

# BIOLOGI SEL

## Chapter I : Apersepsi





# Outline Mata Kuliah

**Nama MK : BIOLOGI SEL**

**Kode MK : BIO 15315**

**Jml SKS : 3 SKS**

**Semester : 3 (Ganjil)**

**Prodi : Tadris Biologi**

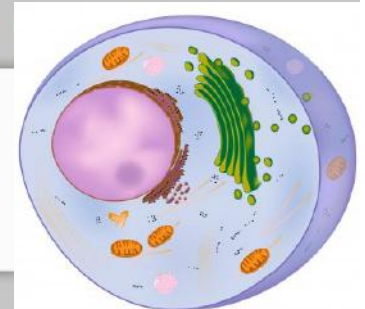
**Prasyarat : -**

**Kel. MK : Komp.Utama Prodi**

**Dosen : Husni Mubarak, S.Pd., M.Si**

# Deskripsi MK

MK ini membahas tentang struktur sel prokariotik dan eukariotik; Struktur dan fungsi dinding sel dan membran plasma; Hubungan antar sel; Struktur dan fungsi organel RE, Badan Golgi, Lisosom, Kloroplas, Mitokondria, Badan Mikro; Struktur dan fungsi inti sel; Sitoskeleton, Ribosom, Sentriol, pembelahan, pertumbuhan dan diferensiasi sel



| Pertemuan | Materi                                                        |
|-----------|---------------------------------------------------------------|
| I         | Overview Perkuliahan dan Kontrak Belajar; Apersepsi           |
| II        | Struktur Sel Bakteri, Sel Prokariotik dan Eukariotik          |
| III       | Membran Plasma dan Dinding Sel                                |
| IV        | Sifat Membran Plasma ( <i>eksperimen sederhana</i> )          |
| V         | Struktur dan Fungsi RE                                        |
| VI        | Struktur dan Fungsi Badan Golgi                               |
| VII       | Struktur dan Fungsi Lisosom dan Badan Mikro                   |
| VIII      | <b>UTS (Ujian Tengah Semester)</b>                            |
| IX        | Struktur dan Fungsi Mitokondria                               |
| X         | Struktur dan Fungsi Kloroplas                                 |
| XI        | Struktur dan Fungsi Ribosom dan Sintesis Protein              |
| XII       | Struktur dan Fungsi Sitoskeleton dan hub. antar sel           |
| XIII      | Struktur dan Fungsi Nukleus dan Kromosom ( <i>Kariotipe</i> ) |
| XIV       | Pembelahan dan Pertumbuhan Sel                                |
| XV        | Diferensiasi Sel                                              |
| XVI       | <b>UAS (Ujian Akhir Semester)</b>                             |

# Evaluasi

|                              |            |
|------------------------------|------------|
| <b>Ujian Tengah Semester</b> | <b>20%</b> |
| <b>Ujian Akhir Semester</b>  | <b>40%</b> |
| <b>Tugas-Tugas</b>           | <b>40%</b> |



**You've Already Knew My Style  
How I Evaluate Your Work ^^**





# Referensi

- Alberts B, Bray D, Lewis J, Raff M, Roberts K, Watson JD. 1989. *Molecular Biology of The Cell 2nd ed.* New York: Garland Publ., Inc.
- Bolsover RS *et al.* 2004. *Cell Biology-A Short Course.* New York: John Willey & Son.
- Campbell, Reece, Mitchell. 2002. *Biologi* [Terjemahan]. Jakarta: Erlangga.
- Sheller P. 1980. *Cell Biology, Struktur Biochemistry and Function.* New York: John Willey & Son.
- Turner PC *et al.* 2000. *Molecular Biology.* Liverpool: Springer.
- Thorpe NO. 1984. *Cell Biology.* New York: John Willey.
- Wolfe SL. 1985. *Cell Ultrastucture.* Belmont: Waardsworth Publishing Company.

# Kontrak Perkuliah



- Batas keterlambatan? ? **15 menit**
- **12.00** – 13.30 → Sholat Dhuhur??
- Absent (Alpha) > 3 kali → **Tidak boleh Ujian**
- Izin tidak dibatasi (asal **JELAS** dan **JUJUR**)
- Izin sakit → Surat Keterangan Dokter/ Puskesmas/ Klinik
- **SADAR** atas **KEWAJIBAN**, bukan hanya haknya
- **Sopan** dan **Santun (Anda Sopan, Saya Segan ^^)**
- Keberatan/ Pertanyaan/ Unek2 → Kritik membangun/  
Silahkan menemui secara personal/ Sopan dan santun

**Mention the parts of a home!!**

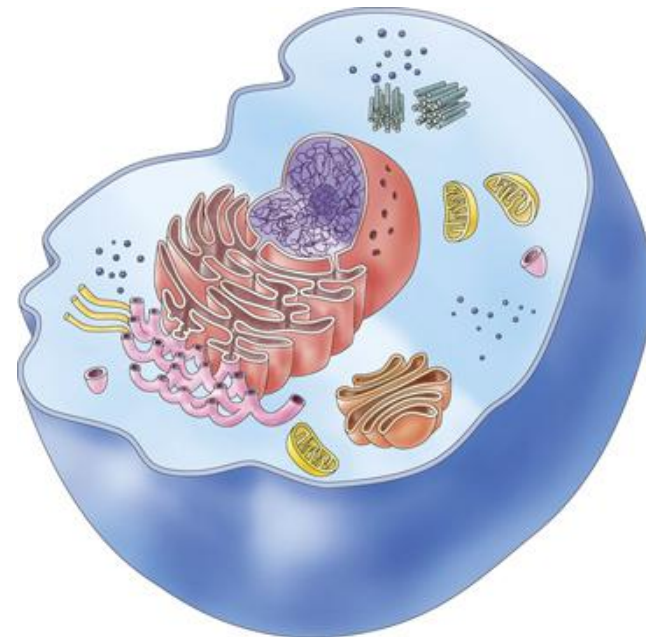




# Apa yang kalian ketahui tentang sel??



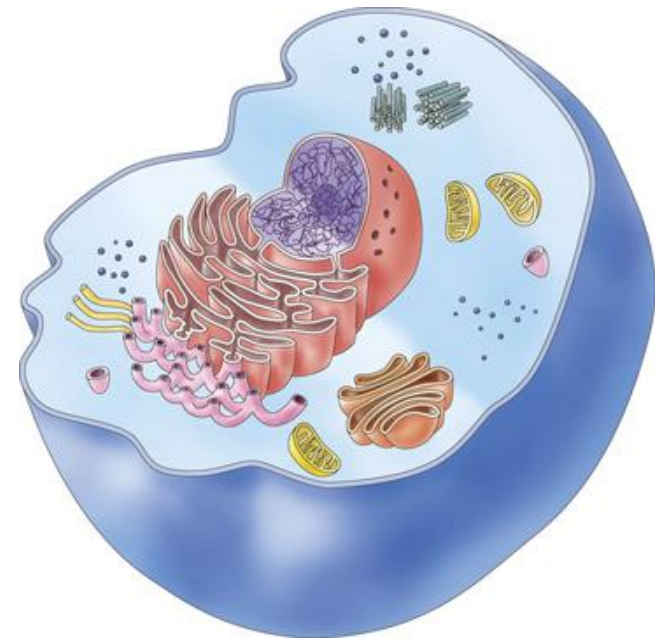
**Sel**



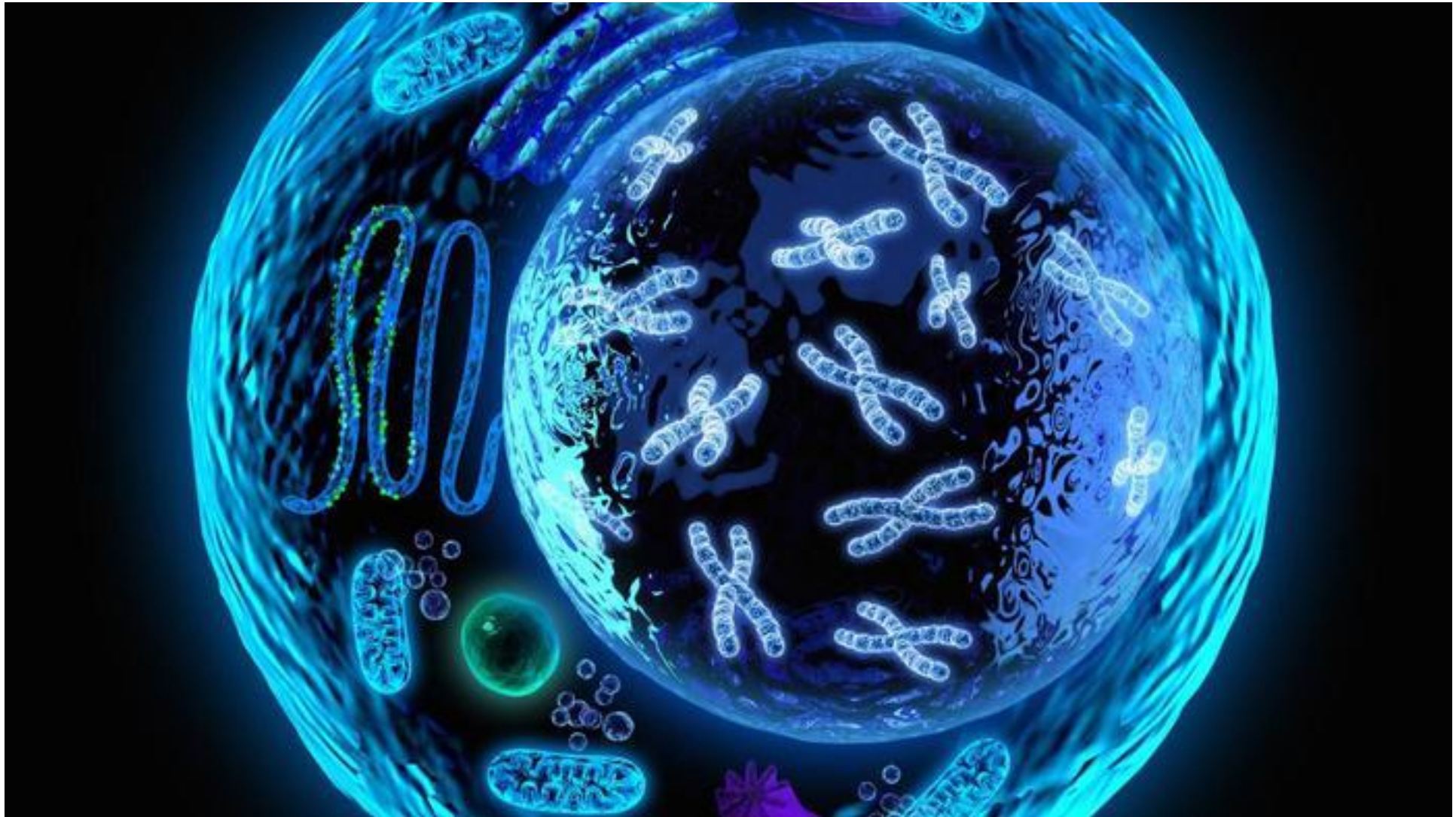
**Sel**

**Coba Jelaskan**

**Bagaimana  
Persamaannya??**



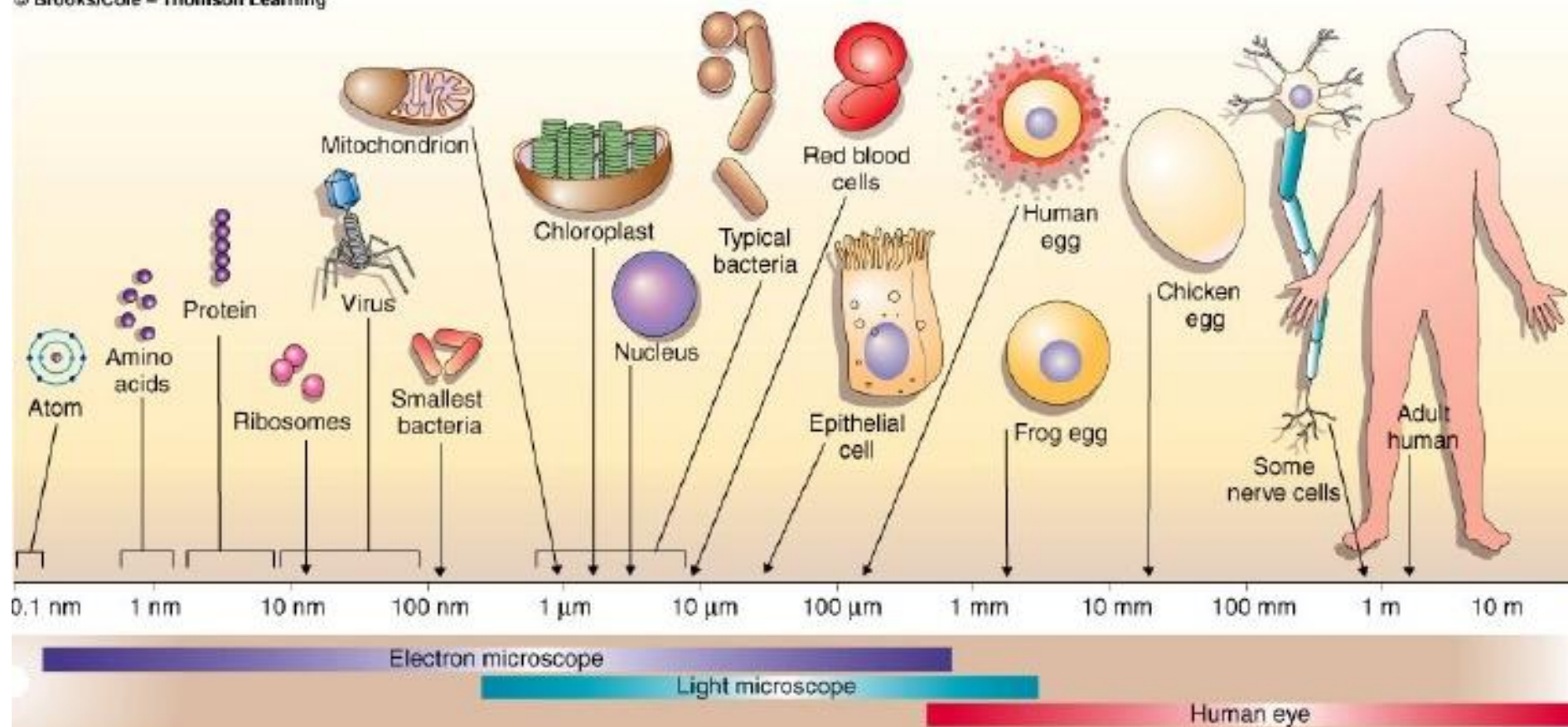
# Jadi apa itu sel??





# Biological size and cell diversity

© Brooks/Cole – Thomson Learning



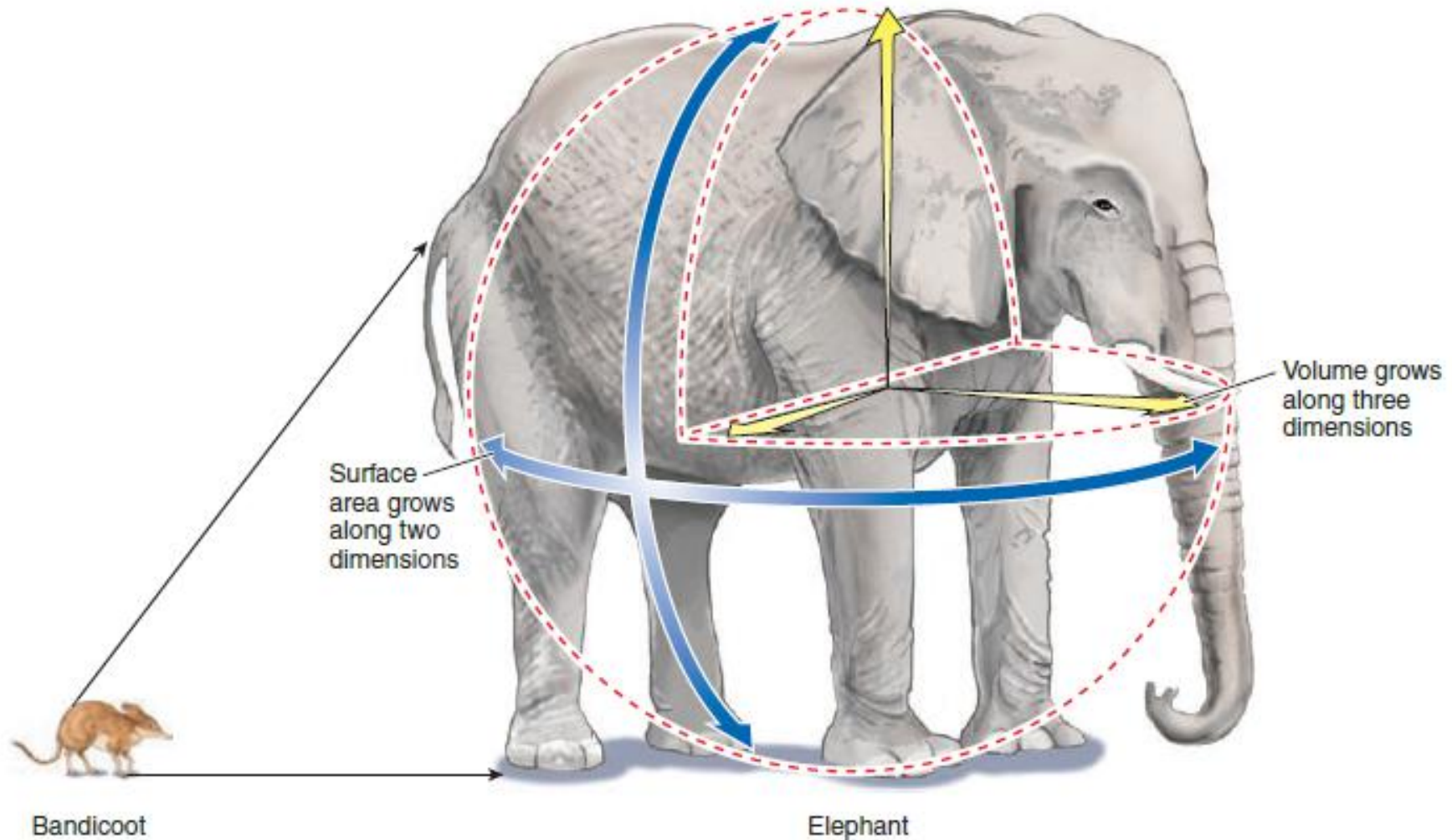
**Measurements**

|              |   |                       |
|--------------|---|-----------------------|
| 1 meter      | = | 1000 millimeters (mm) |
| 1 millimeter | = | 1000 micrometers (μm) |
| 1 micrometer | = | 1000 nanometers (nm)  |

|               |                   |   |                                |                   |
|---------------|-------------------|---|--------------------------------|-------------------|
| 1 meter       | (m)               | = | 39,4 inci                      | (in)              |
| 1 meter       | (m)               | = | 100 centimeter                 | (cm)              |
| 1 centimeter  | (cm)              | = | 10 milimeter                   | (mm)              |
| 1 milimeter   | (mm)              | = | 1000 mikrometer atau micron    | ( $\mu\text{m}$ ) |
| 1 mikro meter | ( $\mu\text{m}$ ) | = | 1000 nanometer atau milimikron | ( $\text{m}\mu$ ) |
| 1 nanometer   | (nm)              | = | 10 Amstrong                    | ( $\text{\AA}$ )  |

| Dimensi                                             | Bidang                                                                | Struktur                     | Metode                                   |
|-----------------------------------------------------|-----------------------------------------------------------------------|------------------------------|------------------------------------------|
| > 0,1 mm atau 100 $\mu\text{m}$                     | Anatomi                                                               | Organ                        | mata dan lensa sederhana                 |
| 100 $\mu\text{m}$ – 10 $\mu\text{m}$                | Histologi                                                             | Jaringan                     | Mikroskop cahaya                         |
| 10 $\mu\text{m}$ - 0,2 $\mu\text{m}$<br>atau 200 nm |                                                                       | Bakteri                      | Mikroskop cahaya                         |
| 200 nm – 1 nm                                       | Morfologi,<br>Submikroskopis,<br>Ultra struktur,<br>Biologi molekuler | Komponen-komponen sel, virus | Mikroskop polarisasi, mikroskop elektron |
| < 1 nm                                              | Molekul dan atom                                                      | Susunan atom                 | Difraksi sinar X                         |

# Mengapa sel berukuran kecil?





# WHY ARE MOST CELLS SMALL?

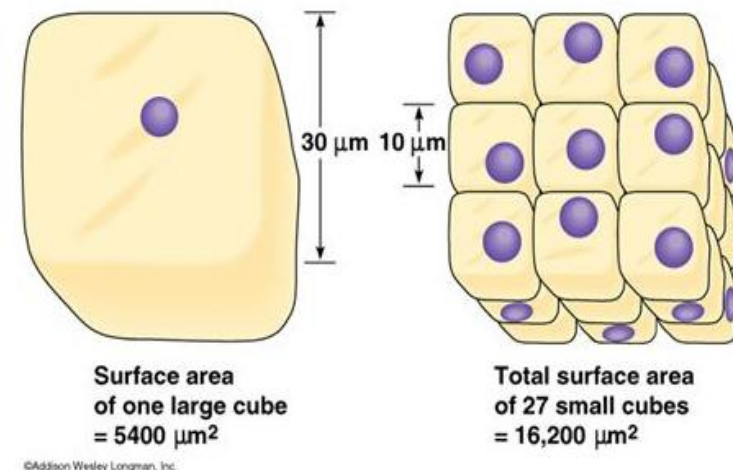
Most cells are too small to be seen without a microscope

Cells are small because their size is limited by their outer surface area.

Cells take in food and get rid of wastes through their outer surface.

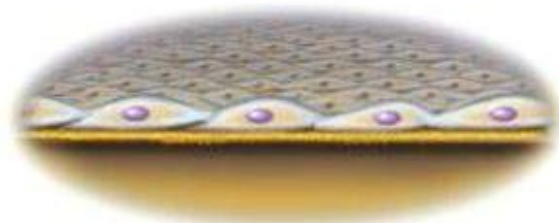
If a cell gets too large, the cell's surface area will not be large enough to take in enough nutrients or pump out enough wastes.

**Ukuran sel dibatasi oleh  
Luas permukaan – Ratio Volume  
Volume sel bertambah lebih cepat**

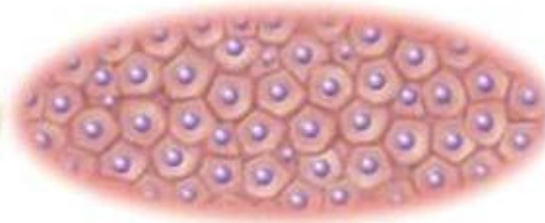


# Bentuk Sel???

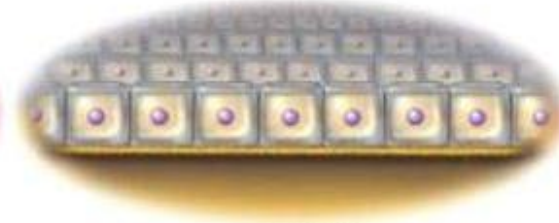
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Squamous



Polygonal



Cuboidal



Columnar



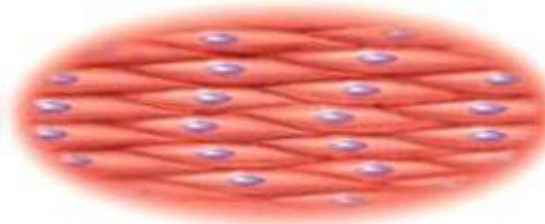
Spheroid



Discoid



Stellate



Fusiform (spindle-shaped)



Fibrous

- Squamous = thin and flat
- Polygonal = irregularly angular with 4 or more sides
- Cuboidal = squarish
- Columnar = taller than wide
- Spheroid = round
- Discoid = disc-shaped
- Stellate = starlike
- Fusiform = thick in middle, tapered at ends
- Fibrous = threadlike

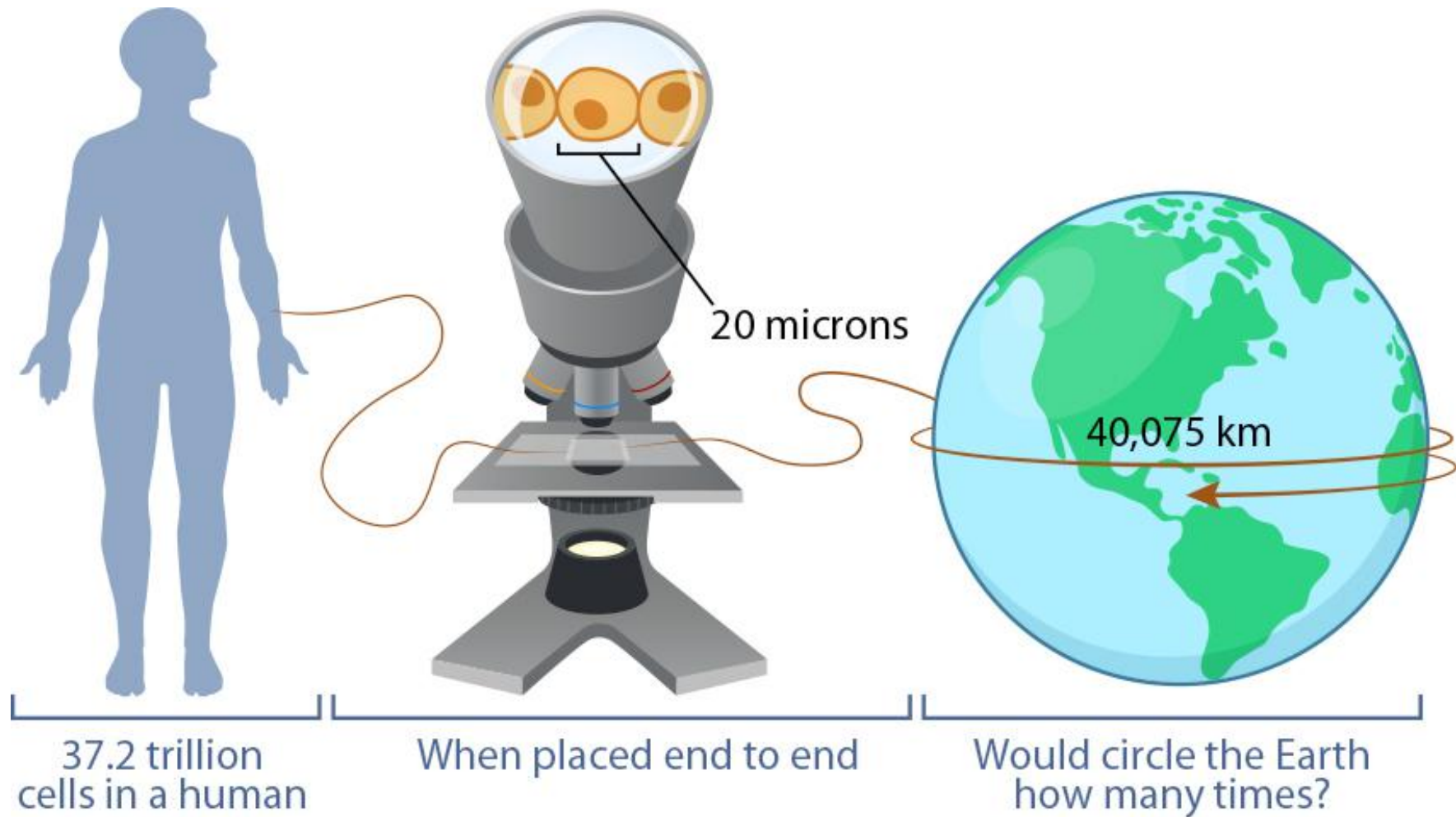
# Cell Shape

– A cell's shape reflects its function





# Berapa Jumlah Sel pada Manusia??

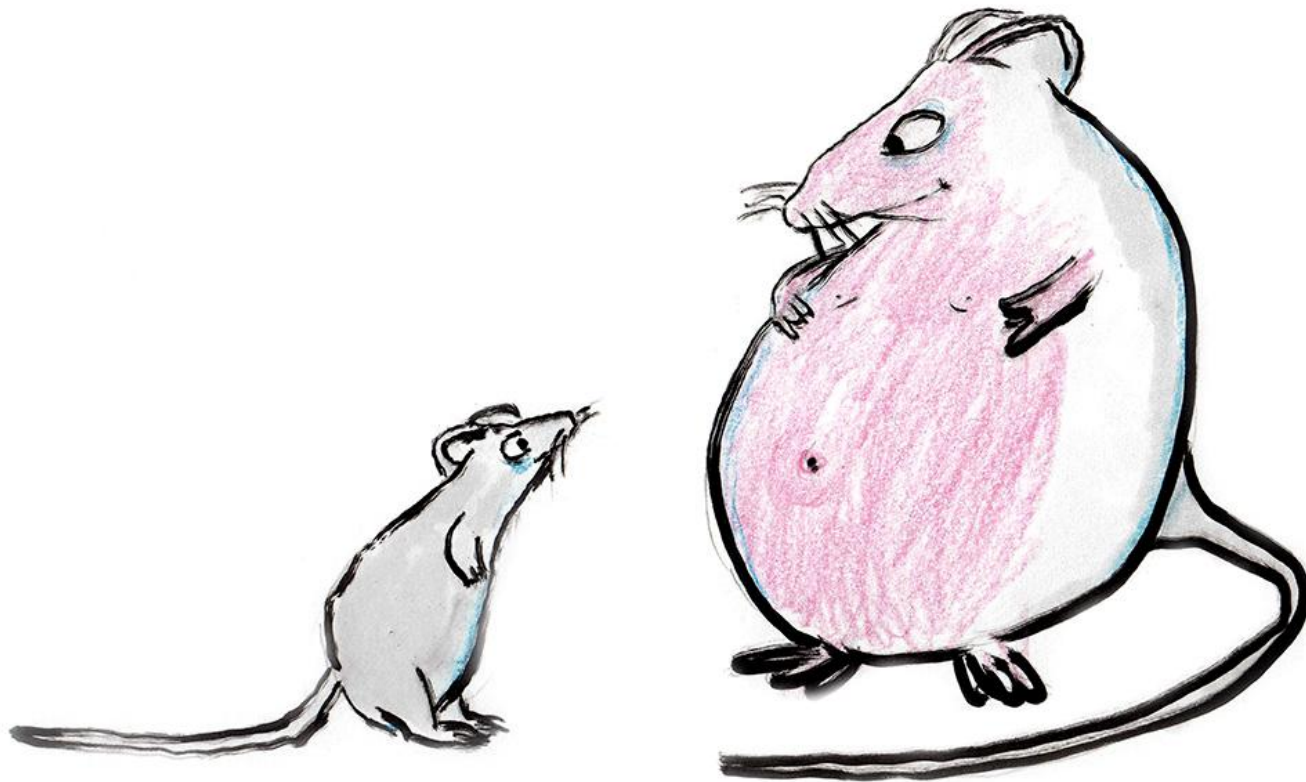


Q = ***Jenis sel manakah yang paling besar??***

| cell type           | average volume ( $\mu\text{m}^3$ ) | BNID           |
|---------------------|------------------------------------|----------------|
| sperm cell          | 30                                 | 109891, 109892 |
| red blood cell      | 100                                | 107600         |
| lymphocyte          | 130                                | 111439         |
| neutrophil          | 300                                | 108241         |
| beta cell           | 1,000                              | 109227         |
| enterocyte          | 1,400                              | 111216         |
| fibroblast          | 2,000                              | 108244         |
| HeLa, cervix        | 3,000                              | 103725, 105879 |
| hair cell (ear)     | 4,000                              | 108242         |
| osteoblast          | 4,000                              | 108088         |
| alveolar macrophage | 5,000                              | 103566         |
| cardiomyocyte       | 15,000                             | 108243         |
| megakaryocyte       | 30,000                             | 110129         |
| fat cell            | 600,000                            | 107668         |
| oocyte              | 4,000,000                          | 101664         |

Sumber: <http://book.bionumbers.org/how-big-is-a-human-cell/>

*Q = Apakah ukuran sel organisme kecil dibandingkan organisme yang lebih besar sama atau berbeda???*





***Secara umum ukuran selnya sama namun jumlah selnya yang berbeda***

Researchers from the UF Genetics Institute, Harvard Medical School and other institutions

“sel-sel yang memiliki ukuran yang sama tapi kebutuhan energinya berbeda secara drastis tergantung pada ukuran organismenya”

“Meskipun Sel merupakan unit struktural, laju metabolismenya tergantung dimana dia berada”

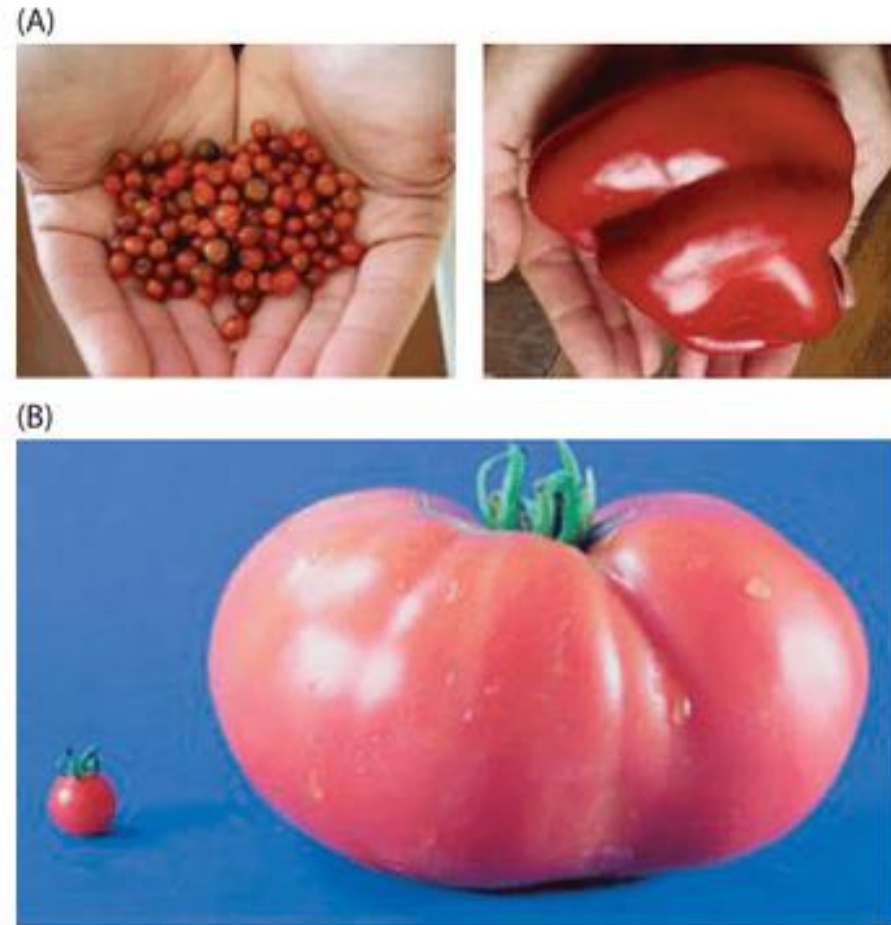


Figure 3: Plant and organ size changes from domestication, breeding hybridization and transgenic modification. These variations are found to be mostly driven by change in cell number. Fruit size of wild and domesticated species: (A) wild relative species of pepper, *Capsicum annuum* cv. Chiltepin (left) and bell pepper (right) (B) wild relative species of tomato, *Solanum* (left), *Solanum esculentum* cv Giant Red (right)

Live Science > Animals

# Bigger Creatures Have Bigger Blood Cells

By [Lindsey Konkel](#) | October 23, 2009 08:50am ET

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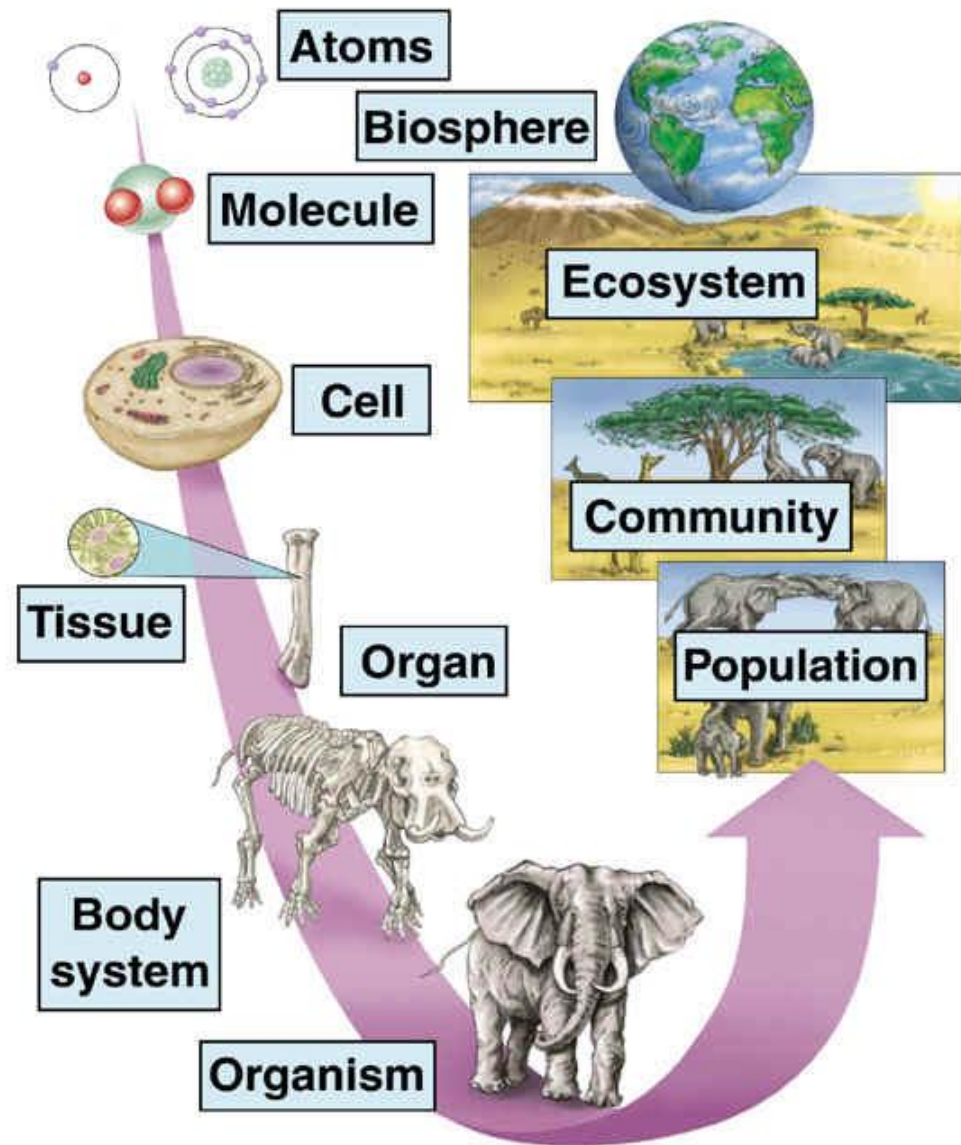
MORE ▾

With four colleagues, Zuzana Starostová, at the time a graduate student at Charles University in Prague, measured the size of red blood cells (a proxy for average cell size) and resting metabolic rate in fourteen species of eyelid [geckos](#). The lizards are morphologically similar, but vary greatly in size: the largest, at a quarter pound, weighs thirty-three times as much as the smallest.

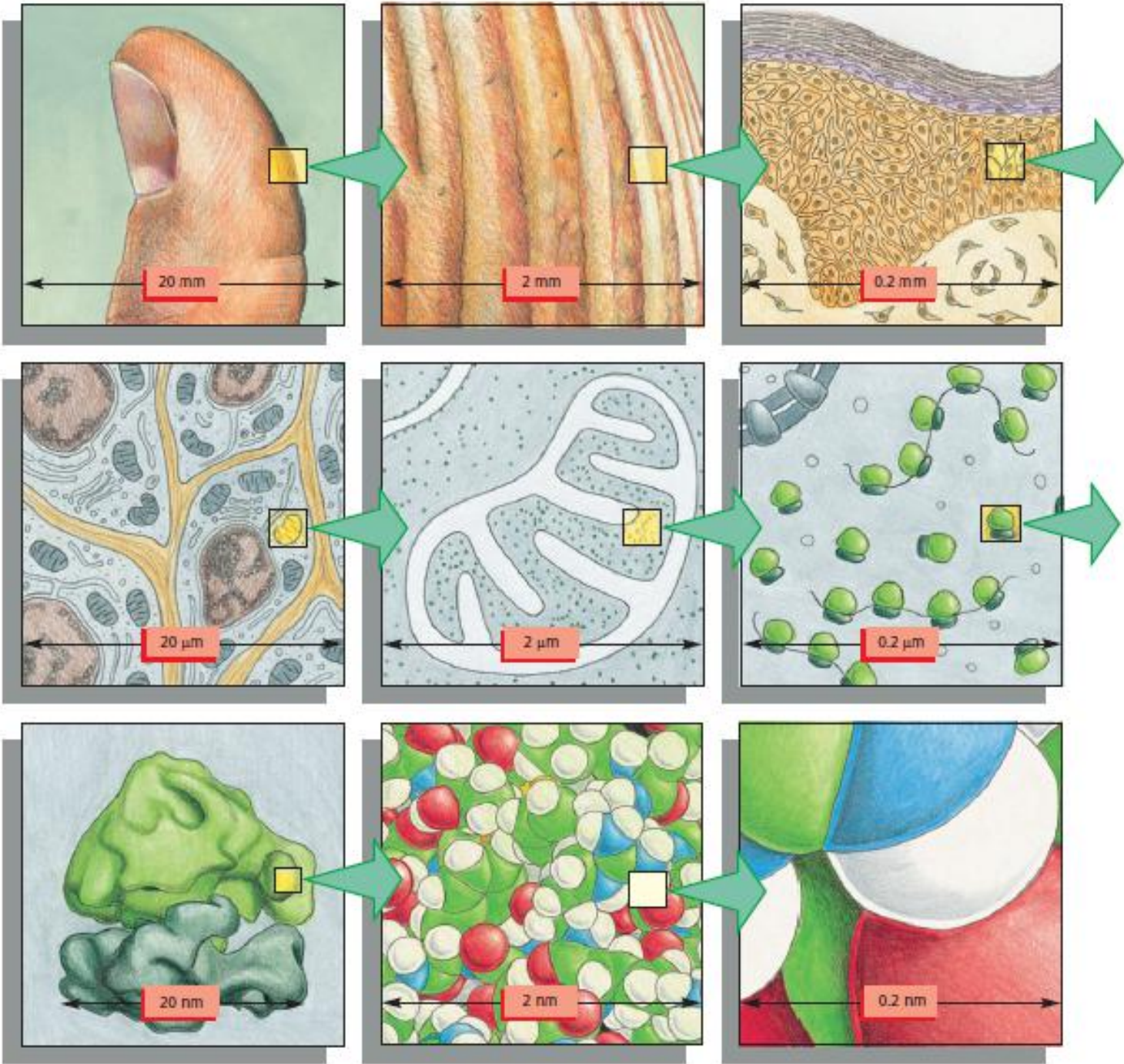


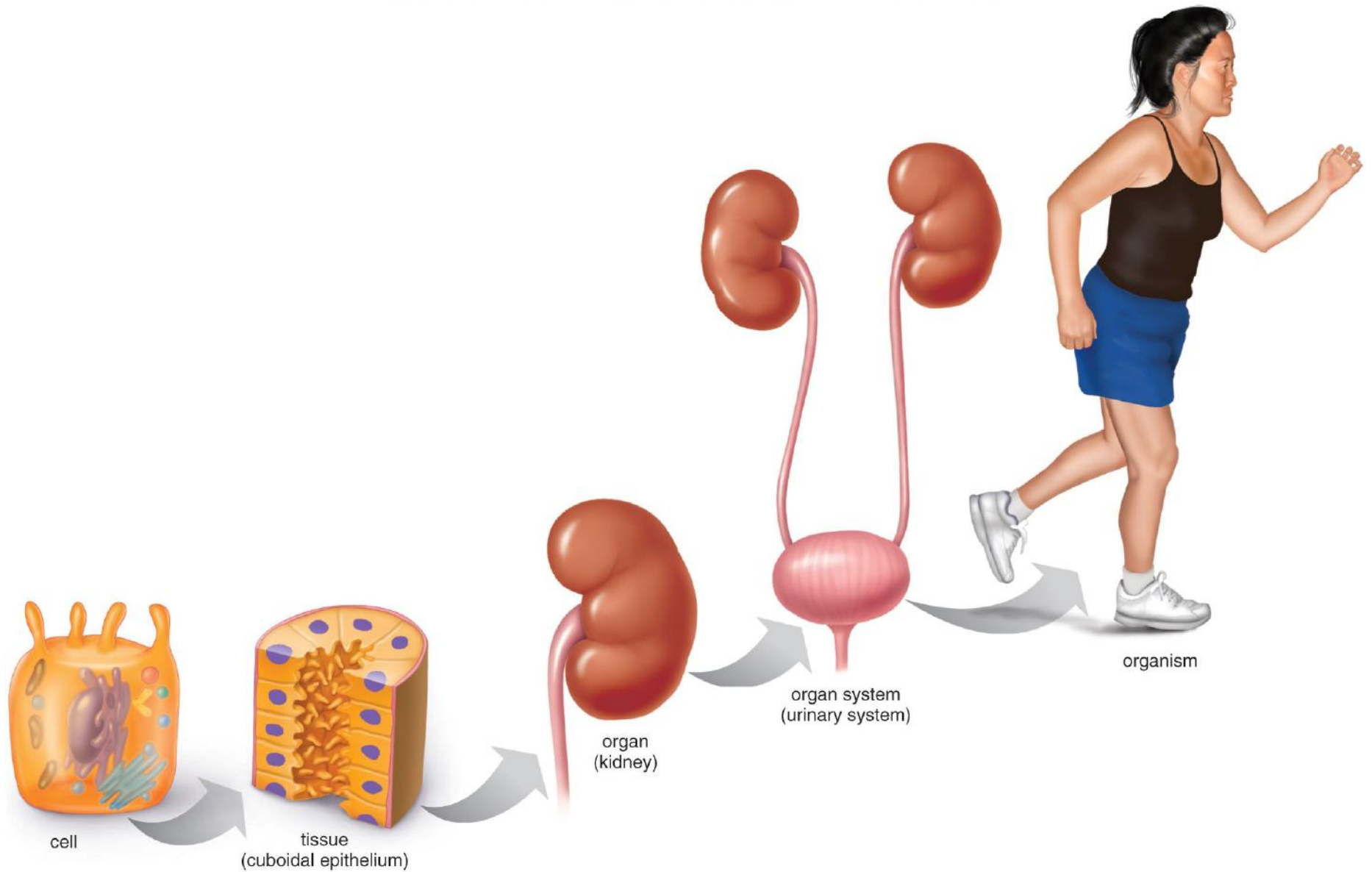
Raven/Berg, Environment, 3/e  
Figure 4.1

# Organisasi Tingkat Kehidupan







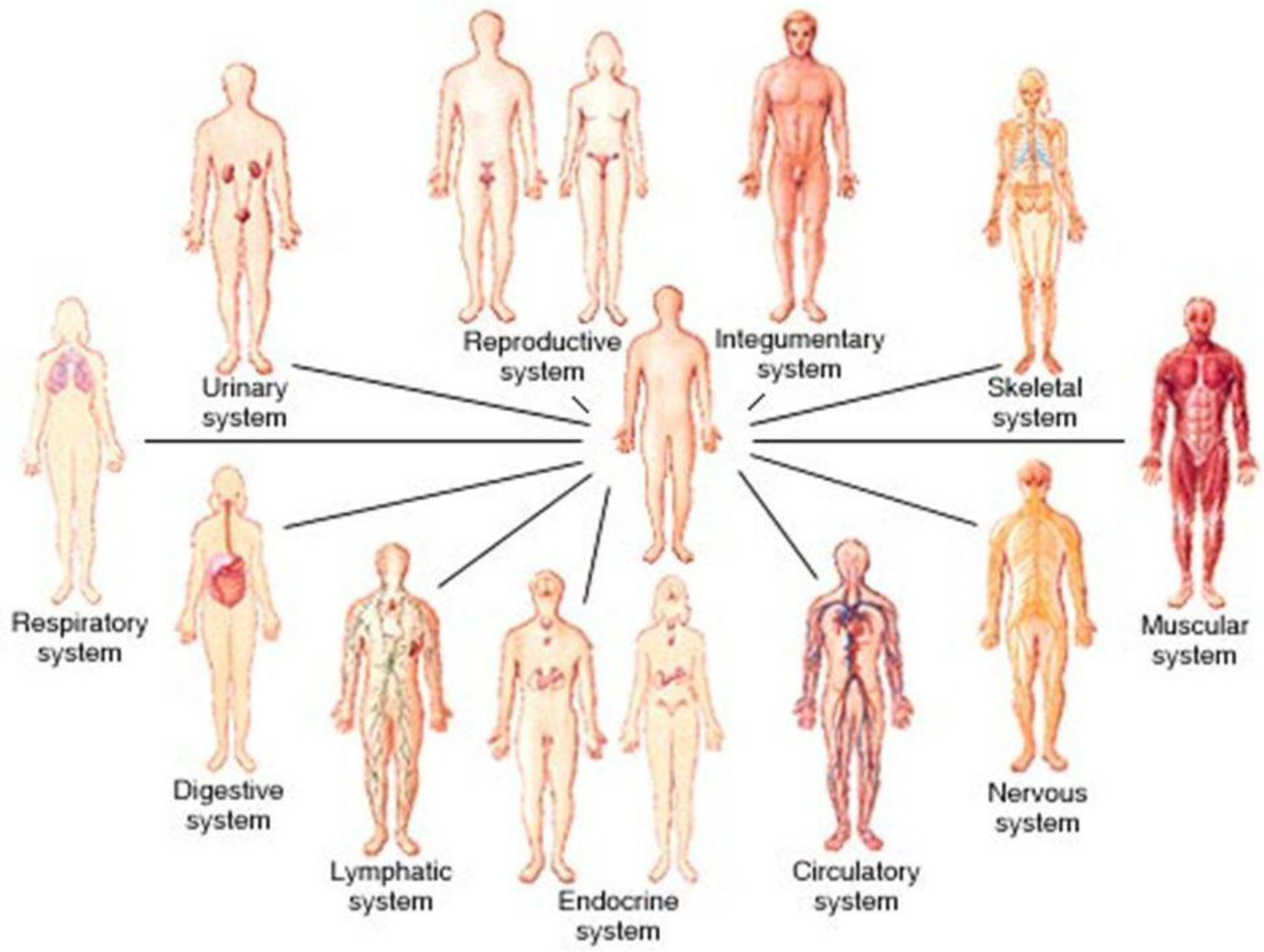


**Sebutkan contoh yang lain!!**

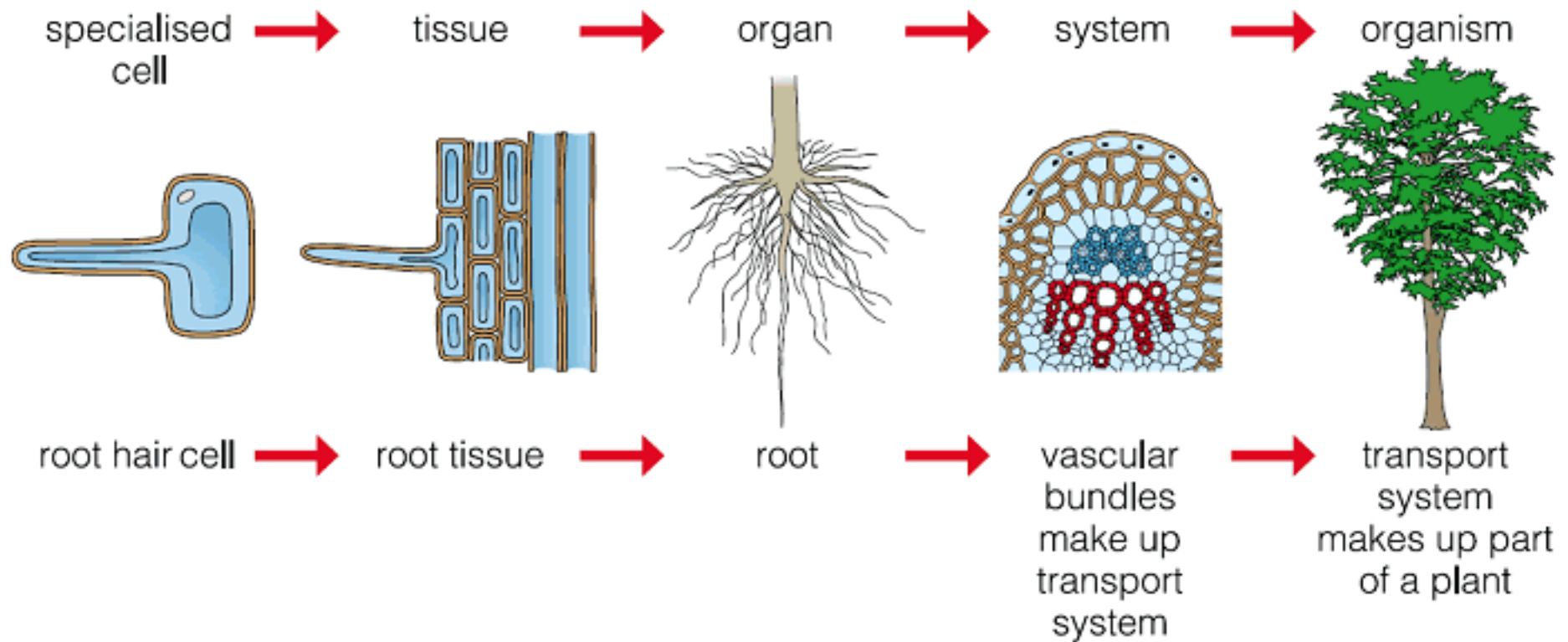
# Berapa sistem organ pada manusia??







# Bagaimana dengan tumbuhan??



# Sel Menurut Kajian Islam

وَلَقَدْ خَلَقْنَا الْإِنْسَانَ مِنْ سُلَالَةٍ مِنْ تُطَيَّبِينَ (عَلَيْهَا نُطْفَةٌ فِي قَرَارٍ مَكِينٍ (13) ثُمَّ  
خَلَقْنَا نَفْسًا لِلذَّلِيلِ وَالْعَوَالِقِ لَمُقَدَّغَةً فَخَلَقْنَا الْأَمْضُغَةَ عِظَامًا فَكَسَوْنَا الْعِظَامَ لَحْمًا ثُمَّ  
أَنْشَأْنَاهُ خَلْقًا آخَرَ فَتَبَارَكَ اللَّهُ أَحْسَنُ الْخَالِقِينَ (14)

*”Dan sesungguhnya Kami telah menciptakan manusia dari suatu saripati (berasal) dari tanah (12) Kemudian Kami jadikan saripati itu air mani (yang disimpan) dalam tempat yang kokoh (rahim) (13) Kemudian air mani itu Kami jadikan segumpal darah, lalu segumpal darah itu Kami jadikan segumpal daging, dan segumpal daging itu Kami jadikan tulang belulang, lalu tulang belulang itu Kami bungkus dengan daging. Kemudian Kami jadikan dia makhluk yang (berbentuk) lain. Maka Maha sucilah Allah, Pencipta Yang Paling Baik (14)” (Al-Muminun: 12-14)*

Organ

Jaringan

Sistem Organ

*Dan sesungguhnya Kami telah menciptakan manusia dari suatu saripati (berasal) dari tanah (12) Kemudian Kami jadikan saripati itu **air mani** (yang disimpan) dalam tempat yang kokoh (**rahim**) (13) Kemudian air mani itu Kami jadikan **segumpal darah**, lalu segumpal darah itu Kami jadikan **segumpal daging**, dan segumpal daging itu Kami jadikan **tulang belulang**, lalu tulang belulang itu Kami **bungkus dengan daging**. Kemudian Kami jadikan dia **makhluk yang (berbentuk) lain**. Maka Maha sucilah Allah, Pencipta Yang Paling Baik (14)”*  
**( Al-Muminun: 12-14)**

SEL

SEL

Organ

Organisme

# Tugas

Buatlah Peta Konsep  
**Sejarah Perkembangan Sel**







Thank  
You