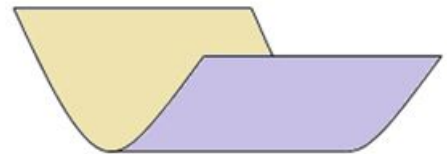
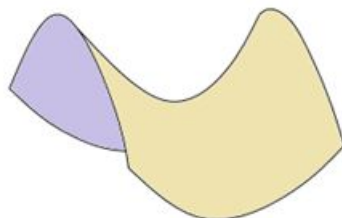
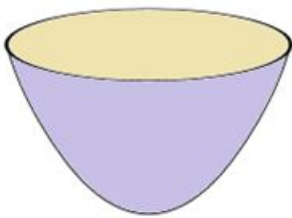


**3.2.** :

?), - , « »... - , ( , - « : », « » - , « » - . , - , ; ( ) - « », z - ( ), - , , , . , « »!

1 ( , ) - :  $f(x, y, z) = Ax^2 + By^2 + Cz^2 + Gx + Hy + Kz + L = 0$ .

« - - » (  $A = B = C = 0$  ). « » « . 1):



)	)	)
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. 1:

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( . 1):

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<sup>1</sup>  $2D \times x \times y + 2E \times y \times z + 2F \times x \times z + 2G \times x + 2H \times y + 2K \times z + L = 0,$

:  $A \times x^2 + B \times y^2 + C \times z^2 + A, B, C, D, E, F$

? – ( ! ) 2.  
- : , , « -  
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2: « » (the Möbius strip),

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» ( . 2).

, , , , « -  
» : 3 ( . . 3) , -



Möbius Strip, M. Escher (1963)

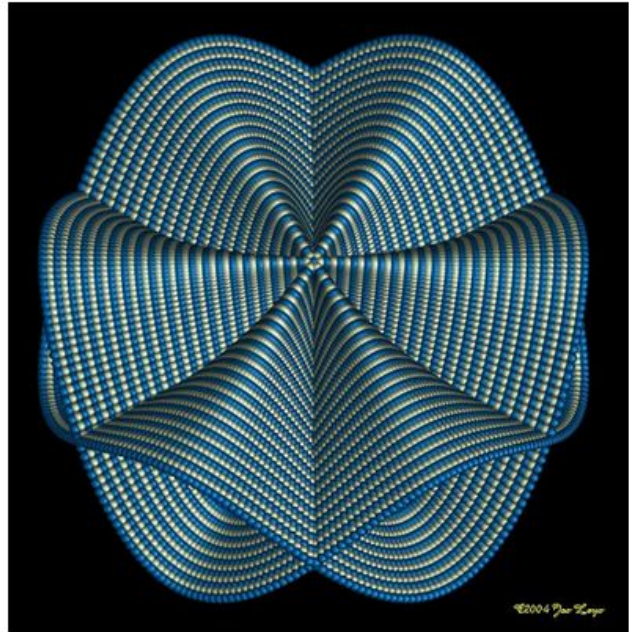
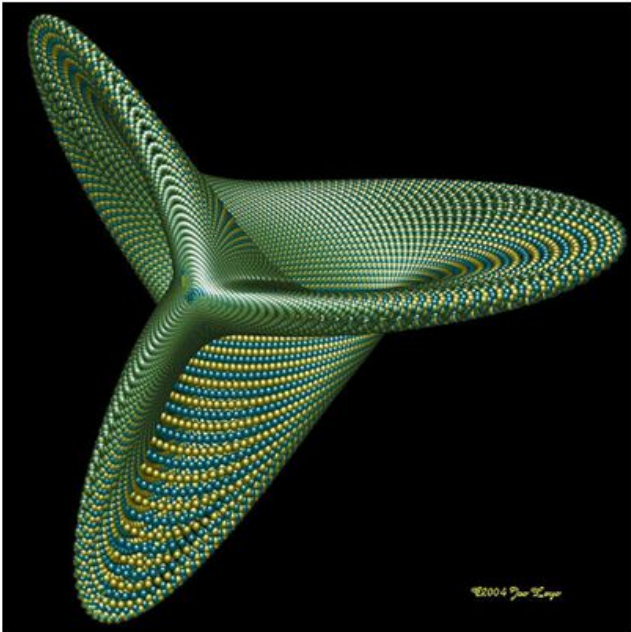
3: <https://www.youtube.com/watch?v=pgbHR290RW8>

, ( ) , -  
: , - ( ).  
( ). ( , )  
) , ( )  
180° ). ( , )  
, ,

<sup>2</sup> August Ferdinand Möbius (1790-1868), German mathematician and theoretical astronomer who is best known for his work in analytic geometry and in topology. In the latter field he is especially remembered as one of the discoverers of the *Möbius strip* (1858)

<sup>3</sup> youtube; – « ».

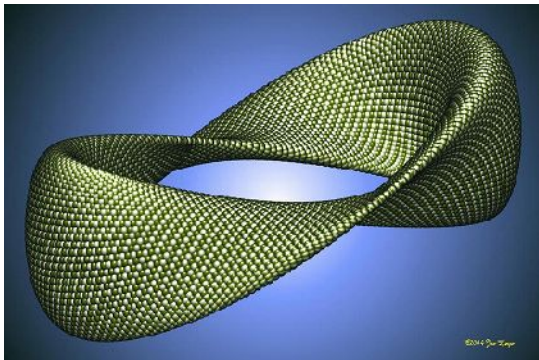
, , , ( , , , ).  
( . . 4-6),  
, , , , , - , -  
: , - , , , - , -  
: ( ) → ( ) →  
) → , ( ) →  
) → , ( ) →



4: « »

5: « »

, , « »  
« » , « »  
« » , , , ,  
« »



6: « »  
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( + )

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» 2) « ,  
»: 1) « ,  
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« » -

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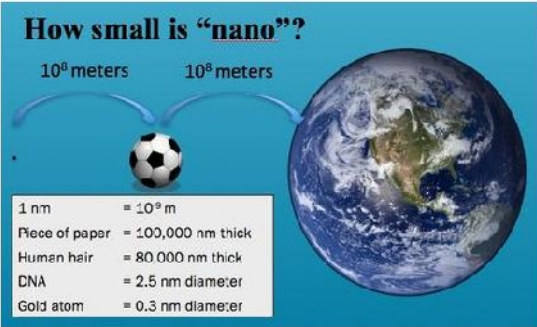
( ) - , , ,  
( ! ) - « \_made»

« »  
« »

» « 1 Å (ångström<sup>4</sup>) = 1×10<sup>-10</sup> ,  
« » 3 Å = 3×10<sup>-10</sup> .

« »  
/

( ),  
= 1×10<sup>-9</sup> ( .7).  
... ? : 1 (1 nm)



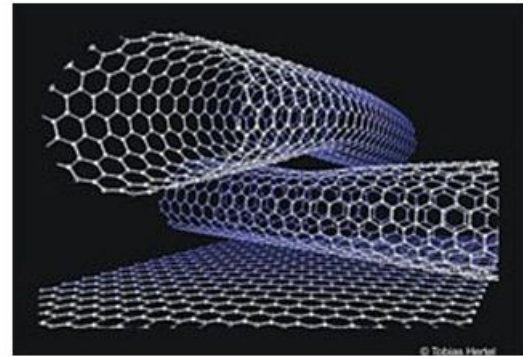
... .7: ?

<sup>4</sup> Anders Jonas Ångström (1814-1874), a Swedish physicist, after whom the unit was named (1868).

1 100 ( . 8–9–10).

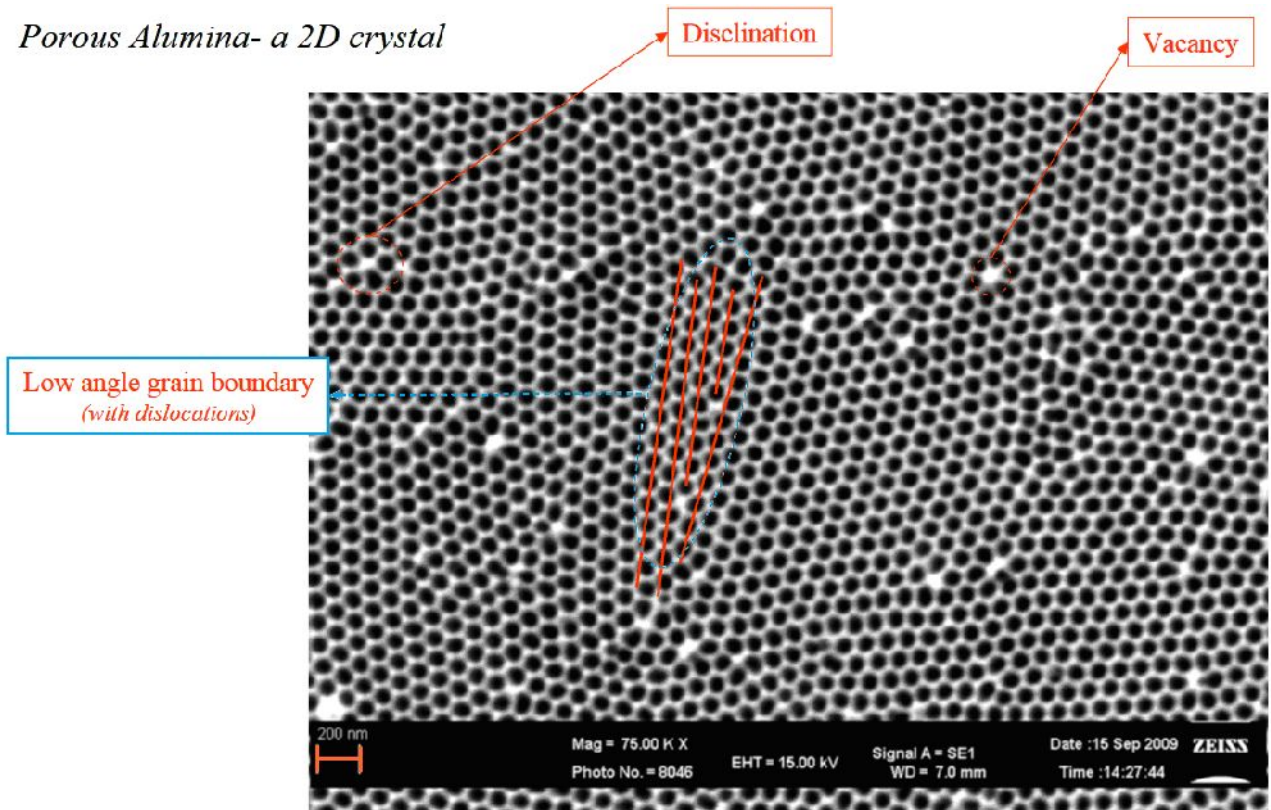
(« »)

« »



<p>____. 8: ( ), Indium tin oxide</p>	<p>____. 9: –</p>
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*Porous Alumina- a 2D crystal*

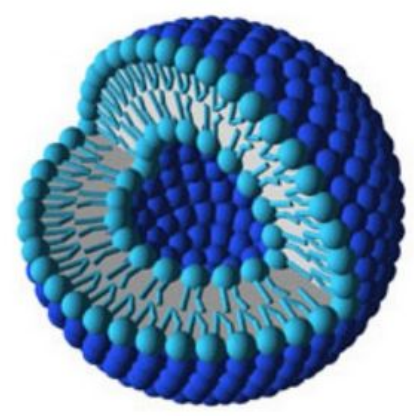
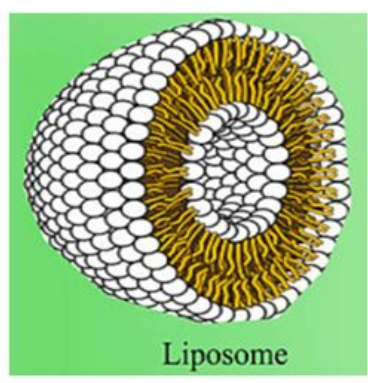


\_\_\_\_. 10: « » – 2D

( : – . 9, – . 10).



50  
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+ ?  
»?..  
« Bluetooth-  
... 8-9-10),  
...  
« » -  
1 1000 ; 2 ;  
25...300 .  
( . 4-5-6).  
( . 11).

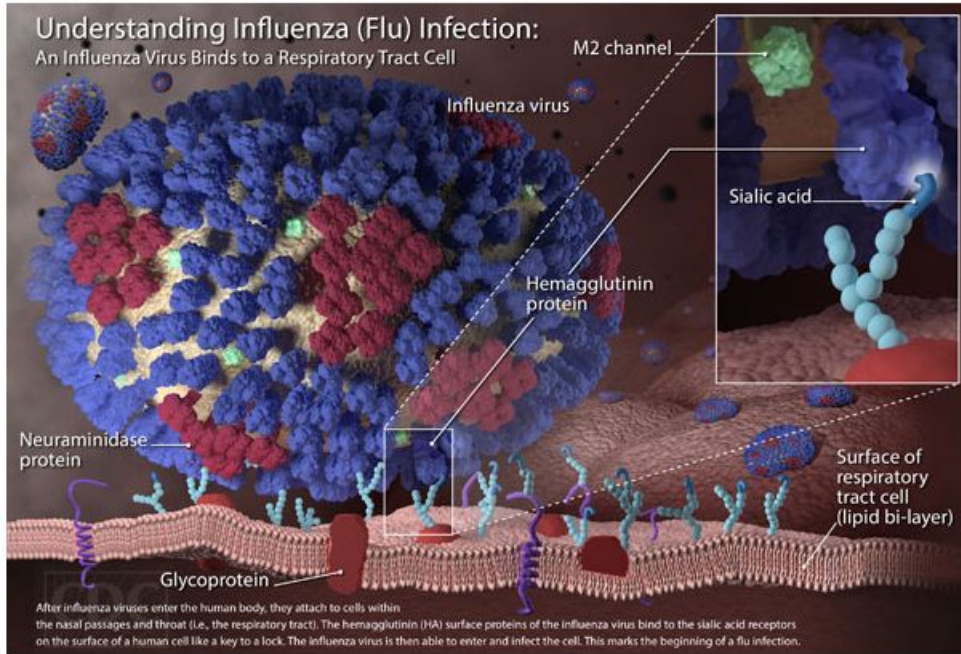


. 11: (vesicle bilayer<sup>5</sup>),

20 ( - )  
- 10-50 ( - )

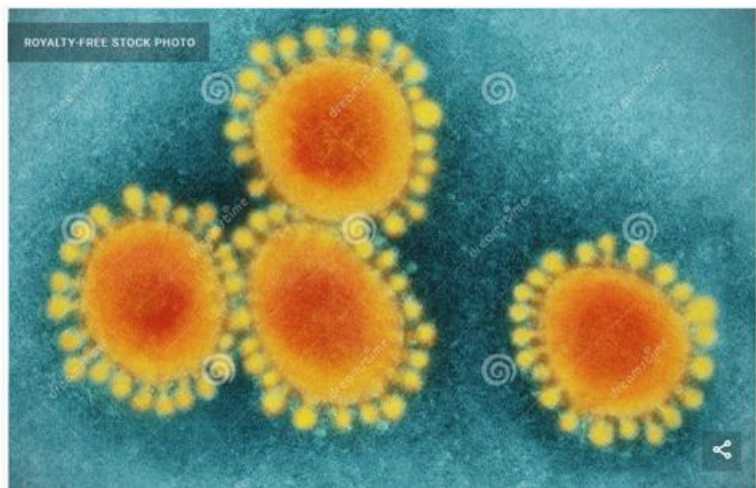
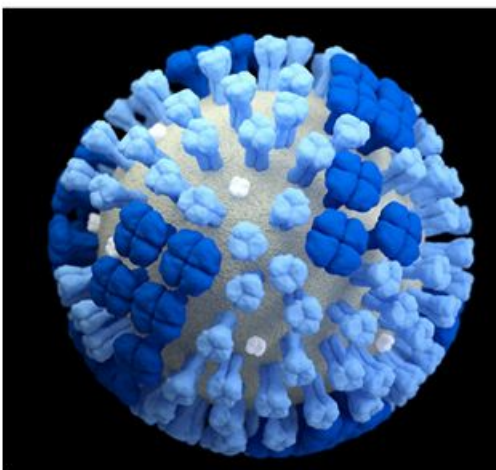
<sup>5</sup> bilayer – a film of two molecules thick (formed, e.g., by lipids), in which each molecule is arranged with its hydrophobic end directed inward toward the opposite side of the film and its hydrophilic end directed outward.

( . 12...26).



\_\_\_ . 12:

H7N9 ( , )



Virus under microscope, close up on four Corona viruses

\_\_\_ . 13:  
(Influenza Virus: grey Membrane, blue surface Proteins)

\_\_\_ . 14: Corona virus

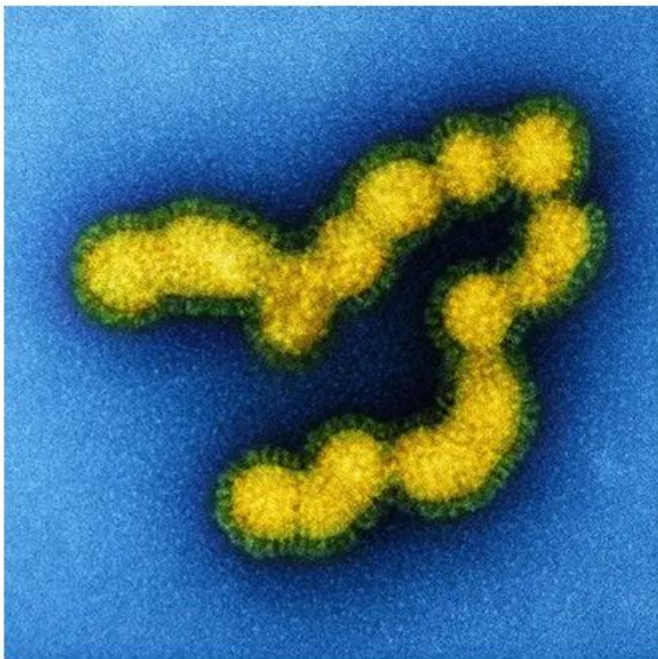




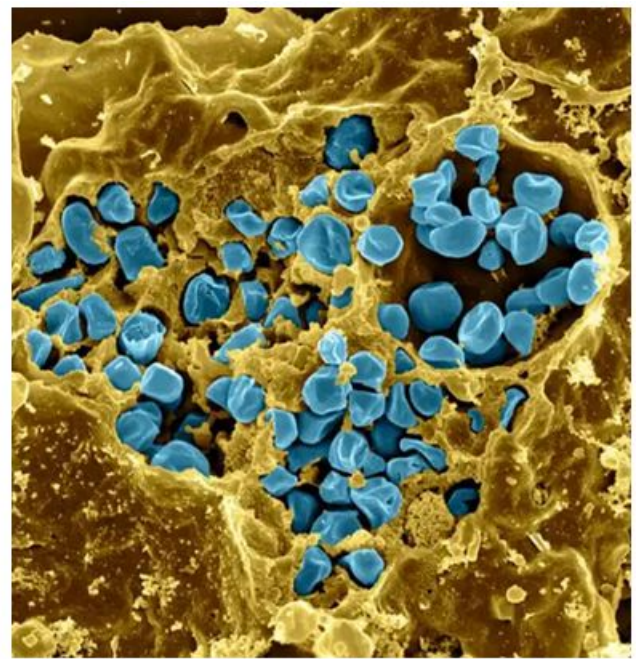
\_\_\_\_. 15:

Ebola

<https://weather.com/health/cold-flu/news/2019-01-30-stunning-microscopic-images-viruses-bacteria>



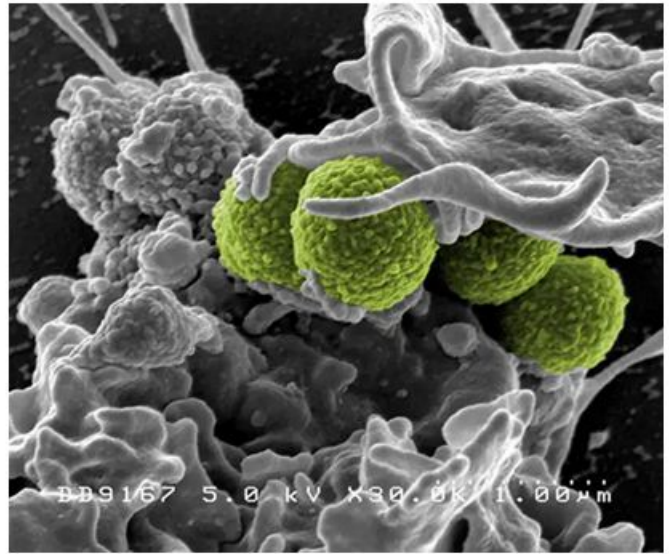
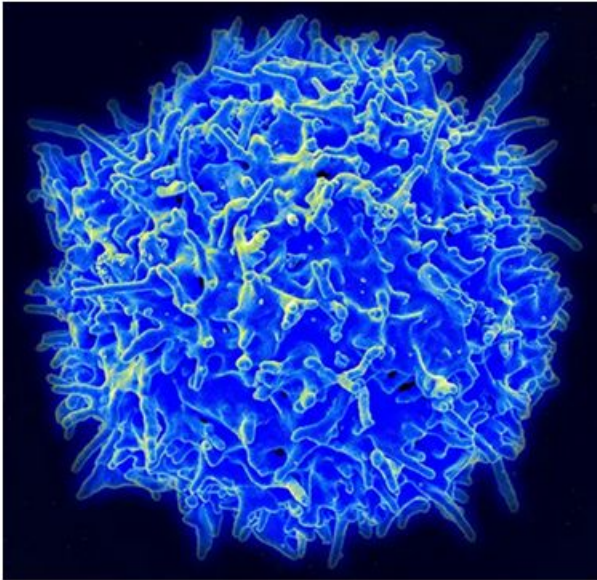
\_\_\_\_. 16:



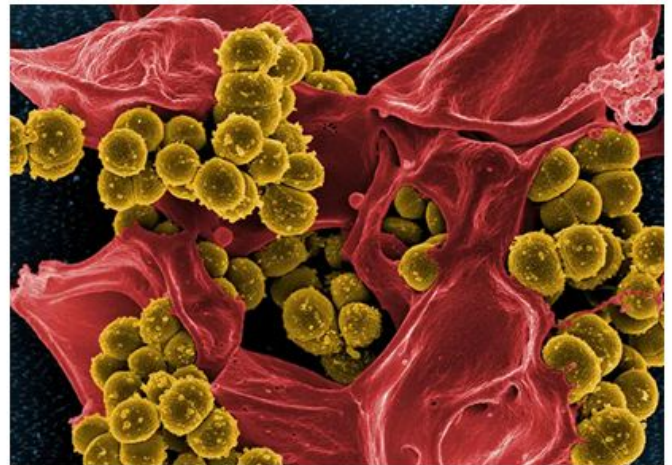
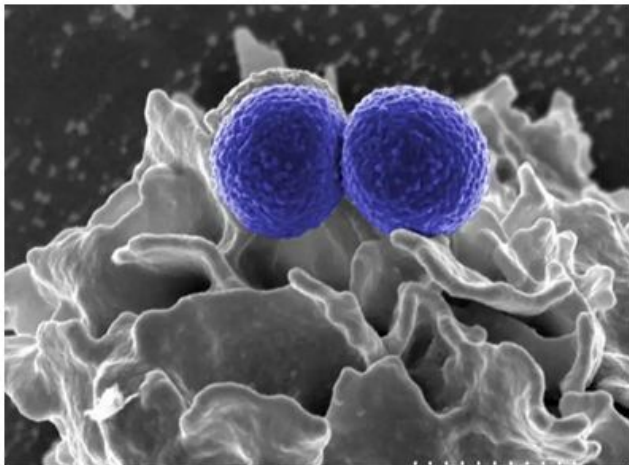
\_\_\_\_. 17:

*Francisella Tularensis*

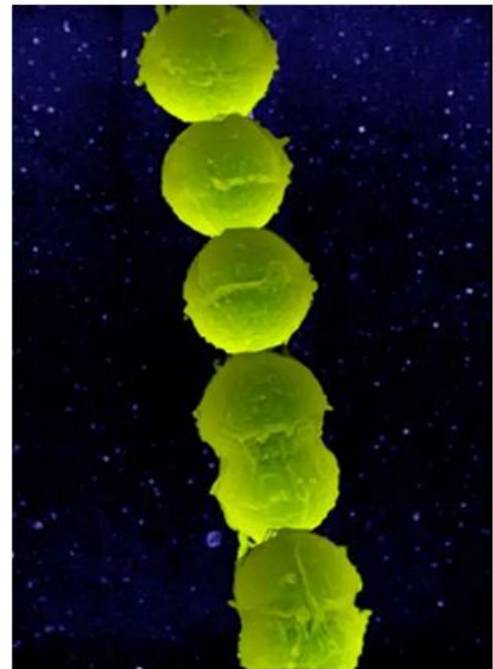




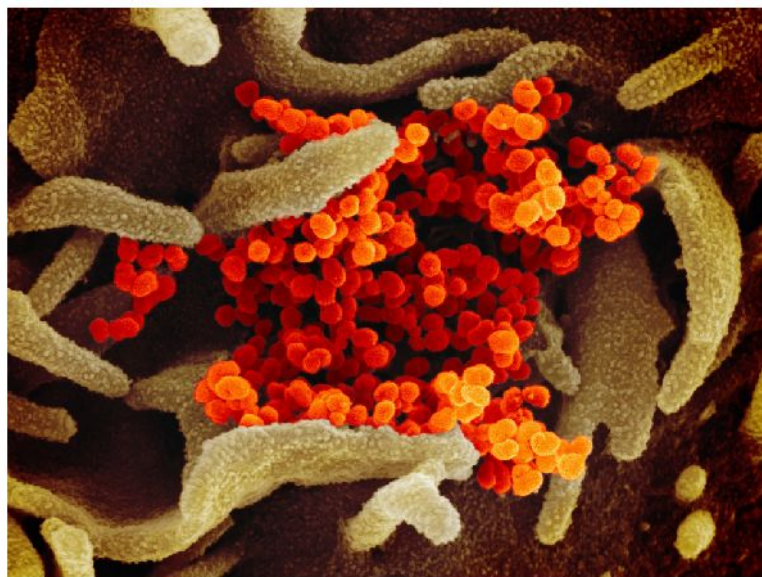
<p>____.18: - . . ( - )</p>	<p>____.19: MRSA ( , MRSA252)</p>
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<p>____.20: - (MRSA , MRSA252)</p>	<p>____.21: (MRSA)</p>
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<p>____. 22: _____ : <i>Klebsiella pneumoniae</i>,</p>	<p>____. 23:</p>
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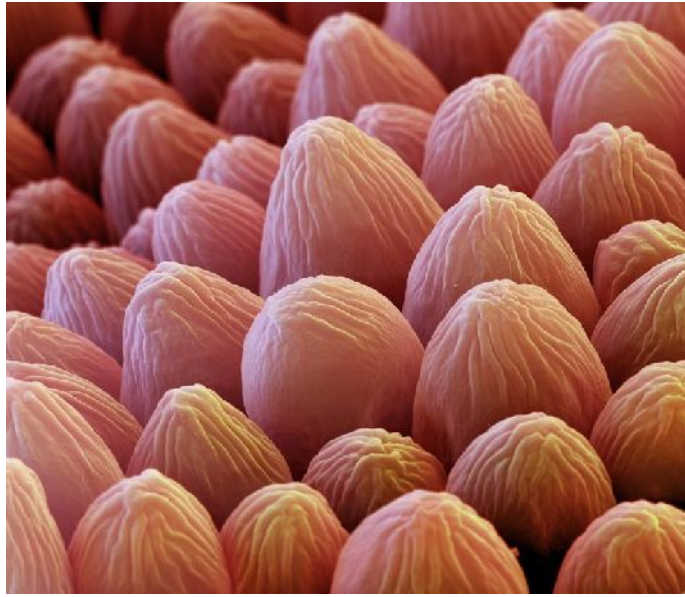


In this image from a scanning electron microscope, the new coronavirus is in orange.

\_\_\_\_. 24: \_\_\_\_\_ - ( \_\_\_\_\_ )

<https://www.npr.org/2020/02/13/805837103/images-what-new-coronavirus-looks-like-under-the-microscope>

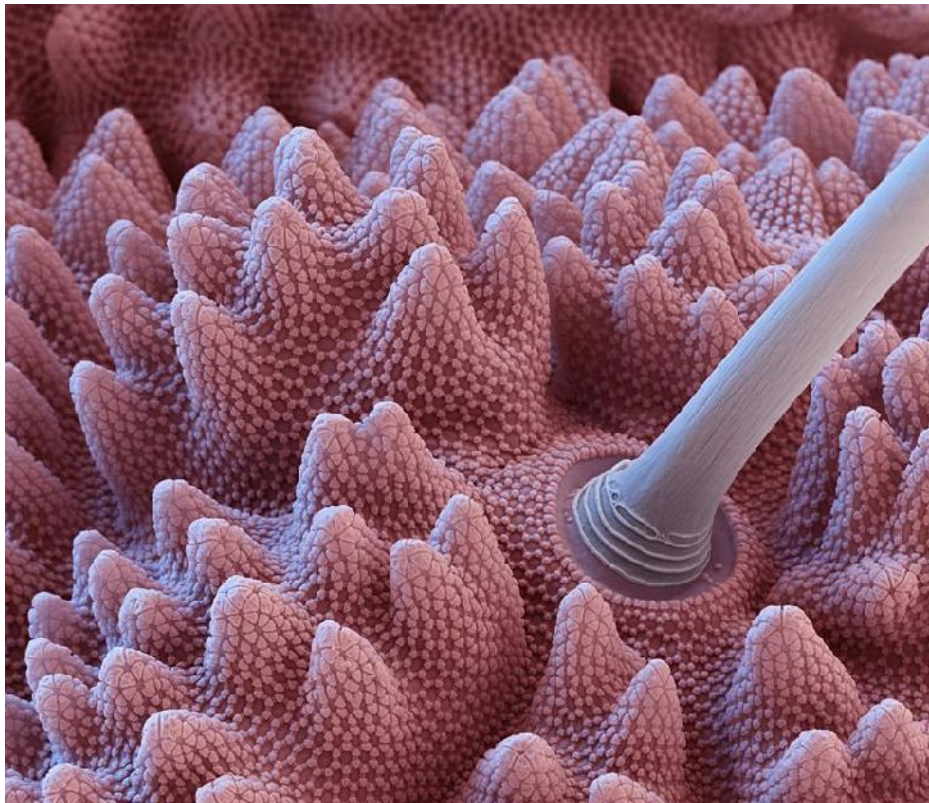




\_\_\_\_. 25:

« »

16



\_\_\_\_. 26:

Springtail<sup>6</sup> (*Collembola*<sup>7</sup>, « »/« ») « »

<sup>6</sup> a minute primitive wingless insect which has a springlike organ under the abdomen that enables it to leap when disturbed. Springtails are abundant in the soil and leaf litter.

<sup>7</sup> ( ) (Springtails (*Collembola*)).

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1	Möbius Ring Magic and Science Experiment: <a href="https://www.youtube.com/watch?v=f-19NLKxNUc">https://www.youtube.com/watch?v=f-19NLKxNUc</a>	( ) :
2	Möbius strip's ants : <a href="https://www.youtube.com/watch?v=pgbHR290RW8">https://www.youtube.com/watch?v=pgbHR290RW8</a>	...
3	J.S. Bach – Crab Canon on a Möbius Strip: <a href="https://www.youtube.com/watch?v=xUHQ2ybTejU">https://www.youtube.com/watch?v=xUHQ2ybTejU</a>	Canon 1 & 2 (1747), , ...



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6. Mobius Ring Magic and Science Experiment (2013) . – Available at: <https://www.youtube.com/watch?v=f-19NLKxNUc>
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