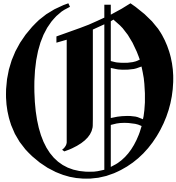


A Biological Tale

By Mr. Otterspoor



nce upon a time, as most people who study living and once living things (called _____ for short) believe there was a single basic unit of life called a _____. It was alone in the world as it was the first of its kind. However you shouldn't feel too sorry for it because it was almost certainly surrounded by many other organic molecules. Not to get too far off track but an organic molecule is one that contains the element _____. Also we should probably specify what kind of cell we are talking about here. Bacteria are _____ as they lack a membrane enclosed nucleus. _____ on the other hand have lots of membranous sacks including one in particular around their nucleus.

So as I was saying this first living thing was most likely a _____ as it lacked internal membranes, and it was surrounded by molecules such as: the building blocks of proteins called _____ and sugars more properly called _____. There were also the four nucleotides that make up DNA named _____, _____, _____, _____. As I would not like to be accused of missing an opportunity to define yet another vocabulary term I will take this opportunity to state that molecules that are made up of repeating subunits are generally known as _____. These molecules are special because they can bond together in specific combinations and in so doing store _____. The rule regarding bonding of nucleotides is called the _____. It is very important because it allows DNA to copy itself in a process named _____ but we'll get to that in few more paragraphs.

So here we are floating in a pool of organic molecules wondering how this first living thing could keep its insides separate from the outside environment. Luckily for it, and us I guess, there were some other molecules in that pool, molecules that had a polar head region and a non-polar tail region. These _____ are very important because with very little coaxing they like to form long

sheets. These sheets usually pair up in groups of two. The _____ or water loving heads point outward and the _____ or water hating tails pointing inward. In this arrangement we now have what can also be called a bi-molecular layer but most people just call it a cell's _____. This region of the cell is probably the most important because it is selectively _____. By only allowing certain things to pass through it, the cell is able to maintain the constant state of its internal environment, what scientists like to call _____.

But what good is a stable internal environment unless you have stuff to fill it with. Most of those little structures inside the cell that do specific jobs are called _____. There is much debate about where and how they came to be inside the cell but one theory called the _____ _____ gives us a possible explanation. Oh there I go again not properly defining all of my terms, but everyone knows that _____ is a mutually beneficial relationship. This biological mutualism is diametrically opposed to _____ which is the benefiting of one organism at the expense of another. The relationship in between the aforementioned relationships is called _____. This is when one organism is helped and the other is ... well to put it frankly indifferent. Wait, where were we? (Wow what a wacky alliteration.) Ohh that's right our cell was about to become different.

So, just to remind you, we have this prokaryotic cell floating around copying its genetic material and looking for food, and wouldn't you know it, but one day it just up and engulfs another prokaryote. Strangely this engulfed prokaryote is able to breakdown sugars and can create a molecule called _____ that contains high-energy bonds. This process of turning sugar into usable cell energy is called _____. Much to the engulfed creature's surprise, instead of being digested by the larger prokaryote it was enslaved!!!! Its fate was to be kept alive inside the other and used as a source of energy. Today we call these captured slaves the mitochondria.

That was it, the moment our predecessor was created, and it only took a billion more years of change over time (pronounced _____ to those of us who think about these kinds of things).

Yeah, yeah I hear you groaning...but how could a single, living _____ have changed to so perfectly fit its environment?

It is at this part of the story that you should hear the voice of Richard Dawkins, you know the guy who wrote that book _____, screaming in your head. Dawkins asserts that the earliest form of _____ was one in which _____ chemical forms were selected for. He also proposed the idea that as the quantity of freely available _____ needed by the replicators to copy themselves was depleted they must have been forced to find more interesting ways to get the material that they needed. And so a ruthless cycle of _____ began, all driven by small changes (called _____) in the base instructions of each replicating molecule. The better the molecule was at gathering the necessary materials for survival the more likely it was to pass its information on to the next _____ even if it meant gobbling up a few of the other replicating molecules nearby (who was going to notice anyway the eye wouldn't appear for another few hundred million years). These first eaters of others, _____, if you must bring vocabulary words into this, soon became quite successful.

As selfish and cruel as it seems, at the end of the day _____ doesn't care who gets hurt because it doesn't care about anything, it's just a _____. So somehow these little chains of deoxyribonucleic acid wind up becoming so complex that they can code for piles of _____ so complicated that they become capable of creating computers and cars and really, really, really big containers of popcorn at the movie theater. I mean seriously, who can eat the whole Monster-Deluxe-Super-Giant-Family- Limited-Time-Only-Value-Size anyway? What if you could? What if for whatever reason you were born with a single mistake in your sequence of _____ (and as I am sure you know by now the switching of one base is more scientifically known as a _____) that enabled you to consume huge quantities of popcorn? What if the extra energy you gained from eating all of those butter flavored kernels made you more able to attract a mate? Then your fortunate genetic mistake would be passed on to your many _____ (as you are able to

live longer and produce more children) thereby leading to a shift in the entire _____ of your species. But that's obvious. What's not so obvious is how did that little single cell floating in a pool of organic goo become so darn complex? (read the next line in your best Mr. T voice, out loud)

Easy fool!!!! it _____. (End Mr. T voice section) See as these first living things grew larger and more numerous they started to depend on and compete with each other. This interrelation of organisms based on the flow of energy is called a _____. Some members of this community fit into the general category of living things that are able to make their own food energy from the sun using a process called _____. The _____ are able to do this because they have the green pigment _____. Unfortunately for them they are eaten by the group of organisms called the _____. In the end we all must accept our fate, to have our physical materials recycled by the _____. For many reasons, including several laws of physics, the _____ from the sun cannot be recycled. Speaking of physics experiments...

Scientists use experimentation to test their _____. During these experiments separate groups are used. One is the _____, in which conditions are kept the same. The second is called the _____ and this is the group that is manipulated. As this test is conducted information is recorded called _____. The variable that is being controlled by the experimenter is the _____ variable. The _____ variable is the one that is measured after the other one is manipulated. At times the collection of this information is aided by the use of _____. One particularly important device to biology is the microscope. There are three main varieties of microscope: the first is the one that uses glass lenses to focus light called the _____ the second is the _____ which uses a beam of electrons to view a prepared slide. The third is the _____, which also uses electrons but can display three-dimensional images. The electron microscopes have a much higher _____ or ability to distinguish between two closely positioned objects.

Great now we have these great devices but what the heck are they good for? Well we could use them to examine the inside of the cell. Stop it! You have no choice in the matter if I, as the narrator, want to use them to look inside cells. If you don't like it write your own darn story (Hey tell you what, I'll make it worth 50 extra work points if you use all of the words from this packet, type it up and email it to me with an answer key before the midterm... seriously) It was the advancements in microscopes that allowed the discovery of the organelles. Among the organelles that science has discovered are the sites of polypeptide synthesis called the _____. They accomplish this amazing feat by utilizing a special singled stranded molecule called _____. There are three different kinds of this molecule _____ which is responsible for bringing the instructions from the nucleus to the _____ who does the actual polypeptide assembly with the help of the _____ which brings the amino acids according to the matching of the three nucleotide sequence found on the mRNA called the _____. There are also a series of interconnected tubes called the _____. These tubes transport things to the shipping center called the _____. This organelle creates membranous pouches that are more properly called _____. These pouches can sometimes contain special enzymes for breaking down cellular materials. These specialized pouches are called _____. One would be remiss to not mention the name of the colloidal material that supports the organelles _____. Or the strands of protein celled _____ that create the _____ that acts as the support structure for the cell.

Now as we all know by now what good is just a random bunch of little subcellular parts... what we need here is increased surface area to get stuff done. The _____ are the energy producing organelles. To do this they take in _____ and _____ to make ATP. The byproducts of this process are a gas called _____ and a liquid named _____. There is also a fair amount of _____ that is eventually lost to vastness of space. This conversion of energy takes place across a highly folded inner membrane called the _____. The energy carrying

molecule produced here can be used to do a lot of things. Sometimes it is used to extend the plasma membrane in order to engulf a large food particle. The process has been named “cell eating” or _____ . There is a similar process in which a smaller amount of liquid is brought into the cytoplasm by the invagination of the membrane. This has been termed _____ or “cell drinking.” Both of these methods are forms of _____ transport. This form of transport is used when things are too big to cross the membrane on their own or even with the help of a _____ . Hey that reminds me! What do you call it when water moves across the cell membrane from an area of higher concentration to an area of lower concentration? _____ , that’s right now I remember. But why, dear dedicated reader of biological tales, would a cell need to add to its _____ , knowing that its amount of cell membrane (measured as _____) would increase at a slower rate? Why it could only be because it needed to grow and develop. Hey aren’t those some of the characteristics of _____ ? What were the other ones... ohh right all _____ things must be made of cells, be able to use and _____ energy, be highly _____ and be able to _____ .

Well now we’ve really gone and done it. We’ve somehow managed to let the humans out of the jar (must have been when we were punching the holes in the lid.) Human cells are able to produce duplicates of themselves using a process called _____ . The first step of cellular reproduction is the dissolving of the _____ and the condensing of the _____ . This sounds like a minor accomplishment until you realize that there are _____ pairs of them in a human... but that isn’t even the half of it, literally, because just before the cell entered this phase called _____ it replicated its DNA. So instead of the usual _____ chromosomes there are now _____ . But no matter our intrepid cell forges on to the next phase by arranging all of its genetic material across the middle of the cell. _____ is by far the most recognizable phase due to this central chromosome configuration (yeah more alliteration) which was accomplished via the extraordinary efforts of the _____ . Who have grabbed onto each pair of duplicated chromosomes.

This is relatively easy to do since each copy is connected to the original chromosome by a _____ . This pulling apart the pairs of _____ stage is called _____ . As the chromosomes are divided into two new cells the cytoplasm also needs to be divided to ensure each _____ gets some of the organelles and this is accomplished by _____ . The purpose of cellular reproduction is to create ___ new cells that are _____ . These cells then enter the longest phase of their _____ , the in between divisions phase or better known as _____ . The theory that states that all cells come from other cells is the _____ . In fact prokaryotes use a very similar method to reproduce called _____

But O my Best Beloved (excuse me as I have a Rudyard Kipling moment) that is not where you and I come from. Instead let me tell you a story... A Just So (Biological) story

How Your Parents Got Their Gametes.

Once upon a time, when your parents were just a whole lot younger than they are today, their bodies were made out of only one kind of cell.

They had the type of cells that make up body tissues

and despite what you may have heard from the crafty crocodile down by the river

or the ever so spotty leopard in the forest, these cells, O Best Beloved, were called _____ cells.

These very cells went willy-nilly throughout their day

dividing and increasing their volume

and then dividing and increasing their volume

and then dividing and increasing their volume some more.

And your parents, being loving and caring and full of each other adoration

Decided that it had come time to pass on their _____

and so your parents said to each other:

“Let us pass on our heritable traits.”

And so being so loving and caring of each other, your parents decided to share equality in your formation, so that you too, O Best Beloved, could be full of all their loving and caring and share in their adoration.

So they each took one of their cells,

their very best cells in fact, and plucked it from their very loving bodies.

They then took the two cells and smushed them together to make what was to be you.

But it is here that they had a problem.

For as loving and caring and full of each others adoration your parents were, what they were not, was able to pass on their heritable traits.

For try and try as they might, they did not have the right combination of chromosomes.

No matter how small the cell was that they plucked from their very adoring body

when they combined the two together to make you, O Best Beloved,

they could not get the number of chromosomes to be any less than 92.

That was because the cells that make our bodies are _____

or having two glorious and splendidly complete copies of each chromosome

Saddened by their inability to make you they sought out the wisest and most knowing of all the knowers... The Bearded Man.

When he saw them arrive he noticed that they were indeed full of love and caring and adoration

And so he decided to help them

This was quite unusual as Bearded Men often eat people who are full of love,

after all love is quite tasty, especially in a good sauce made of plums and sugar and little red peppers

But instead, He asked them in his most serious and knowing voice

“When you eat cake do you each eat a whole cake?”

To which your parents, no less full of love responded

“No, we each eat a half.”

“Indeed” said the Bearded Man, stroking his ever so resplendent and magnificently radiant beard.

Noticing that they were no less full of caring

He then asked them another question

“When you sleep at night, do you each have a bed?”

“No” they responded, “we each have a half.”

“Indeed” said the Bearded Man, this time taking twice as long stroking his ever so resplendent and magnificently radiant beard.

And then noticing that they were still no less full of adoration, asked a third question

“Then why is it that you each are trying to give a whole to your child when all you ever take for yourselves is a half?”

And with that, O Best Beloved, your parents finally understood what they needed to do.

They each jumped up and grabbed a hold of the Bearded Man’s ever so resplendent and magnificently radiant beard and tied a hair to each of their 46 chromosomes and pulled with all of their might.

This scared the Bearded Man as he was afraid they might get knots in his ever so resplendent and magnificently radiant beard and so the Bearded Man struggled to free himself.

He gave a mighty yell and pulled with all his might, which if you measured it is quite a lot of might,

Finally pulling himself free

In freeing himself, he also wound up pulling apart their chromosomes.

Thereby reducing the number in half.

These cells are called _____.

And so they each took one of their cells with half the amount of love and caring and adoration as before and smushed them together.

And this time it worked.

Because even though each of their _____ (or reproductive cells as we call them today) only had half the needed information

The other made up for it with an equally opposite pair

And so that is why you are still just as full of their love and caring and adoration as can be.

And that is How Your Parents Got Their Gametes.

The End

Well, as nice as that bedtime story was, it didn't tell the whole story of reduction division, or as it is more commonly called _____. This reproductive cell making process takes much the same course as Mitosis only it goes through two divisions not just one. After the cells leave interphase they copy the DNA and assemble them into chromosomes much in the same way they did for mitosis. However, when the cell reaches _____ there are a few noticeable changes from its previous incarnation. The sister chromatids have now found their _____ and formed groups of four called _____. It is at this point that sooo much variation is created that we, the proctors of the study of life, will ask you to write an essay about it... but that is next marking period so be cool. The first way variation can be created is by the occasional switching of one part of a chromosome with another identical part of a non-sister chromatid. This exchange of genetic material is called _____. It is possible because the genes found on a particular chromosome are always found at the same spot or _____. So swapping parts with each other is no big deal except that it can change the flavor of the individual genes... or to put it more technically the _____. The other way variation is created by the _____ way the _____ chromosomes and _____ chromosomes distribute themselves in the next phase, _____. So now all this variation has been created we can pull apart our chromosomal material and divide the cytoplasm. The process repeats itself again this time breaking apart the sister chromatids and resulting in a post _____ cell count of four.

Well I hope 4 is your lucky number. It may not be if some of what we have learned so far this year has not diffused its way into your minds otherwise you'll be on the five or six year plan.

But I guess we'll find out soon enough. I hope your midterm story has a happy ending.

Hey... ever been to

www.darienps.org/teachers/otterspool

You can download homework sheets

Watch Video Questions

And see me eat

duck embryos

But the
real reason
this page
is here

is to create an odd number of pages so when this story gets copied the last page...
you know the one with all of the vocab words on it... can be ripped off
thereby avoiding the need for you to perform the dreaded
flip back a hundred something times

I wouldn't want
to tire you
out.

(so tear off the next page and get started already)

A Biological Tale – Word Bank

Each word is used only once

1. 2
2. 23
3. 46
4. 92
5. active
6. adapted
7. adenine
8. alleles
9. amino acids
10. anaphase
11. anaphase 1
12. ATP
13. Bacteria
14. base pairing rule
15. binary fission
16. biologists
17. carbohydrates
18. carbon
19. carbon dioxide
20. cell
21. cell cycle
22. cell theory
23. cellular respiration
24. centrioles
25. centromere
26. chemical resources
27. chlorophyll
28. chromosomes
29. codon
30. commensalism
31. competition
32. compound light microscope
33. consumers
34. control group
35. convert
36. Cristae
37. crossing over
38. cytokinesis
39. Cytoplasm
40. cytosine
41. cytoskeleton
42. data
43. daughter cell
44. decomposers
45. dependant
46. diploid
47. DNA
48. endoplasmic reticulum
49. energy
50. Eukaryotes
51. evolution
52. experimental group
53. food chain
54. gametes
55. gene pool
56. generation
57. glucose
58. Golgi apparatus
59. guanine
60. haploid
61. heat
62. heritable traits
63. heterotrophs
64. homeostasis
65. homologous pair
66. hydrophilic
67. hydrophobic
68. hypothesis
69. identical
70. independent
71. information
72. interphase
73. life
74. living
75. loci
76. lysosomes
77. mRNA
78. maternal
79. meiosis
80. membrane
81. metaphase
82. metaphase 1
83. microtubules
84. mitochondria
85. mitosis
86. molecule
87. mutations
88. natural selection
89. nucleic acids

90. nuclear membrane
91. offspring
92. organelles
93. organized
94. organism
95. osmosis
96. oxygen
97. parasitism
98. paternal
99. permeable
100. phagocytosis
101. phospholipids
102. photosynthesis
103. pinocytosis
104. point mutation
105. polymers
106. producers
107. prokaryotes
108. prophase
109. protein
110. random
111. replication
112. reproduce
113. resolution
114. ribosome
115. RNA
116. rRNA
117. SEM
118. sister chromatids
119. somatic
120. spindle fibers
121. stable
122. surface area
123. symbiosis
124. symbiotic cell theory
125. technology
126. telophase 2
127. TEM
128. tetrads
129. The Selfish Gene
130. thymine
131. transport protein
132. tRNA
133. vesicles
134. volume
135. water