(A2) in Otto and Whitton (2000) contains typos and should read:

$$\frac{\sigma_c\,\sigma_c'}{\ln\left[c\,N\left(e^{\frac{\sigma_c}{2\,c\,N\,v\,\sigma_c'}}-1\right)\frac{\sigma_c'}{\sigma_c'+\sigma_c}\right]}$$

Note the c in the denominator and the σ_c' in the exponential. These errors were in the manuscript only and did not affect subsequent derivations for equations (3).

Derivation of A2 of Otto and Whitton (2000)

Letting $\sigma 1 = \sigma_c$ and $\sigma 2 = \sigma_c{}'$, the following derives equation A2, using the fixation probability given by equation A1:

```
Simplify[p[t] c N v fixation[t] /. fixation[t] → 2 σ2 (σ1 + σ2) / (σ2 + p[t] σ1) /.
  p[t] → p0 / (p0 + (1 - p0) Exp[-σ1 t])]
```

$$\frac{2\,c\,e^{t\,\sigma 1}\,N\,p0\,v\,\sigma 2\,(\sigma 1+\sigma 2)}{\sigma 2-p0\,\sigma 2+e^{t\,\sigma 1}\,p0\,(\sigma 1+\sigma 2)}$$

The number of fixation events is given by the integral with respect to time:

```
Integrate[%, t]
```

$$\frac{2\,c\,N\,v\,\sigma 2\,\mathrm{Log}\left[\sigma 2-p0\,\sigma 2+e^{t\,\sigma 1}\,p0\,(\sigma 1+\sigma 2)\right]}{\sigma 1}$$

Evaluating the definite integral from time = 0 to g:

```
(% /. t → g) - (% /. t → 0)
```

$$-\frac{2\,c\,N\,v\,\sigma 2\,\mathrm{Log}[\sigma 2-p0\,\sigma 2+p0\,(\sigma 1+\sigma 2)]}{\sigma 1}+\frac{2\,c\,N\,v\,\sigma 2\,\mathrm{Log}\left[\sigma 2-p0\,\sigma 2+e^{g\,\sigma 1}\,p0\,(\sigma 1+\sigma 2)\right]}{\sigma 1}$$

The "Log" here is the natural log.

Setting this to one (i.e., one fixation event) and solving for g gives the number of generations that must pass, on average, between the appearance of two successful beneficial mutations:

```
g /. Simplify[Solve[% == 1, g]]
```

$$\left\{\frac{\mathrm{Log}\left[\frac{(-1+p0)\,\sigma 2+e^{\frac{\sigma 1}{2\,c\,N\,v\,\sigma 2}}\,(p0\,\sigma 1+\sigma 2)}{p0\,(\sigma 1+\sigma 2)}\right]}{\sigma 1}\right\}$$

The rate of fixation is the inverse of this quantity. Also setting the initial frequency to 1/(c*N) in an organism with ploidy level "c" gives:

```
Simplify[1 / % /. p0 → 1 / (c * N)]
```

$$\left\{\frac{\sigma 1}{\mathrm{Log}\left[\frac{\sigma 2-c\,N\,\sigma 2+e^{\frac{\sigma 1}{2\,c\,N\,v\,\sigma 2}}\,(\sigma 1+c\,N\,\sigma 2)}{\sigma 1+\sigma 2}\right]}\right\}$$

Assuming that the population size is large (N large), we drop $\sigma 2$ relative to c N $\sigma 2$ in the above to get:

$$\frac{\sigma 1}{\mathrm{Log}\left[c\,N\left(e^{\frac{\sigma 1}{2\,c\,N\,v\,\sigma 2}}-1\right)\frac{\sigma 2}{\sigma 1+\sigma 2}\right]};$$

This gives the rate at which second beneficial alleles are expected to fix, which when multiplied by their beneficial effect $\sigma 2$ gives the rate of increase in fitness:

$$\text{RateFitnessIncrease} = \frac{\sigma 1\, \sigma 2}{\text{Log}\left[c\, N \left(e^{\frac{\sigma 1}{2\, c\, N\, v\, \sigma 2}} - 1\right) \frac{\sigma 2}{\sigma 1 + \sigma 2}\right]};$$

Thus (A2) contains two typos: The "c" is missing in the denominator, and it should be $\sigma 2$ in the denominator of the exponent term.

Confirming that equations (3) are unaffected

Assuming that the effects of the mutations are the same ($\sigma 1 = \sigma 2$), the effect of ploidy on rate of fitness increase is:

hap = RateFitnessIncrease /. c → 1 /. σ2 -> σ /. σ1 -> σ

$$\frac{\sigma^2}{\text{Log}\left[\frac{1}{2}\left(-1 + e^{\frac{1}{2\,N\,v}}\right) N\right]}$$

dip = RateFitnessIncrease /. c → 2 /. σ2 → h σ /. σ1 → h σ

$$\frac{h^2\, \sigma^2}{\text{Log}\left[\left(-1 + e^{\frac{1}{4\,N\,v}}\right) N\right]}$$

tetra = RateFitnessIncrease /. c → 4 /. σ2 → h1 σ /. σ1 → h1 σ

$$\frac{h1^2\, \sigma^2}{\text{Log}\left[2\left(-1 + e^{\frac{1}{8\,N\,v}}\right) N\right]}$$

For (3a):

dip / hap

$$\frac{h^2\, \text{Log}\left[\frac{1}{2}\left(-1 + e^{\frac{1}{2\,N\,v}}\right) N\right]}{\text{Log}\left[\left(-1 + e^{\frac{1}{4\,N\,v}}\right) N\right]}$$

We take the limit in two cases.

When N v is assumed very large, we obtain a limit of h^2, using the following approximations (recall that $-1 + e^x \sim x$ for x small):

$$\text{Log}\left[\frac{1}{2}\left(-1 + e^{\frac{1}{2\,N\,v}}\right) N\right] \sim \text{Log}\left[\frac{1}{2}\left(\frac{1}{2\,N\,v}\right) N\right] = \text{Log}\left[\left(\frac{1}{4\,N\,v}\right) N\right]$$

$\text{Log}\left[\left(-1 + e^{\frac{1}{4\,N\,v}}\right) N\right] \sim \text{Log}\left[\left(\frac{1}{4\,N\,v}\right) N\right]$, which is the same as above.

When N v is assumed very small, we obtain a limit of $2\, h^2$, using the following approximations:

$$\text{Log}\left[\frac{1}{2}\left(-1 + e^{\frac{1}{2\,N\,v}}\right) N\right] \sim \text{Log}\left[\frac{1}{2}\left(e^{\frac{1}{2\,N\,v}}\right) N\right] = \text{Log}\left[\frac{1}{2}\left(e^{\frac{1}{2\,N\,v}}\right) N\right] = \text{Log}\left[\frac{1}{2} N\right] + \frac{1}{2\,N\,v} \sim \frac{1}{2\,N\,v}$$

$$\text{Log}\left[\left(-1 + e^{\frac{1}{4\,N\,v}}\right) N\right] \sim \text{Log}\left[\left(e^{\frac{1}{4\,N\,v}}\right) N\right] = \text{Log}[N] + \frac{1}{4\,N\,v} \sim \frac{1}{4\,N\,v}$$

Similarly, for (3b):

tetra / dip

$$\frac{h1^2 \text{Log}\left[\left(-1+e^{\frac{1}{4 N v}}\right) N\right]}{h^2 \text{Log}\left[2\left(-1+e^{\frac{1}{8 N v}}\right) N\right]}$$

We take the limit in two cases.

When N v is assumed very large, we obtain a limit of $\frac{h1^2}{h^2}$, using the following approximations (recall that $-1+e^x \sim x$ for x small):

$$\text{Log}\left[\left(-1+e^{\frac{1}{4 N v}}\right) N\right] \sim \text{Log}\left[\left(\frac{1}{4 N v}\right) N\right]$$

$$\text{Log}\left[2\left(-1+e^{\frac{1}{8 N v}}\right) N\right] \sim \text{Log}\left[2\left(\frac{1}{8 N v}\right) N\right]$$, which is the same as above.

When N v is assumed very small, we obtain a limit of $2 \frac{h1^2}{h^2}$, using the following approximations:

$$\text{Log}\left[\left(-1+e^{\frac{1}{4 N v}}\right) N\right] \sim \text{Log}\left[\left(e^{\frac{1}{4 N v}}\right) N\right] = \text{Log}[N] + \frac{1}{4 N v} \sim \frac{1}{4 N v}$$

$$\text{Log}\left[2\left(-1+e^{\frac{1}{8 N v}}\right) N\right] \sim \text{Log}\left[2\left(e^{\frac{1}{8 N v}}\right) N\right] = \text{Log}\left[2\left(e^{\frac{1}{8 N v}}\right) N\right] = \text{Log}[2 N] + \frac{1}{8 N v} \sim \frac{1}{8 N v}$$