Example: carbohydrate catabolism

At present we have one term ‘carbohydrate catabolism’

But carbohydrate catabolism differs when looked at at different ‘levels’

– cell

– multi-cellular organism
carbohydrate catabolism

- multi-cellular organism (human)
- lingual amylase in saliva (extracellular)
- \(\alpha\)-amylase in small intestine (extracellular)
- transported across intestinal wall to hepatic portal vein -> liver parenchymal cells/other tissues
- glycolysis etc. (intracellular)
carbohydrate catabolism

So gps annotated to this process might include:

- lingual amylase, α-amylase
- phosphofructokinase I, glyceraldehyde-3-phosphate dehydrogenase

But, in a single celled organism, only:

- phosphofructokinase I, glyceraldehyde-3-phosphate dehydrogenase
So, most metabolism is cellular, but in a multi-cellular organism, can be both cellular and organism level.

Same for transport:

- Oxygen transport
  - Oxygen transport by haemoglobin around organism
  - Oxygen transport within cell to mitochondria by e.g. by myoglobin
- biological_process
  - cellular process
    - cellular physiological process
  - physiological process
    - cellular physiological process
Solution

Split metabolism into ‘cellular metabolism’ and ‘organism metabolism’
Most types of metabolism would just move to be children of ‘cellular metabolism’
Make digestion a part_of ‘organismal catabolism’
new terms

- biological_process
  - cellular process
  - physiological process
    - cellular physiological process
  - metabolism
    - biosynthesis
    - catabolism
    - cellular metabolism
    - organismal metabolism
  - organismal physiological process