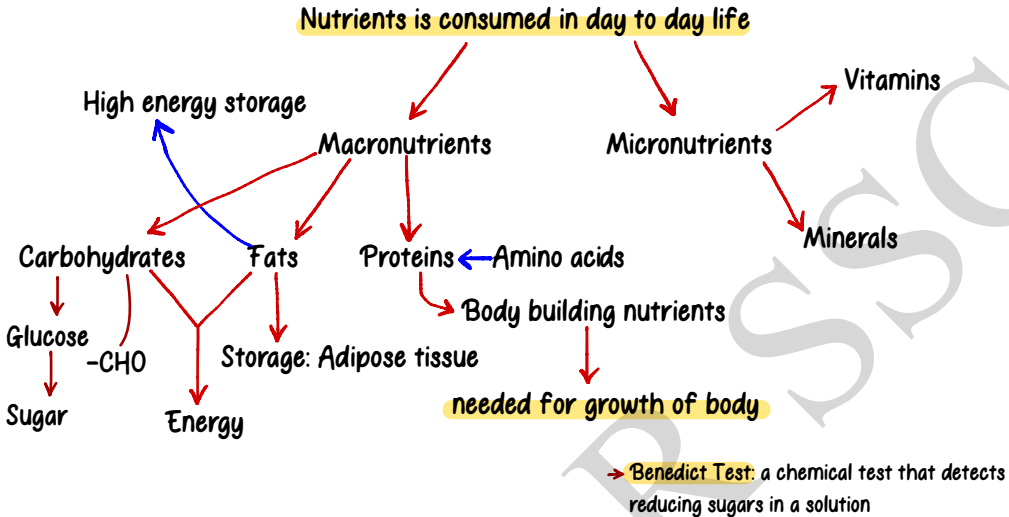


NUTRITION IN PLANTS AND ANIMALS

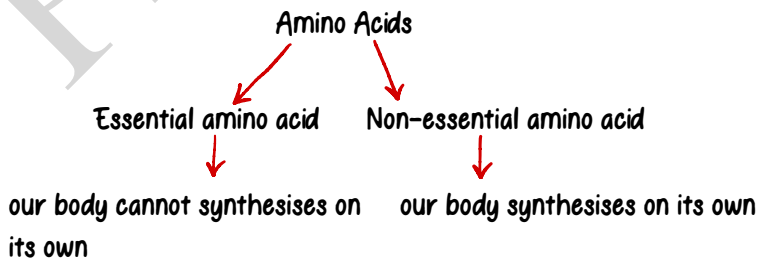
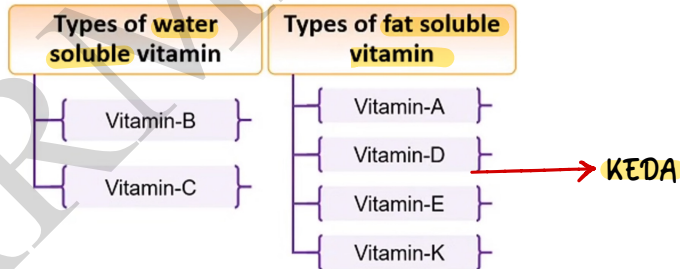


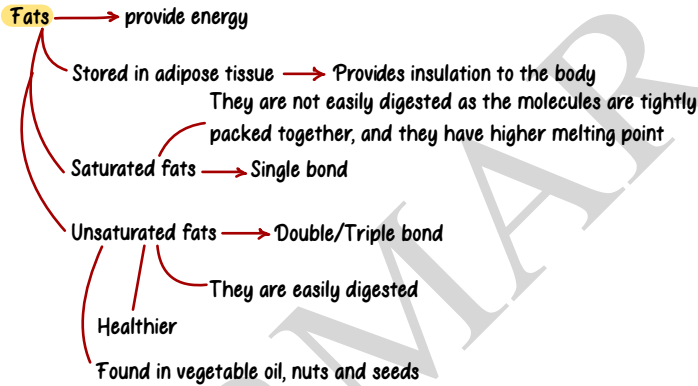
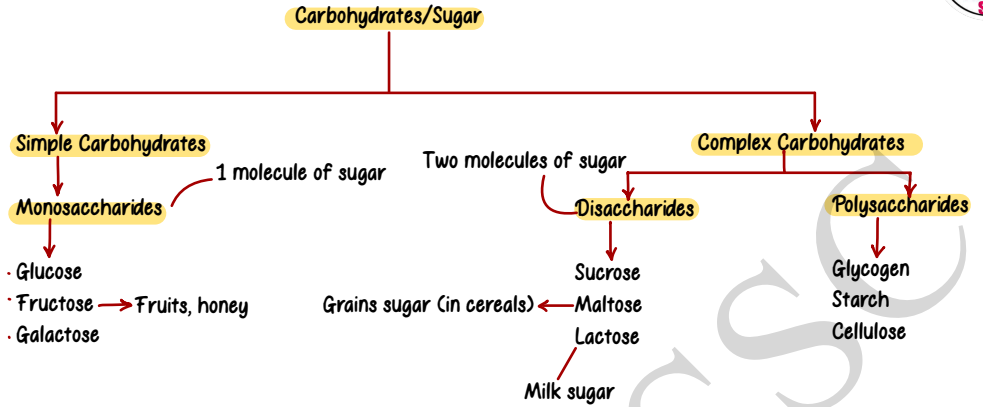
NUTRIENTS IN ANIMALS



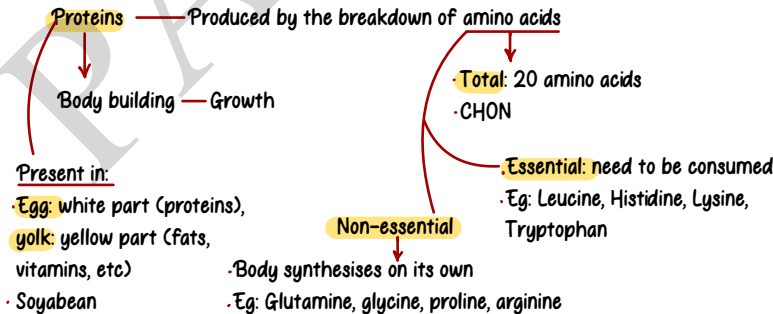
- **1912: Casimir Funk**, coined the term "VITAMIN"

On the basis of solubility:





Trans fat → it is a type of unsaturated fat that occurs naturally or artificially in foods



KWASHIORKOR VS MARASMUS

- In preschool children (1-5 years of age)
- Due to low protein intake
- Mild growth retardation
- Mild reduction in body weight
- Protruding abdomen and subcutaneous fat reserved
- Ribs not very prominent
- Poor appetite
- Enlarged fatty liver
- Oedema present
- Moonfacies
- Sparse hair
- Flaky paint-like skin
- Lethargic
- Requires adequate amount of protein



Kwashiorkor

- In weakened infants (<1 year old)
- Due to low calorie intake
- Severe growth retardation
- Severe reduction in body weight
- Shrunken abdomen and subcutaneous fat not preserved
- Prominent ribs
- Voracious feeder
- No fatty liver
- Oedema not present
- An old man like face
- No hair changes noted
- Dry and wrinkled skin
- Alert but irritable
- Requires adequate amount of protein, fat and carbohydrate



Marasmus

PARMAR

In carrot, mango, apple, papaya

S.No	Vitamin	Chemical Name
1	vitamin A	Retinol
2	vitamin D	Calciferol
3	vitamin E	Tocopherol
4	Vitamin K	Phylloquinone
5	vitamin B1	Thiamine
6	vitamin B2	Riboflavin
7	vitamin B3	Niacin
8	vitamin B5	Pantothenic acid
9	vitamin B6	pyridoxine
10	vitamin B7	Biotin
11	vitamin B9	Folic acid
12	vitamin B12	Cyanocobalamin
13	vitamin C	Ascorbic Acid

- In fish oil
- Sunlight
- Synthesised by our body

In sprouts

In citrus fruits

Vitamin	Chemical name	Deficiency
Vit A	Retinol,retinoid, carotenoid	Xerophthalmia/Nightblindness
Vit B1	Thiamine	Beri-beri,wernickes korasoff psychosis
Vit B2	Riboflavin	Ariboflavinos
Vit B3	Niacin,niacinamide	Pellagra
Vit B5	Pantothenic acid	Burning feet syndrome
Vit B6	Pyridoxine, pyridoxamine, pyridoxal	Anemia
Vit B7	Biotin	Dermatitis,enteritis
Vit B9	Folic acid	Megaloblastic anemia, neural tube defects
Vit B12	Cyanocobalamin Methylcobalamin	Megaloblastic anemia
Vit C	Ascorbic acid	Scurvy/bleeding gums
Vit D	Ergocalciferol Cholecalciferol	Rickets,osteomalacia
Vit E	Tocopherols	Hemolytic anemia in newborn/anti-sterility
Vit K	Phylloquinone	Hemorhagic disease of newborn (can happen to anyone)

Vitamin B complexes
Total: 8

No blood clotting

TRICK Diseases

B1: Thymine ————— **Tho** **Beri Beri**

B2: Riboflavin ————— **R**

B3: Niacin ————— **Ne** **Pellagra** → 3 Ds

- Dementia: loss of memory
- Diarrhoea
- Dermatitis: skin issues

B5: Pantothenic acid ————— **Pant**

B6: Pyridoxine ————— **Par**

B7: Biotin ————— **Biodata** (Vitamin H)

B9: Folic Acid ————— **Foster**

Minerals

- Calcium: for bone/tooth health
- Iodine: to prevent from Goitre
- Iron: deficiency may lead to Anaemia

B12: Cobalamin/ Cyanocobalamin ————— **Ca** **Pernicious anaemia**

Vitamin D sources

- Sunlight
- Fish oil

Vitamin C sources

- Lemon
- Amla

Vitamin E sources

- Sprouts

- Vitamins in milk: A, B, and D

Vitamin C not present

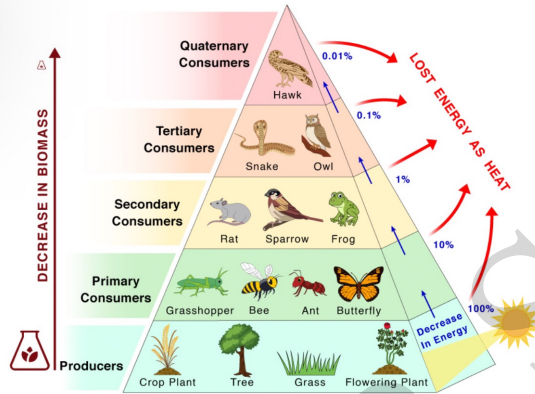
↘ Not present in eggs as well

Vitamin	Sources	Functions	Deficiency Disease
Vitamin A (Retinol)	Liver oil, Fish, Carrot, Milk, spinach and fruits such as Papaya and mango	Vision and growth	Night blindness, Xerophthalmia Keratinisation of skin
Vitamin B ₁ (Thiamine)	Yeast, Milk, Cereals, Green vegetables, Liver, Pork	Co – enzyme in the form of Thiamine pyro phosphate (TPP) in glycolysis	Beri – Beri (peripheral nerve damage)
Vitamin B ₂ (Riboflavin)	Soybean, Green vegetable Yeast, Egg white, Milk, Liver kidney	Co enzyme in the form of FMN (Flavin mono nucleotide) and FAD (Flavin adenine dinucleotide) in redox reactions	Cheilosis (lesions of corner of mouth, lips and tongue)
Vitamin B ₃ (Niacin)	Cereals, Green leafy vegetables, Liver, Kidney	Co enzyme in the form of NAD and NADP ⁺ in redox reactions.	Pellagra (photo sensitive dermatitis)
Vitamin B ₅ (Pantothenic acid)	Mushroom, Avocado, Egg yolk, Sunflower oil	Part of coenzyme A in carbohydrate protein and Fat metabolism	Inadequate growth
Vitamin B ₆ (Pyridoxine)	Meat, Cereals, Milk, Whole grains, Egg.	Co enzyme in amino acid metabolism, formation of Heme in Hemoglobin	Convulsions
Vitamin B ₇ (Biotin)	Liver, kidney, Milk, Egg yolk, Vegetables, Grains	Co enzyme in fatty acid Biosynthesis	Depression, Hair loss, muscle pain.
Vitamin B ₉ (Folic acid)	Egg, Meat, Beet root, Leafy vegetables, Cereals, Yeast	Nucleic acid synthesis, maturation of red blood cells	Megaloblastic anaemia



- Lipophilic vitamin required for protection of cell membrane and blood cells formation: Vitamin E
- A typical adult human body contains 25g of magnesium
- Yeast breaks down the food material outside the body and then absorbs it
↓
Saprophytic mode of nutrition (feed on dead or decaying matter)
- B12 is not present in plant foods → Pernicious anaemia to be target by year 2047 (India)
- Brain gets energy from glucose
- Proteins are made of 20 amino acids
- Fats store maximum energy per gram
- Soya milk: protein rich more than meat
- Amla is richest in Vitamin C
- Autotrophic mode of nutrition: Carbon dioxide, water, chlorophyll and sunlight
- Autotrophic mode of nutrition: bacteria
- Fungi: Heterotrophic mode of nutrition
- Amoeba: Holozoic mode of nutrition

Trophic Levels



- Not more than 10% transfer of energy from one trophic level to another

Match the column A with column B:

(SSC CHSL 30/05/2022 Evening)

26.

Column -A (Vitamin)	Column -B (Source)
i) Vitamin A	a. Whole Grain bread and Nuts
ii) Vitamin B	b. Carrot, Mango, Papaya
iii) Vitamin C	c. Egg yolk, Soya Product
iv) Vitamin D	d. Citrus fruits, red and green pepper

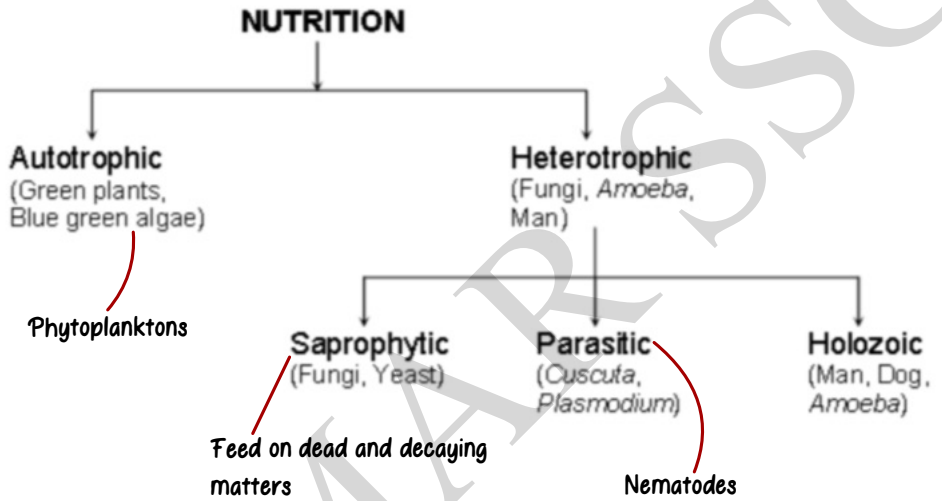
(a) i-b, ii-a, iii-d, iv-c
(b) i-a, ii-b, iii-c, iv-d

(c) i-b, ii-c, iii-a, iv-d
(d) i-c, ii-b, iii-d, iv-a

कॉलम A को कॉलम B से मिलाएँ:

कॉलम-ए (विटामिन)	कॉलम-बी (स्रोत)
i) विटामिन ए	a. साबूत अनाज की ब्रेड और मेवे
ii) विटामिन बी	b. गाजर, आम, पपीता
iii) विटामिन सी	c. अंडे की जर्दी, सोया उत्पाद
iv) विटामिन डी	d. खट्टे फल, लाल और हरी मिर्च

- Nutrients requirement of adolescents are higher than adult
- Nuts, vegetable oil, and fish are rich in sources of Omega 3 (fatty acids)
- Threonine is essential for healthy skin and teeth



- Zinc plays an important role in cell division, cell growth, wound healing and the breakdown of carbohydrates

34.

Which of the following is NOT a pair of micronutrients?

(SSC MTS 19/07/2022 Morning)

निम्नलिखित में से कौन सा सूक्ष्म पोषक तत्वों की एक जोड़ी नहीं है?

- | | |
|--|--------------------|
| (a) Iodine and minerals | a) आयोडीन और खनिज |
| (b) Calcium and fats <i>Macro</i> | b) कैल्शियम और वसा |
| (c) Minerals and Iron | c) खनिज और लोहा |
| (d) Iodine and Iron | d) आयोडीन और आयरन |

NUTRIENTS IN PLANTS

- Plants make food through photosynthesis

Requires:

CO₂

Water

Sunlight

Mg

Chlorophyll (green color)

Chloroplast

Plastids

Cell of a plant

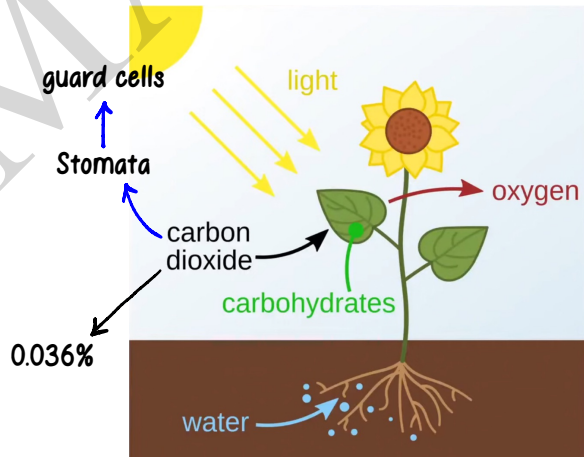
3 types:

Chloroplast

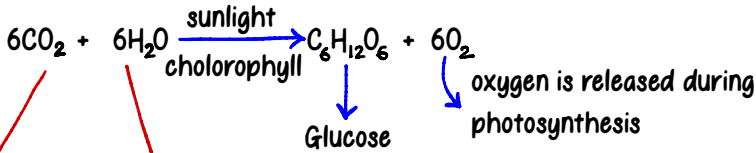
Chromoplasts

Leucoplast

Kitchen house of the cell



- thylakoids contain a pigment called chlorophyll, that absorbs light



Dark reaction
Site: stroma

Light reaction
Site: grana

Study of algae: **Phycology**

- Algae as well performs photosynthesis
- Green algae: **Chlorophyta**
- Red algae: **Rhodophyta**
- Yellow algae: **Phycophyta**
- Fire algae: **Pyrrophyta**
- Golden brown algae: **Chrysophyta**
- Brown algae: **Phaeophyta**

• Food stored in leucoplast; starch and oils

- **Amyloplast:** starch
- **Aleuroplast:** proteins
- **Elaioplast:** fats and oil

• **Mycology:** Study of fungi

Calvin cycle (light-independent reaction)/C3 cycle

Colour

- Tomato: **Lycopene**
- Carrot: **Beta carotene/Xanthophyll**
- Red capsicum: **Beta carotene**

Traps light energy
Carotenoids

- Cherries, apple, blueberries, grapes, pomegranate: **Anthocyanin**
- In brown algae food is stored in the form of complex carbohydrates that may be in the form laminarin and mannitol

NPK used in Urea

1828, Friedrich Wohler synthesised Urea

<u>Macro</u>	<u>Micro</u>
N - Nitrogen	Fe- Iron
P- Phosphorus	Mn - Manganese
K - Potassium	Cu - Copper
S - Sulfur	Zn - Zinc
Ca - Calcium	B - Boron
Mg - Magnesium	Cl - Chloride
Carbon, Hydrogen	Mo - Molybdenum

- Chlorella (algae) rich in protein and Iron
- Starches are made of long chain of glucose
- At least a half of the carbon dioxide fixation on earth is carried out by algae through photosynthesis
- Protein synthesis in plants: by use of nitrogen (legumes)

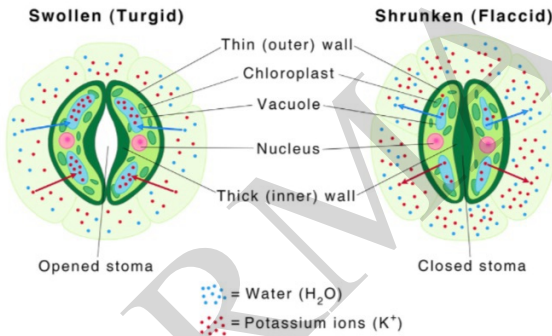
it has rhizoid bacteria, that absorbs Nitrogen from soil or atmosphere

- Glycolysis: breakdown of glucose into pyruvate
- Release of water into air by plants: Transpiration (day)
- Guttation: secretion of droplets from the pores (hydathodes) of plants at night
- Application of plant and soil science to crop production is known as Agronomy

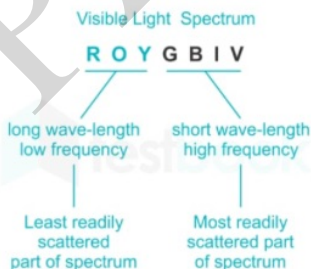
- Agrostology: study of grasses
- Anatomy: study of body structure/body parts
- Mango tree is example of autotroph
- ATP obtained by respiration of one molecule of glucose: 2
- Glycation: result of covalent bonding of a sugar molecule

Guard Cells

Prevent water loss in plants by regulating the size of stomata's pores



• White light made up of seven colours — V I B G Y O R



Green colour least used

Red color Highly used