QUANTITATIVE RELATIONSHIPS
(SENSITIVITY)

▲ NUCLEAR DECAY ACTIVATION ANALYSIS ("removed radioactivity")

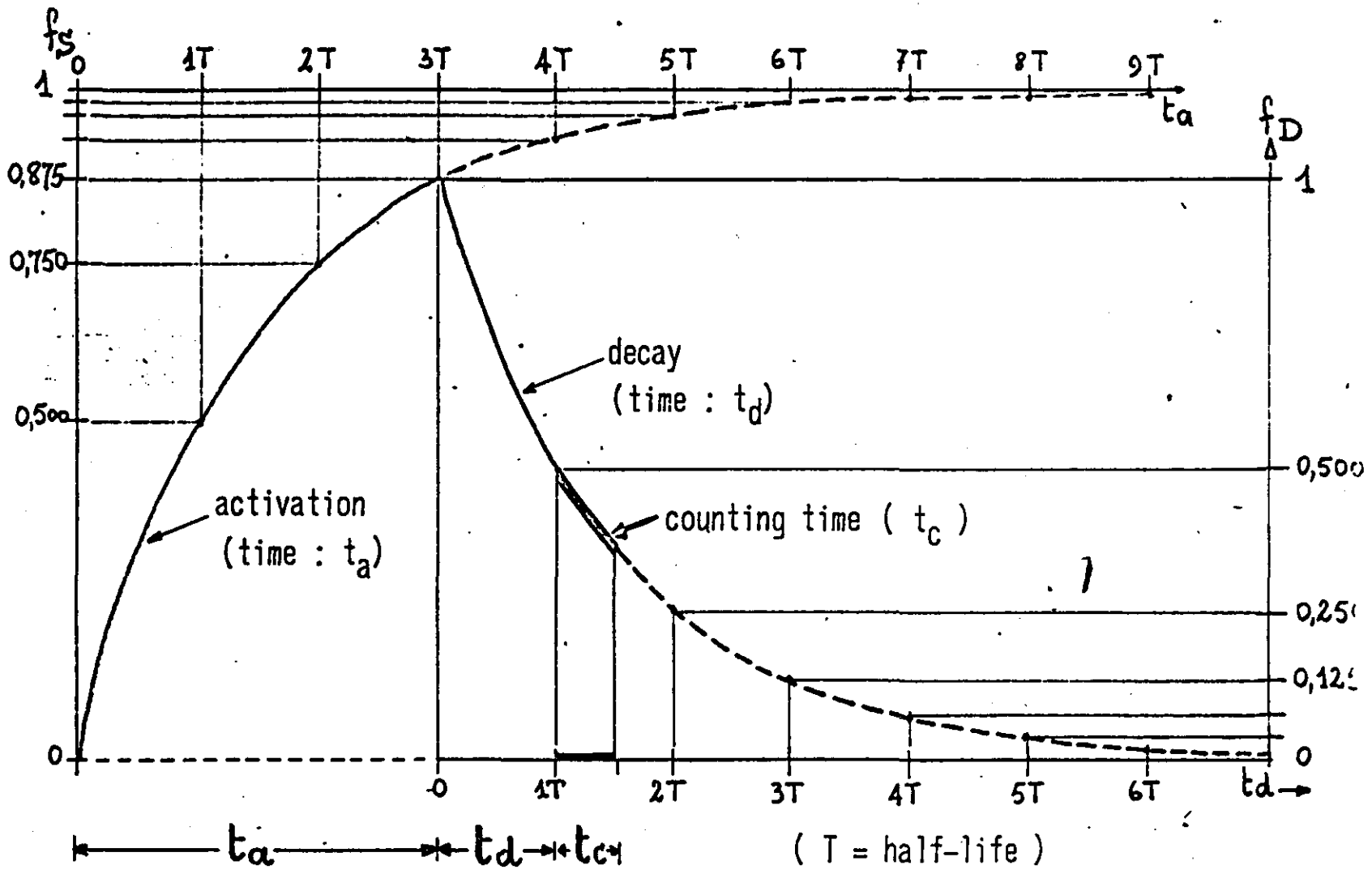
$$\frac{A}{m} = \underbrace{\frac{\sigma \cdot \varepsilon \cdot f}{M} \cdot \mathcal{H} \cdot \Phi \cdot 0{,}602}_{f_E} \cdot \underbrace{\left(1 - 0{,}5^{\,t_a / T_{\frac{1}{2}}} \right)}_{f_S} \cdot \underbrace{\left(0{,}5^{\,t_d / T_{\frac{1}{2}}} \right)}_{f_D} \cdot \underbrace{\left(\frac{T_{\frac{1}{2}} - T_{\frac{1}{2}} \cdot 0{,}5^{\,t_c / T_{\frac{1}{2}}}}{0{,}693} \right)}_{f_C} \quad [\text{cps}$$

Activity = fonction ($\underbrace{M , f , \sigma , \varepsilon , T_{\frac{1}{2}}}_{\text{constant parameters}}$, $\underbrace{\mathcal{H} , \Phi , t_a , t_d , t_c , m}_{\text{variable parameters}}$)

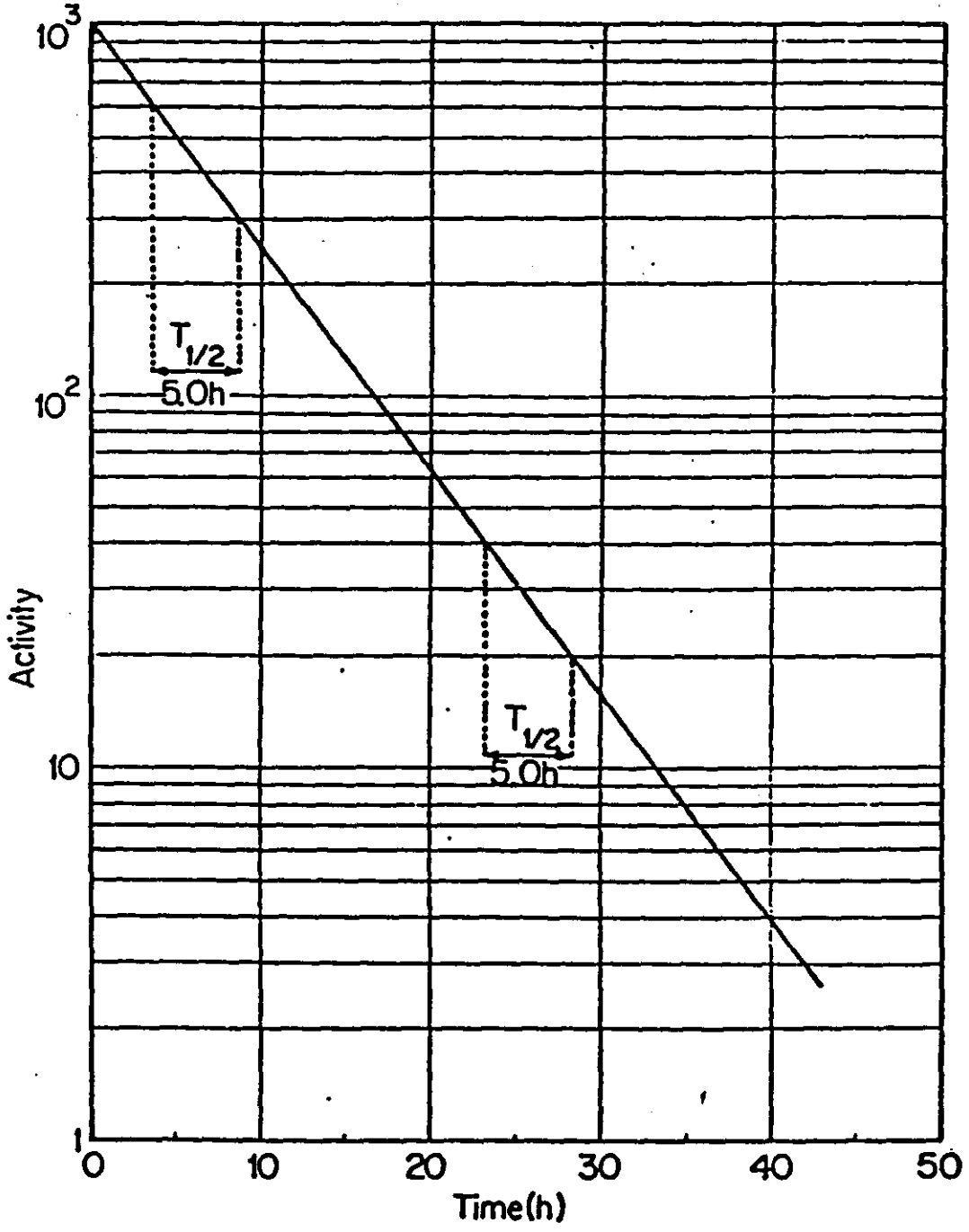
IN PRACTICE : $m_x = m_s \cdot A_x / A_s$ (relative method)

Fig. 5

ACTIVATION AND DECAY CURVES



51a



. 5.1. Radioactive decay of a single radionuclide ($T_{1/2} = 5.0$ h)

$$A(t) = A^0 \exp(-\lambda t)$$

$$\log A(t) = \log A^0 - \lambda t$$

5.2a

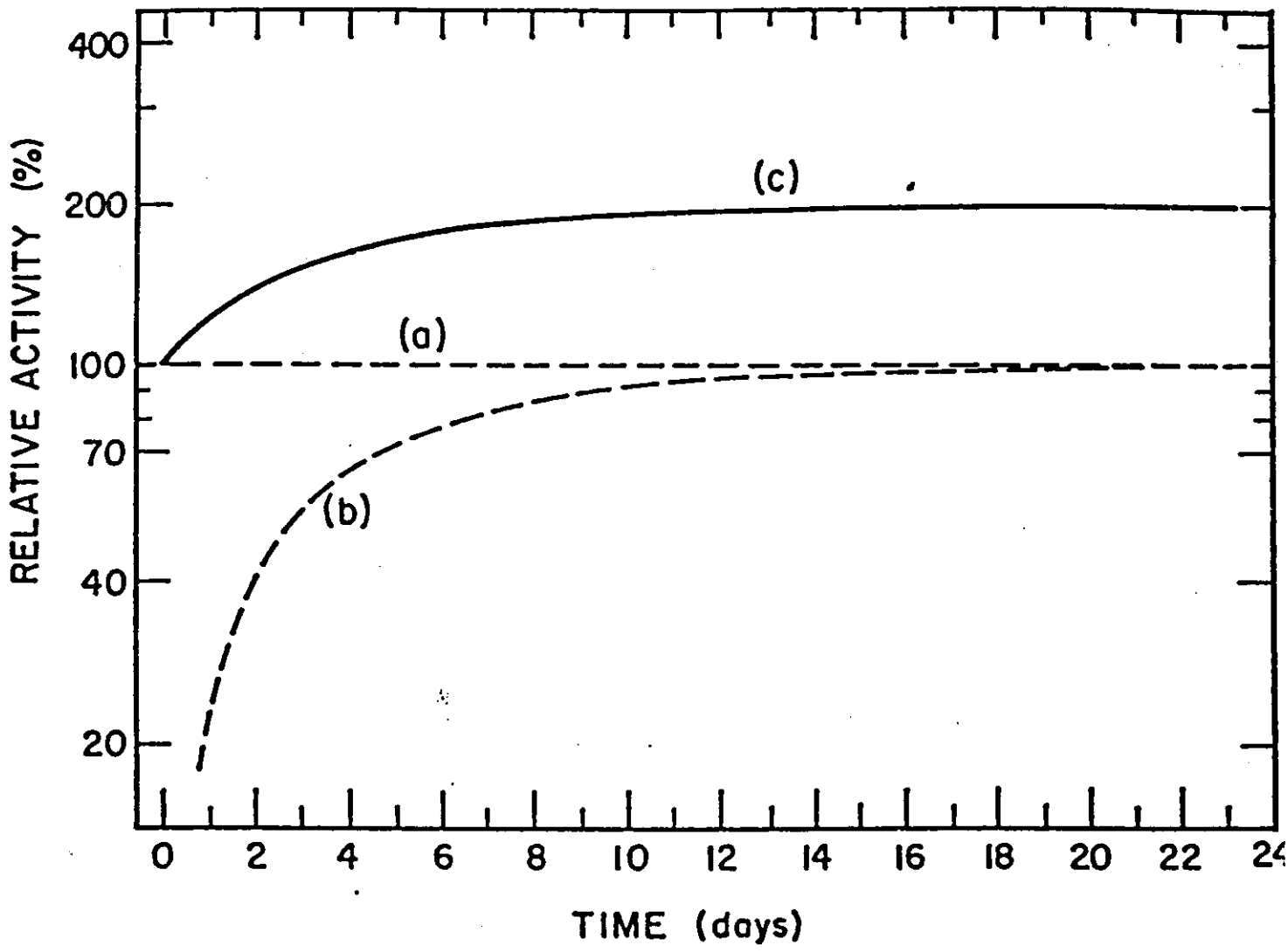
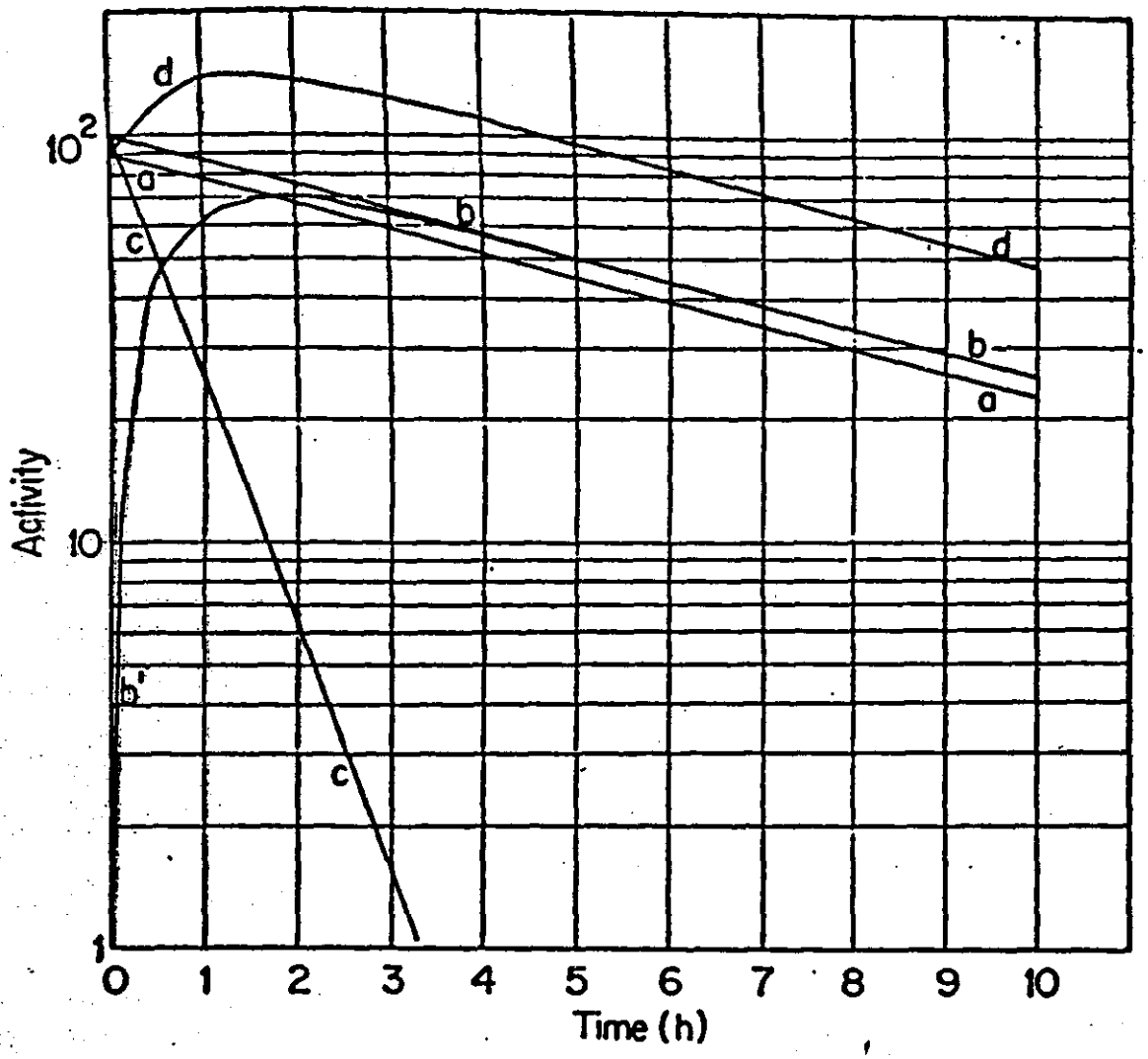


Figure 4.4 Growth and decay curves for the radionuclides 27-y $^{90}Sr \rightarrow$ 64-h ^{90}Y: (*a*) the decay curve for an initially pure source of ^{90}Sr; (*b*) the growth curve for ^{90}Y in the source; (*c*) the observed total activity of the source.

5.24



5.4. Transient equilibrium; $(T_{1/2})_1 = 5.0$ h and $(T_{1/2})_2 = 0.5$ h; $0\lambda_1$)
ve aa: activity due to parent
ve bb: daughter activity in the parent-plus-daughter fraction
ve b'bb: daughter activity growing in freshly purified parent fraction
ve cc: decay of freshly isolated daughter fraction
ve dd: total activity of an initially pure parent fraction.

5.24

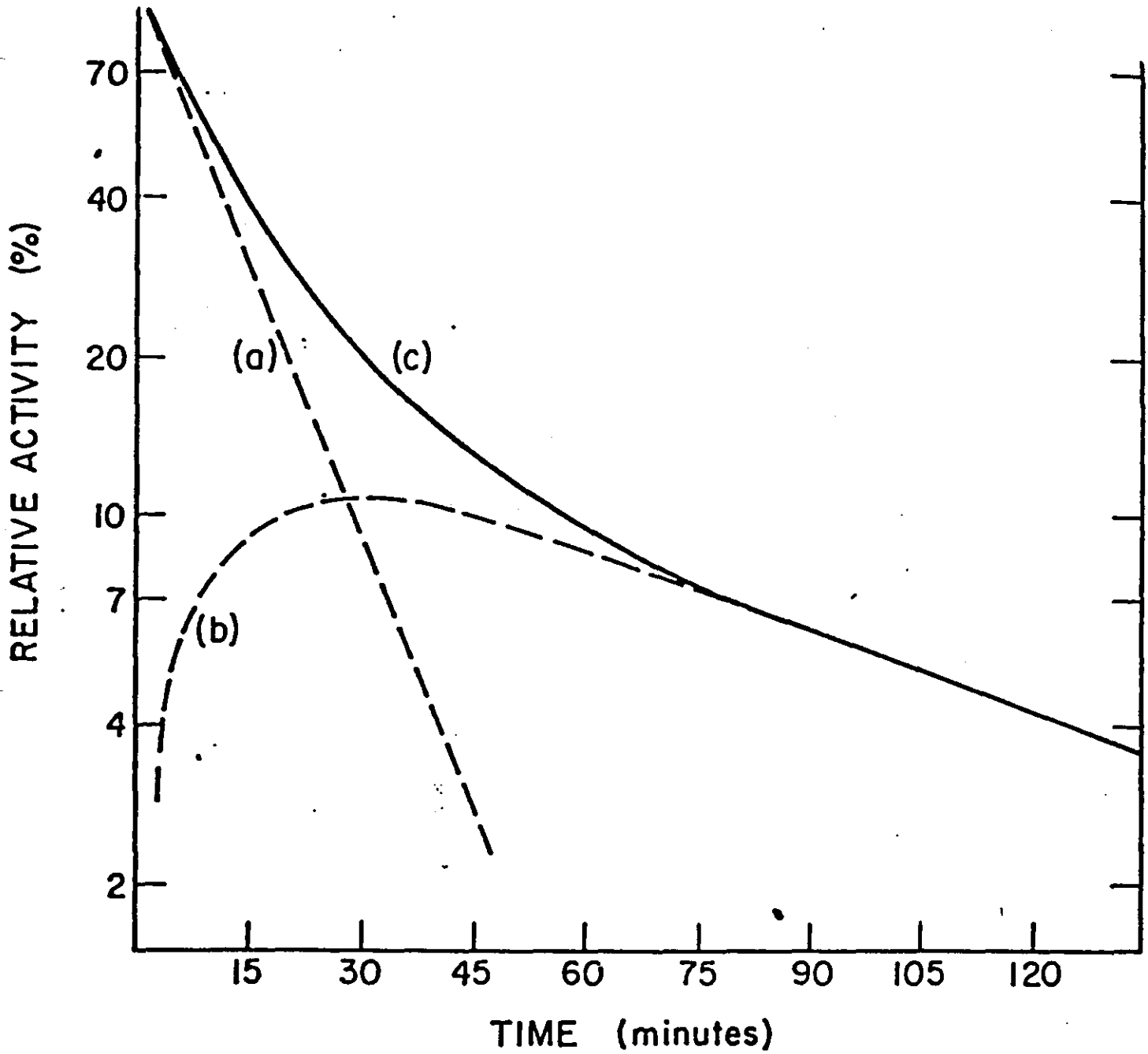


Figure 4.5 Growth and decay curves for the radionuclides 8.7-m ^{49}Ca → 57.5-m ^{49}Sc: (*a*) the decay curve for an initially pure source of ^{49}Ca; (*b*) the growth curve for ^{49}Sc in the source; (*c*) the observed total activity of the source.