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2.5.3 Exploratory Quiz: Rates of Predation and Synthesis
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Question 1

1/1 point (graded)
In the last video, Ethan explained how trophic levels work, with only about 10% of the energy from each level reaching the next. In particular, only about 10% of the energy at the level of the sardines (the primary consumer) reaches the marlin (the secondary consumer).

Trophic Energy

Secondary Consumer
(Marlin)

10%

Primary Consumer
(Sardine)

10%

Primary Producer
(Plankton)
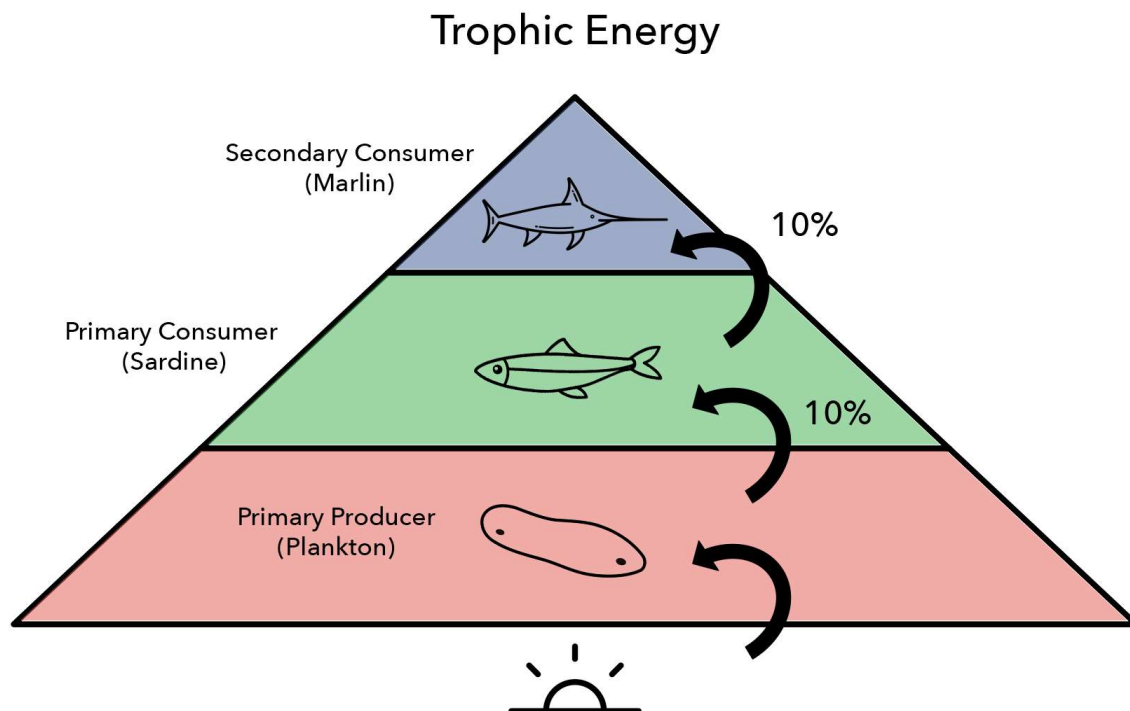
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But Ethan misspoke in the last part when he said we might expect d, the synthesis rate for marlin, to be 10 times bigger than b, the predation rate on sardines. What might we expect instead about the relative sizes of b and d? Why?

$$\frac{dS}{dt} = \mathbf{a}S - \mathbf{b}SM$$

$$\frac{dM}{dt} = -\mathbf{c}M + \mathbf{d}SM.$$

*(Recall from earlier sections that b is the predation rate of marlin on the sardine, and the interaction term **b**SM represents roughly the amount of sardines marlin are eating per unit time. On the other hand, d is the synthesis rate of the marlin, with **d**SM representing roughly the increase in marlin population per unit time due to their consumption of sardine.)*

- $b \approx d$

- d about 100 times greater than b

- b is about 100 times greater than d

- b is about 10 times greater than d ✔

- None of the above.

Explanation
Since only about 10% of the energy in the sardine reaches the marlin, this means if the marlin consume **b**SM sardines, only about 10% of this energy contributes to the growth of the marlin population. So we expect **d**SM to be approximately equal to 10% of **b**SM, which is means that d is about 10% of b, or b is about 10 times greater than d.

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ⓘ   Answers are displayed within the problem

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