

Nanobiotechnology

◎ **BT: Biotechnology**

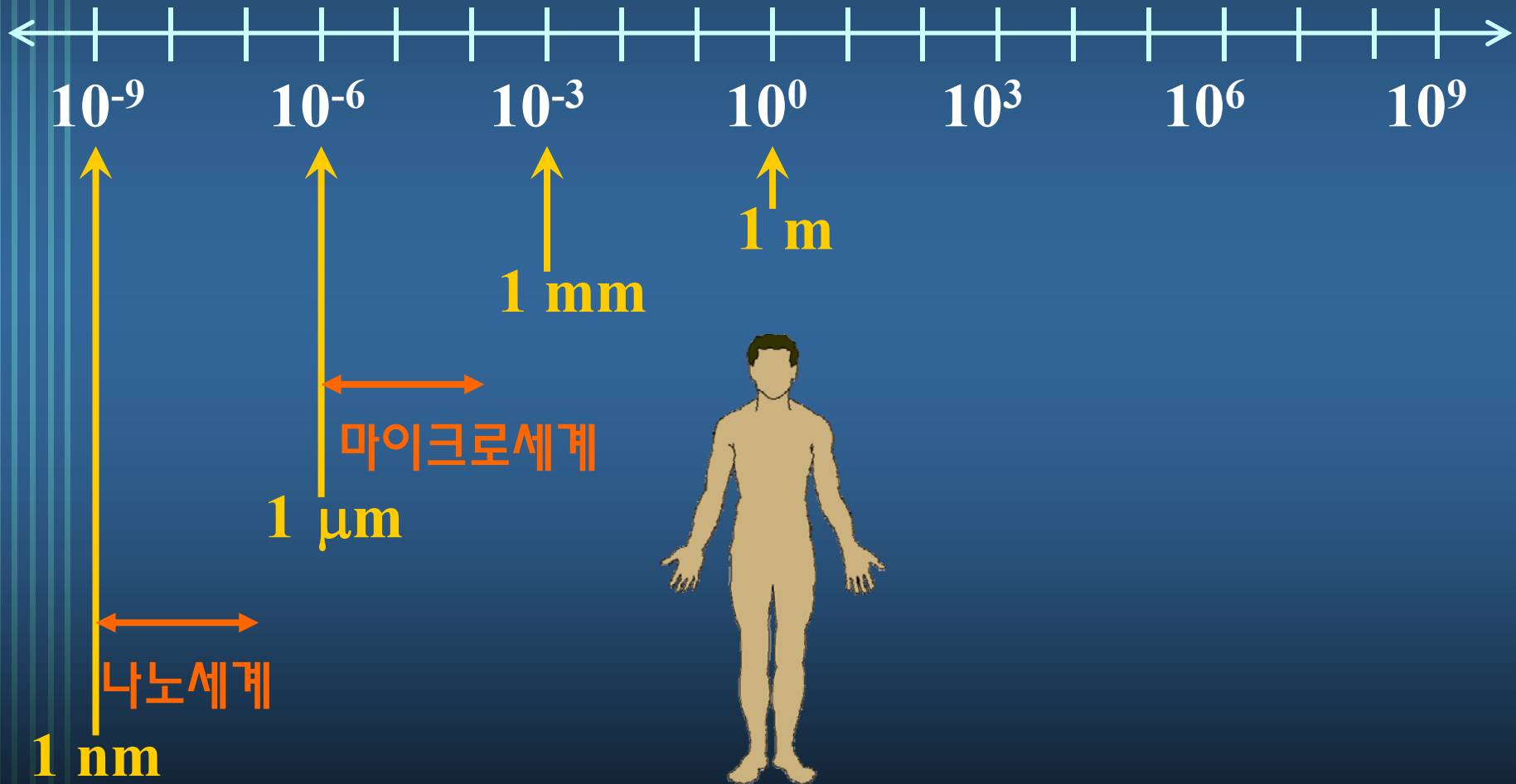
◎ **NT: Nanotechnology**

◎ **What is Nano?**

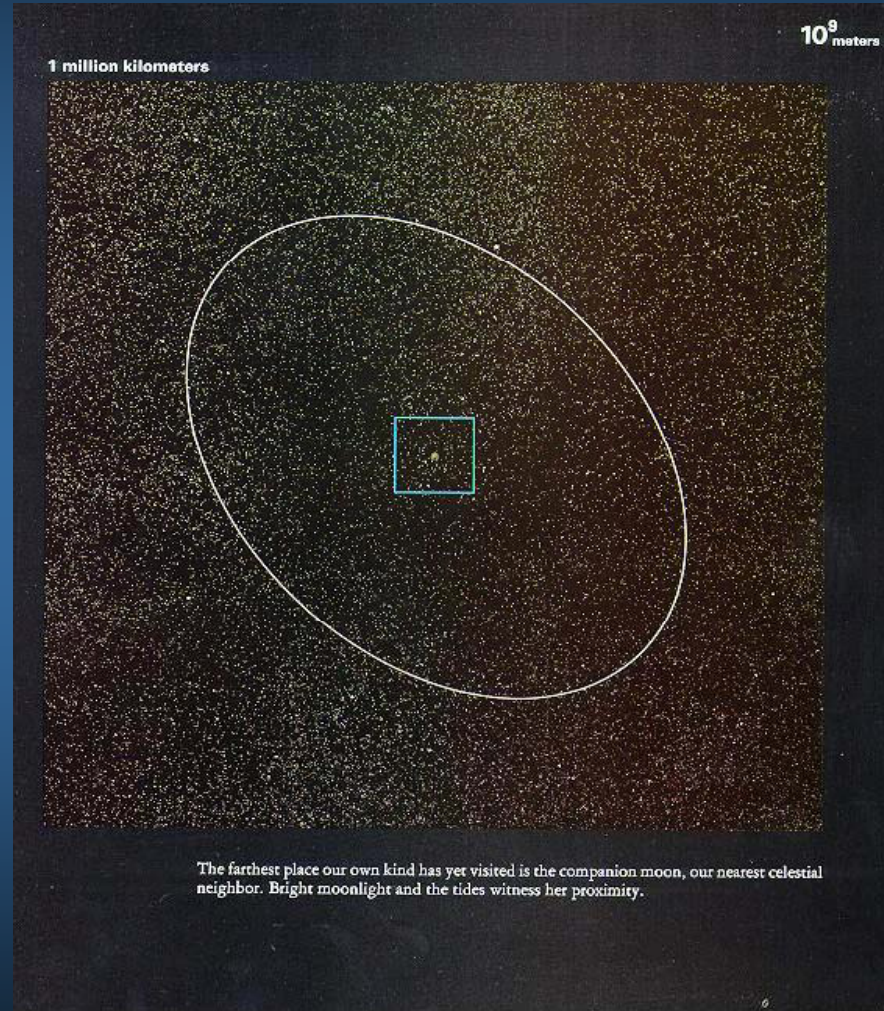
◎ Nano nanos(난쟁이), 10^{-9}

◎ Nanoscale 1 - 100 nanometers

길이의 세계



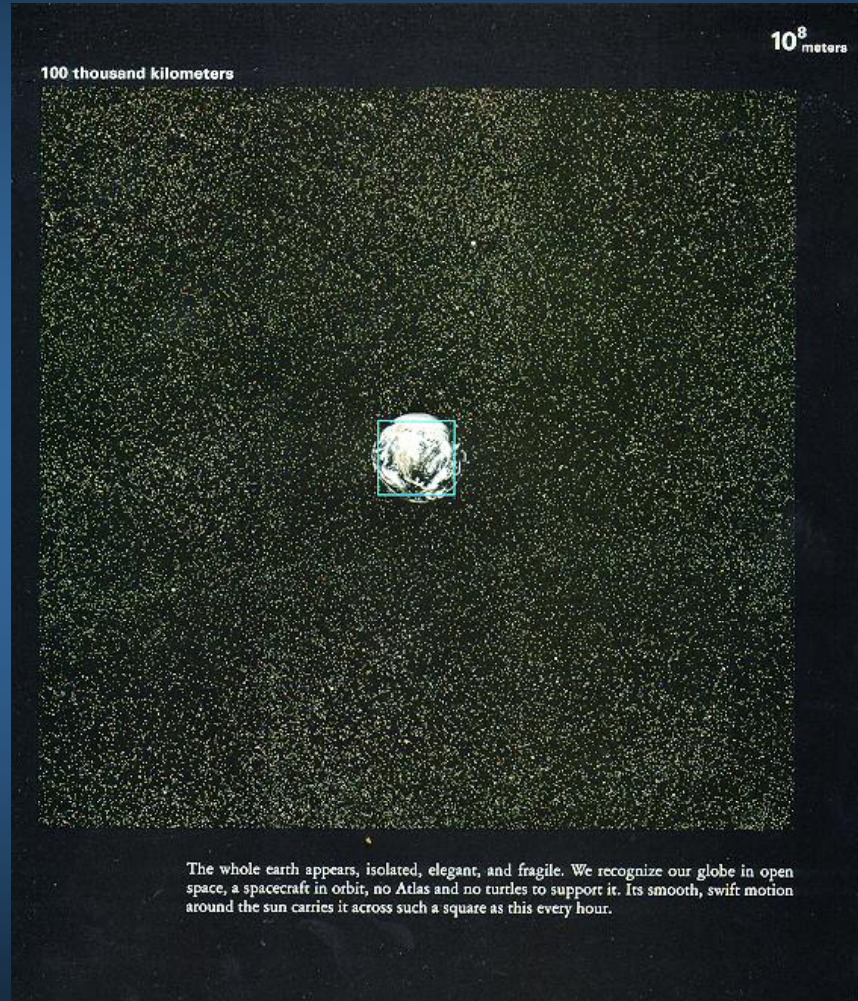
..... ←--- 10^9 m ---→



우주

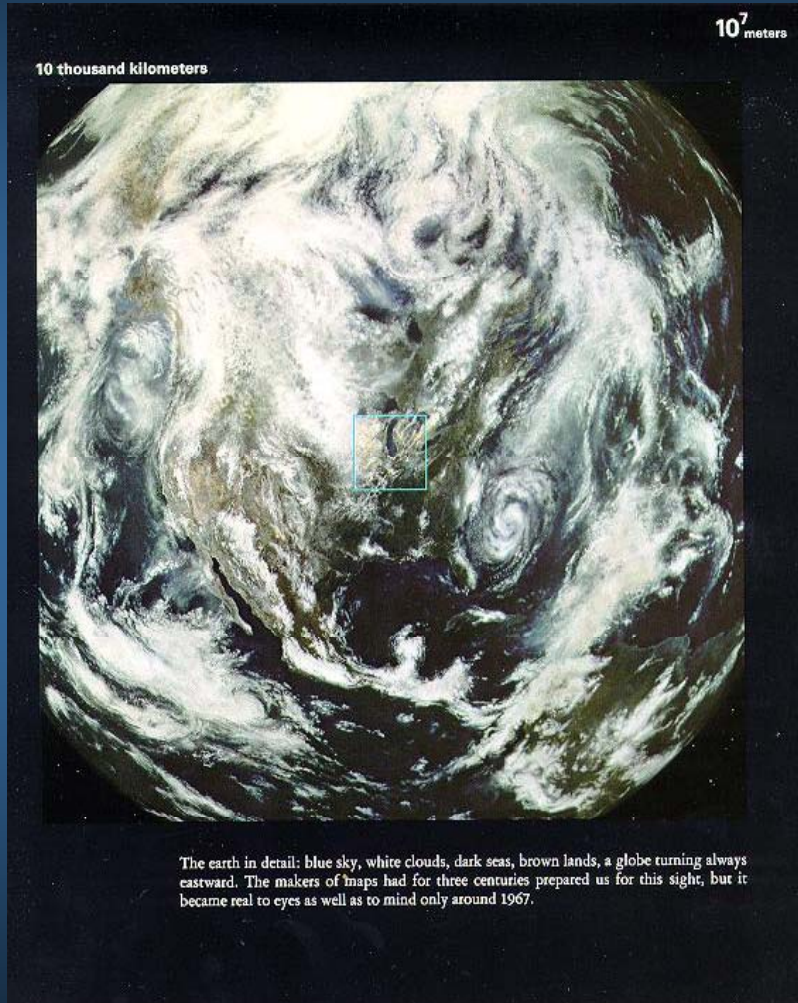
가운데 점: 지구

..... ←--- 10^8 m ---→



지구

..... ←--- 10^7 m ---→

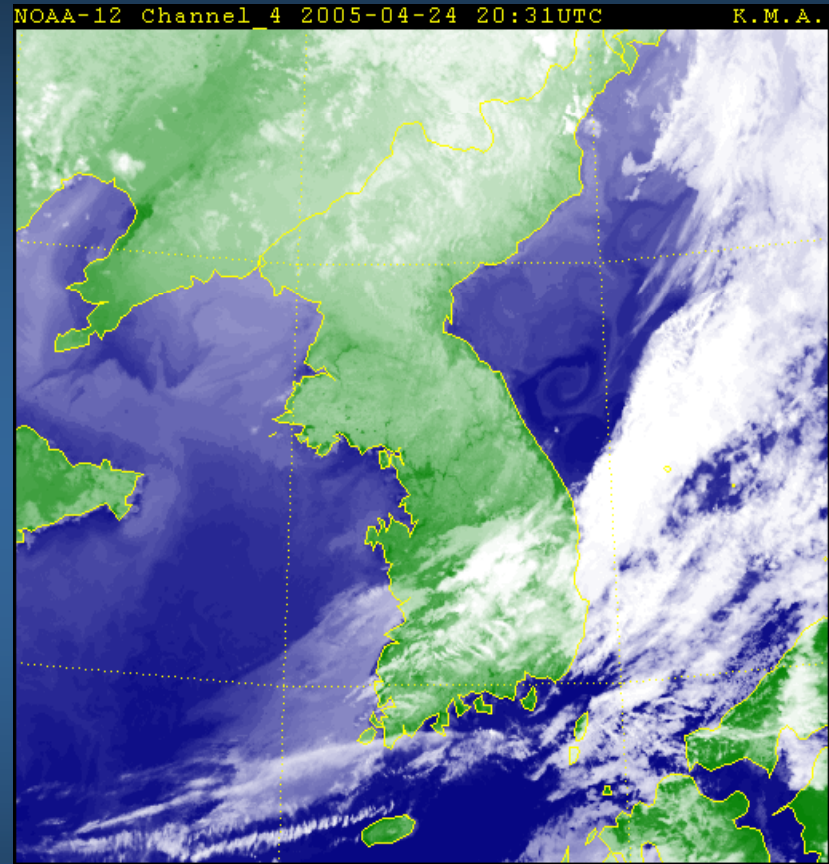
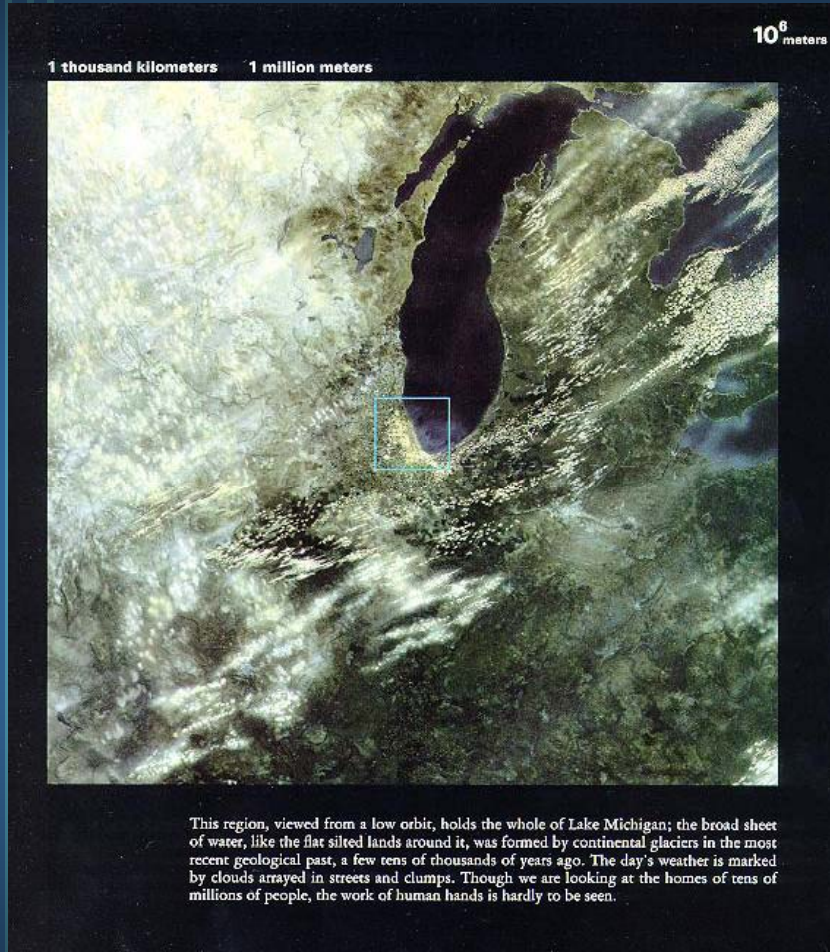


10^7 m = 10,000 km

지구

←.....→ 10^6 m →

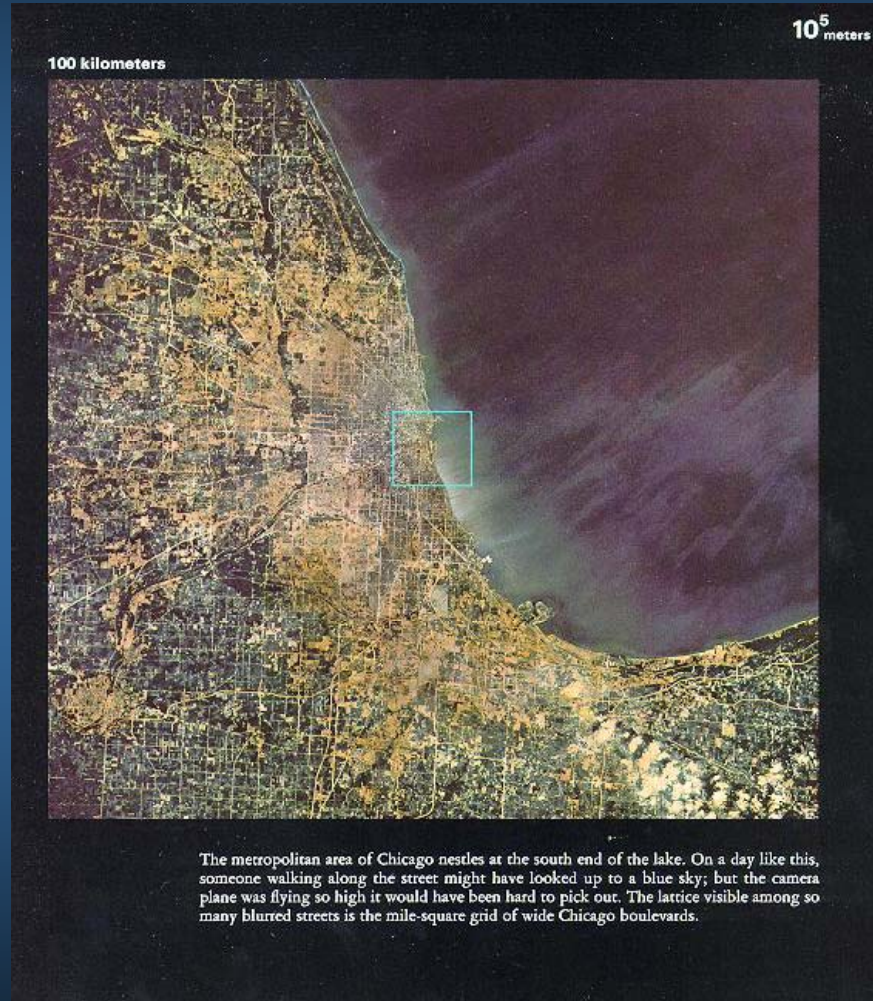
←---→ 10^6 m →



지구상의 어느 곳?

10^6 m = 1,000 km
한반도

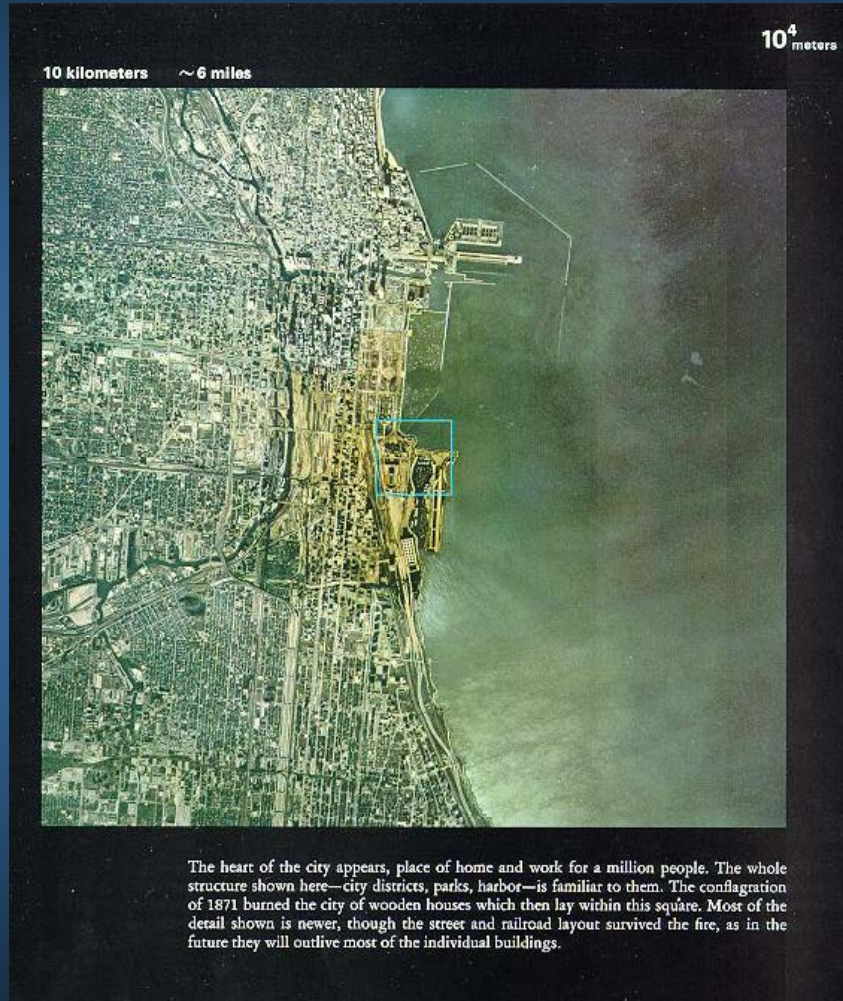
..... ←--- 10^5 m ---→



10^5 m = 100 km

어느 도시?

..... ←--- 10^4 m ---→



$$10^4 \text{ m} = 10 \text{ km}$$

어느 도시?

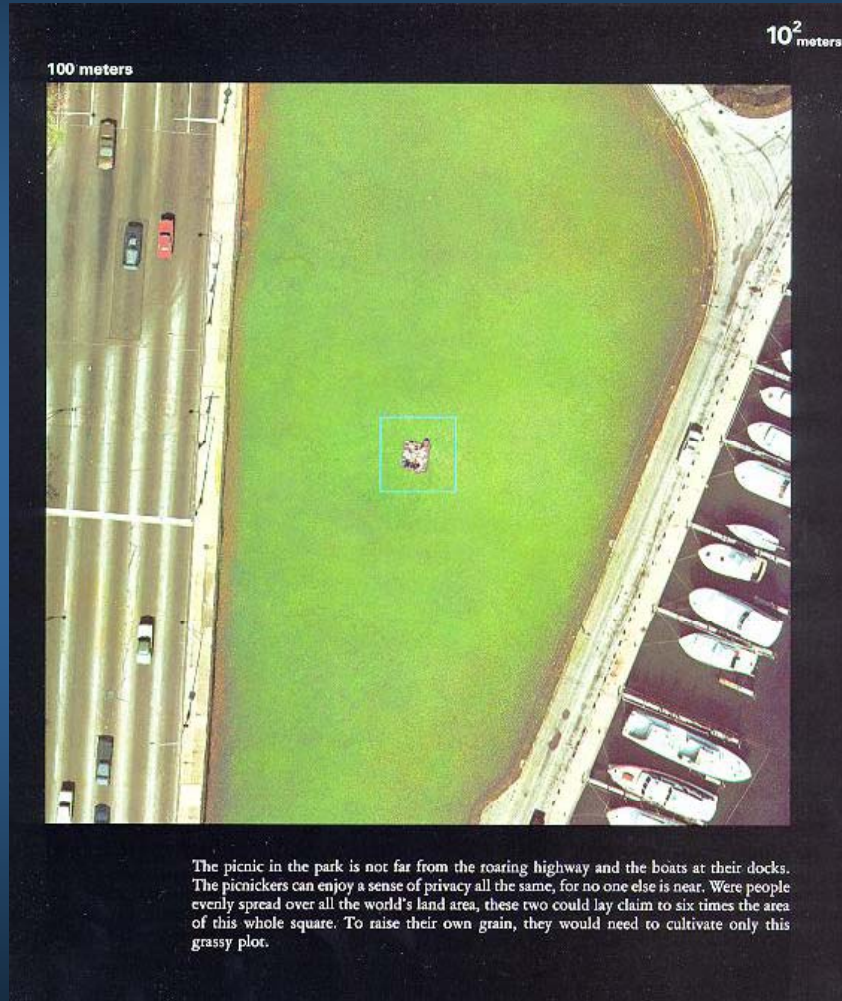
..... ←--- 10^3 m ---→



$$10^3 \text{ m} = 1 \text{ km}$$

Lake Shore Drive

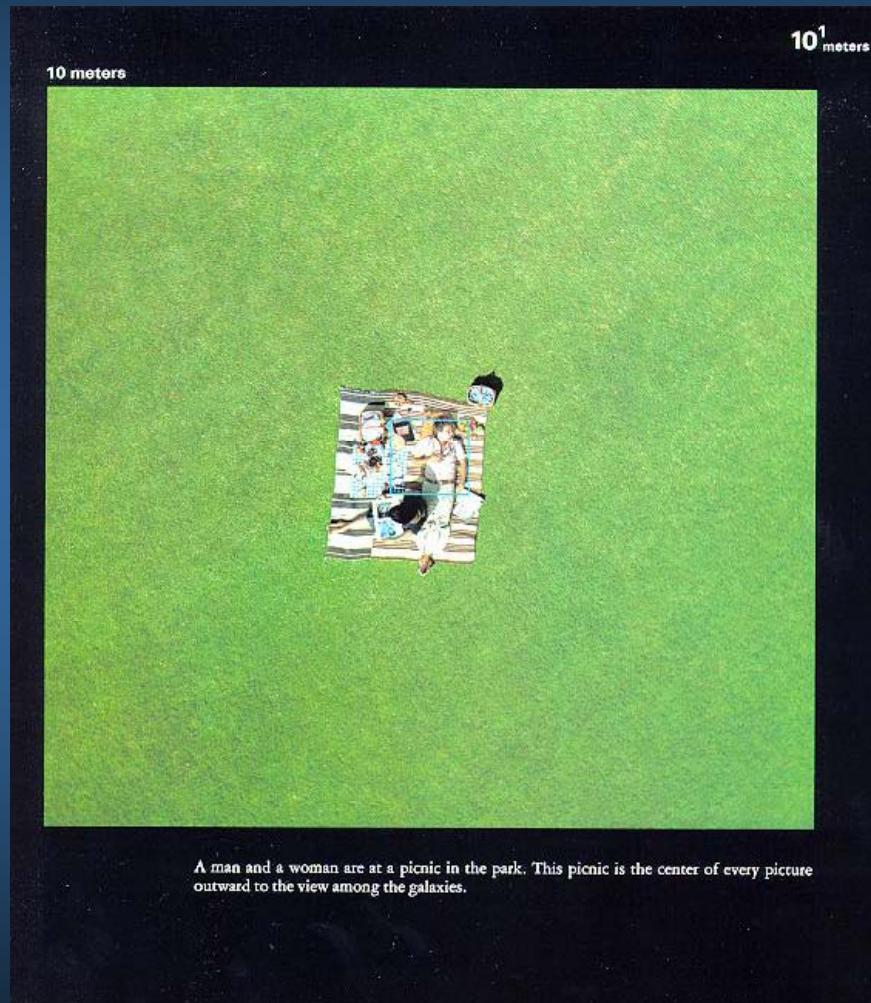
..... ←--- 10^2 m ---→



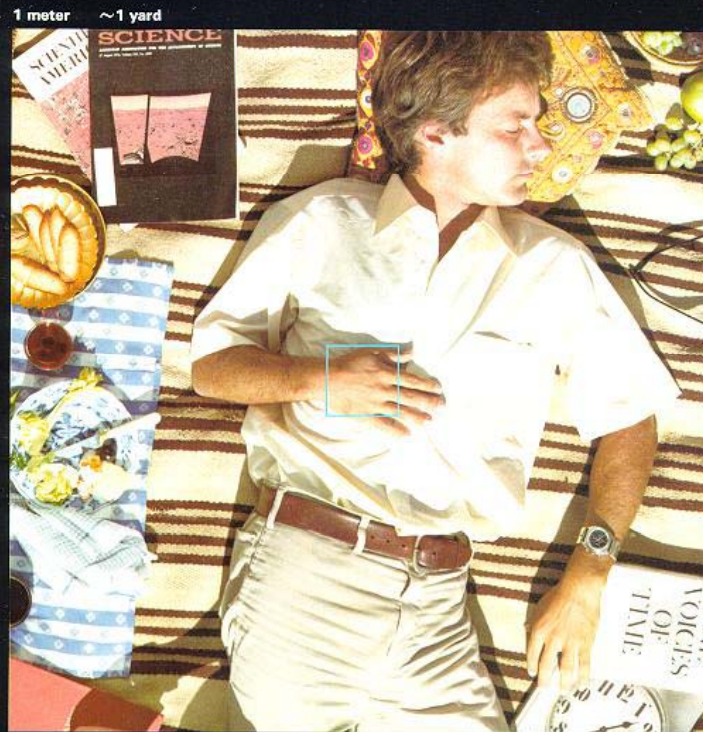
.....

←----- 10^1 m -----→

.....

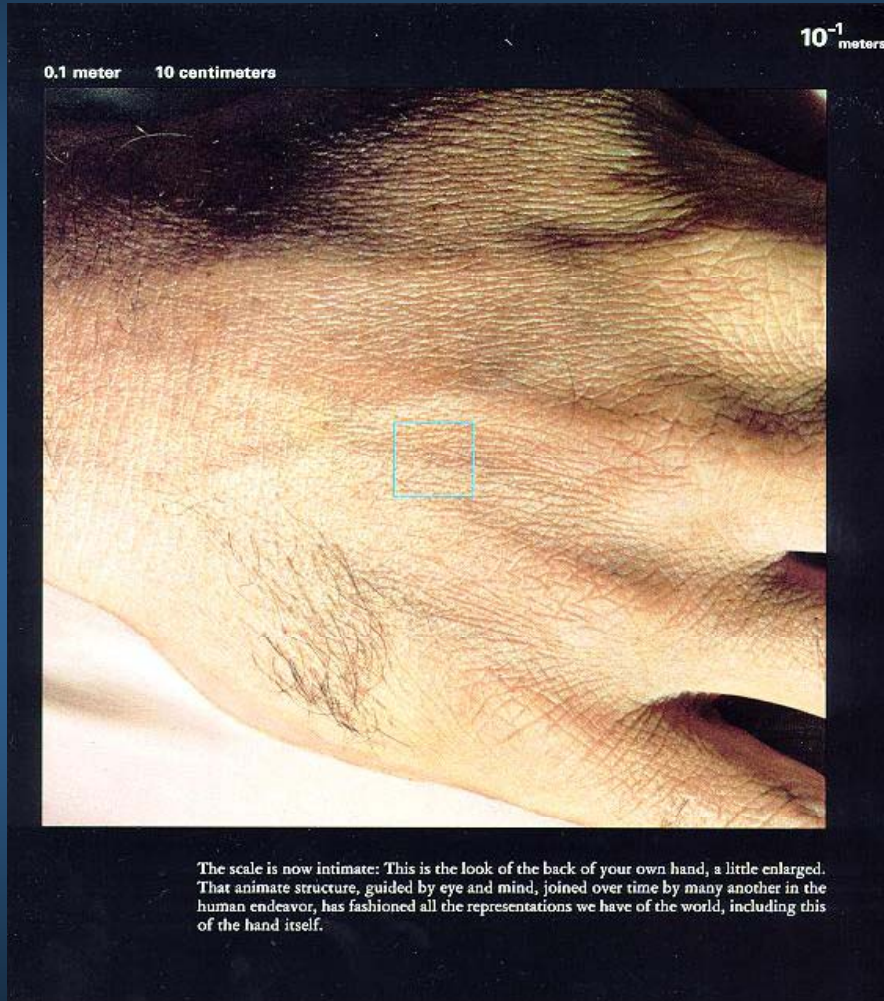


←--- 1 m ---→



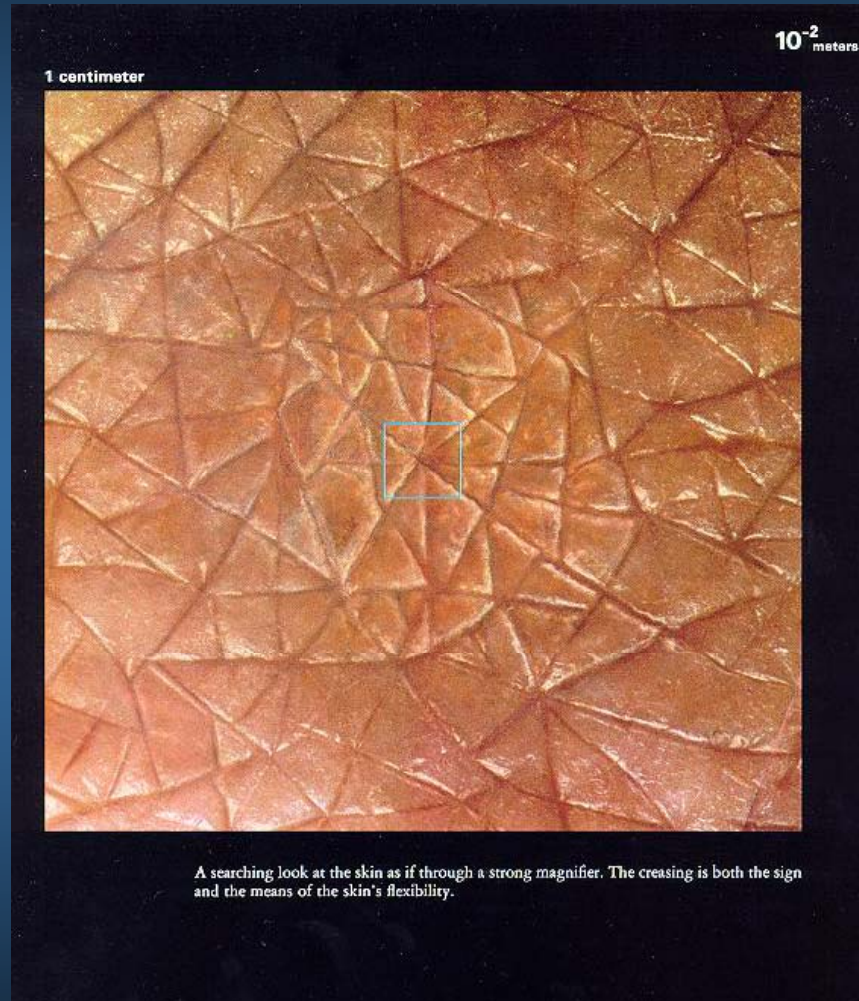
This is the scale of human companionship, conversation, touch: A man is asleep on a warm October day. Around him are necessities and pleasures for mind and body. Between this image and the next frame inward, the size of the image would for once match the size of what it represents. "Of all things man is the measure," wrote Protagoras the Sophist.

..... ←--- 10^{-1} m ---→



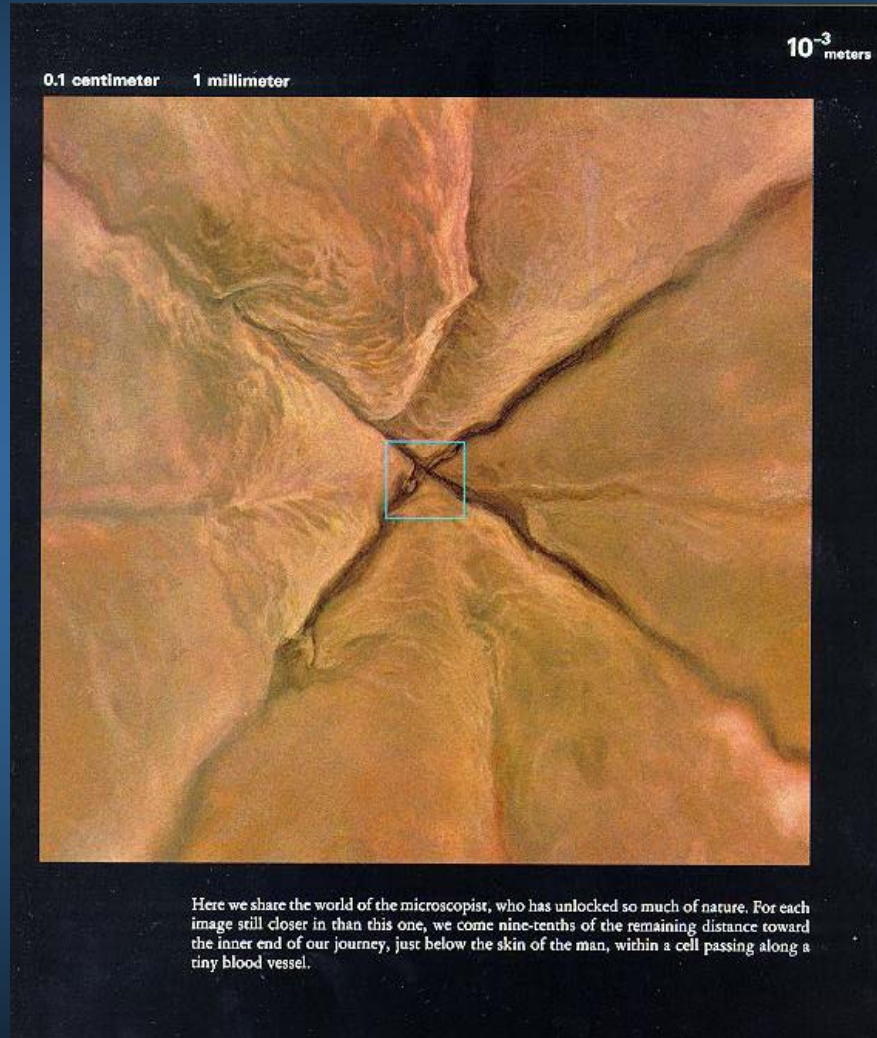
$$10^{-1} \text{ m} = 10 \text{ cm}$$

..... ←--- 10^{-2} m ---→



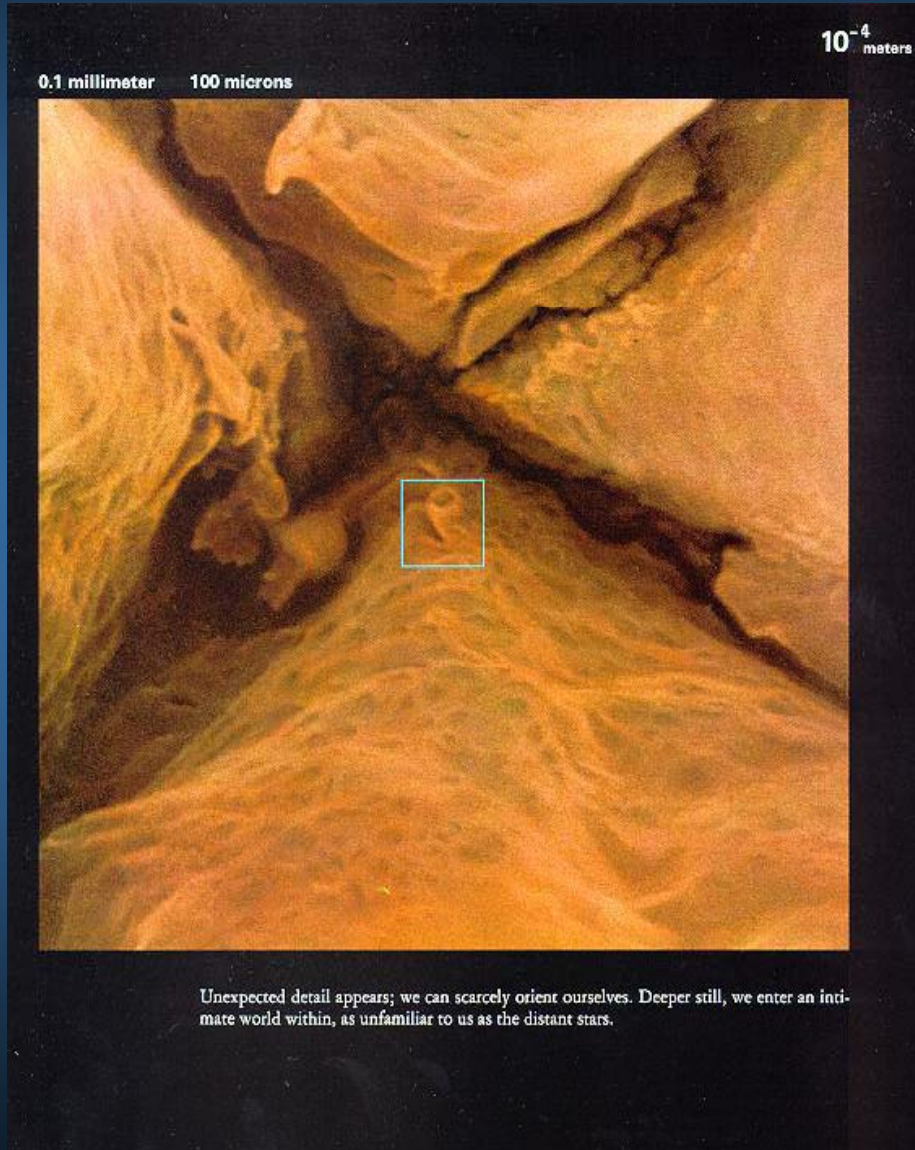
$$10^{-2} \text{ m} = 1 \text{ cm}$$

..... ←--- 10^{-3} m ---→



$$10^{-3} \text{ m} = 1 \text{ mm}$$

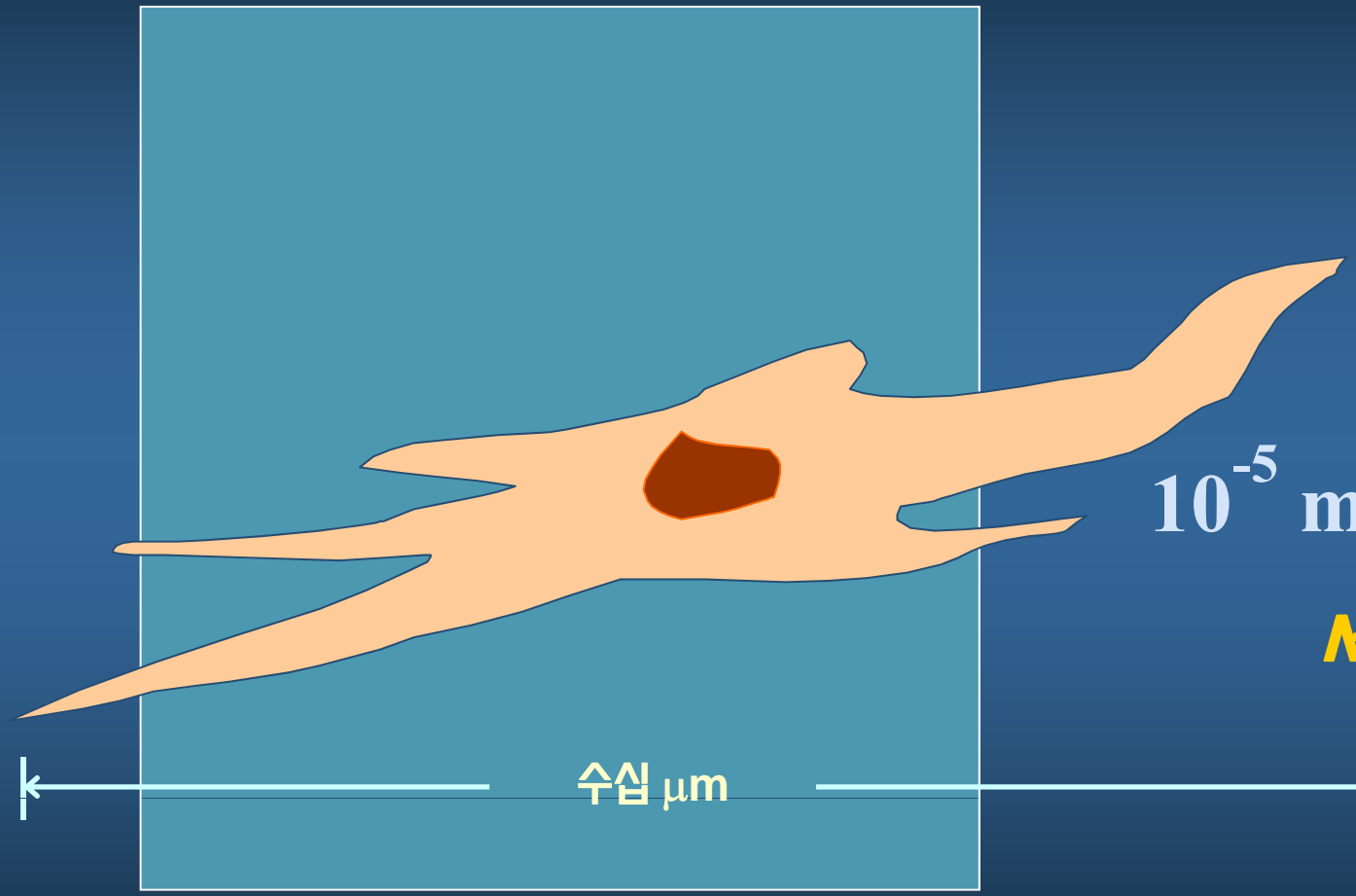
..... ←--- 10^{-4} m ---→



$$10^{-4} \text{ m} = 100 \mu\text{m}$$

마이크로 세계

..... ←----- 10^{-5} m ----->

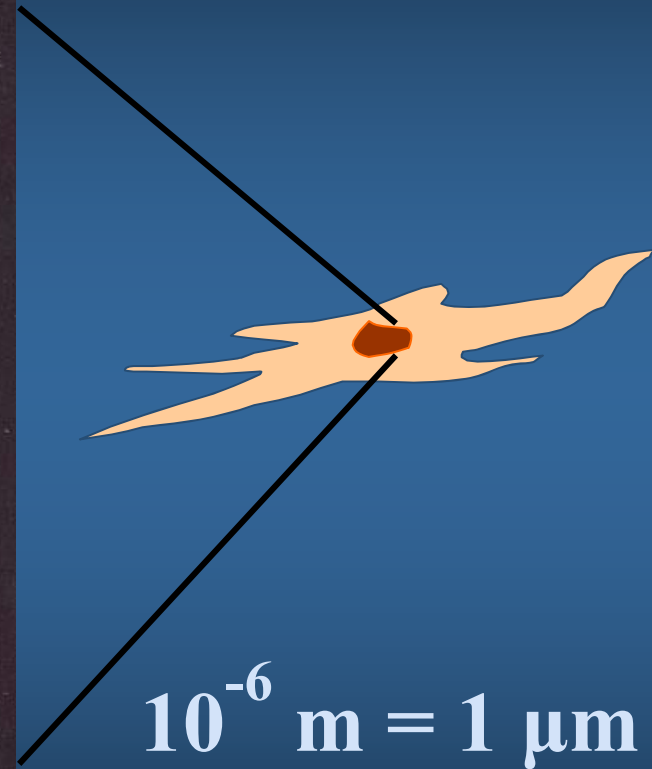
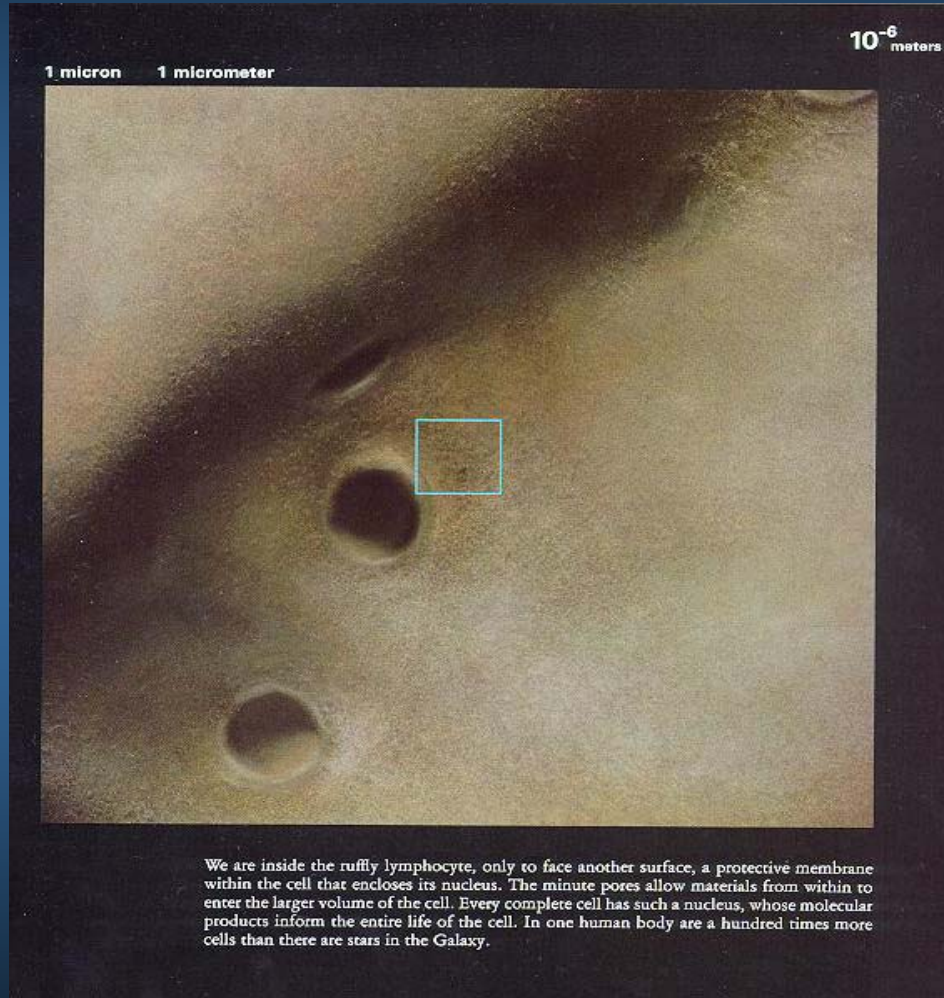


10^{-5} m = 10 μ m

세포

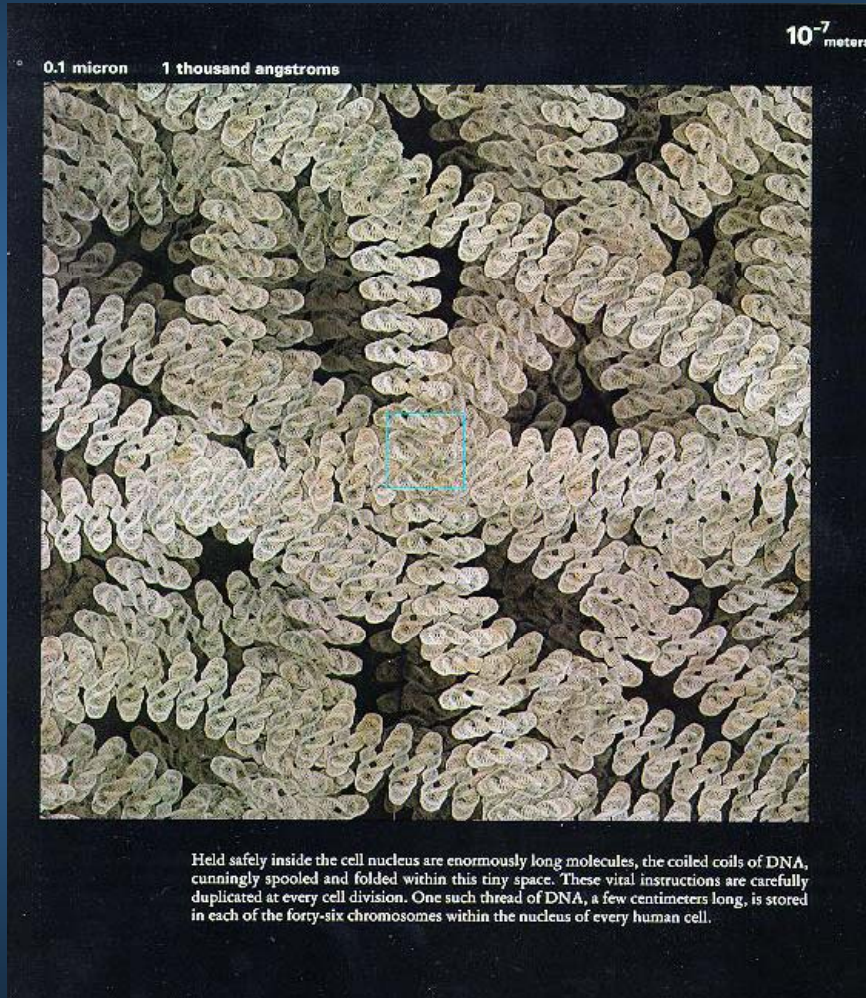
←----- 수십 μ m ----->

..... ←--- 10^{-6} m ---→



세포핵

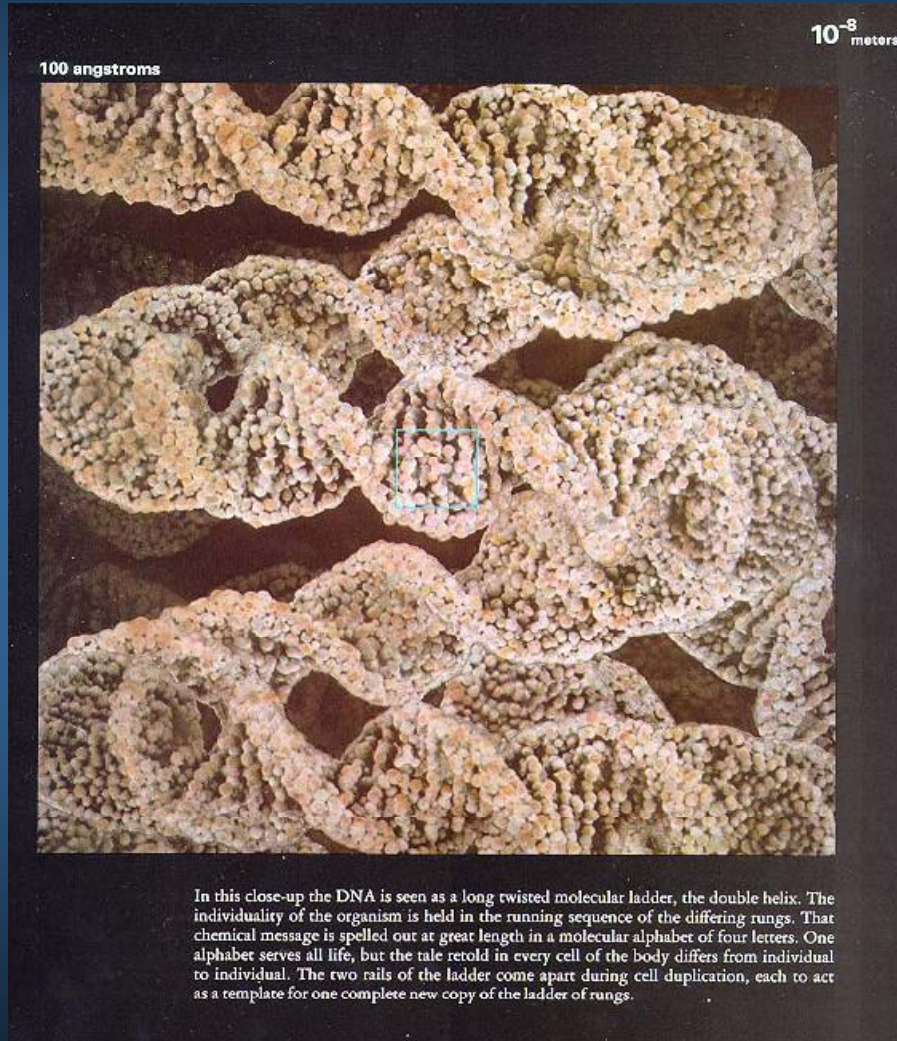
..... ←--- 10^{-7} m ---→



$$10^{-7} \text{ m} = 100 \text{ nm}$$

**DNA 이중나선이
다시 꼬여 있는 모습**

..... ←--- 10^{-8} m ---→



$$10^{-8} \text{ m} = 10 \text{ nm}$$

DNA 이중나선

나노 세계