```
\section{Theory}  \label{sec:theory}

\subsection{Thermal Time}  \label{sec:ttime}

For ectotherms (like plants)
whose body temperature depends on their environment,
the rate of development can be written
$r\left[T(t)\right]= m \left[T(t) - T_b\right]$
where $m$ is the change in rate per change in temperature
and $T_b$ is a ``base temperature''
below which no development occurs.  %: $r\left[T(t) \leq T_b\right] = 0$.
When $T(t) > T_b$,
the total fraction of development $f(t)$ completed at time $t$ is
\begin{equation}
f(t) = \int^t_0 \! r\left[T(t')\right] \, dt' = m \, \tau(t) \label{eq:full}
\end{equation}
where $\tau(t)$ can be called a ``thermal time''
defined as
\begin{equation}
\tau(t) =\int^t_0 \left[ T(t') - T_b \right]\, dt'.  \label{eq:tau}
\end{equation}
For example,
\cite{hornbuckle_etal2016} used thermal time to determine when corn reached
its third reproductive stage after planting.  % include more references?

\subsubsection{Assumptions}  \label{sec:assump}

We make assumptions when using thermal time as defined by~(\ref{eq:tau})
to predict organism development.
%Some of the more important assumptions are the following.
\begin{itemize}
\item The rate of development $r$ can be approximated
by a linear function of temperature.
\item No development occurs for $T(t) \leq T_b$.
\item The temperatures used to calculate thermal time
are the temperatures actually experienced by the organism.
\end{itemize}
These assumptions are \emph{never} completely valid.
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