

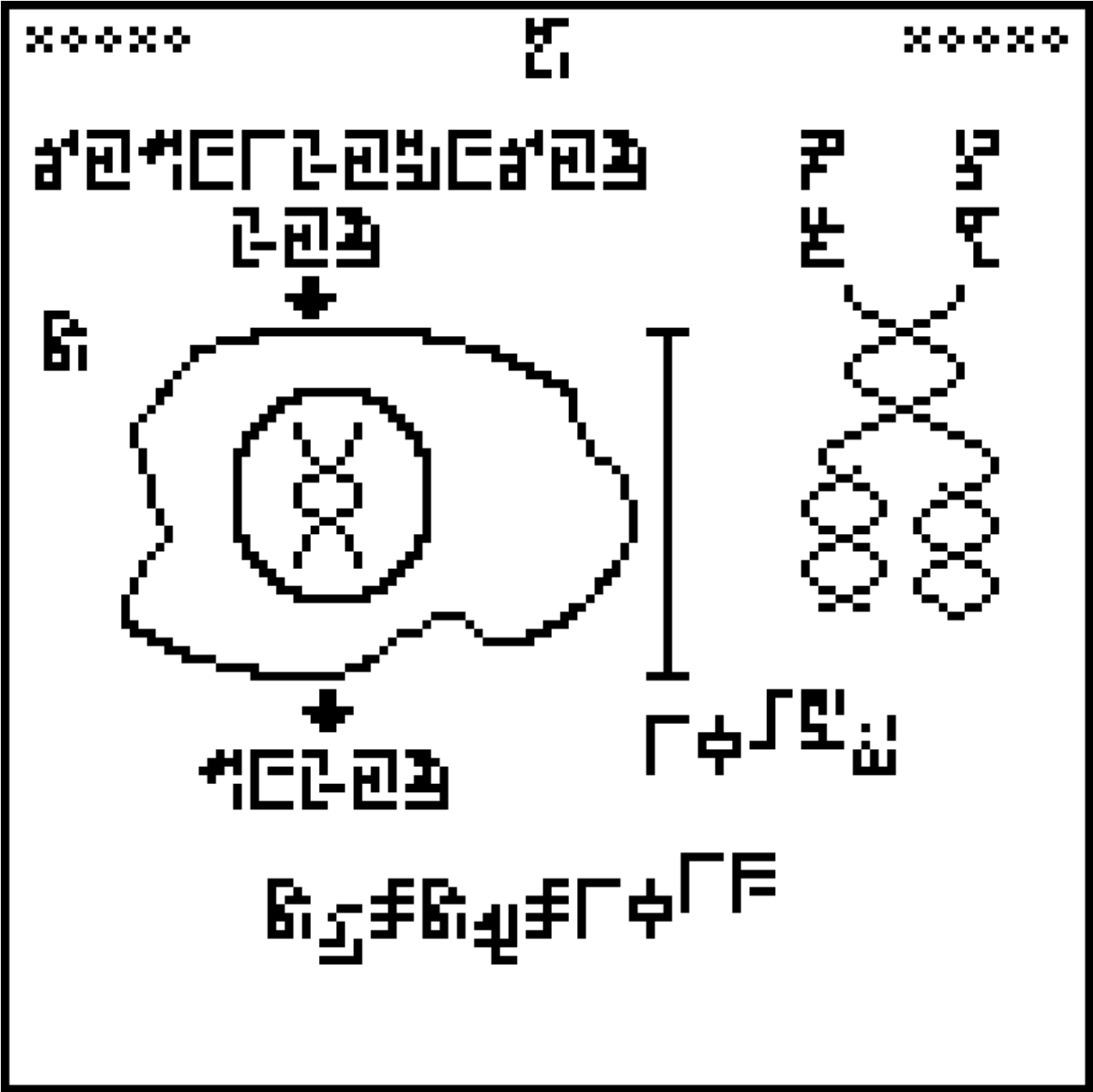
The Universe of Discourse

Mon, 02 Nov 2015

A message to the aliens, part 18/23 (cell respiration and division)

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This is page 18 of the [Cosmic Call](#) message. An explanation follows.



The 10 digits are:

0 1 2 3 4 5 6 7 8 9

This page depicts the best way to fry eggs. The optimal fried egg is shown at left. Ha ha, just kidding. The left half of the page explains cellular respiration. The fried egg is actually a cell, with a DNA molecule in its nucleus. Will the aliens be

familiar enough with the structure of DNA to recognize that the highly abbreviated picture of the DNA molecule is related to the nucleobases on the previous page? Perhaps, if their genetic biochemistry is similar to ours, but we really have no reason to think that it is.

The illustration of the DNA molecule is subtly wrong. It shows a symmetric molecule. In reality, one of the two grooves between the strands is about twice as big as the other, as shown at right.

The top formula says that $C_6H_{12}O_6$ and O_2 go into the cell; the bottom formula says that CO_2 comes out. (Energy comes out also; I wonder why this wasn't mentioned.) The notation for chemical

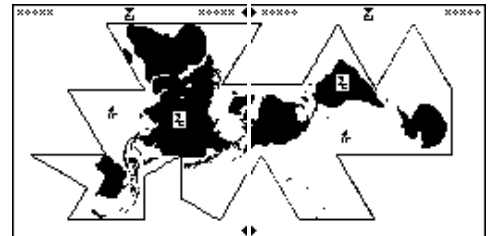
compounds here is different from that used on [page 14](#): there, O_2 was written as 𐀔𐀔; here it is written as 𐀔𐀔𐀔𐀔 ("2xO").

The glyph near the left margin 𐀔 does not appear elsewhere, but I think it is supposed to mean "cell". Supposing that is correct, the text at the bottom says that the number of cells in a man or woman is 𐀔𐀔10¹³𐀔𐀔. The number of cells in a human is not known, except very approximately, but 𐀔𐀔10¹³𐀔𐀔 is probably the right order of magnitude. ([A 2013 paper from Annals of Human Biology](#) estimates 𐀔3.72·10¹³𐀔.)

Next to the cell is a ruler labeled 𐀔𐀔10⁻⁵𐀔𐀔 meters, which is a typical size for a eukaryotic cell.

The illustration on the right of the page, annotated with the glyphs for the four nucleobases from the previous page 𐀔𐀔𐀔𐀔, depicts the duplication of genetic material during cellular division. The DNA molecule splits down the middle like a zipper. The cell then constructs a new mate for each half of the zipper, and when it divides, each daughter cell gets one complete zipper.

The [next article](#) will discuss pages 19 and 20, shown at right. (Click to enlarge.) Try to figure it out before then.



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