Stu HS / Dr. Ned
Assign #6 / Oct 15, 2010

6+/6T great

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SB3PGR02 (P17)

p. 255 (24) Plant C. parviflora (Pure ~~breeding~~)

Parents	F1	F2
① Blue × white	Blue	101 Blue, 33 white
② Blue × pink	Blue	192 Blue, 63 pink
③ Pink × white	Blue	272 Blue, 121 white, 89 pink

a) Explain these results genetically. Define the allele symbols that you use, and show the genetic constitution of the parents, the F_1 and the F_2 in each cross.

Key

$w^+_p^+_$	blue
w^+_pp	pink
$ww p^+_$	white
$wwpp$	white

② Blue × Pink

$w^+w^+p^+p^+$ × w^+w^+pp
(w^+p^+) (w^+p)

	w^+p^+	
w^+p	$w^+w^+p^+p$	

1 Blue

$w^+w^+p^+p$
(w^+p^+, w^+p)

	w^+p^+	w^+p
w^+p^+	$w^+w^+p^+p^+$	$w^+w^+p^+p$
w^+p	$w^+w^+p^+p$	w^+w^+pp

3 Blue : 1 pink

good

③ Pink × White

w^+w^+pp $ww p^+p^+$
(w^+p) (wp^+)

	w^+p	
wp^+	w^+wp^+p	

1 Blue

w^+wp^+p
(w^+p^+, w^+p, wp^+, wp)

	w^+p^+	w^+p	wp^+	wp
w^+p^+	$w^+w^+p^+p^+$	$w^+w^+p^+p$	$w^+wp^+p^+$	w^+wp^+p
w^+p	$w^+w^+p^+p$	w^+w^+pp	w^+wp^+p	w^+wpp
wp^+	$w^+wp^+p^+$	w^+wp^+p	wwp^+p^+	wwp^+p
wp	w^+wp^+p	w^+wpp	wwp^+p	$wwpp$

9 blue : 4 white : 3 pink

① Blue × white

$w^+w^+p^+p^+$ $ww p^+p^+$
(w^+p^+) (wp^+)

	w^+p^+	
wp^+	$w^+wp^+p^+$	

1 Blue

$F_1 \times F_1$
$w^+wp^+p^+$
(w^+p^+, wp^+)

	w^+p^+	wp^+
w^+p^+	$w^+w^+p^+p^+$	$w^+wp^+p^+$
wp^+	$w^+wp^+p^+$	wwp^+p^+

3 blue : 1 white

b) (F2) Blue × (F2) white → $\frac{3}{8}$ blue, $\frac{1}{8}$ pink, $\frac{1}{2}$ white. What are their geno?

w^+wp^+p ⊗ wwp^+p
Blue white

	w^+p^+	w^+p	wp^+	wp
wp^+	$w^+wp^+p^+$	w^+wp^+p	wwp^+p^+	wwp^+p
wp	w^+wp^+p	w^+wpp	wwp^+p	$wwpp$

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Red and blue pigments give purple color.
They are synthesized by separate biochemical pathways.
White = Compounds that are not pigments

Ⅰ ·· → $white_1 \xrightarrow{E}$ blue

Ⅱ ·· → $white_2 \xrightarrow{A}$ yellow $\xrightarrow{B}$ red

Ⅲ ··· → $white_3 \xrightarrow{D}$ $white_4$

C

A – E = enzyme / corresponding genes

Assume recessive = lack of enzyme function

What combe produce F_2 of following ratios?

a) 9 purple : 3 green : 4 blue — $b^+b^+r^+ry^+y$ × $b^+b^+r^+ry^+y$

b) 9 purple : 3 red : 3 blue : 1 white — $b^+br^+r^+y^+y$ × $b^+br^+r^+y^+y$

c) 13 purple : 3 blue — $b^+b^+r^+r^+y^+y\,w^+w^-$ × $b^+b^+r^+r^+y^+y\,w^+w^-$

d) 9 purple : 3 red : 3 green : 1 yellow — $b^+br^+ry^+y^+$ × $b^+br^+ry^+y$

Key
$b^+_$ = blue
bb = white
$r^+_y^+_$ = red
r^+_yy = white
$rry^+_$ = yellow
$w^+_$ = unlinked gene
w^-w^- = suppressor (recessive unlinked gene)

great

a) $b^+b^+r^+ry^+y$
$(b^+r^+y^+$ b^+ry^+ b^+r^+y $b^+ry)$

	$b^+r^+y^+$	b^+ry^+	b^+r^+y	b^+ry
$b^+r^+y^+$	P	P	P	P
b^+ry^+	P	G	P	G
b^+r^+y	P	P	B	B
b^+ry	P	G	B	B

great

b) $b^+br^+r^+y^+y$
$b^+r^+y^+$, br^+y, br^+y^+ br^+y

	$b^+r^+y^+$	br^+y^+	b^+r^+y	br^+y
$b^+r^+y^+$	P	P	P	P
br^+y^+	P	R	P	R
b^+r^+y	P	P	B	B
br^+y	P	R	B	W

c) $b^+b^+r^+r^+y^+y\,w^+w^-$
$b^+r^+y^+w^+$, $b^+r^+y^+w^-$, $b^+r^+yw^+$, $b^+r^+yw^-$

	$b^+r^+y^+w^+$	$b^+r^+y^+w^-$	$b^+r^+yw^+$	$b^+r^+yw^-$
$b^+r^+y^+w^+$	P	P	P	P
$b^+r^+y^+w^-$	P	P	P	P
$b^+r^+yw^+$	P	P	B	B
$b^+r^+yw^-$	P	P	B	P

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d)

$b^+br^+ry^+y^+$									
br^+y^+, br^+y^+, br^+y^+, bry^+									
$b^+r^+y^+$	$b^+r^+y^+$	$b^+r^+y^+$	$b^+r^+y^+$	br^+y^+	b^+ry^+	b^+ry^+	br^+y^+	b^+ry^+	br^+y^+
P	P	P	P	P	P	P	P	P	P
R	G	P	R	P	G	P	R	G	Y