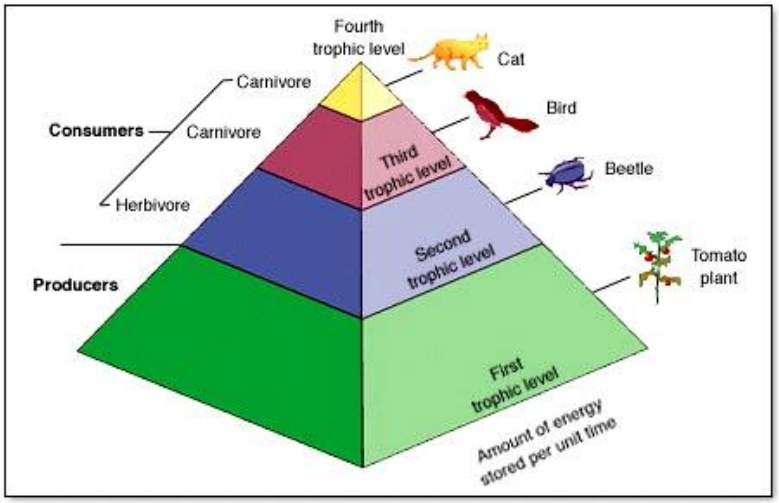
2.1.4 Explain the principles of pyramids of numbers, pyramids of biomass, and pyramids of productivity, and construct such pyramids from given data.

Course Companion p.48,49,50

Ecological Pyramids

- Pyramids are graphical models of the quantitative differences that exist between the trophic levels of a single ecosystem.

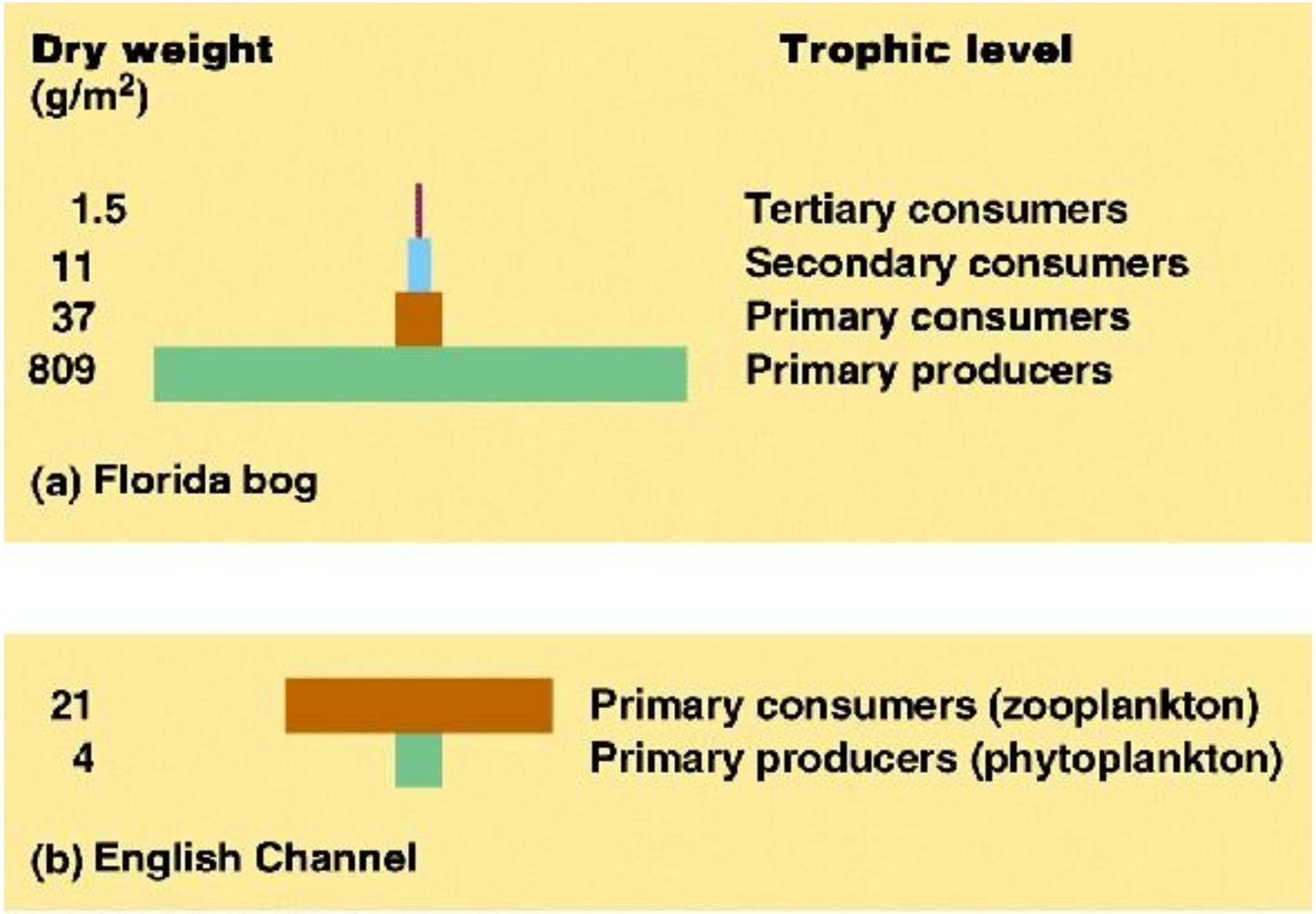


1. Pyramids of BIOMASS

- A pyramid of **biomass** represents the standing stock of each trophic level measured in units such as grams of biomass per square metre ($g\ m^{-2}$).

- Biomass may also be measured in units of energy, such as $J\ m^{-2}$

1. Pyramids of BIOMASS



2. Pyramids of NUMBERS

- Pyramids of **numbers** sometimes display different patterns, for example, when individuals at lower trophic levels are relatively large (i.e. oak tree)

- Similarly, pyramids of **biomass** can show greater quantities at higher trophic levels because they represent the biomass present at a given time

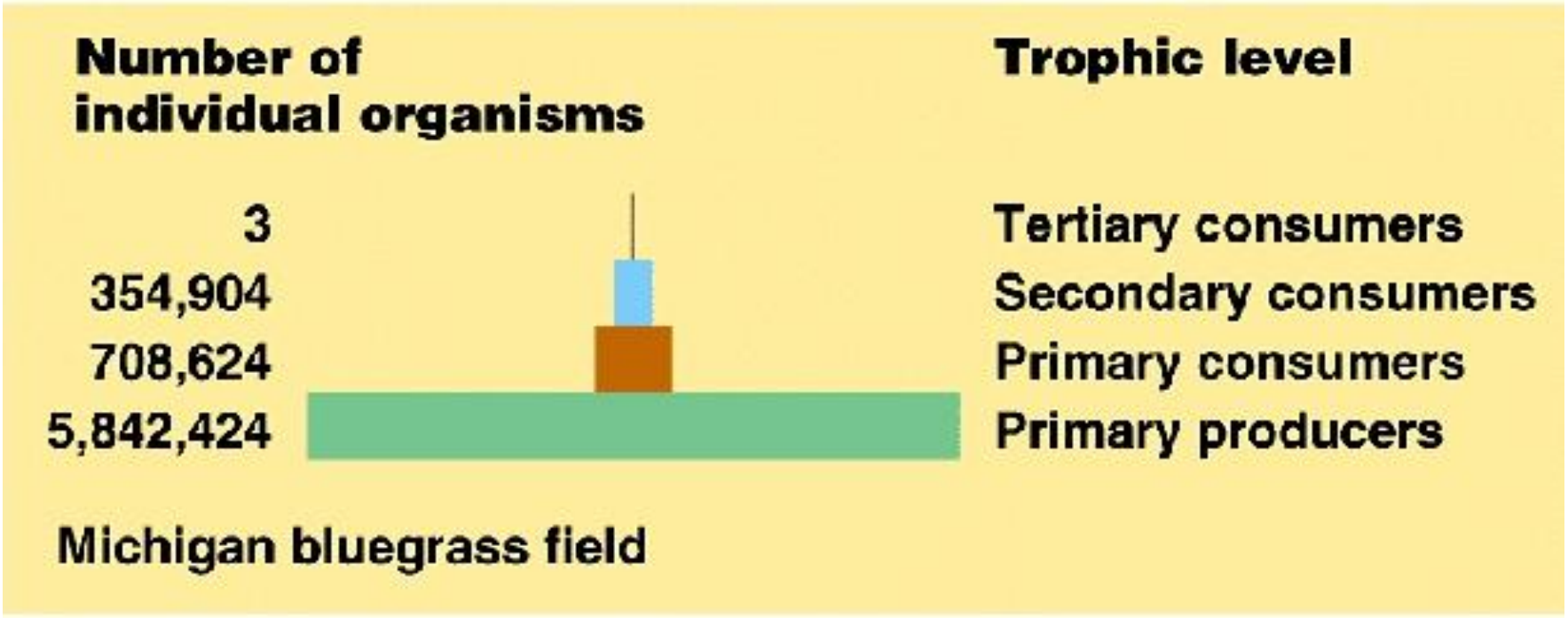
- Both pyramids of numbers and pyramids of biomass represent stores.

2. Pyramids of NUMBERS

- *Usually* smaller organisms are eaten by larger organisms and it takes numerous small organisms to feed one large organism

- To support 3 individuals at the top carnivore level, there were 354,904 primary carnivores feeding upon 708,624 herbivores who in turn fed upon 5,842, 424

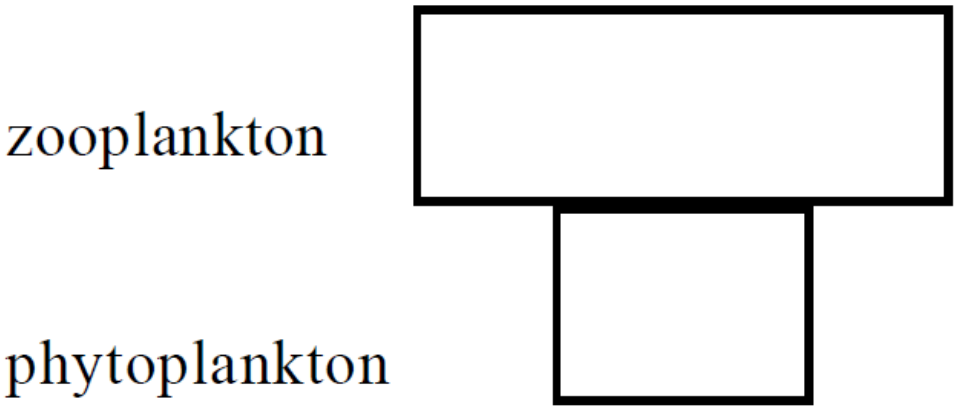
2. Pyramids of NUMBERS



1.1.10 Evaluating Pyramid Models

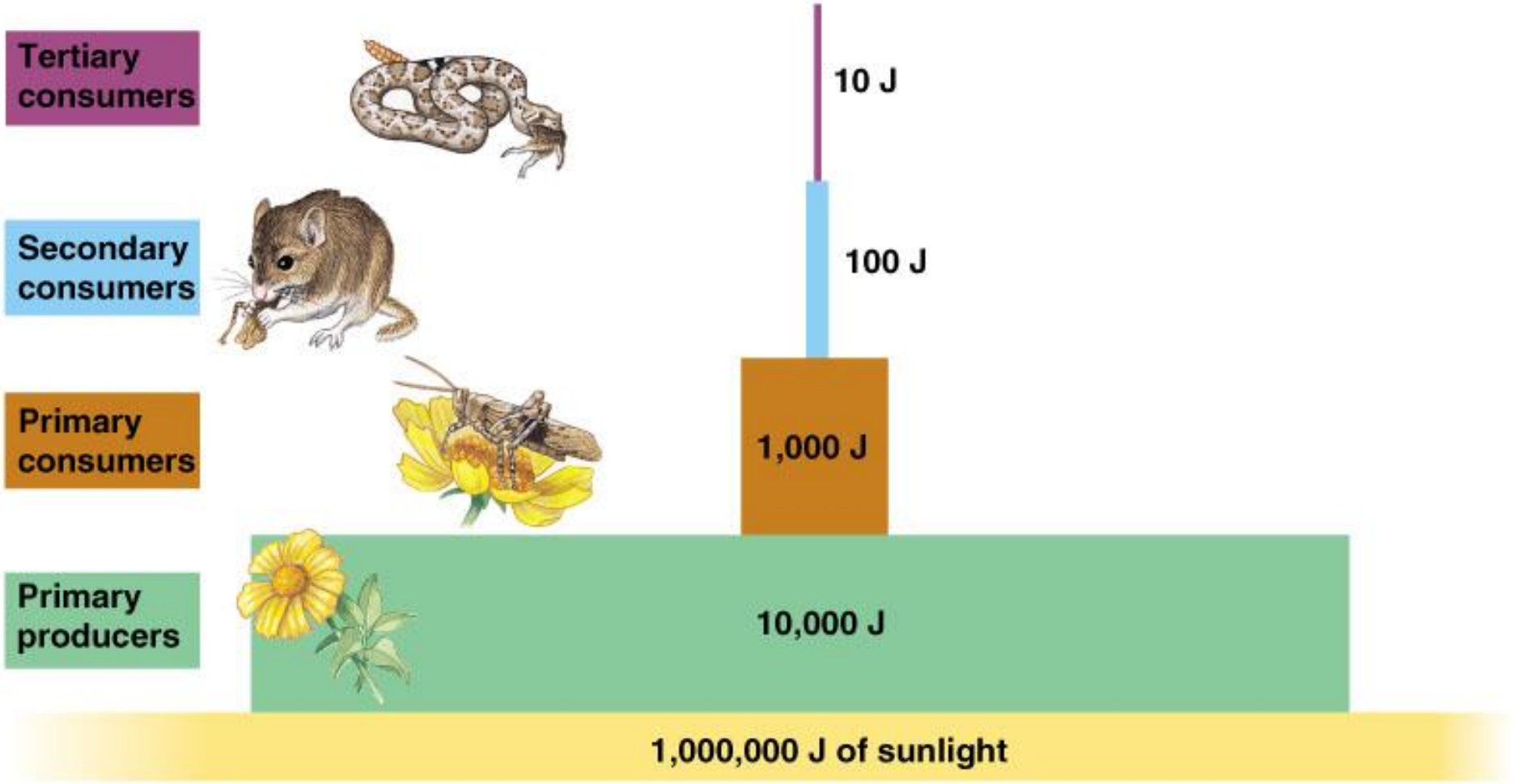
Pyramids of numbers - Do not take into account the relative size of producers and consumers - one tree can support thousands of caterpillars, for example, so the pyramid is often inverted.

Pyramids of biomass - Overcome the problem of body size but do not take into account productivity. Consequently, they sometimes present a misleading picture. In exams, the most common example is an inverted pyramid of biomass for the English Channel.



Despite appearances, the biomass of zooplankton are not being supported in any sustainable way by a smaller biomass of phytoplankton - the pyramid does not show the **productivity** of the phytoplankton (i.e. the number of new phytoplankton the phytoplankton are producing).

3. Pyramids of PRODUCTIVITY



3. Pyramids of PRODUCTIVITY

- refer to the flow of energy through a trophic level and invariably show a **decrease** along the food chain

- The most difficult to construct but always pyramidal!

2.1.4 Explain the principles of pyramids of numbers, pyramids of biomass, and pyramids of productivity, and construct such pyramids from given data.