

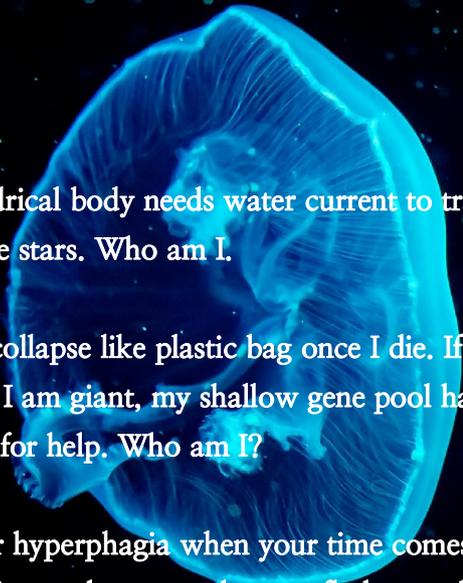
## BIOMIMETICS 2018 ROUND 1

### Instructions:-

- (a) This questionnaire has (I) a word search puzzle and (II) 4 descriptive questions.
- (b) You should submit your answer (as much as you could, not necessarily all question) in pdf format to our email id-
- (c) Don't forget to mention your and your groupmates' name in the answer-sheet.

I. Find ME if you CAN.....

N	B	N	I	H	C	R	U	A	E	S	S
O	U	N	M	Y	N	D	D	R	G	R	Z
I	M	D	L	D	Z	P	Q	I	A	N	N
T	B	J	V	U	Y	R	A	L	L	N	F
A	L	J	Y	X	C	N	L	S	P	L	N
R	E	Z	X	R	T	I	T	K	A	M	R
G	B	Z	A	S	P	I	F	M	B	R	N
I	E	B	Q	R	N	S	I	E	Y	B	R
M	E	U	E	G	D	N	D	X	R	Y	W
K	I	T	R	J	G	Y	M	R	N	I	T
D	A	A	J	O	K	B	H	Z	I	P	N
C	Y	D	S	B	R	R	L	G	R	B	R

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1. My cylindrical body needs water current to travel. I have a snake in my name and you may find me among the stars. Who am I.
  2. My eyes collapse like plastic bag once I die. If intimidated I can leave you with circular wounds. Although I am giant, my shallow gene pool has surprised scientists over years. If I see a glowing jelly I can run for help. Who am I?
  3. We go for hyperphagia when your time comes. We might double our body weight when your time comes. We may know not how to fly but pack our bags when your time comes. Who are WE and who is YOU.

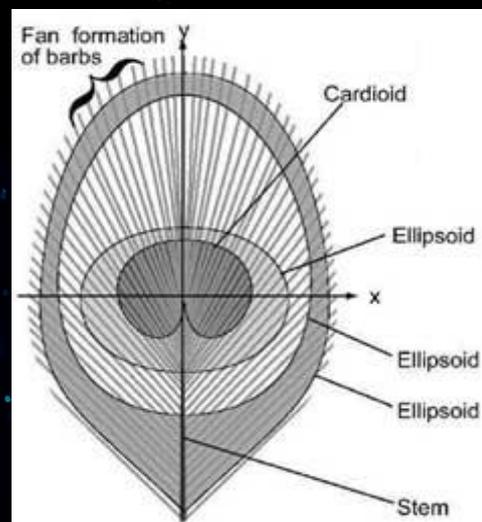
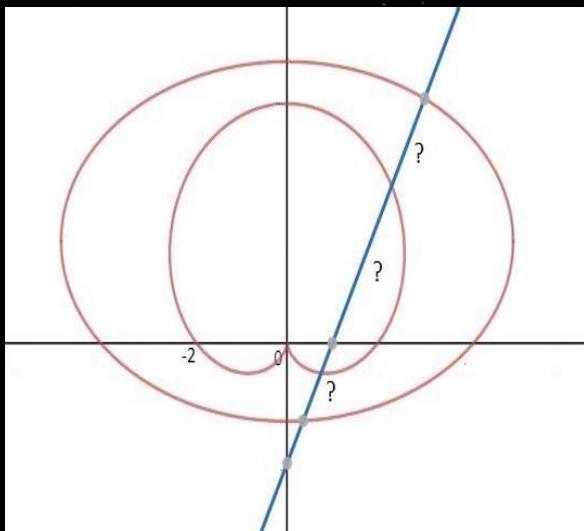
4. Love is a fickle thing even in our world. We generally are committed but will prefer quantity over quality. In spite of being monogamous we have the record of the highest breakup rates.
5. We use plant toxins for our defense as children although we are remarkably muscular. We grow exponentially and being voracious feeders even gobble up our own birth shells.
6. I am a chemical that helps my beholder to glow. Though my beholders name is misleading to human world, his predators get scared of his larvae as I symbolize toxin to them, and mates come finding for him in his adulthood. Which chemical am I, you may search your biology lab?
7. I am one of the most important pollinators of the plants. The unique and fast beating of my wings creates small hurricane like eddy current and I love to fly breaking the general aerodynamics principles.

8. I can sense electric signals of food instead of just odour. You can bend and mend me only if you are not afraid of coming near me. I date back to the Jurassic period and from the kin of notorious killing machines of the sea.

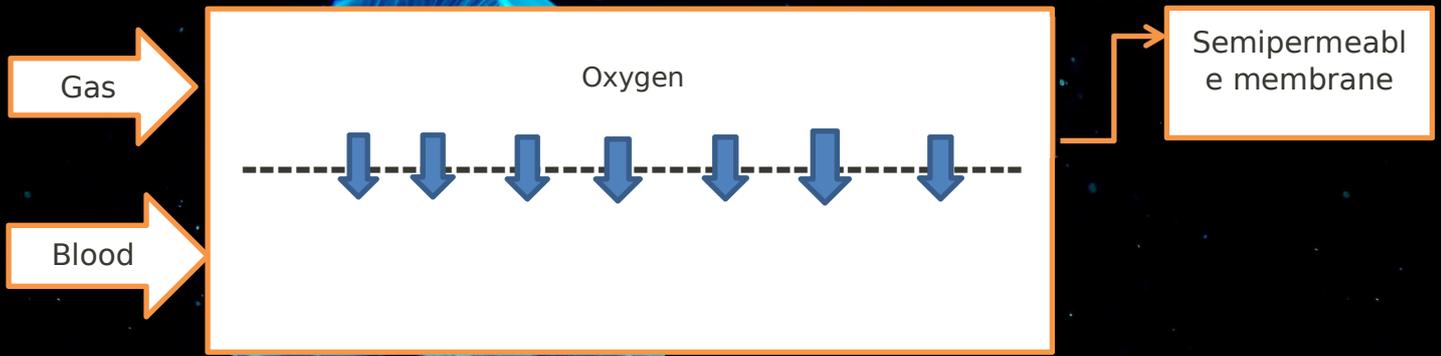
9. You may think I am a small child raggedly dressed but I am just one of the spherical creatures of the reefs. Water flows through our strange vessels instead of blood and we breathe with our feet.
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## II.

1. The peacock has structural colors. The peacock tail feather has a central stem with an array of about 200 barbules on each side. The beauty of the characteristic eye pattern comes from the rounded shapes that have a high degree of resolution. The pupil of the eye is formed by a dark purple cardioid and the iris is formed by a blue ellipsoid. The thickness of the keratin films on the barbules gives a bronze color. Then an abrupt and minute change in the thickness of keratin film produces a blue color. Another change produces a bronze color. If the eye feather is put on a Cartesian plane, the center of the ellipsoid lies at 1.7 units on the Y axis, with a major axis and minor axis of 10 and 6 units respectively. If the 70<sup>th</sup> barb intersects the X axis at 1 unit and the Y axis at -2 units, find out the distance in units between each change of color ( bronze, blue and bronze ).



2. When a flat stone is thrown horizontally instead of sinking it bounces back from the surface of the water. There is a lizard named basilisk lizard or "Jesus Christ Lizard" that can run on water surface even. Can you correlate these two phenomenon and give a scientific reason on how the lizard runs on water.
3. A membrane oxygenator is a device used to add oxygen to, and remove carbon dioxide from the blood. It can be used in two principal modes: to imitate the function of the lungs in cardiopulmonary bypass (CPB), and to oxygenate blood in longer term life support. Blood and a gas mixture flow from left to right in two channels separated by a semipermeable membrane. Blood gives up CO<sub>2</sub> to the gas stream continuously along the channel and takes up oxygen from the channel. Now we design a membrane oxygenator as a part of a heart-lung bypass machine. It transfers 300 ml/min of oxygen into blood flowing at 5.5 l/min. The blood enters the oxygenator with an effective oxygen concentration of 0.1 ml oxygen/ml blood. Then with what oxygen concentration should the blood leave the oxygenator?



4. A person has normal blood pressure (systolic and diastolic) due to some reasons there is hardening of the arteries, including the brachial artery in the upper arm. Then what will be the difference between the person's measured and actual blood pressure?  
(a) =0 (b) <0 (c) >0 (d) cannot be determined  
Explain your answer.

