12. Appendix A.

The mean value theorem has the following form [88]:

if function $\phi(\mathbf{x})$ is continuous within interval **<a,b>** and function $\psi(\mathbf{x})$ is integrable within interval **<a,b>** and $\psi(\mathbf{x}) \geq \mathbf{0}$ for $\mathbf{a} \leq \mathbf{x} \leq \mathbf{b}$ then

$$\int_a^b \phi(x)\cdot\psi(x)\,dx = \phi(c)\cdot\int_a^b \psi(x)\,dx \,, \tag{A.1}$$

where **a<c<b**.

Applying this theorem to the integral in equation (3.33) gives:

$$\int_{-s_0/2}^{s_0/2} \exp\left[-\frac{\alpha\cdot(x\cdot e^{\alpha\cdot t}-u)^2}{2\cdot D\cdot(e^{2\cdot\alpha\cdot t}-1)}\right]\cdot f(u)\,du = \exp\left[-\frac{\alpha\cdot(x\cdot e^{\alpha\cdot t}-\zeta)^2}{2\cdot D\cdot(e^{2\cdot\alpha\cdot t}-1)}\right]\cdot\int_{-s_0/2}^{s_0/2} f(u)\,du \,, \tag{A.2}$$

where $-\mathbf{s_0/2} < \zeta < \mathbf{s_0/2}$. When $\mathbf{t} \to \infty$ in expression (A.2) one receives:

$$\lim_{t\to\infty}\left\{\exp\left[-\frac{\alpha\cdot(x\cdot e^{\alpha\cdot t}-\zeta)^2}{2\cdot D\cdot(e^{2\cdot\alpha\cdot t}-1)}\right]du\cdot\int_{-s_0/2}^{s_0/2} f(u)\,du\right\} = \exp\left[-\frac{\alpha\cdot x^2}{2\cdot D}\right]\cdot\int_{-s_0/2}^{s_0/2} f(u)\,du \,. \tag{A.3}$$

Similarly, applying theorem (A.1) to the integral in equation (3.38) gives:

$$\begin{aligned}&\int_0^{R_0} \exp\left(-\frac{\alpha}{4\cdot D}\cdot\frac{r^2\cdot e^{\alpha t}+u^2}{e^{\alpha t}-1}\right)\cdot I_0\left(\frac{\alpha}{2\cdot D}\cdot\frac{u\cdot r\cdot e^{\alpha t/2}}{e^{\alpha t}-1}\right)\cdot f(u)\cdot u\,du = \\ &= \exp\left(-\frac{\alpha}{4\cdot D}\cdot\frac{r^2\cdot e^{\alpha t}+\zeta^2}{e^{\alpha t}-1}\right)\cdot I_0\left(\frac{\alpha}{2\cdot D}\cdot\frac{\zeta\cdot r\cdot e^{\alpha t/2}}{e^{\alpha t}-1}\right)\cdot\int_0^{R_0} f(u)\cdot u\,du \,,\end{aligned} \tag{A.4}$$

where $\mathbf{0} < \zeta < \mathbf{R_0}$. Finally, when $\mathbf{t} \to \infty$ in expression (A.4) one receives:

$$\begin{aligned}&\lim_{t\to\infty}\left[\exp\left(-\frac{\alpha}{4\cdot D}\cdot\frac{r^2\cdot e^{\alpha t}+\zeta^2}{e^{\alpha t}-1}\right)\cdot I_0\left(\frac{\alpha}{2\cdot D}\cdot\frac{\zeta\cdot r\cdot e^{\alpha t/2}}{e^{\alpha t}-1}\right)\cdot\int_0^{R_0} f(u)\cdot u\,du\right] = \\ &= \exp\left(-\frac{\alpha\cdot r^2}{4\cdot D}\right)\cdot 1\cdot\int_0^{R_0} f(u)\cdot u\,du \,.\end{aligned} \tag{A.5}$$