX Sp pr cn bw sp/S2 ls Cy,InL pr cn bw sp. This has the advantage that both types of F1 males, Curlies and non-Curlies, may be utilized. Then one proceeds as described above. A few, late hatching homozygous Curly survivors will appear along with the Minute, brown flies in F2. These can be distinguished from the regular Curlies by also being homozygous for pr and sp.

Supported by research grants from the National Science Foundation (G-19394) and the Wisconsin Alumni Foundation.
Geer, B. W. Knox College. A new synthetic medium for Drosophila. Sang's (1956) Medium C or modifications of Medium C have been used extensively in nutritional and genetic studies of Drosophila with excellent results. However, it is sometimes necessary or desirable to replace casein with an amino acid mixture. Many amino-acid mixtures have been tested by this laboratory to determine their adequacy for the diet of D. melanogaster and the following medium was found to be the best.

<table>
<thead>
<tr>
<th>Amino Acids</th>
<th>mg</th>
<th>Other Components</th>
<th>mg</th>
</tr>
</thead>
<tbody>
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<td>80</td>
<td>RNA</td>
<td>100</td>
</tr>
<tr>
<td>L-Cystine</td>
<td>30</td>
<td>Cholesterol</td>
<td>30</td>
</tr>
<tr>
<td>L-Glutamic acid</td>
<td>840</td>
<td>Thiamine.HCl</td>
<td>0.2</td>
</tr>
<tr>
<td>Glycine</td>
<td>40</td>
<td>Nicotinic acid</td>
<td>1.2</td>
</tr>
<tr>
<td>L-Histidine.HCl</td>
<td>100</td>
<td>Riboflavin-5'-phosphate, Na</td>
<td>1.0</td>
</tr>
<tr>
<td>DL-Isoleucine</td>
<td>300</td>
<td>Calcium pantothenate</td>
<td>1.6</td>
</tr>
<tr>
<td>L-Leucine</td>
<td>200</td>
<td>Pyridoxine.HCl</td>
<td>0.25</td>
</tr>
<tr>
<td>DL-Lysine.HCl</td>
<td>190</td>
<td>Biotin</td>
<td>0.03</td>
</tr>
<tr>
<td>DL-Methionine</td>
<td>80</td>
<td>Folic Acid</td>
<td>1.0</td>
</tr>
<tr>
<td>DL-Phenylalanine</td>
<td>130</td>
<td>Choline chloride</td>
<td>8.0</td>
</tr>
<tr>
<td>DL-Threonine</td>
<td>200</td>
<td>FeSO4</td>
<td>1.0</td>
</tr>
<tr>
<td>L-Tryptophan</td>
<td>50</td>
<td>CaCl2</td>
<td>1.29</td>
</tr>
<tr>
<td>L-Tyrosine</td>
<td>80</td>
<td>MgSO4·7 H2O</td>
<td>24.6</td>
</tr>
<tr>
<td>DL-Valine</td>
<td>280</td>
<td>MnSO4·H2O</td>
<td>1.29</td>
</tr>
<tr>
<td>Other Components</td>
<td></td>
<td>NaHCO3</td>
<td>100</td>
</tr>
<tr>
<td>Agar</td>
<td>1500</td>
<td>KH2PO4</td>
<td>183</td>
</tr>
<tr>
<td>Sucrose</td>
<td>1000</td>
<td>Na2HPO4</td>
<td>189</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Water to 100 ml</td>
<td></td>
</tr>
</tbody>
</table>

Flies have been cultured on this medium by serial transfer under germ-free conditions for several generations.

Preparation of the medium is as follows: Dissolve the RNA in an amount of phosphate buffer solution equivalent to 0.4 of the final volume. Mix the buffer-RNA solution and all of the amino acids except cystine and dissolve the amino acids by gentle heating. After neutralization with dilute NaOH, add the B-vitamins, salts, and choline. Add cholesterol as a suspension prepared by dissolving cholesterol in warm 95% ethanol, adding water, and removing the ethanol by autoclaving for ten minutes. Dissolve the cystine in a minimal amount of 1 N HCl and add. After a final neutralization, add sucrose and agar. Adjust the final volume to 100 ml by adding water. Sterilize the medium by autoclaving at 15 pounds of pressure for 15 minutes.

The reports of Hinton, Noyes, and Ellis (1951), Sang (1956), and Salmon (1964) were especially useful during the development of this medium.

This work was supported by NSF Grant No. GB-2239.


When a dark colored background is needed for counting eggs, caramelized dextrose has proved to be very convenient. It is non-toxic, and one spoonful per Kg of standard cornmeal-molasses-agar medium is enough to obtain a dark even color.
A modification of a method used by Keyl and Keyl (Arc. F. Hydrobiol 56:43-57, 1959) for Chironomus salivary chromosomes produces good results with Drosophila. There are several advantages in this method over most standard techniques. The staining time is short; only two minutes are required. Because there is good resolution of the fine bands on a clear background and the chromosomes spread easily, this is a good method for studying specific regions of the chromosomes.

The details of this method follow:

1. Dissect large well-fed larvae in a drop of Shen's solution (9 g of NaCl, 0.42 g of KCl, 0.25 g of CaCl₂, 1 l of H₂O) on a siliconed slide.
2. Immediately transfer the glands to a drop of 3 parts 95% ethyl alcohol and 1 part 45% acetic acid for 30 seconds. (A stop watch is used for timing).
3. Transfer the glands to a small drop of acetic carmine and acetic orcein on a siliconed cover glass for two minutes. The staining solution is 1 part of 1% carmine boiled in 45% acetic acid mixed with 4 parts of 1% natural orcein dissolved in 50% acetic acid.
4. Absorb the excess stain from the glands with a small strip of bibulous paper making sure that the paper does not come in contact with the glands by using a dissecting needle to hold the glands in place.
5. Immediately place a small drop of 72% lactic acid over the glands.
6. Invert the cover glass on a clean slide and hold it in place while tapping the cover glass several times directly over the glands with the eraser end of a pencil.
7. Fold a sheet of bibulous paper around the slide and press well with the thumb in a rolling motion being careful not to let the cover glass slip. A little experimenting will help determine the amount of pressure to use to obtain the desired amount of spreading.

The slide can be studied immediately using phase contrast. The preparations can be maintained for several weeks without sealing; however, the slides can be made permanent by the dry ice technique (Baker, W. K. DIS 26:129, 1959).

1 Radiation Ecology Section, Health Physics Division Oak Ridge National Laboratory, Oak Ridge, Tennessee.
2 Research sponsored by the U. S. Atomic Energy Commission under contract with the Union Carbide Corporation.
University of Texas; University of Arkansas. A new Drosophila culture technique.

Since attempts to raise endemic Hawaiian spp. on standard banana or cornmeal media were failures, a new medium was devised, using several dried breakfast cereals of the high-protein, high vitamin and mineral types. Other D. spp. do extremely well on it. The basic recipe is as follows:

1000 ml distilled water
13.5 to 14.5 g Bacto agar, fine (amount varies with climate)
50.0 g dried Brewers yeast
1 jar (4.75 oz) Gerber's Strained Banana Baby food
10.0 g Kellogg's Special K cereal
5.0 g Kellogg's Concentrate cereal
15.0 g Gerber's High-Protein cereal
15.0 g Kretschmer's Wheat Germ

In addition 5 ml of ETOH (95%) was used to wet the dry yeast, and 5 ml of propionic acid was used for mold inhibition.

To secure good pupation and eclosion, mature larvae were transferred to vials half-filled with lightly moistened sand; larvae burrow down (some spp. to 4.0 inches) to pupate. At eclosion adults climb upward through the sand using the ptilinum to force a trail. This technique works best for those spp. whose larvae crawl up into the cotton plug when mature.

Work supported by NSF Grant GB 711.

A fly holder for injecting Drosophila.

When injecting Drosophila with mutagenic agents, it is desirable to do it in as short a period of time as possible, especially when the compound injected is chemically unstable. A lucite plate with 20 small cavities, each of a size to accommodate one fly, has proved to be quite useful. The flies are kept in a position suitable for injection, as shown in the drawing, and when ready one or two taps of the plate will remove them easily. It is possible in this way to inject about 150 flies in one hour.

The finite range of energetic charged particles and their variation in linear energy transfer for the treatment of Drosophila. A simple holder has been devised which makes irradiation convenient and uniform for particles having ranges between a few millimeters and a few centimeters. A circular well 1" diam x 0.5 mm deep (for flies averaging 1.0 mm thick) is machined into a lucite disk 1 3/4" diam x 1/2" thick. Eight ventilation grooves 0.015" x 0.015" are milled from this depression to the outside. A cover is made by cementing a thin window over a circular hole 1 1/4" diam in a lucite disk 1 3/4" diam x 1/4" thick. We use Mylar of thickness 0.001" for the window because it is quite strong, handles well and will give a flat surface readily. The window is attached by brushing a small amount of acrylic cement onto the lucite and gently dropping a square of selected Mylar in place. This is trimmed after drying under pressure. John E. Neff of the NASA Ames Research Center suggests stretching 1/2 mil Mylar on an optical flat of glass and cementing this to the plastic ring with Eastman 910 adhesive, to give a very flat, taut window.

In use, flies are lightly etherized and placed dorsally in the depression as close together as desired. The window is placed over the flies carefully and taped to the back piece. The flies are slightly compressed, holding them in place and minimizing the depth of the germ cells and its variation from fly to fly. Air is gently blown through the chamber every few minutes with a hypodermic syringe or rubber bulb until the flies recover from the anesthetic. Ventilation is adequate, since Rosemarie Binnard at the NASA Ames Research Center found no evidence of an oxygen effect in X-ray induced mutations when comparing standard gelatin capsules to these holders. Drosophila will live in them for several hours without forced ventilation, dying on longer containment from apparent dessication. Modification of the holders for continuous flow of moist air (or other gases) is simple. Keying of the two pieces to prevent rotation, as done by Jane Duffy at the Institute for Cancer Research, is recommended to prevent damage to the flies during assembly.

The thick lucite construction is adequate for most particle irradiations. The nuclear properties of H\(^1\) and C\(^{12}\) minimize neutron production and bremsstrahlung, and tests have shown that such secondary reactions contribute less than 1% to the dose in these holders. It is important to have the diameter of the window larger than the beam, so that forward scattering will not contribute to the dose. A double thin window holder has been constructed for comparison, and is preferable for highly penetrating radiations. The double window design is also better for use with X-rays, since the back scatter from thick lucite significantly increases the dose absorbed from the incident radiation and its effective linear energy transfer. We are developing a more sophisticated design which will improve ventilation, increase compression of the flies and permit partial body irradiation. This should be useful with UV as well as charged particles, but the simplicity of the present design makes it preferred for routine work.


It was observed in our laboratory that the medium of some cultures turned a dark, reddish-brown color after several days, while others remained the light, yellow-brown color of the original new food. We had also noticed bacterial contamination in cultures sent to us from various laboratories throughout the country including the two major stock centers. Because in some of the cultures with this discoloration marked decreases in productivity were found, it was decided to try to identify the cause of the change in color.

By allowing flies from the darkly colored bottles to walk on a Petri dish containing new food and then removing them, it was found that the same dark color appeared on this food. From these dark areas sub-cultures were made with the advice of Dr. Priscilla Kilbourn of the University of Oregon, Department of Biology and using standard bacteriological identification methods, we found the organism apparently responsible for the discoloration to be of the Genus *Achromobacter*. It was a short, small, Gram-negative rod-shaped bacterium. This genus can be found in soil and water.
A sensitivity test was done using discs of broad-spectrum antibiotics and of sulfa drugs. Two drugs - dihydrostreptomycin and tetracycline - were found to have the best inhibitory effects on the bacterial growth.

For purposes of decontaminating the cultures, these two antibiotics were incorporated simultaneously into the regular fly media in the following proportions:

- dihydrostreptomycin sulfate (Upjohn Co.) 100 micrograms/ml. food
- tetracycline hydrochloride (Tetracyn Phizer) 30 micrograms/ml. food

The procedure for decontamination is as follows: contaminated flies are put onto antibiotic food in bottles or vials. After a good number of eggs has been laid, all the parents are removed. The eggs are allowed to mature on the antibiotic food. After hatching, these new flies are transferred again to plain food without antibiotics, preferably without etherizing. If it is necessary to select the flies, care should be taken to clean brushes, etherizers, plates, etc., with 70% ethanol to prevent recontamination. The plain food cultures are then incubated and observed to see if the discoloration appears again.

Because the action of the antibiotics used may have unknown and potentially undesirable genetic effects, the drugs probably should not be used for very special stocks. The treatment should be completed in one generation.

We have found this method very satisfactory for ridding most of our cultures of all contamination. The productivity of the cultures is much improved with this treatment.

Gallo, A. J. Governo do Estado de São Paulo, Brazil. An apparatus for filling vials.

We saw this apparatus in a bacteriological laboratory (Instituto Adolfo Lutz-São José do Rio Preto) and we are using it with success in our own laboratory. It is specially useful because we can fill all vials with a standard quantity without dirtying the walls of the tubes. The vial is placed under the apparatus and gets filled when one presses the Mohr pinchcock. Only a wooden basis, a funnel, a piece of latex, a piece of glass tube and a Mohr pinchcock are required. According to the picture, it may be made in a proper size.
Lee, William R. The University of Texas. In previous work on feeding radioactive isotopes to Drosophila, flies during their entire life cycle have been kept in contact with or close to media containing the isotope. As a result the proportion of mutations induced by beta rays from the media is high in relation to those induced by the incorporation of the isotope into the genetic material. Pulse labeling can be accomplished by injection; however, results reported by Kaplan et al. (Genetics 49: 701-714) (also observed in this laboratory) show poor labeling of sperm from males injected with tritiated thymidine. Kaplan obtained better labeling by feeding larvae. Cytological considerations indicate the desirable time to feed would be just before synthesis of DNA prior to meiosis. Therefore, it is desirable to pulse label larvae during the first 24 hours of the third instar.

To accomplish feeding a radioactive isotope during a specific larval stage, 63 mm diameter and 29 mm deep Stender dishes are filled half full of corn meal Drosophila media. A sheet of black satin through which larvae cannot pass is pressed into contact with the surface of the media and is allowed to extend up on the sides of the Stender dish to prevent larvae from crawling over its edge into the media below. 0.05 ml of a solution containing 50 microcuries of phosphorus-32 as inorganic phosphate is pipetted onto the surface of the satin which initially absorbs most of the P-32. The surface of the satin is then sprayed with yeast and the Stender dish allowed to incubate at 34°C for three days. At the end of the three days the satin is covered with a growth of P-32 labeled yeast.

Larvae from a three day old Drosophila culture are floated out with a concentrated sugar solution and third instar larvae picked out with a brush. For convenience these larvae are stored in petri dishes on moistened filter paper during the collecting process. The larvae are then washed into a funnel screened with a disk of nylon chiffon. This concentrates the larvae into a cluster which is then brushed onto a 4 cm diameter disk of nylon chiffon. This disk is then transferred by 10 inch tongs to a Stender dish containing the labeled yeast.

Larvae are allowed to feed on the labeled yeast for 24 hours; then, the satin containing the larvae on its upper surface is removed with the tongs and placed in a funnel over a jar to collect radioactive materials. The funnel is lined with nylon chiffon which retains the larvae but allows the radioactive yeast and bits of media to be washed through. A fine stream of water from a polyethylene squeeze bottle is directed at the larvae and they are washed until further washing does not reduce the radioactivity. The nylon chiffon containing the washed larvae is then placed into a half-pint bottle with Drosophila media for pupation.

Radioautographs of sperm from females inseminated by males treated in the above manner with either P-32 or tritiated thymidine showed heavy uniform labeling during the first three days of mating yet the male germ cells had been subjected to radiation from radioactive media for only one day and during the relatively insensitive spermatogonial stage.

The 4 mm thick glass of the Stender dishes provides good shielding against the Beta rays of P-32. A wrist film badge worn during these operations has not recorded any significant radiation.

This investigation was supported by Public Health Service Grant GM 11449-02 from the National Institute of General Medical Sciences.

Strickberger, M. W. and L. Harth. St. Louis University. A simple dispenser for Drosophila medium is an ordinary automatic coffee percolator of the 32 cup variety or larger that is sold quite cheaply in hardware stores as "party" coffee makers (our's cost $10.00). They are fitted with a spigot that easily controls the amount of medium dispensed and they have a warming element which keeps the medium hot and fluid. To use, remove the inside coffee "basket", add the cooked hot medium, and connect the apparatus to electricity. The hot medium will prevent the high voltage "percolator" element from operating and will restrict heating to the low voltage "warming" element. If desired, the high voltage heating element can be permanently disconnected by reconnecting the wiring so that its circuit is by-passed. In those instances when all of the medium is quickly dispensed through this device, use of the electrical warming element is not necessary.
Wilson, J. University of California at Riverside. A sampler for collecting adults from unetherized population cages.

Sampling adults from Bennett population cages yields the same phenotype frequency as egg samples, is faster, and disturbs the population only to the extent of removing some adults for a few minutes. The simple apparatus and technique described below gives samples of 100-200 flies in less than a minute if the population is moderately dense.

Materials and Assembly: See diagram.

Method: The assembled sampler is inserted in the cage as in the above diagram. The outer rubber stopper is withdrawn ca. two inches. The inner stopper is pushed out of the tube and the outer stopper is immediately replaced. The adults will move into the tube if it is on the lighter side of the cage. The inner stopper is then replaced by pulling the string. The sampling time should be short - 30 to 60 seconds - to obtain maximum density of adults and to avoid larvae in the sample. The tube is then withdrawn. Later, the flies may be replaced in the cage in an empty shell vial. The mortality in the sample is 2-3% due to crushing between the stopper and the wall of the tube.


CO\textsubscript{2} was found to be the best anaesthetic for females being used in egg formation studies. Unlike ether which inhibits egg production, repeated tests showed that CO\textsubscript{2} had little or no detrimental effect even when females were kept under anaesthesia for some minutes. A simple anaesthetiser was turned from perspex in the form illustrated below. CO\textsubscript{2} is regulated through a simple bubble gauge into the base (A) which has the perforated dish (C) fitted into it. The cone shaped top (B) is a push fit on to the base, and is made to accept the culture vials from which the adults are tapped. Its inner dimension fits closely onto the perforated dish. (The scale line represents 2 cm.)
Lewontin, R. C. University of Chicago.
A cheap, disposable population cage.

Population cages can be made cheaply and quickly enough to be disposed of at the end of experiments or even during experiments by making use of the new polyfoam plastic containers made for picnic coolers, milk boxes, etc. The material is light, waterproof, cuts easily, and is extremely cheap. An example is given below of a cage suitable for most standard population experiments.

Materials

1. Polyfoam porch milk box, with cover, #40HA. Inside dimensions, 8-1/2" wide x 11-3/4" long x 11-1/2" deep. Wall thickness 1". Glo-Brite Products, 6415 N. California Ave., Chicago 15, Illinois. Cost $2.95

1. Piece of 40 gauge brass mesh 4" x 12". Cost $0.50

1. Piece of broadcloth or muslin 16" x 20". Cost $0.10

Total cost of disposable materials $3.55

In addition, non disposable materials transferable from cage to cage are:

1. Sheet window glass, 13-3/4" x 10-1/2". Cost $0.75

15. Polyethylene cups, 1-1/2" diam. x 2-1/4" high @ $.20 each, #1215: Dynalab Corp., Rochester, N. Y. Cost $3.00

Make the cage as follows:

1. Cut height of the box down to 8" (outside dimension).
2. Cut rim off the cover so that the remaining piece fits inside the box.
3. Cut 15 holes in the cut-down cover, each hole slightly larger than a food cup.
4. Put cut-down cover with holes on the floor of the box inside to serve as a rack for the food cups.
5. Cut a hole 4-1/4" x 3-1/2" in end of the box, 2" down from the top.
6. Sew muslin into a sleeve or tube shape 16" long and tape into hole at end of box. Use plastic covered storm window tape or other exterior plastic tape.
7. Cut a hole 3" x 10-1/2" in side of the box and tape wire mesh to inside of this hole.
8. Cover the box with the glass plate and tape around the edges with masking tape.

The whole construction takes about one hour, under primitive conditions.

This box is completely fly tight provided the cloth sleeve is carefully doubled and tied after it is used each time. It is much easier to change cups in the cage by reaching through the sleeve than by the usual method of inserting the cups in holes in the cage and the size of the cups in the cage is not critical since they are completely enclosed.

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SEVENTH DROSOPHILA RESEARCH CONFERENCE: May 8 and 9, 1965

In accordance with the decision reached at the 6th (Madison, Wisconsin) Drosophila Conference, the next meeting will be held in Seattle, Washington. I have chosen May 8th and 9th as reasonable dates. However, there is still time to change, and I invite any suggestions and objections both as to date and as to the format of the meetings.

Any such suggestions may be sent to:

L. Sandler
Department of Genetics
University of Washington
Seattle, Washington

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Edward H. Brown has accepted a position as Assistant Professor in the Department of Zoology at the University of Illinois in Urbana. He will begin this appointment in February, 1965. From January to December, 1964, he worked with Dr. James H. Sang of the Poultry Research Centre, Edinburgh, on a Postdoctoral Fellowship.

John Erickson, formerly of the University of Oregon, has joined the staff at Western Washington State College, Bellingham, Washington, where he is starting a new Drosophila laboratory. Reprints, old and new, would be appreciated.

John W. Gowen. In moving our research from Iowa State University to Colorado State University, a new laboratory of Drosophila genetics has been created. The laboratory is tied in closely with investigations having similar objectives - utilizing large populations of viruses, bacteria, mice and dogs. The inheritance studies cover those events which occur spontaneously, in disease and under irradiation or other environmental stimuli within the species named. All studies are integrated together as well as having the worthwhile cooperation of the disciplines in the College of Veterinary Science and University as a whole. Opportunities for graduate or post-graduate study form a significant part of the program.

T. Kanehisa, University of Kobe (Japan), has returned from the Istituto di Genetica, Universita Di Milano and is continuing work on the tumor-inducing factor of tumor stock Freckled.

Kobe University, Faculty of Science, Biological Laboratory has moved to a new building (Address: 12 Rokkodai-cho, Nadaku, Kobe, Japan).

Ingerid Kvelland is spending two years from October 1, 1964, as a Research Associate at the laboratory of Dr. Doermann, University of Washington, Seattle, Washington.

Ross J. MacIntyre has received the degree of Ph.D. from the Johns Hopkins University, October 1964, and has commenced a two-year postdoctoral fellowship in the Department of Plant Breeding, Cornell University, under Bruce Wallace. The thesis is entitled "Responses of Esterase-6 alleles of Drosophila melanogaster and Drosophila simulans to selection in experimental populations." The alleles are shown to reach stable equilibria when populations are initiated at different allele frequencies, and the particular equilibrium is shown to differ in stocks differently constructed in genotype. Heterosis is concluded to rest upon a polygenic basis, in this case.

George A. Marzluf has received the degree of Ph.D. from the Johns Hopkins University, October, 1964, and has entered upon a postdoctoral fellowship in the Department of Physiological Chemistry, University of Wisconsin Medical School, under Robert L. Metzenberg. The Ph.D. thesis is entitled "Studies of the Mechanism of Action of the Suppressor of Vermilion of Drosophila melanogaster," and compares the properties of the enzymes extracted and partially purified from the wild type and from suppressed vermilion, respectively.

Per Of tedal is spending the academic year at the Genetics Laboratory, City of Hope, Duarte, California.

Frank Seto, formerly of the Radiation Immunology group, Biology Division of the Oak Ridge National Laboratory in Oak Ridge, Tennessee, has joined the faculty of the Zoology Department, University of Oklahoma, Norman, Oklahoma. He will continue research in Developmental Biology.

University of Sussex. A school of Biology will open at this new University in October, 1965. Part of the University College, London, Drosophila group will move there with Professor J. Maynard Smith, and Professor J. H. Sang's Drosophila Unit, now at the Poultry Research Centre, Edinburgh, will also transfer to this school. Accommodation will be available for post-graduate and post-doctoral research workers interested in the areas now being studied by these two groups (see Directory), and in microbial genetics.

This new school will be glad to get reprints of past work in order to supplement its library facilities, and would welcome inclusion in reprint circulation lists.

D. L. Williamson, formerly an NIH Postdoctoral Fellow in Genetics, Department of Biology, Yale University, has joined the Department of Anatomy, Woman's Medical College of Pa., Philadelphia, Pa., as Assistant Professor of Research and is continuing studies on maternally inherited traits in Drosophila.
No organism is as well characterized genetically nor is more amenable to sophisticated controlled genetic manipulation as is Drosophila. In spite of this Drosophila has contributed little to our knowledge of major genetical concepts at the molecular level. This fact is even more depressing when one realizes that Beadle and Euphrussi's classical studies on the eye pigments in Drosophila served as the forerunner of modern biochemical genetics. Indeed, of the approximately 100 different enzyme or enzyme systems known to be under genetic control in all organisms, Drosophila can only provide 7 or 8 clear cut examples. Furthermore, as of this writing there is not one example in Drosophila of a biochemical control mechanism under genetic influence. This critique could go on and on, but would only serve to belabor the point.

The reasons for this state of affairs is varied and complex, though perhaps the most difficult barrier has been at the technical level. However, two breakthroughs indicate a resurgence of molecular genetic studies in Drosophila. The first of these is the isolation of "biochemical mutants" by Novitski and his group (DIS 37:51) and the second is the successful cultivation of Drosophila tissue in vitro by M. Horikawa and A. S. Fox (Science, in press).

Anticipating this renewed interest created by these two formidable tools a bibliography of biochemical and biochemical genetic studies in Drosophila has been prepared. The source for all titles through 1962 has been the "Bibliography of Drosophila Genetics" first edited by H. J. Muller and then by I. H. Herskowitz. Titles from 1963 through approximately April 1964 were obtained from Current Contents. The classification of the papers should not be taken too seriously but rather only as a rough guide. It is to be noted this is not nor is it intended to be an exhaustive bibliography. Many times when a series of papers by the same author appeared on the same subject only the last paper was cited. In addition there are no doubt many errors of omission including only the most cursory survey of the non-english written journals.

Originally this bibliography was compiled for the private use of members of our laboratory in order to give a birdseye view of what has been done in Drosophila and hopefully to serve as a guide for future studies. It is hoped it will be of some use to other Drosophologists.

I. Biochemical Studies of Chromosomes.


* Supported by research grants from the National Institutes of Health (GM-11777) and the Wisconsin Alumni Research Foundation administered by Allen S. Fox.

II. Chemical Constituents.

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BIBLIOGRAPHY OF THE BIOCHEMICAL GENETICS OF DROSOPHILA 40:107


Okubo, S. 1957. A glucoside in D. m. DIS 31:150.


Rasmussen, B. and Bjorkman, D. 1958. The fatty acid content in D. m. DIS 32:150-151.


III. Chromatographic Analysis.


IV. General Biochemical Studies, Development, and Growth.


Brehme, K. S. 1939. The minute condition as a possible effect of a hormone deficiency. DIS 12 62.


V. Enzymes.


Auf Der Maur, P. 1960. Uricase activity in the mutant white of D.m. DIS 34:70.


Farnsworth, M. W. 1956. Localization of alkaline phosphatase in lethal embryos and larvae of minute (4) and minute (1) o. DIS 30:113-114.


Kikkawa, H. 1960. Genetic control of amylase in D.m. DIS 34:89.


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BIBLIOGRAPHY OF THE BIOCHEMICAL GENETICS OF DROSOPHILA 40:113


VI. Nucleic Acids.


Altorfer, N. 1953. Teneur en acide ribonucleique de differentes genotypes chez D. m. Experien-


Caspersson, T., Hammarsten, E., and Hammarsten, H. 1935. Interactions of proteins and nucleic

Caspersson, T. and Schultz, J. 1938. Nucleic acid metabolism of the chromosomes in relation to

Farnsworth, M. W. 1958. Quantitative studies of DNA in wild-type and minute larvae. DIS 32:121-122.

Freed, J. J. and Schultz, J. 1956. Effect of the Y chromosome on the deoxyribonucleic acid
content of ovarian nucleic acid in D. m. females. (Abstr.) J. Histochem. and Cytochem., 4:441-

Gay, H. 1960. La localisation cytochimique des acides nucleiques et des proteines cellulaires
et la determination de leur mode d'association. (Abstr.) I Congr. int. histochem. Cytochim.,


Gershenson, S. M. 1939. The production of directed mutations with the aid of nucleic acid.

Herskovitz, I. H. 1961. The hypothesis of nucleotide sharing by adjacent functional units of

Hinton, T., Ellis, J. and Theriault, D. L. 1949. Amino acid and nucleic acid relationships in

Hinton, T. and Ellis, J. 1950. A nucleic acid requirement in D. correlated with a position

Kirby, K. S. 1962. Deoxyrribonucleic acids. IV. Preparations of deoxyrribonucleic acid from

Lesher, S. 1951. Studies on the larval salivary gland of D. I. The nucleic acids. II.

Lesher, S. 1952. Studies on the larval salivary gland of D. III. The histochemical localization
and possible significance of ribonucleic acid, alkaline phosphatase and polysaccharide.

Levenbook, L., Travaglini, E. and Schultz, J. 1953. Nucleic acids and free polynucleotide

Levenbook, L., Travaglini, E. and Schultz, J. 1955. Effect of the Y chromosome on nucleic
acids and polynucleotide fragments in the unfertilized D. m. egg. (Abstr.) 3eme Congr. Int.
Biochim. Bruxelles, Resumes des Communications:70.

Levenbrook, L., Travaglini, E. and Schultz, J. 1958. Nucleic acids and their components as
affected by the Y chromosome of D. m. I. Constitution and amount of ribonucleic acids in the

Mcmaster-Kaye, R. 1960. The metabolic characteristics of nucleolar chromosomal cytoplasmic ribo-

Mcmaster-Kaye, R. and Taylor, J. H. 1958. Evidence for two metabolically distinct types of ribo-


Mead, C. G. 1962. The relationship of a DNA-associated RNA with euchromatic and heterochromatic
derived DNA of D. m. (Abstr.) Rec. Genet. Soc. Amer; 31:101; and Genetics, 47:970.


Mead, C. G. and Fox, A. S. 1961. The characterization of the deoxyribonucleic acids of D. m.
DIS 35:89-90.

Mead, C. G. and Fox, A. S. 1961. Isolation and characterization of D. DNA. (Abstr.) Fed-


Welch, R. M. 1957. A developmental analysis of the mutant 1(2)gl of D.m. based on cytophotometric determination of nuclear deoxyribonucleic acid (DNA) content. Genetics, 42:544-559.


VII. Nutrition.


VIII. Pigments.

A. Body pigments.

1. Chemistry.


Taira, T. and Nawa, S. 1955. Yellow pigment found in the body of the mutant "red" in D.m. DIS 29:167.


2. Enzymology.


B. Eye pigments.
1. Chemistry.


Baglioni, C. 1958. Two new pteridins, found in D.m. DIS 32:111.


Glassman, E. 1958. Further studies of the maroon-like (ma-1) and rosy (ry) eye-color mutants. DIS 32:123.

Glassman, E. 1959. Allelism and complementation of bronzy (bz) and maroon-like (ma-1) eye-color mutants in D.m. DIS 33:135.


Nawa, S. 1960. The structure of the yellow pigment from D. DIS 34:95.


Nawa, S., Taira, T. and Ophima, C. 1957. Nonenzymatic conversion of the yellow pigment found in D.m. DIS 31:146.


Nolte, D. J. 1954. The eye-pigmentary system of D. V. The pigments of the light and dark groups of mutants. J. Genet. 52:127-139.


Steinberg, A. G. 1939. The Lobe alleles and V' hormone. DIS 11:51.


2. Enzymology.


Ursprung, H. 1960. Xanthine dehydrogenase in wildtype, white and brown D. m. DIS 34:110.
IX. Proteins and Protein Synthesis.


X. Radioactive Incorporation.


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Woodstock, Maryland: Woodstock College, Dept. of Biology, Tel. No. DA8-2101(DIS 38).
<table>
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