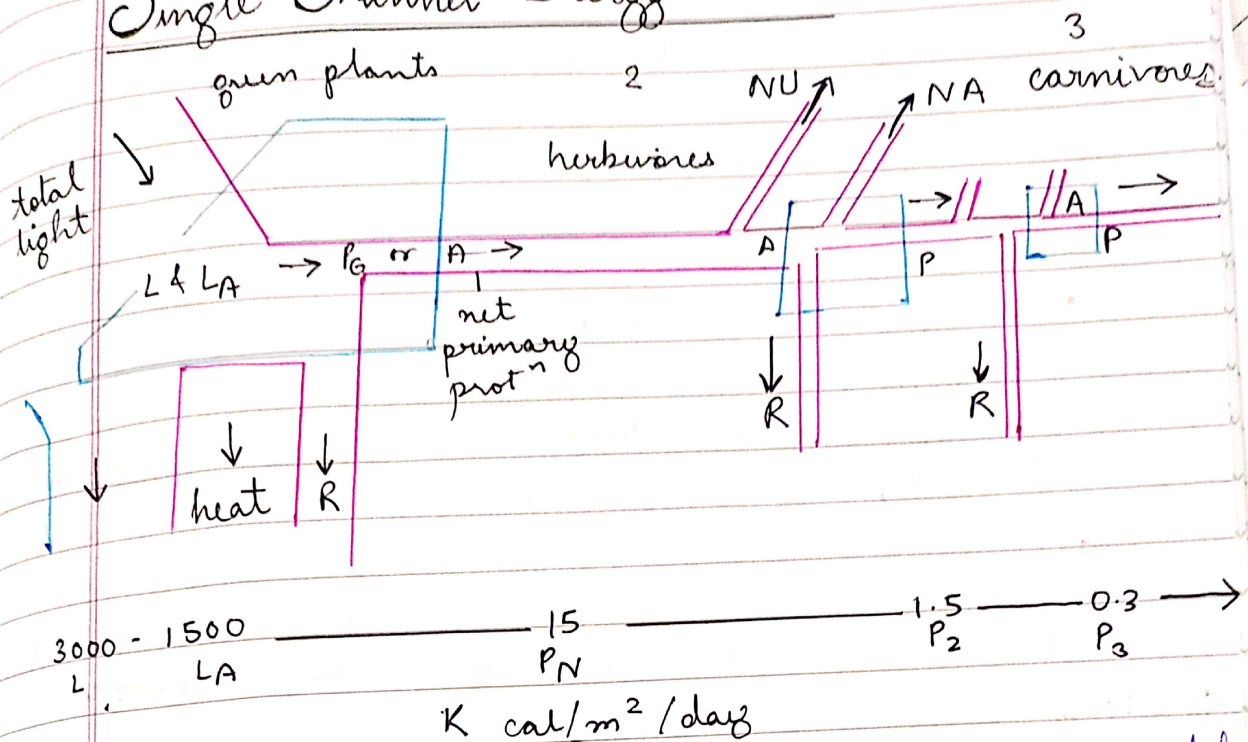


Single Channel Energy Model



- The principle of working of the 2 logs of model of thermodynamics.
- The total incoming solar radiation and gross production by autotrophs is 10.11%.
 - It may be also not 21% of energy or 23% is consumed in metabolic reaction, maintenance & production.
 - Then by herbivores / grazing animals feeding on autotrophs 22m² are consumed by herbivore means 17% of net gross production.
 - Decomposition acc. for about 34% of net production of the plant material 20 gm calories 79.5% of production is not used. It is obvious that much more energy is available for herbivores. It is noted that various pathway 4 acc. for total energy capture of autotroph i.e., gross production.
 - At the herbivore of 15 gm/cm² per year, 34% used in respiration. There is considerably more energy loss.

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At carnivore level only 3.0 gm/c/cm^2 or 2% of net production pass through carnivores. Most efficient utilisation occurring in autotroph.

At carnivore level, 60% of the energy intake is consumed in metabolic activity & the remainder become non-utilised segment. Losses represent the trophic level, pipe shows energy level in & out of each level. Energy inflow, balance outflow required by 1st law of thermodynamics, energy restored as the 2nd law. This model shows the trophic level, that the energy flow is reduced Producers to herbivores then to carnivores.

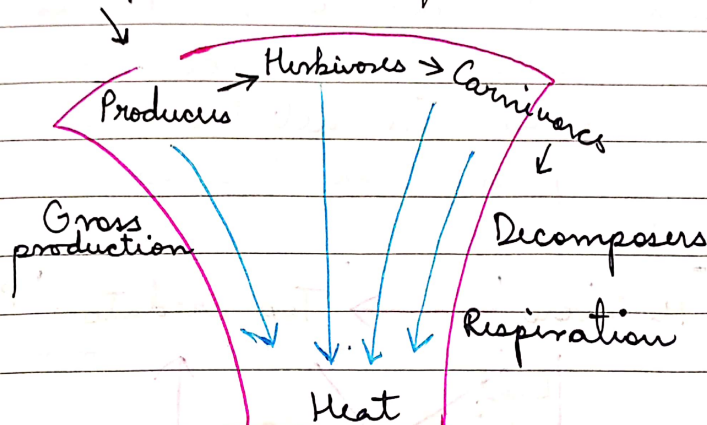
Each transfer of energy from well to another, major part is loss as heat or other from successive reduction in energy flow, whether we consider it in terms of total flow (Total assimilation & total energy output) or secondary production. Thus of the 3000 kcal of total energy is falling on green plant approx. 15% is absorbed.

3000 - 15000 kcal of which 11% is converted into one trophic level. Next 1% is 15 kcal 2nd productivity P_2 & P_3 tends to be about 10% at successive consumer trophic level it herbivores & carnivores although efficiency of carnivores is higher, 20% at carnivore level $P_3 = 0.3 \text{ cal}$.

In this, it is natural to agree reduction in energy flow at successive trophic level corresponding dec in biomass.

- Indeed energy taken here represent rate function, production rate, Relationship b/w biomass & energy content may differ acc. to situation. Ex: 1 gm of an algae = many grams of forests tree leaf. Due to fact that rate of production forests tree leaf. Due to fact that rate of production of algae is higher than that of tree leaves, standing crop / biomass.
- Bifunction should be confuse with each other & 2 are not necessarily co-related.

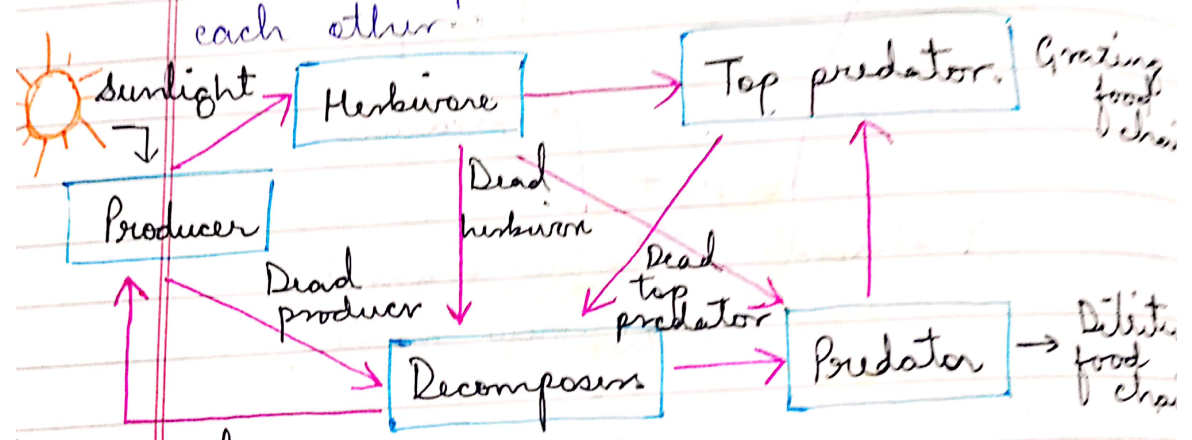
Y shaped energy flow



Y shaped or double channel energy flow model

- Single Channel Energy Flow Diagram, show simple energy flow model for TEEL, 1957 prepared an energy flow, diagram of a spring in U.S.A. Similarly H.T. Odum, 19 prepared EFM by Silver Spring, Florida.
- There are 4,00,000 Kcal / metre sq / per year
- Effective solar radiation falling on green plant for photosynthesis of these 3,89, was lost as heat only 20,810 Kcal, could be used in gross production.

- Again out of this 11911 kcal/kg, respired & only 2233 kcal/m used. This energy is forward to next higher level producers to consumers.
- Odum showed a commonly boundary of input, export of organic are also Y shaped.
- Decomposers are placed in a separate box as a meaning of separating detritus chain, decomposers are mixed group in terms of energy level.
- In nature, the grazing food chain & detritus food chain are in mix with each other. For ex. when herbivores die of natural cause, eaten by predator, enter in detritus F.C & Y shaped model explain how F.C connect with each other.



Decomposed material taken by plants as nutrients - g

In this diagram, the upper part of the food chain is terminate. Adequate part of detritus F.C. Top predator is lion eats the deer & deer & lion die get eaten by lion. This shows b/w the interlinking of food chain.

22.07.21

- You can see that every stage, food chain are linked predator can eat. It is the fact, when the herbivores & to predator get decomposed by top predator, mosquito larvae in pond, eaten by big fishes, living then Y shaped model.
- The energy follows 3 main parts -
 - 1.) Transferred to next trophic level producer to consumer, death to decomposers.
 - 2.) In model given by 1957, for Keet spring, most of the energy rich material eaten by heterotroph, entered the system as plant detritus.
- Whereas H.T. Odum 1957 for silver spring, most of the heterotroph as food chain was produced by green autotrophic plant, E.T
- Odum, 1962, noted that basic feature that to begin dead with some system as heterotroph while in other, chain to begin with detritus used as in silver with the plant. E.T.
- Odum pointed out nature, 2 basic food chain in any system we have already considered
- These 2 kinds of food chains - 1.) The grazing food chain base going to herbivore than, with dead organic matter, passing three detritivores.

