

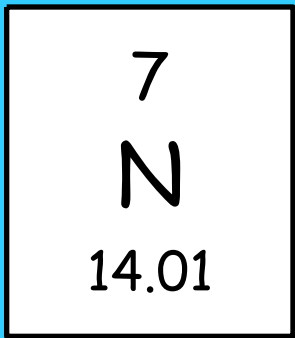
THE NITROGEN CYCLE



NITROGEN

1 H 1.01																	2 He 4.00
3 Li 6.94	4 Be 9.01											5 B 10.81	6 C 12.01	7 N 14.01	8 O 16.00	9 F 19.00	10 Ne 20.18
11 Na 22.99	12 Mg 24.31											13 Al 26.98	14 Si 28.09	15 P 30.97	16 S 32.07	17 Cl 35.45	18 Ar 39.95
19 K 39.1	20 Ca 40.08	21 Sc 44.96	22 Ti 47.88	23 V 50.94	24 Cr 52.00	25 Mn 54.94	26 Fe 55.85	27 Co 58.93	28 Ni 58.69	29 Cu 63.55	30 Zn 65.39	31 Ga 69.72	32 Ge 72.61	33 As 74.92	34 Se 78.96	35 Br 79.90	36 Kr 83.80
37 Rb 85.47	38 Sr 87.62	39 Y 88.91	40 Zr 91.22	41 Nb 92.91	42 Mo 95.94	43 Tc (98)	44 Ru 101.07	45 Rh 102.91	46 Pd 106.42	47 Ag 107.87	48 Cd 112.41	49 In 114.82	50 Sn 118.71	51 Sb 121.76	52 Te 127.6	53 I 126.9	54 Xe 131.29
55 Cs 132.9	56 Ba 137.3	57 La* 138.9	72 Hf 178.5	73 Ta 180.9	74 W 183.9	75 Re 186.2	76 Os 190.2	77 Ir 192.2	78 Pt 195.1	79 Au 197.0	80 Hg 200.6	81 Tl 204.4	82 Pb 207.2	83 Bi 209	84 Po (209)	85 At (210)	86 Rn (222)
87 Fr (223)	88 Ra (226)	89 Ac^ (227)	104 Rf (261)	105 Db (262)	106 Sg (263)	107 Bh (264)	108 Hs (265)	109 Mt (268)	110 Ds (271)	111 Rg (272)							

58 Ce 140.1	59 Pr 140.9	60 Nd 144.2	61 Pm (145)	62 Sm 150.4	63 Eu 152.0	64 Gd 157.3	65 Tb 158.9	66 Dy 162.5	67 Ho 164.9	68 Er 167.3	69 Tm 168.9	70 Yb 173.0	71 Lu 175.0
90 Th 232.0	91 Pa (231)	92 U 238.0	93 Np (237)	94 Pu (244)	95 Am (243)	96 Cm (247)	97 Bk (247)	98 Cf (251)	99 Es (252)	100 Fm (257)	101 Md (258)	102 No (259)	103 Lr (260)



NITROGEN QUICK FACTS

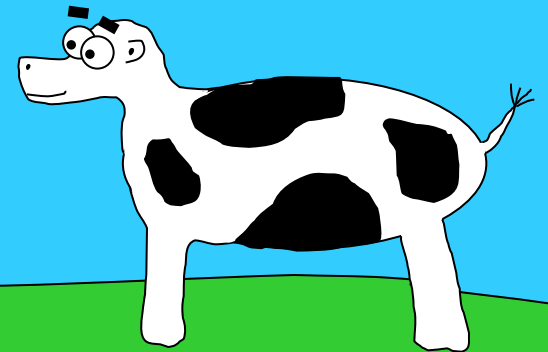
Remember, Carbon = energy and bonds

Well, nitrogen = building blocks

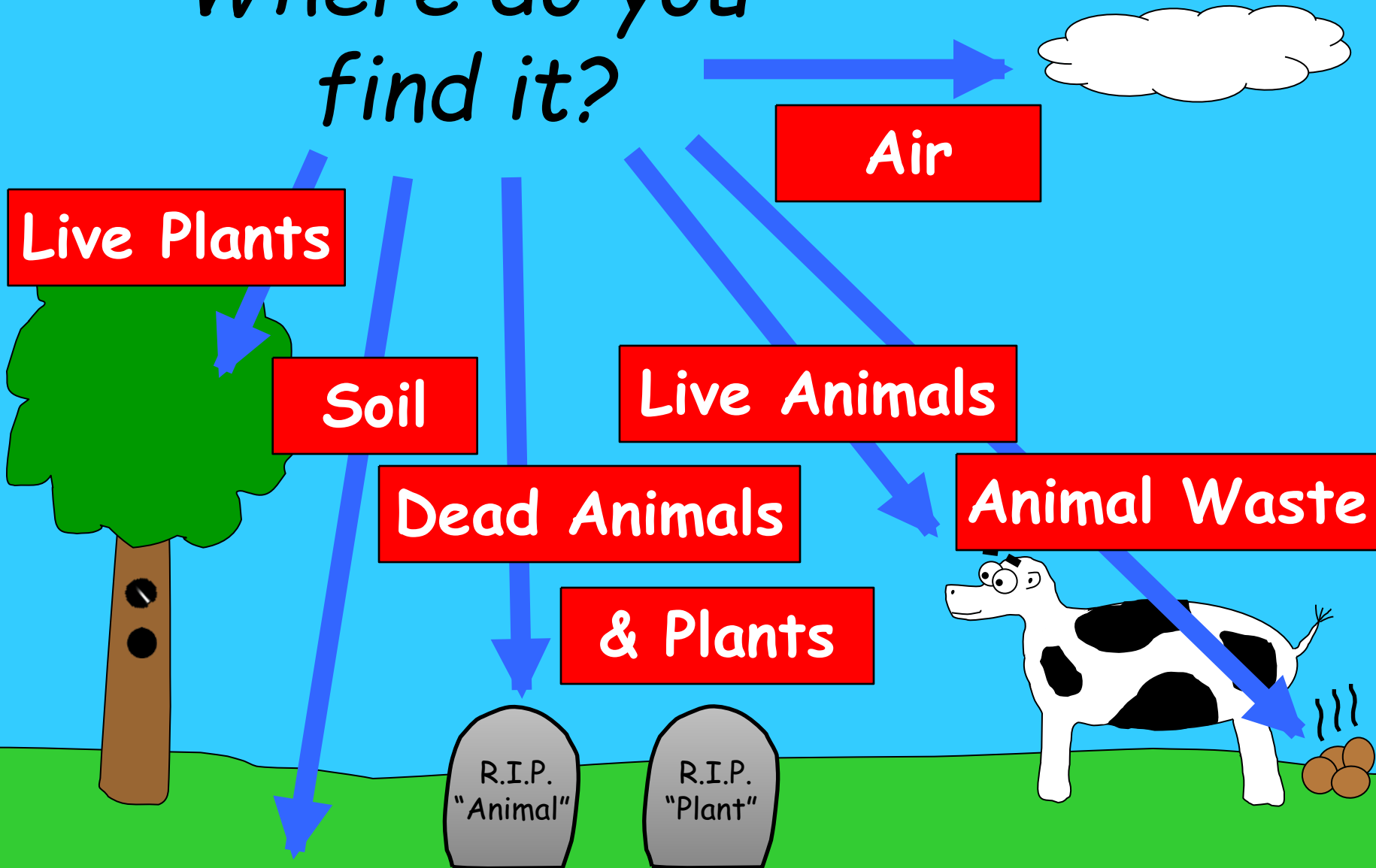
We use nitrogen to build proteins

We use it to build each piece of DNA

It's the #1 gas in the atmosphere - 78%



Where do you find it?



Where else is it found?



Oceans

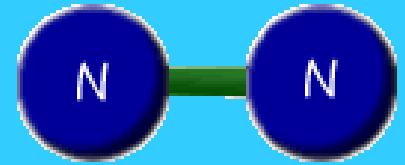
Where else is it found?



Fertilizers

Nitrogen always comes in pairs when in the air...

... we call this **atmospheric nitrogen (N_2)**



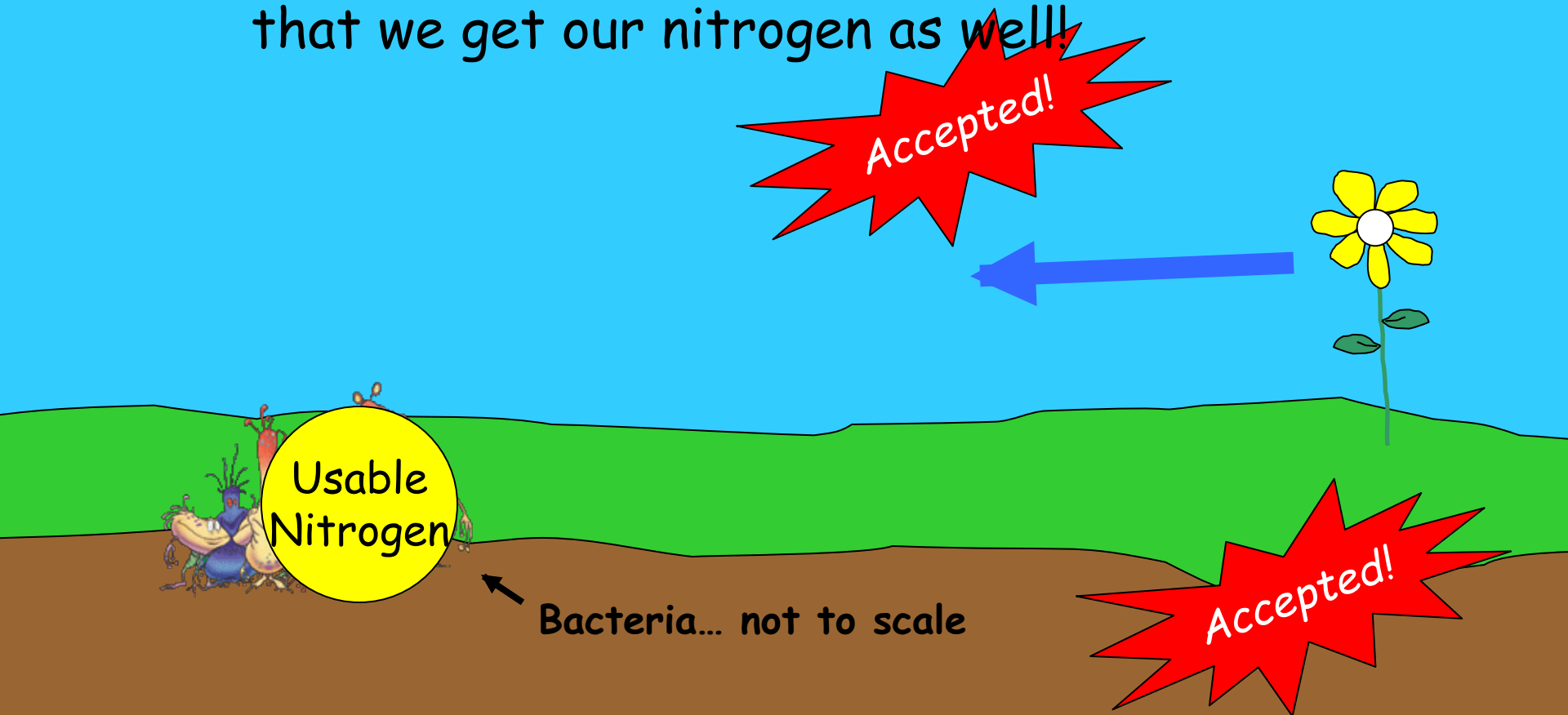
Plants and animals **CANNOT** use N_2 to get their nitrogen!



Luckily there are some kinds of *bacteria* that can change the nitrogen in the air...

into forms that plants can use

Animals can then eat those plants so that we get our nitrogen as well!



Bacteria changing N_2 into a form that can be used by plants is called...

Nitrogen Fixation

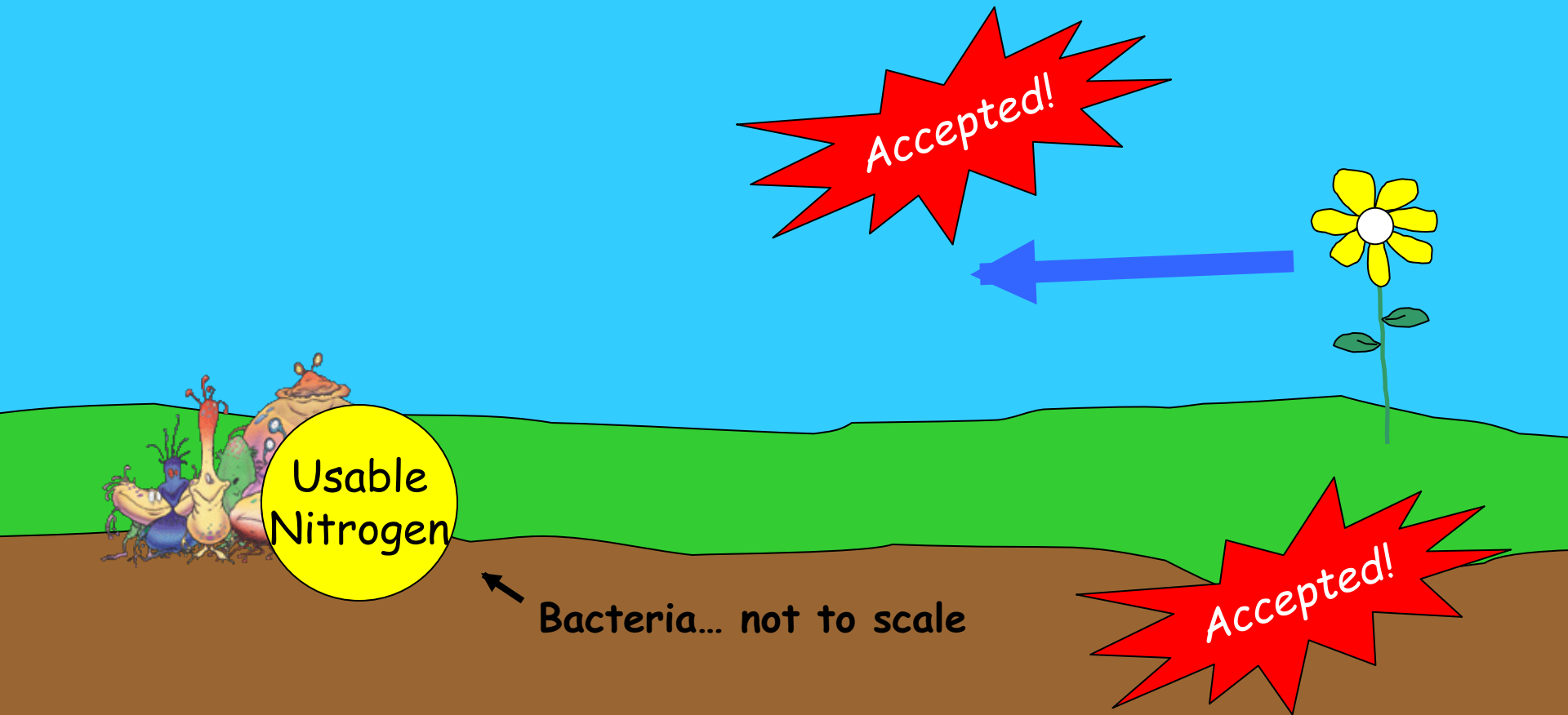
And any bacteria that does this we call...

Nitrogen Fixing Bacteria

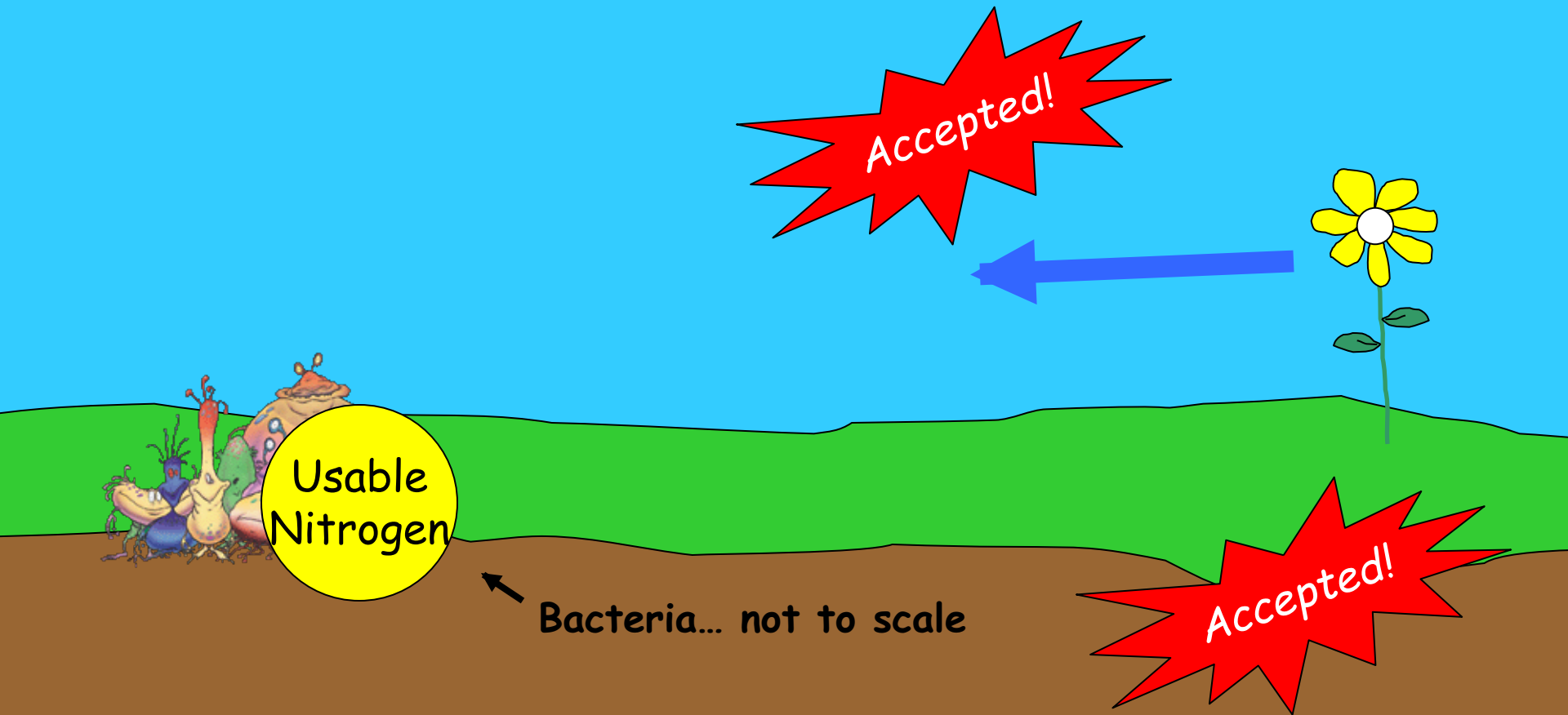
(Creative, I know)



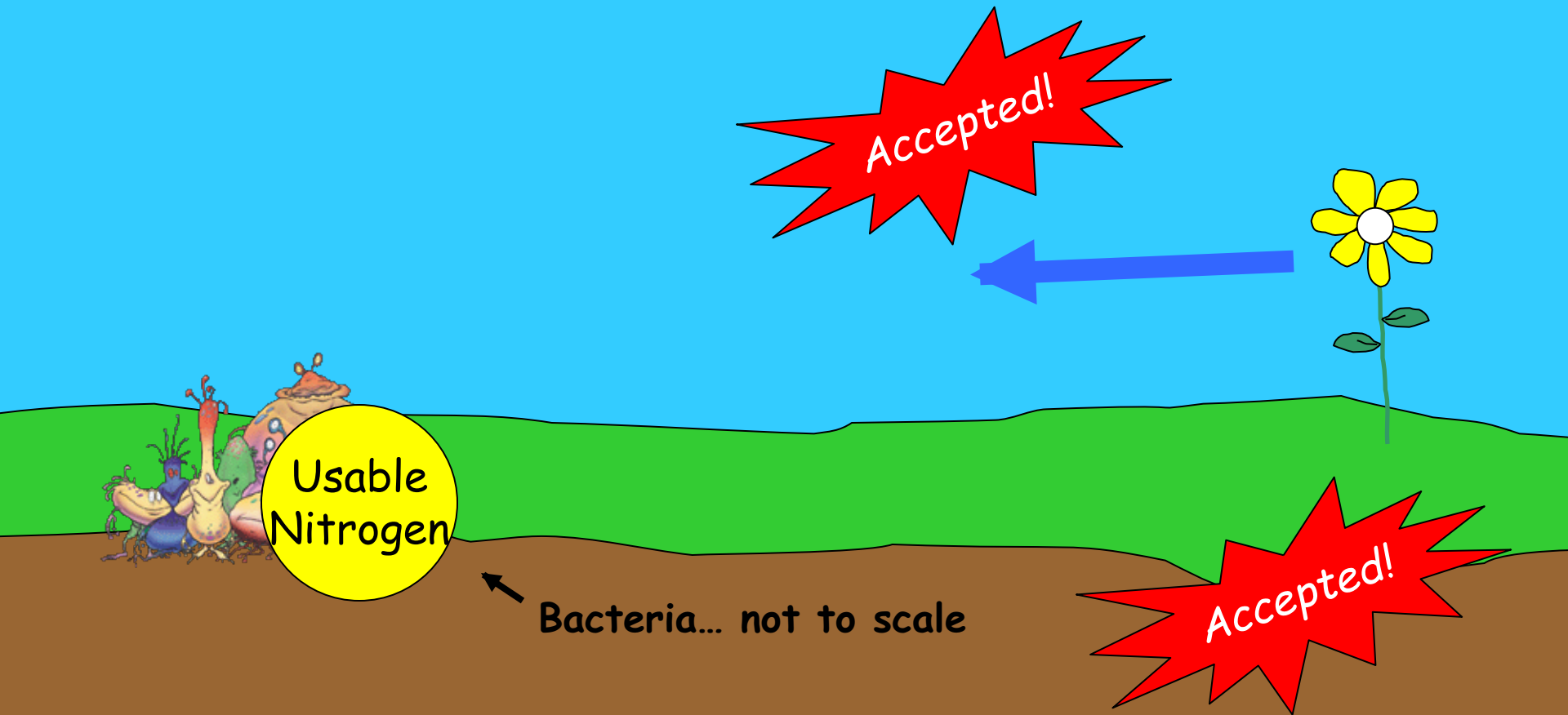
Now draw it in your notes



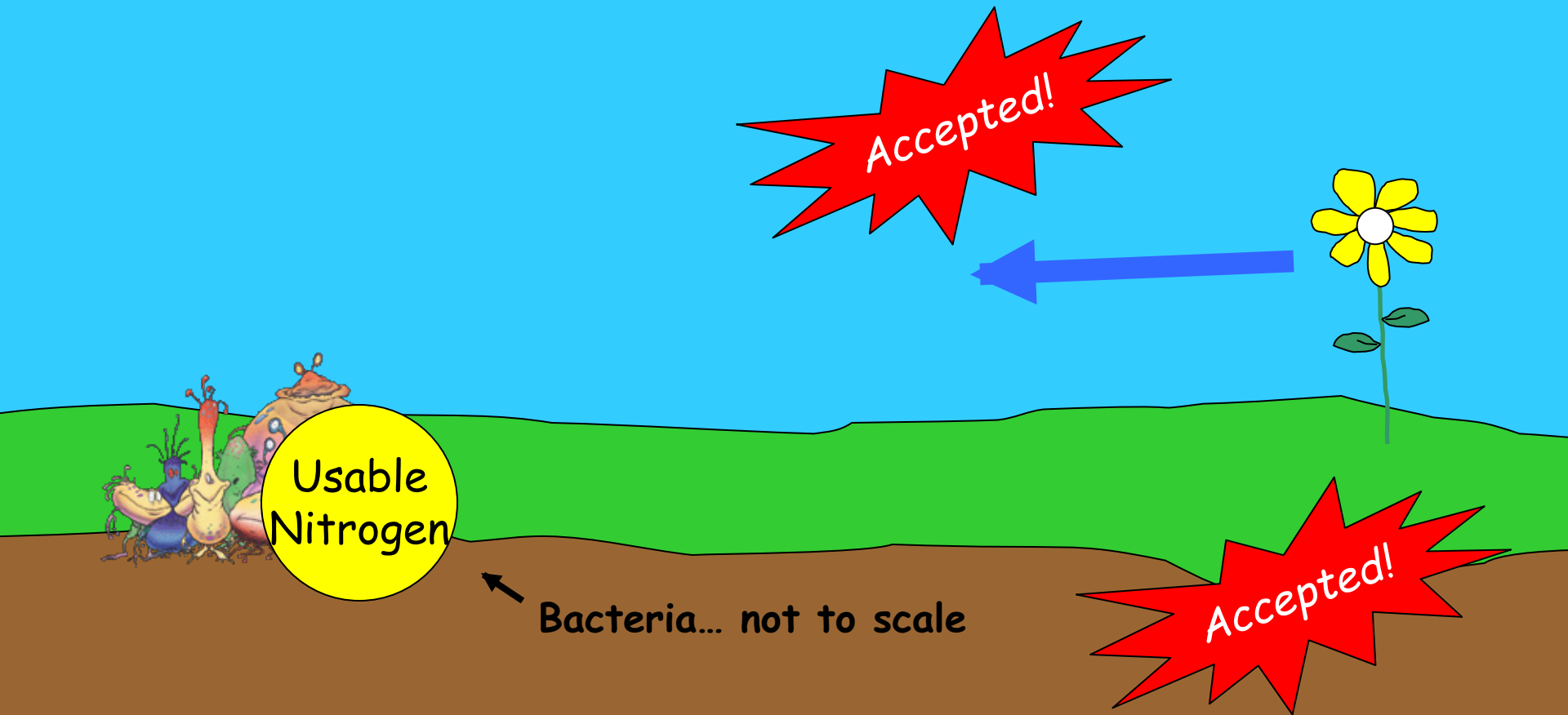
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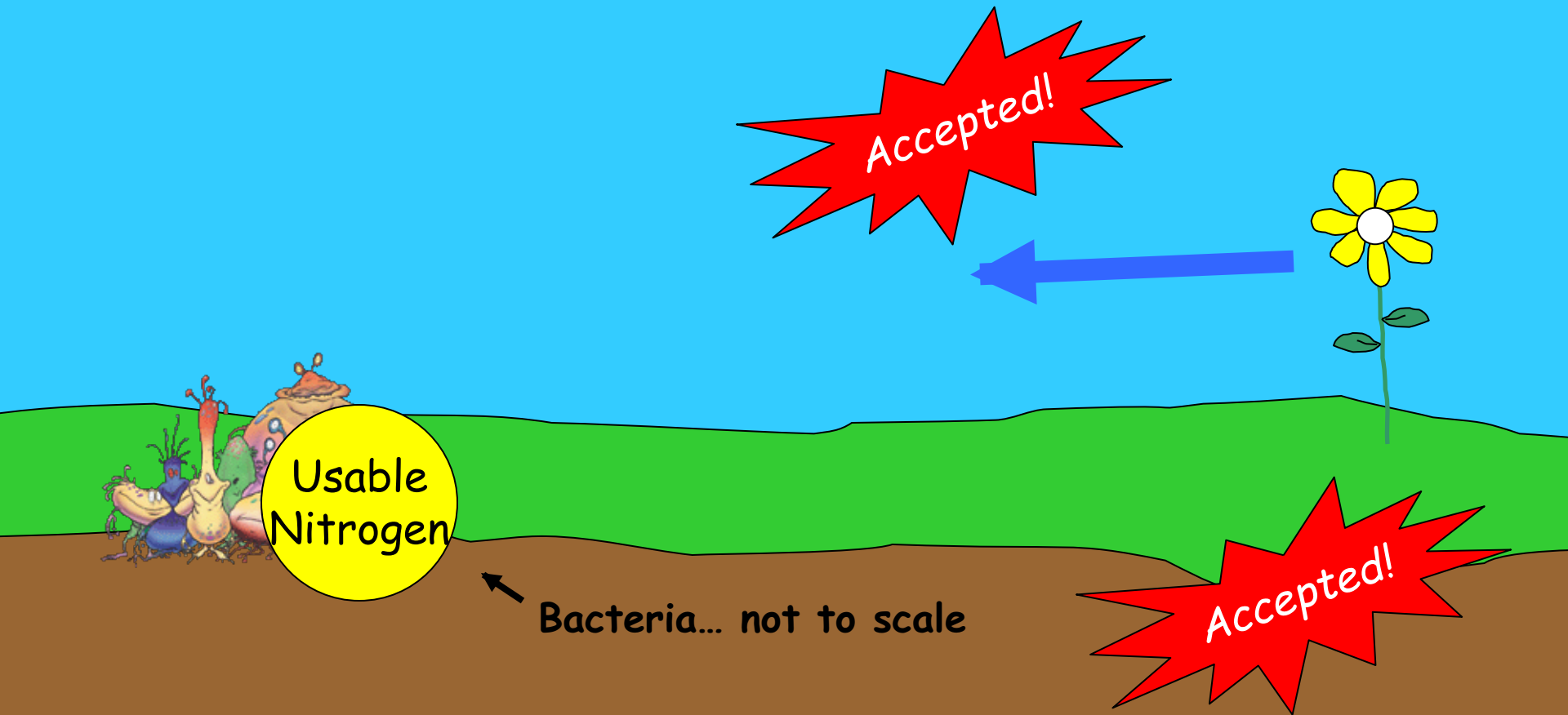
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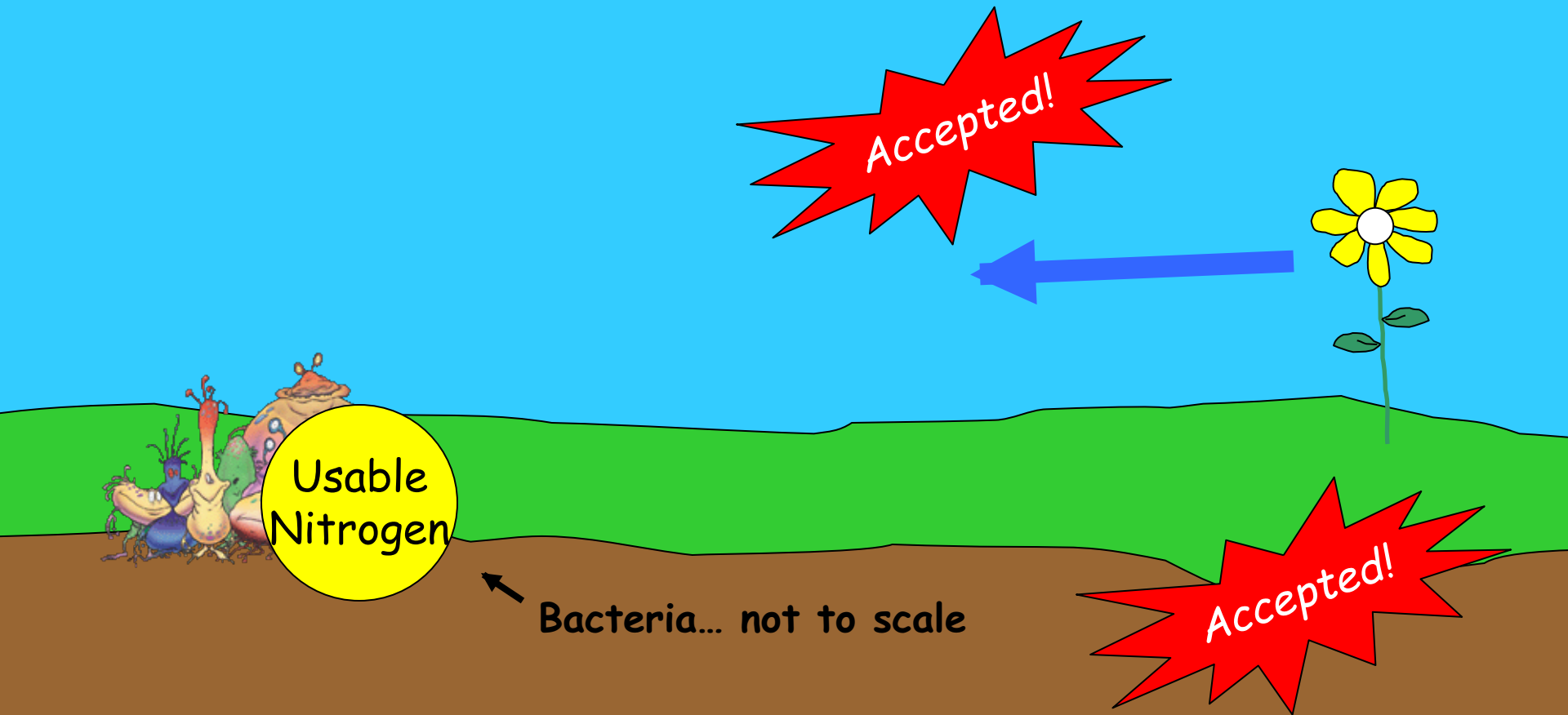
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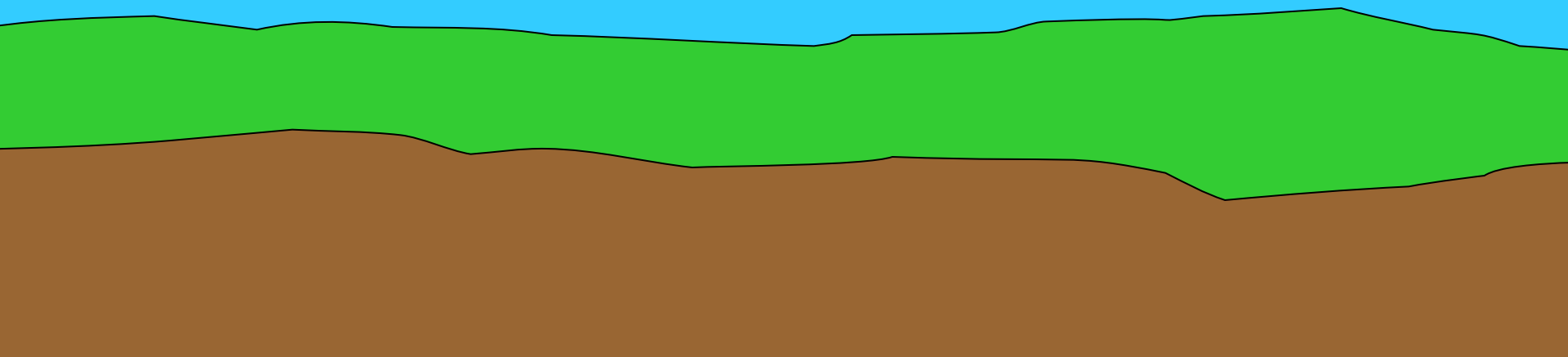
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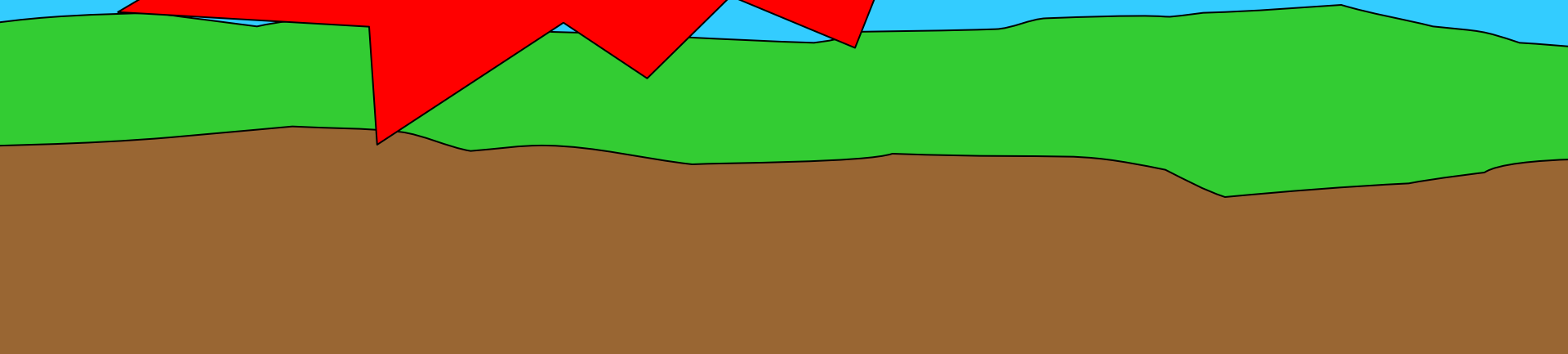
Let's recap on the board shall we?



That's it, we're done, RIGHT?

W O N

TO BE CONTINUED

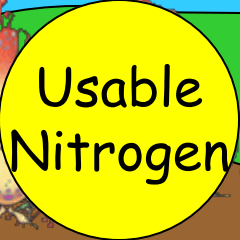
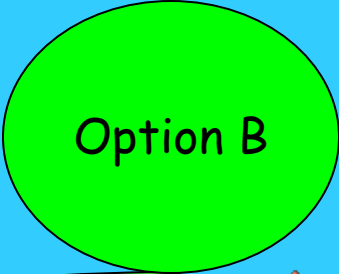
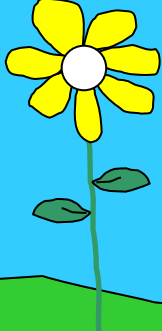
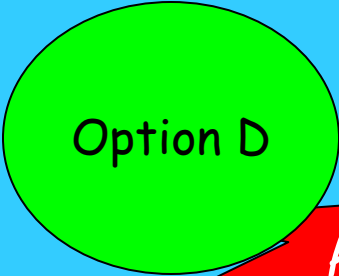
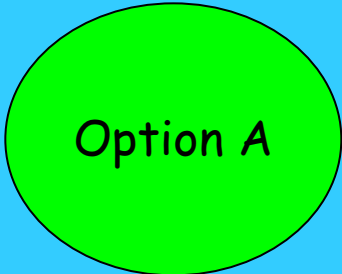


THE NITROGEN CYCLE

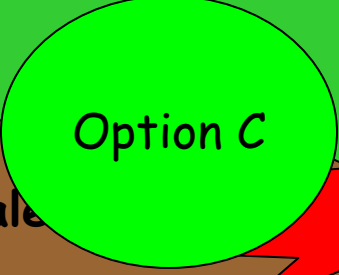
EPISODE II



Let's review - see if you can tell me where "Nitrogen Fixation" is taking place in the process below...

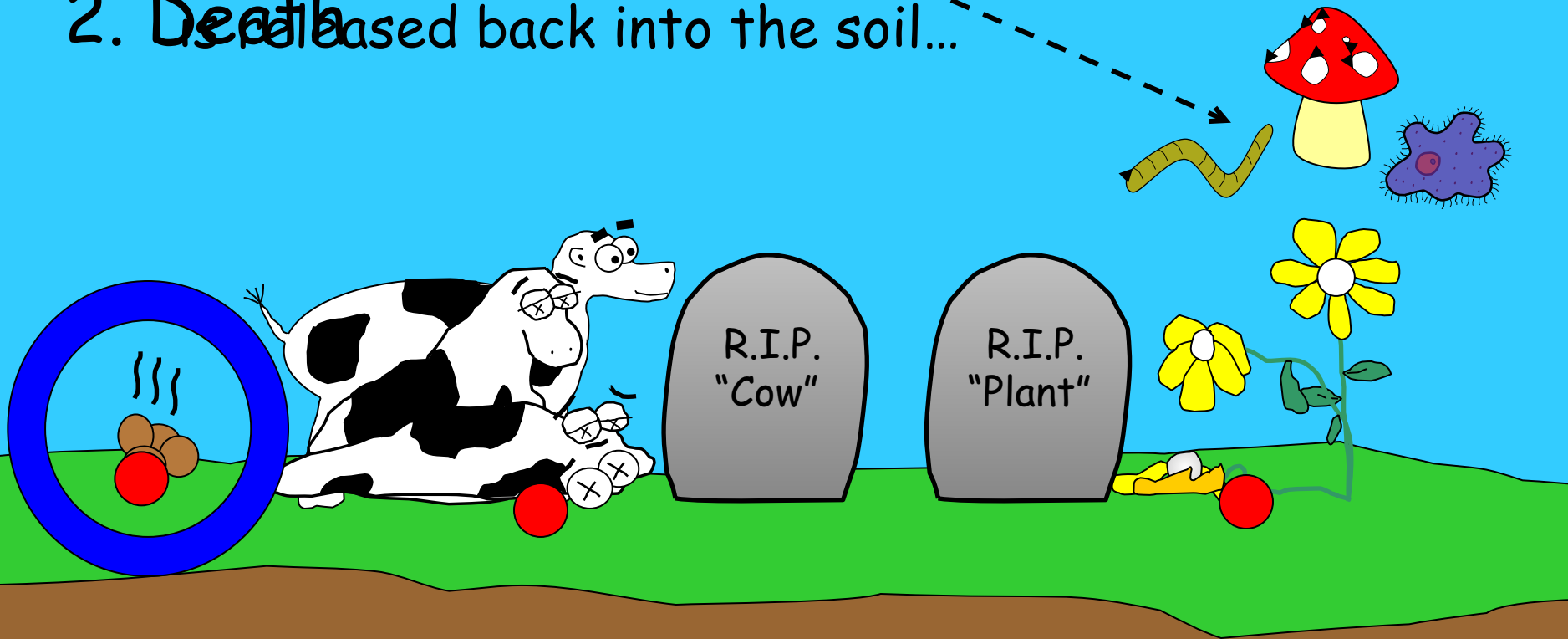


Bacteria... not to scale



So what next? Once the nitrogen goes into animals and plants how does it get out to complete the cycle?

1. **Waste** As animal waste and dead organisms are broken down by **decomposers**, their nitrogen
2. **Death** is released back into the soil...



Two things can happen from there...

1. It can be reabsorbed by plants
2. A second kind of bacteria can change the nitrogen back into N_2



Accepted!

The process where bacteria change usable nitrogen back into N_2 is called...

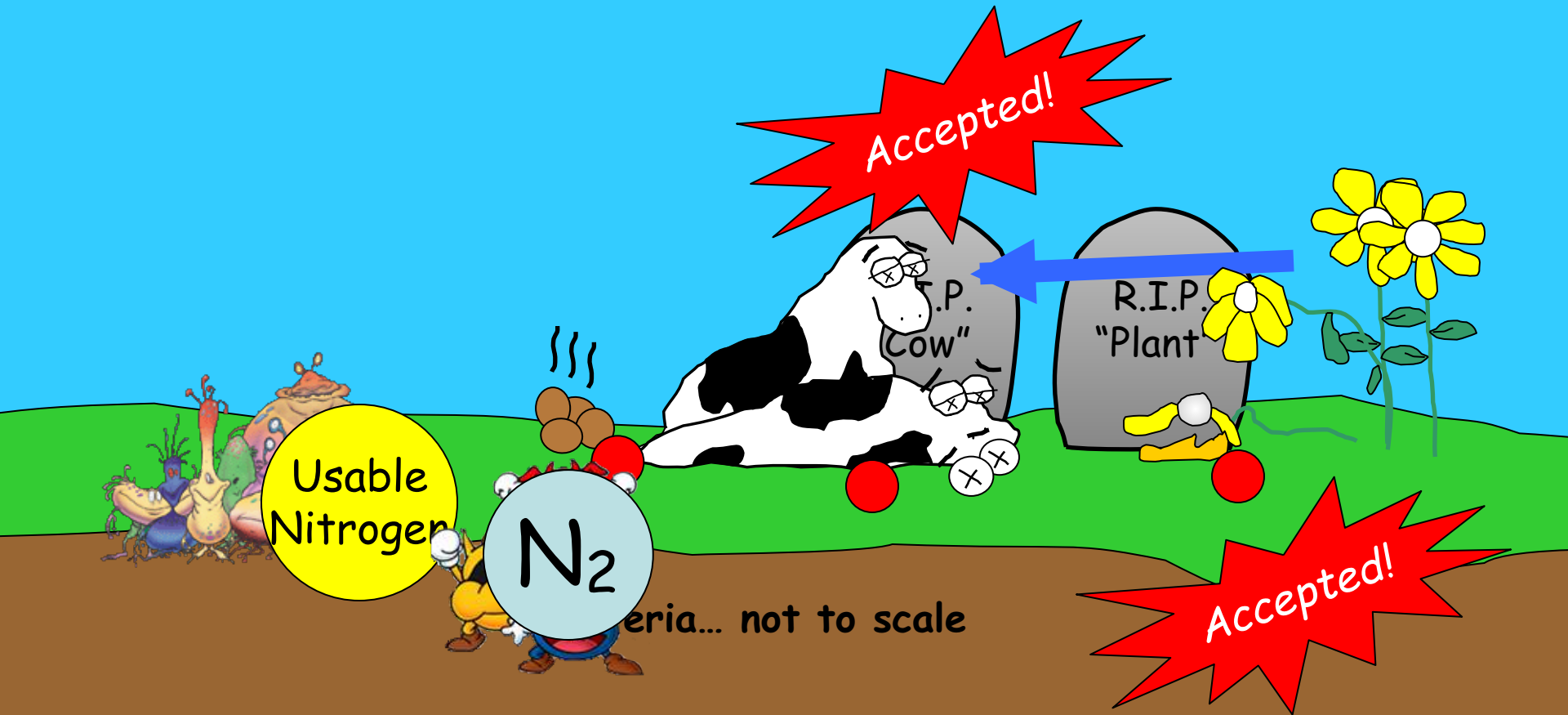
Denitrification

And we call the bacteria that do this...

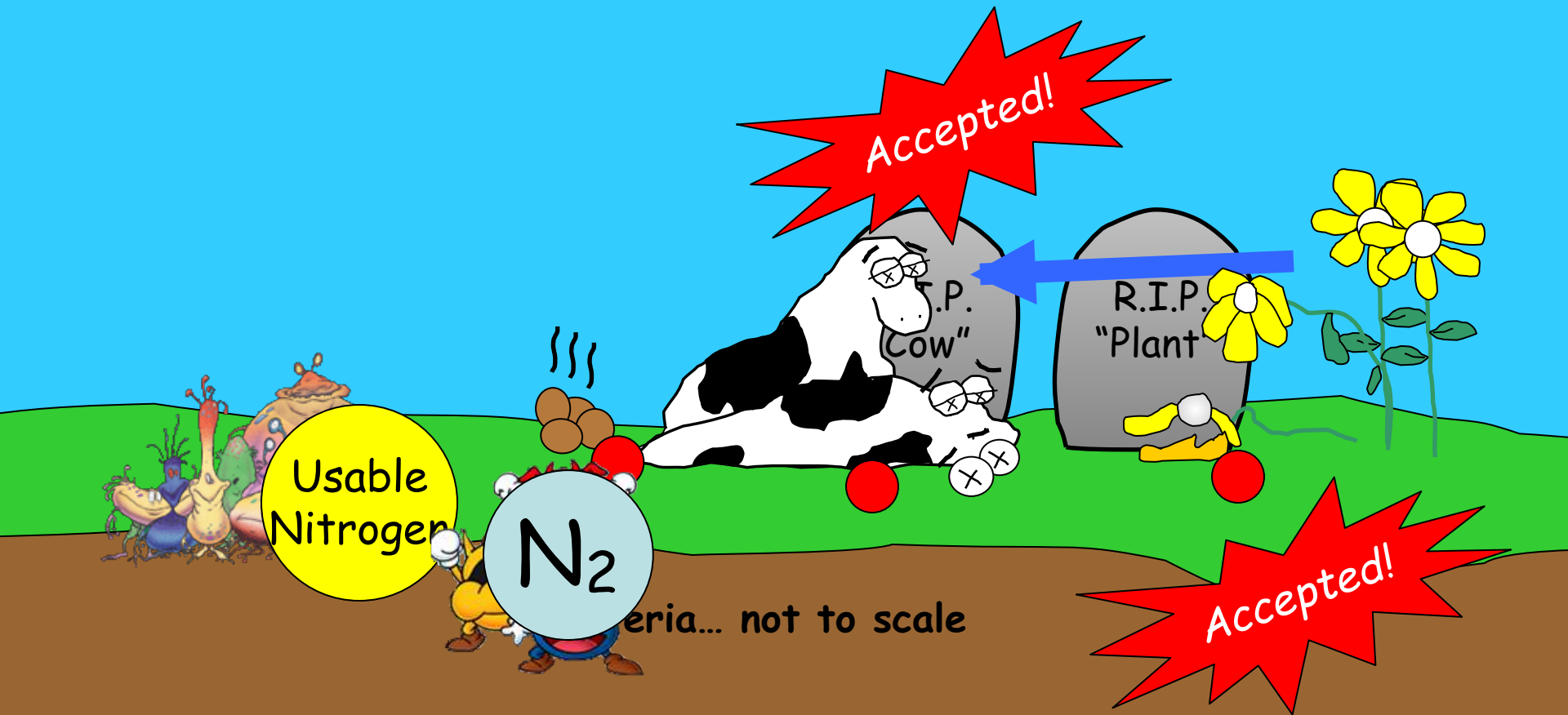
Denitrifying Bacteria



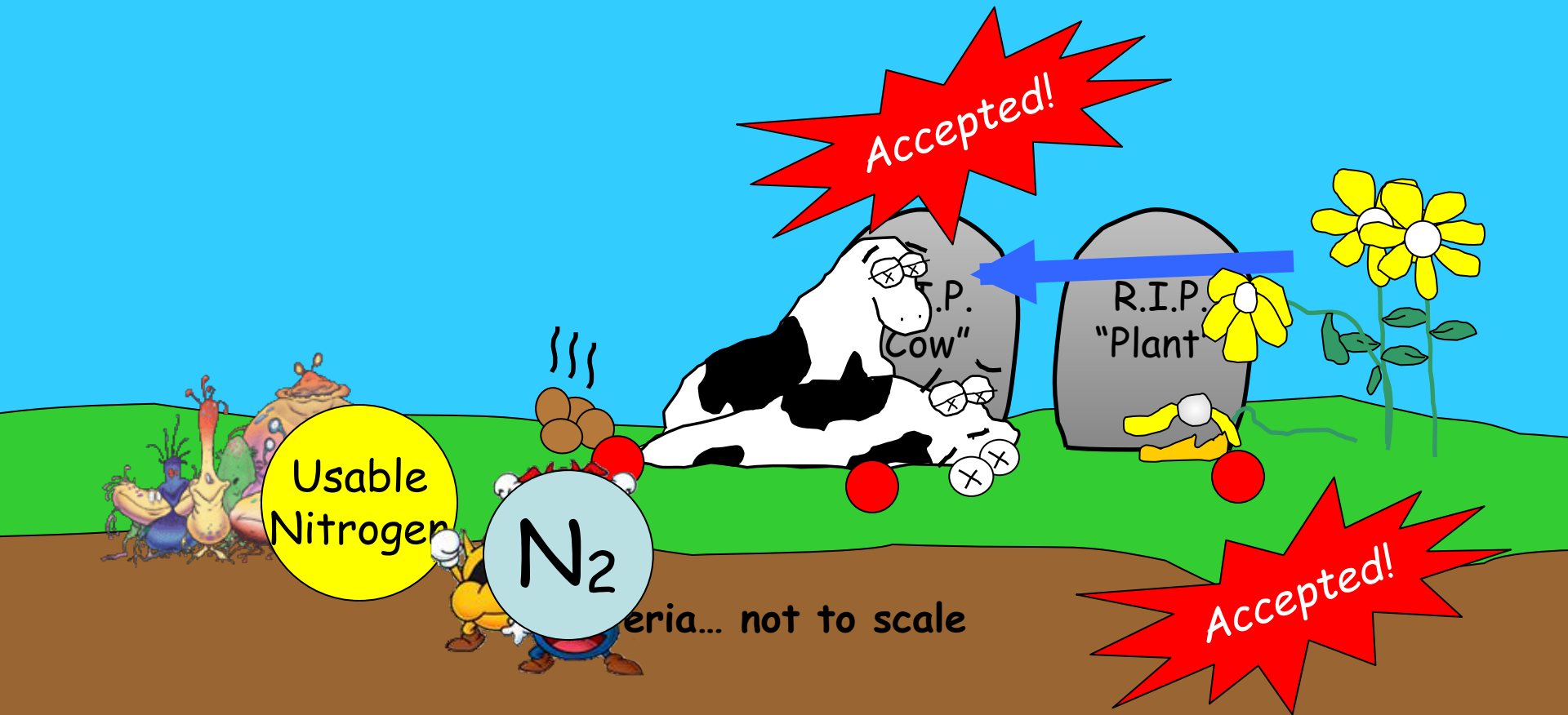
Ladies and gentlemen... we have a cycle



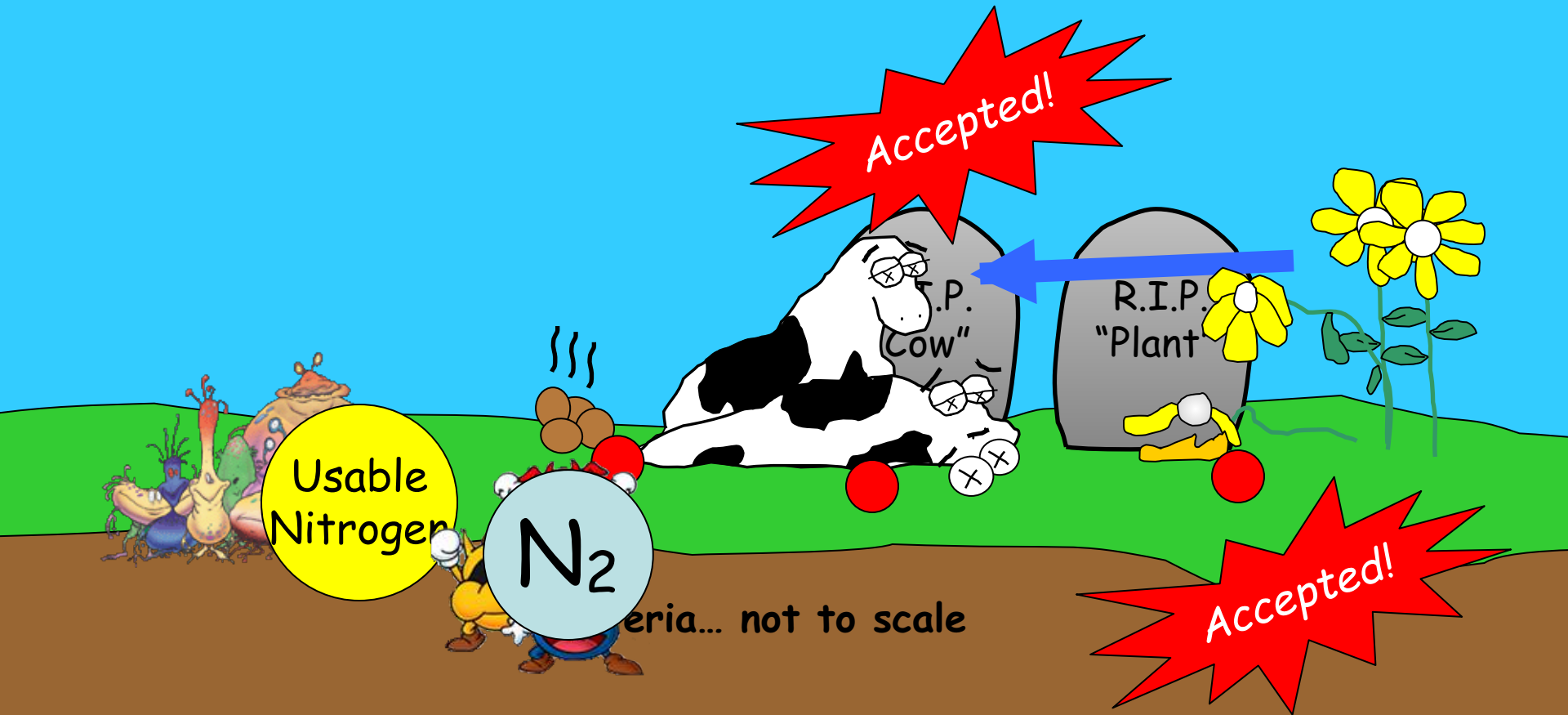
Ladies and gentlemen... we have a cycle



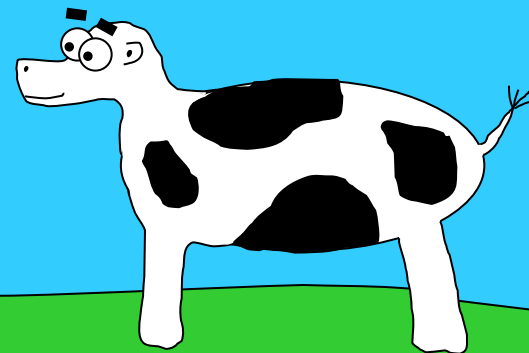
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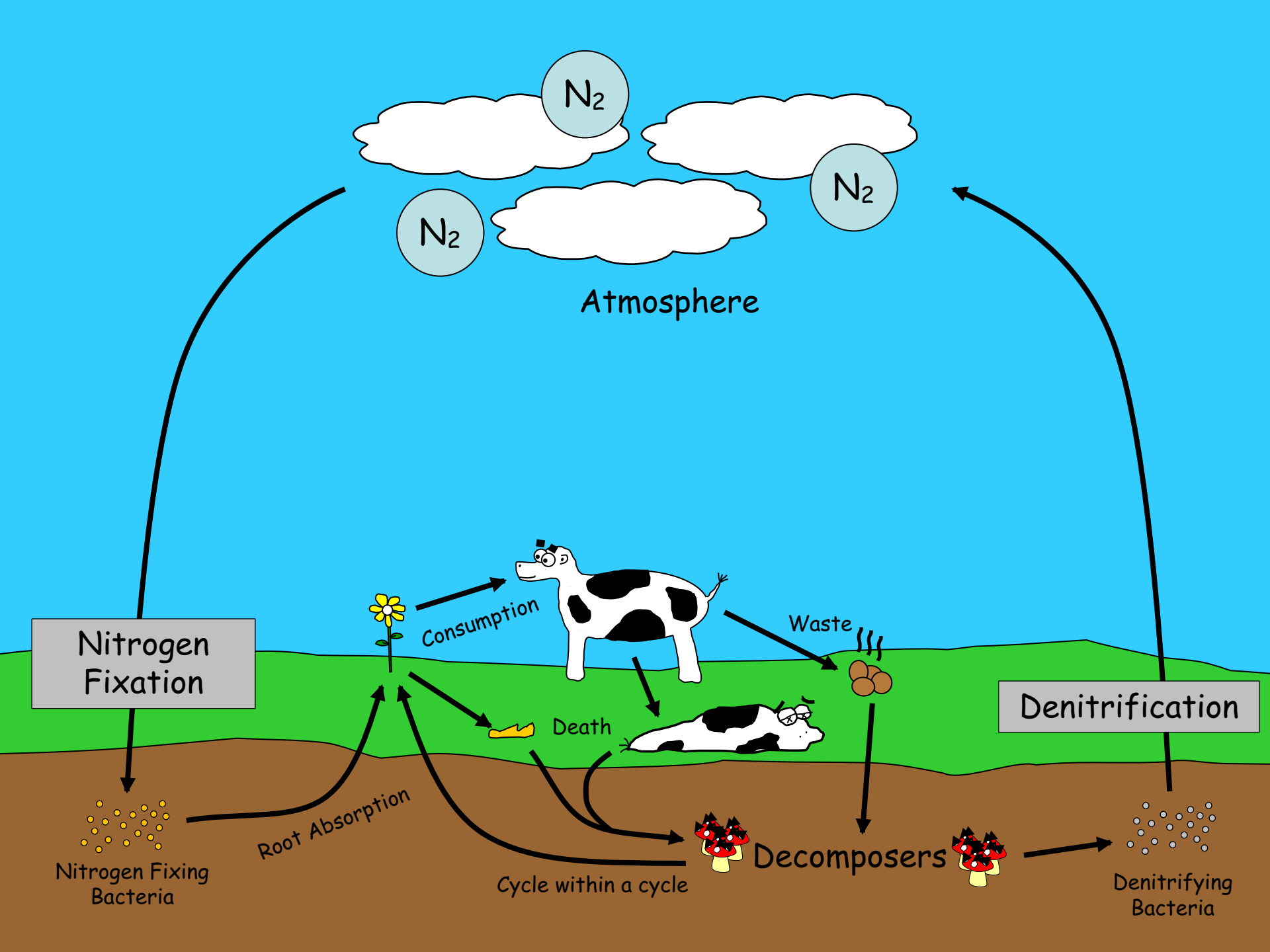


Ladies and gentlemen... we have a cycle



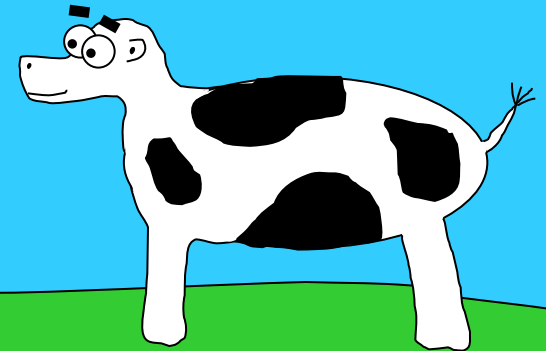
Let's recap on the board shall we?





So how are humans affecting the Nitrogen Cycle?

1. Fertilizer Overload



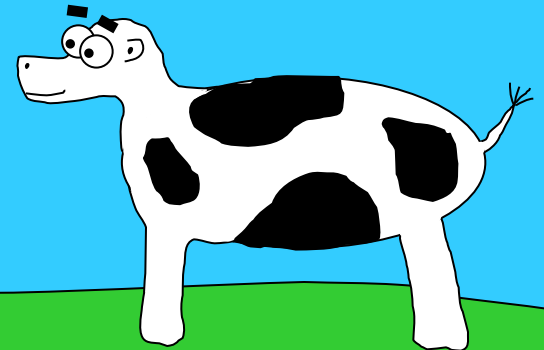


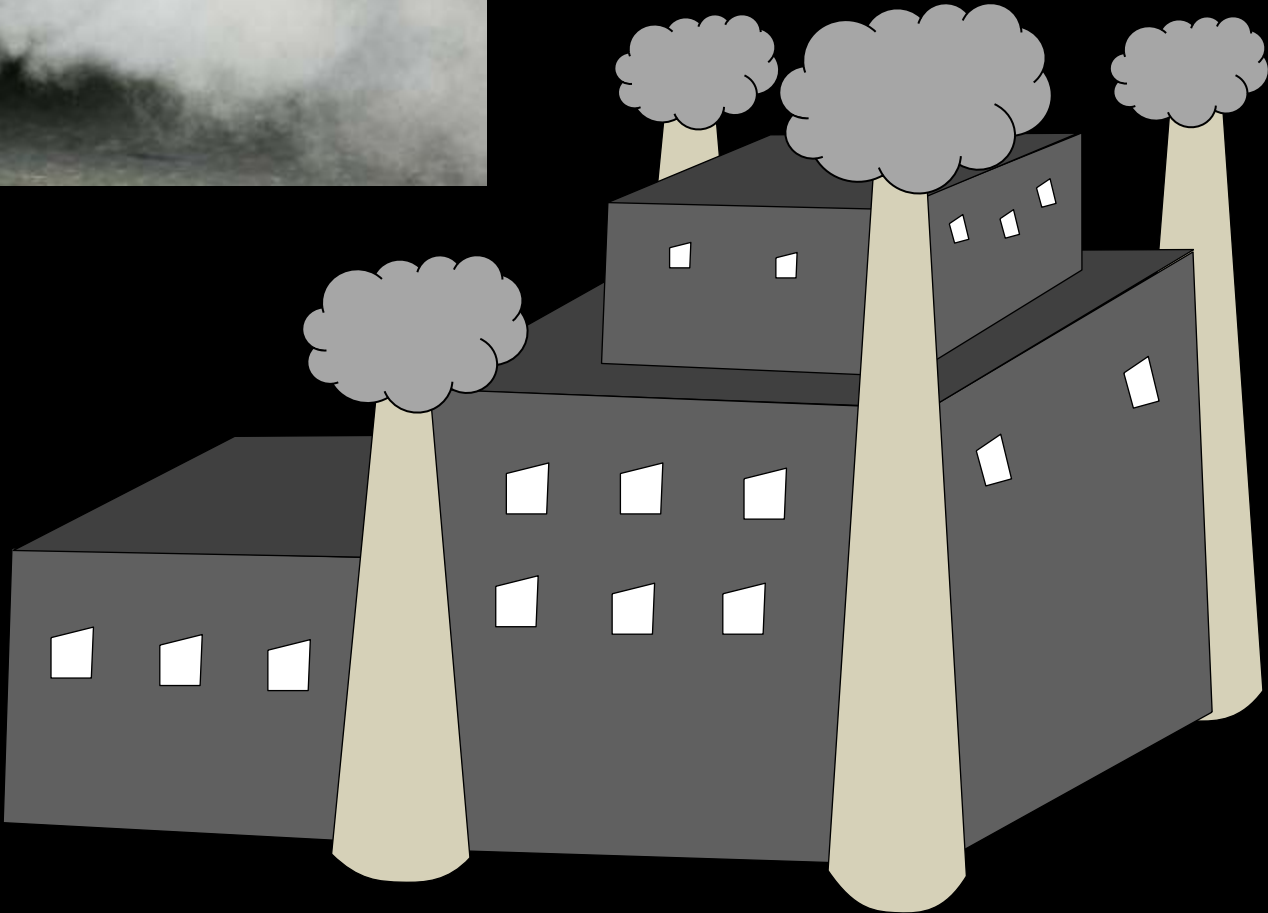
So how are humans affecting the Nitrogen Cycle?



1. Fertilizer Overload

2. Air Pollutants





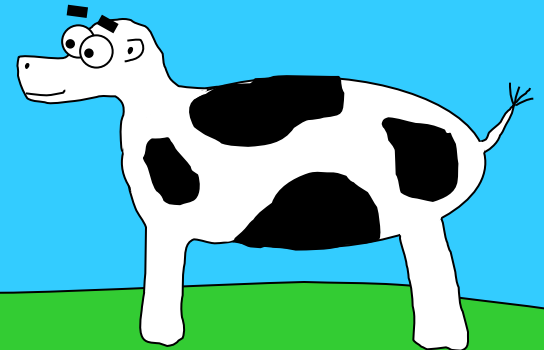
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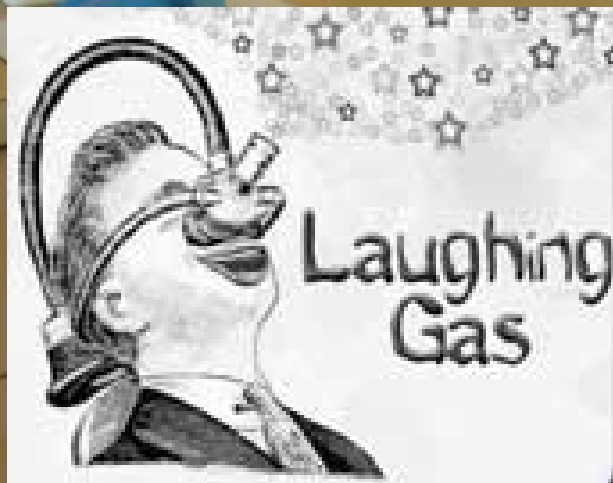
1. Fertilizer Overload

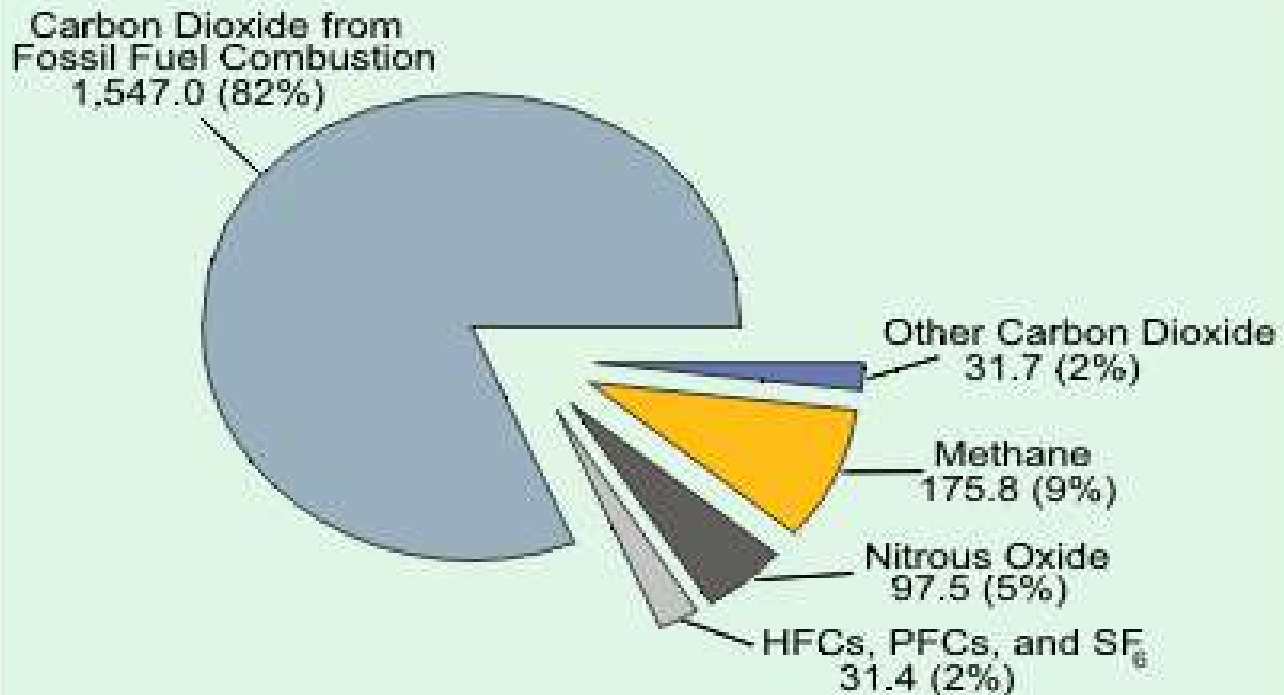


2. Air Pollutants

3. Greenhouse Gases







Source: Energy Information Administration, Emissions of Greenhouse Gases in the United States 2001 (Washington, DC, 2002)

What else should I know about the nitrogen cycle?

Legumes

Lightning

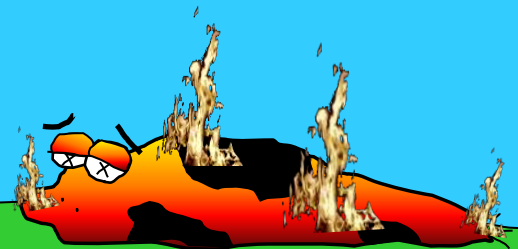




What else should I know about the nitrogen cycle?

Legumes

Lightning



What else should I know about the nitrogen cycle?

IT'S OVER!

