```
(** simple model for development
 involving cell divisions and reamplifications **)

vhafterk[n0_, nk_, k_] :=
  1 / n0 ((2 / (2 (nk / n0) ^ (1 / k))) ^ k - 1) / ((2 / (2 (nk / n0) ^ (1 / k))) - 1);

N[vhafterk[10^5, 300, 29]]
N[vhafterk[300, 5000, 7]]
```

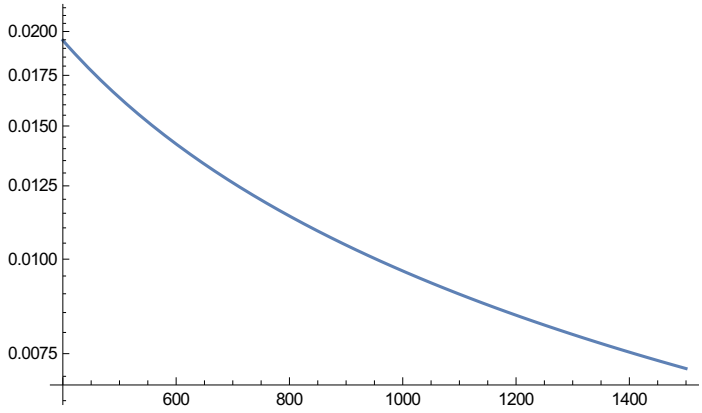
```
0.0149843

0.00946732
```

```
v0predict = N[vhafterk[10^5, b, 29] + vhafterk[b, 5000, 7]]
```

$$\frac{0.00001\left(-1.+\frac{100\,000.}{b}\right)}{-1.+\frac{1.48735}{b^{1/29}}}+\frac{-1.+0.0002\,b}{\left(-1.+\frac{0.296194}{\left(\frac{1}{b}\right)^{1/7}}\right)b}$$

```
LogPlot[v0predict, {b, 400, 1500}, PlotRange → All]
```




```
v0predict /. b → 2500
v0predict /. b → 950
v0predict /. b → 550
v0predict /. b → 370
```

```
0.00499653

0.010023

0.0151845

0.0207
```

```
(** inverting a function -- to compute dynamics
 of transformed heteroplasmy (used in Mouse/) **)

invgfn[x_] := 1 / (1 + Exp[-x])
gfn[y_] := Log[-y / (y - 1)]
ffn[x_] := PDF[NormalDistribution[μ[t], σ[t]], x]
Ffn[x_] := CDF[NormalDistribution[μ[t], σ[t]], x]

(* F_Y(y) = F_X(g^-1(y)) *)
(*f_Y(y) = f_X(x1)/g'(x1) where g(x1) = y *)
```

```
gprime = Simplify[D[gfn[x], x]] /. x → μ[t]
g2prime = Simplify[D[gfn[x], {x, 2}]] /. x → μ[t]
```

$$\frac{1}{\mu[t]-\mu[t]^2}$$

$$\frac{-1+2\,\mu[t]}{(-1+\mu[t])^2\,\mu[t]^2}$$

```
ef = Simplify[gfn[μ[t]] + g2prime / 2 σ[t]^2]
vf = Simplify[(gprime)^2 σ[t]^2]
```

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

$$\frac{\sigma[t]^2}{(-1+\mu[t])^2\,\mu[t]^2}$$