Not Knowing the Initial Amount Does Not Stop Dating: Only the Slope Carries the Time

— five samples sharing one initial ratio lie on a line whose slope does not move when the ratio changes, while one sample with **0.71000** mistaken for **0.70000** is off in age by **53.1913** per cent — the separator is whether the initial ratio is assumed for one point or left unknown for the slope — [Paper 834]

Yuuki YAMAGISHI (山岸 勇輝)
Yamagishi Complexity Torus Lab, Japan
September 2026

— From thinking to syncing. —

Abstract

What radiometric dating does not know is not the rate of decay but how much was there to begin with.This paper counts how an age comes out anyway.No new theorem or law is claimed. First, samples sharing one initial ratio fall on a straight line——over five samples with different parent contents the fit is $R^2 = 1$ (Section 2). **Second, and this is the core. The initial ratio never touches the slope——at 0.70000 and at 0.85000 the slope is $\mathbf{1.4305189443} \times 10^{-2}$, with difference 0** (Section 2). **Third, the intercept is the initial ratio itself——the two lines have intercepts 0.700000 and 0.850000** (Section 2). **Fourth, a single sample forces an assumption——mistaking 0.71000 for 0.70000 makes the error 53.1913 per cent, and taking 0.72000 makes it -53.5962 per cent** (Section 3). **Fifth, if the initial ratios are not shared the line lies, and it does not look as if it does——a scatter of ± 0.002 throws the age off by 2.1315 per cent while R^2 is still 0.971559** (Section 3). **Sixth, the separator is whether one assumes the initial ratio and works from one point, or leaves it unknown and works from the slope——one decay law yields two different measurements** (Section 4). **Keywords**: isochron, radiometric dating, initial ratio, slope and intercept, least squares, model.

Scope of this paper (scope note): **No new theorem or law is claimed——that radioactive decay is exponential, that normalising the daughter by a stable isotope puts the initial ratio in the intercept and the age in the slope (the isochron method), and that sharing one initial ratio is its premise, are all known.No real rock or age is claimed——the half-life of 4.88×10^{10} years and the parent contents of the five samples are values placed to read orders of magnitude.The mechanism of decay is not entered——why nuclei break is not treated.No theory of errors is built——a line is fitted by least squares, with no weights and no error ellipses.No nuclide is chosen——which parent--daughter pair to use is not stated.Relation to earlier papers**: **Paper 796 showed that radioactive equilibrium itself gives no age and that only the departure from it keeps time——this paper does not sit in that seat but stands beside it: there how far one system is from equilibrium, here what several samples have in common.Paper 346 showed that for two of the three reaction orders "half-life" is not even a property of the substance, and its scope note stated that the mechanism of radioactive decay is not entered——this paper does not enter it either.**What is added is **confirming that changing the initial ratio leaves the slope with difference 0, measuring the 53.1913 per cent that a 0.01 error in the assumed ratio costs at one point, measuring that a scatter in the initial ratios costs only a 24.9th of that**, and **placing the separator on assuming versus reading the slope**.

1. Notation and the Question

Setting: **let the parent nuclide be P, the daughter it decays into D, and a stable isotope of the same element D_s.All three are measured in the same sample, and D_s divides.**

$$\frac{D}{D_s} = \left(\frac{D}{D_s}\right)_0 + \frac{P}{D_s}\left(e^{\lambda t} - 1\right), \qquad \lambda = \frac{\ln 2}{t_{1/2}}$$

With P/D_s across and D/D_s up, this is a straight line.The intercept is the initial ratio and the slope is $e^{\lambda t} - 1$.

Question: **can a time come out without knowing how much was there to begin with?**

2. The Initial Ratio Never Touches the Slope

Computation 2.1: **with a half-life of 4.88×10^{10} years (decay constant $\lambda = 1.420384 \times 10^{-11}$ per year), an age of 1.0×10^{9} years, and five samples with parent contents 0.10, 0.45, 0.80, 1.30 and 2.00, the initial ratio was set two ways.**

initial ratio	slope	intercept	R^2
0.70000	$1.4305189443 \times 10^{-2}$	0.700000	1.000000000000
0.85000	$1.4305189443 \times 10^{-2}$	0.850000	1.000000000000

Observation 2.2

this is the core. The two slopes differ by 0.The initial ratio is only added to the vertical axis; it does not enter how the horizontal axis acts——so it need not be known. What is not known is carried by the intercept.

Computation 2.3: **returning from the slope gives $\log(1+s)/\lambda = 1.000000 \times 10^{9}$ years, which is the age that was set.**

Observation 2.4

at age 0 the slope is 0 as well.No time has passed, so no daughter has accumulated——the other end of the slope being the vessel of time.

3. When There Is Only One Point

Computation 3.1: **one sample with true initial ratio 0.71000 and age 1.0×10^{9} years was taken alone, and the age computed under assumed ratios.**

assumed initial ratio	age obtained	error
0.70000	1.531913×10^{9} years	$+53.1913$ per cent
0.71000	1.000000×10^{9} years	0.0000 per cent
0.72000	4.640375×10^{8} years	-53.5962 per cent

Observation 3.2

at one point, the answer moves with the assumption.An error of 0.01 in the initial ratio halves the age or raises it by half——one point does not determine a line, so a slope can only be had by bringing in an intercept.

Computation 3.3: **the five samples were then given initial ratios scattered by ± 0.002.**

measured	value
slope	$1.3998156080 \times 10^{-2}$
R^2	0.971559
age obtained	9.786854×10^{8} years
error	-2.1315 per cent

Observation 3.4

when the premise fails, it still looks nearly straight.R^2 is 0.971559 and yet the age is off by 2.1315 per cent——though that is only a 24.9th of what a 0.01 error in an assumed ratio costs.

Observation 3.5

so several points are there for identity more than for precision.More points both remove the need to assume and let a broken premise show as scatter——one point gives neither.

4. The Separator

Observation 4.1

the separator is whether one assumes the initial ratio and works from one point, or leaves it unknown and works from the slope.One decay law yields two different measurements——the first leans on the assumption being right, the second on the samples having shared one initial ratio.

Observation 4.2

placed beside Paper 796.796 showed that radioactive equilibrium itself gives no age and that only the departure from it keeps time——there how far one system stands from equilibrium, here what several samples have in common. Both name which quantity is the clock.The scope note of Paper 346 stated that the mechanism of decay is not entered——this paper does not enter it either.

> **Observation 4.3**
>
> **what is not said.No real rock or age, no mechanism of decay, no theory of errors and no choice of nuclide is treated——what is shown is that when the unknown is lodged in the intercept, only the slope carries the time.**

5. Census and Closing

1. **intercept holds the ratio, slope the time** (Section 1): **two vessels in one line.**
2. **slope $\mathbf{1.4305189443 \times 10^{-2}}$** (Computation 2.1): **the same at both ratios.**
3. **difference $\mathbf{0}$** (Computation 2.1): **the core.**
4. **intercepts $\mathbf{0.700000}$ and $\mathbf{0.850000}$** (Computation 2.1): **the ratios themselves.**
5. **age recovered $\mathbf{1.000000 \times 10^{9}}$ years** (Computation 2.3): **the value set.**
6. **one point costs $\mathbf{+53.1913}$ per cent** (Computation 3.1): **for an error of 0.01.**
7. **the other way, $\mathbf{-53.5962}$ per cent** (Computation 3.1): **same width, not symmetric.**
8. **scatter costs $\mathbf{-2.1315}$ per cent** (Computation 3.3): **a 24.9th of that.**
9. **and yet $R^2 = \mathbf{0.971559}$** (Computation 3.3): **the eye cannot tell.**
10. **assume, or read the slope** (Observation 4.1): **the separator; Papers 796, 346.**

Closing: **Not knowing the initial amount does not stop dating: only the slope carries the time.Five samples sharing one initial ratio fall on a straight line, and changing that ratio from 0.70000 to 0.85000 leaves the slope $1.4305189443 \times 10^{-2}$ with difference 0, moving only the intercept——because the initial ratio is added to the vertical axis and does not enter how the horizontal axis acts.With a single sample the ratio must instead be assumed, and mistaking 0.71000 for 0.70000 throws the age off by 53.1913 per cent——because one point does not determine a line.A scatter of ± 0.002 in the initial ratios costs 2.1315 per cent while R^2 is still 0.971559, so a broken premise does not announce itself.Placed among the earlier papers——beside Paper 796's naming of which quantity is the clock, and inside the line Paper 346's scope note drew around the mechanism of decay.To be honest——the half-life and the samples are values placed to read orders of magnitude, not measurements of a real rock.**

References

1. Faure, G., & Mensing, T. M. (2005). *Isotopes: Principles and Applications*. Wiley.

2. Yamagishi, Y. (2026). *For Two of the Three Reaction Orders, "Half-Life" Is Not Even a Property of the Substance* [Paper 346]. Zenodo. 10.5281/zenodo.22682323

3. Yamagishi, Y. (2026). *Radioactive Equilibrium Itself Gives No Age: Only the Departure From Equilibrium Keeps Time* [Paper 796]. Zenodo. 10.5281/zenodo.23015393

— From thinking to syncing. —

Yuuki YAMAGISHI (山岸 勇輝)

© 2026 Yamagishi Complexity Torus Lab, Japan · Licensed under Creative Commons Attribution 4.0 International (CC BY 4.0)