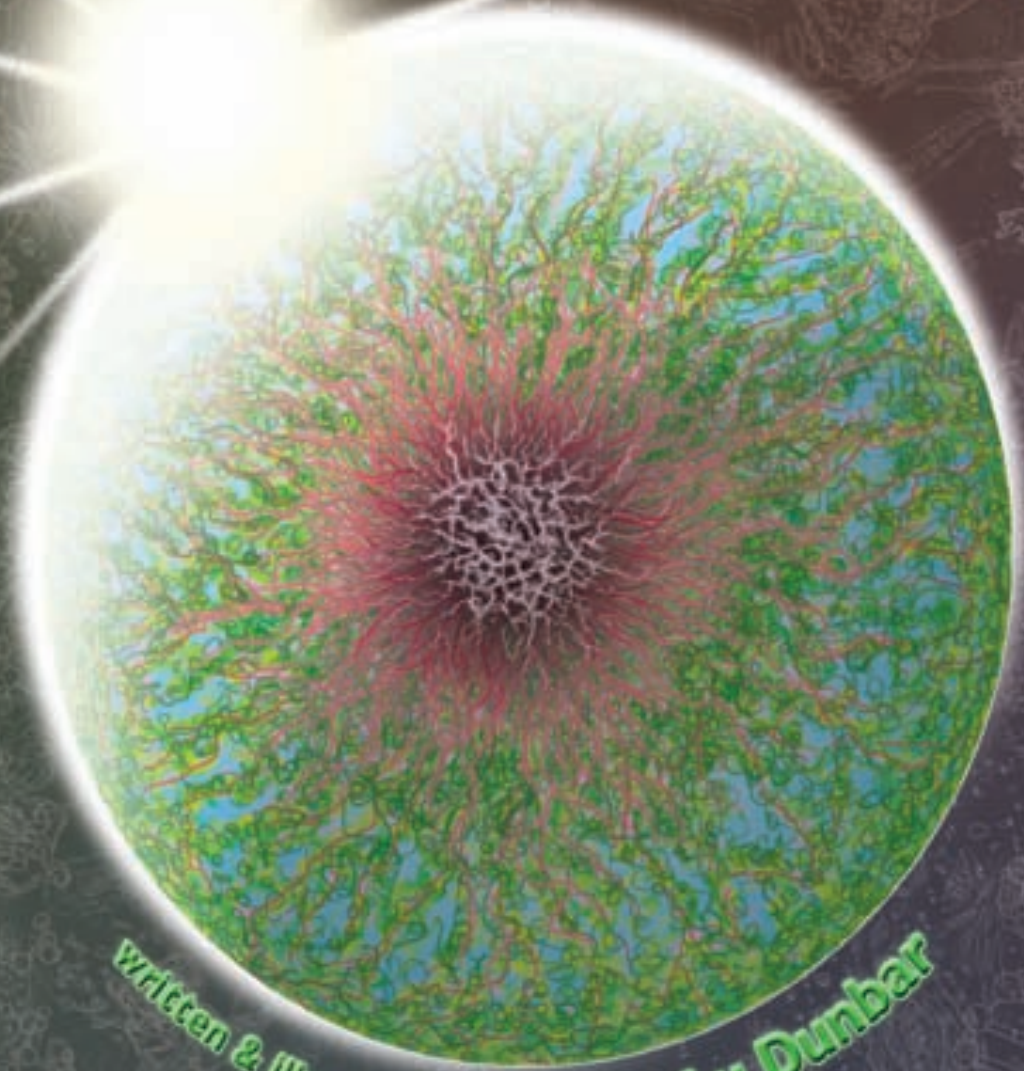
It's ALIVE!

The Universe Verse: Book 2



written & illustrated by James Lu Dunbar

Book two in a three-part series, "It's Alive!" explains the scientific theories regarding the origin of life on Earth with captivating illustrations and whimsical rhymes.

From the formation of our solar system to the birth of bacteria, you'll learn about the conditions that could have created life, the nature of organic existence and the beauty of evolution.

This book is intended for all ages.
If you don't understand everything, don't worry, no one does!
That's why I made it rhyme and added lots of pictures.

⚠ WARNING!

This book contains graphic depictions of scientific knowledge which may lead to decreased ignorance and heightened sensations of awe and wonder.

In the meantime, I have included links to website pages where you can learn more about the highlighted idea. If your screen is large enough, you may want to view this PDF in "Two Up" mode to see the pages as they would be formatted in the book. (View > Page Display >Two-Up)

Enjoy!

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It's ALIVE!

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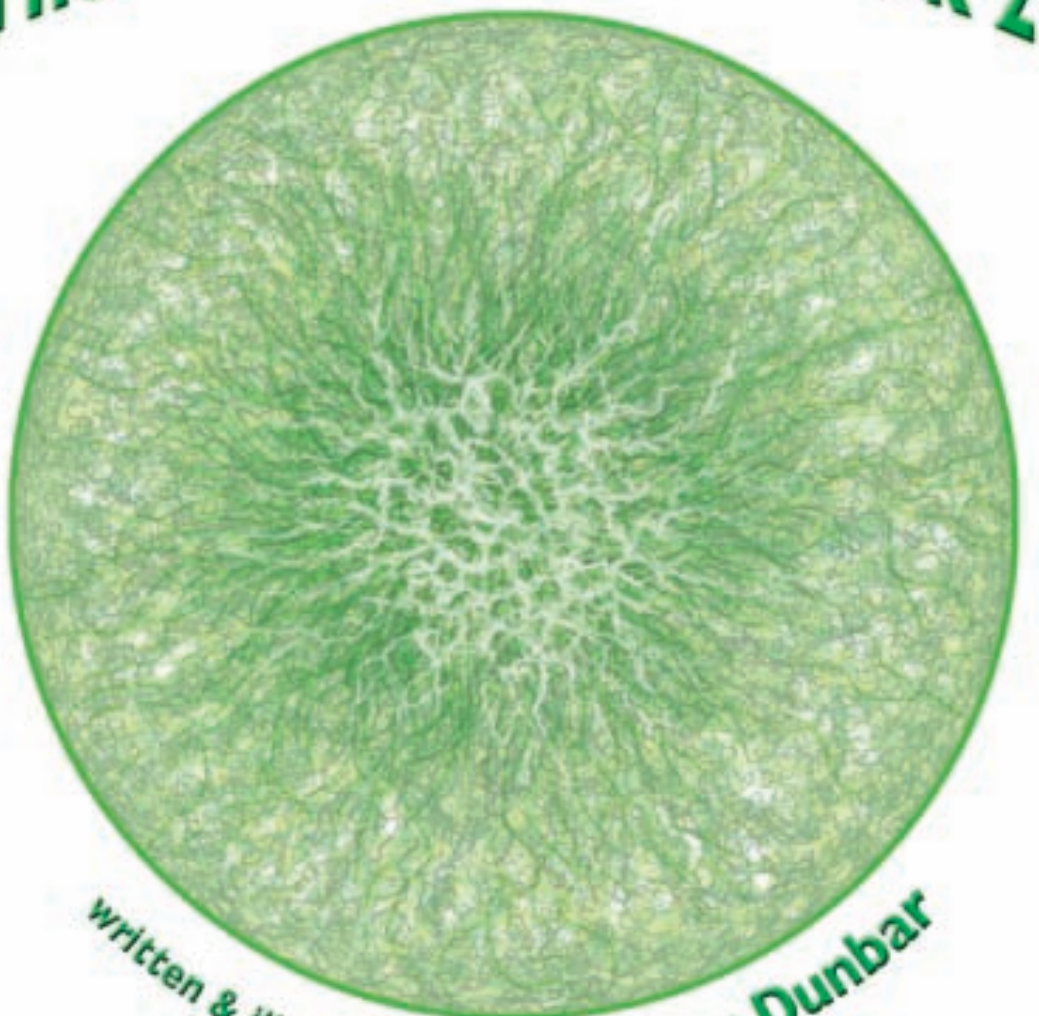

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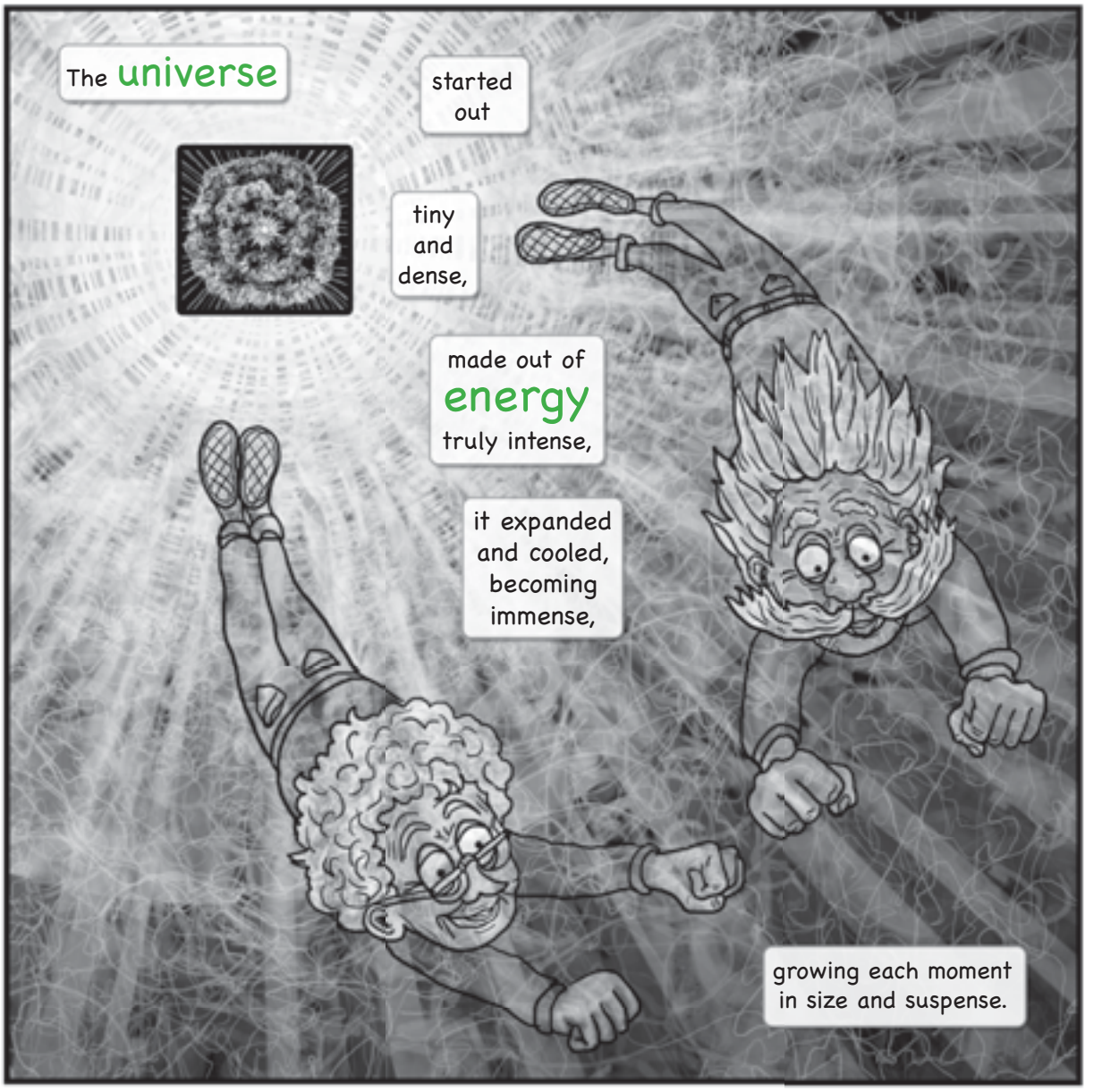
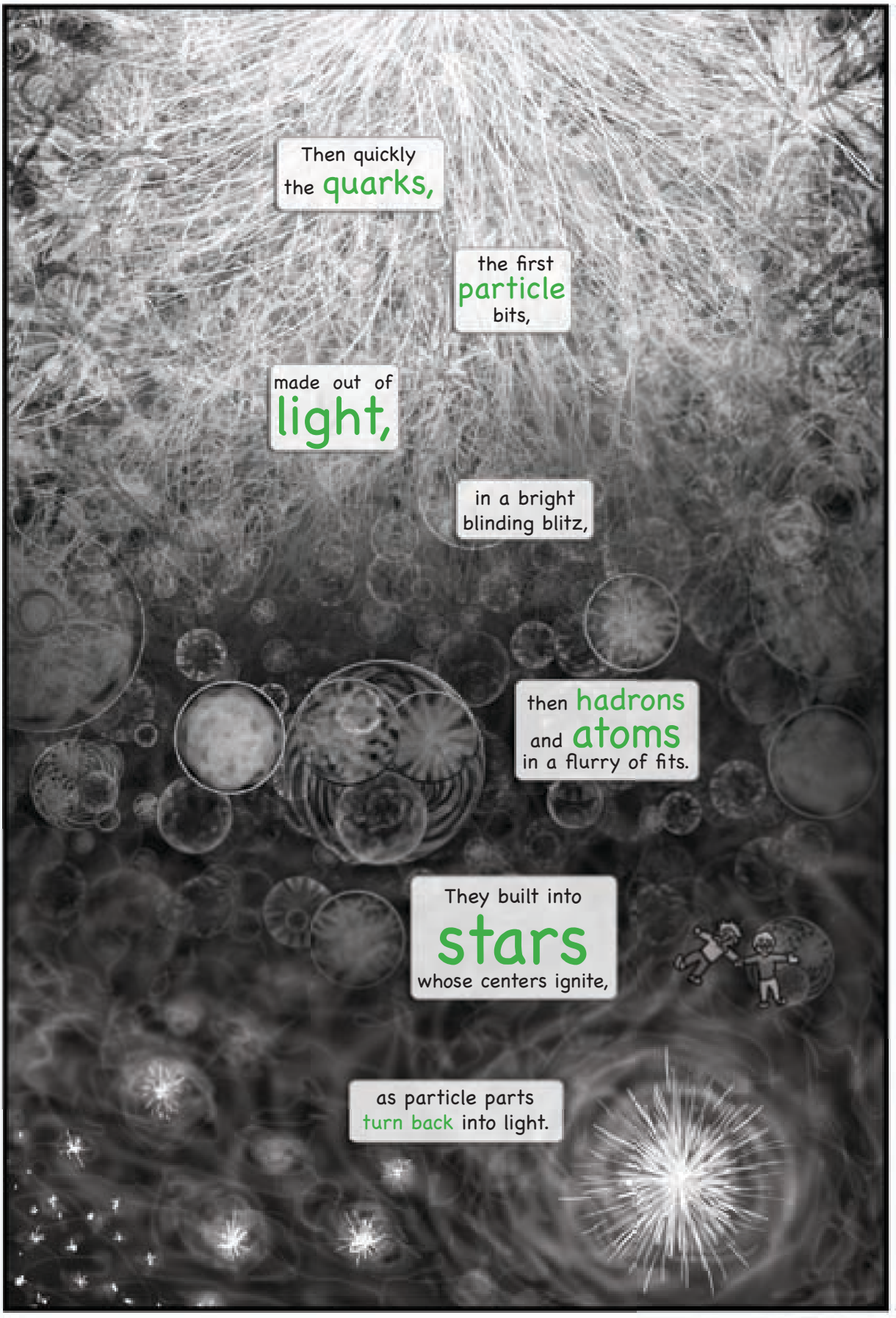
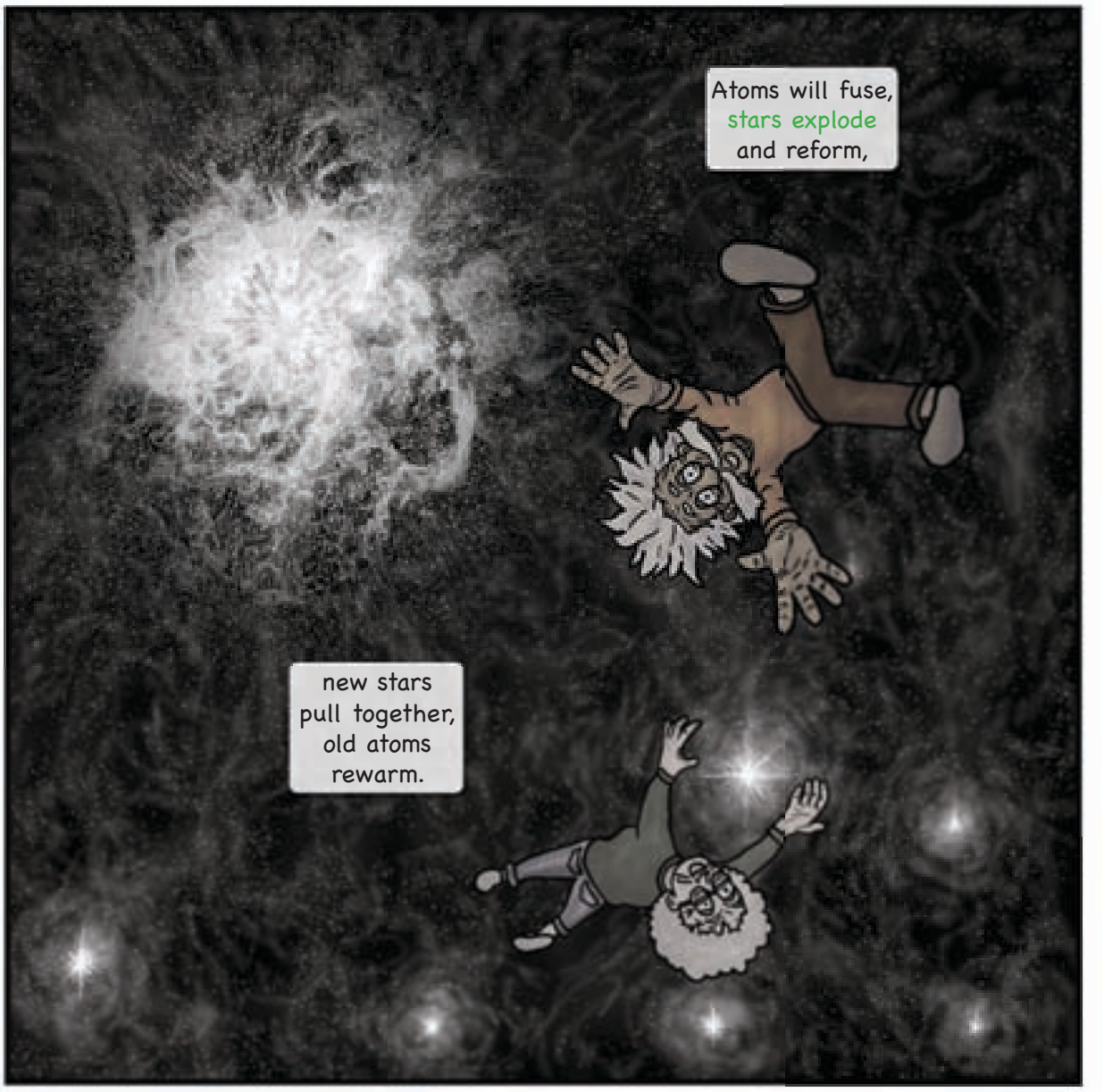
There is no wealth but life.

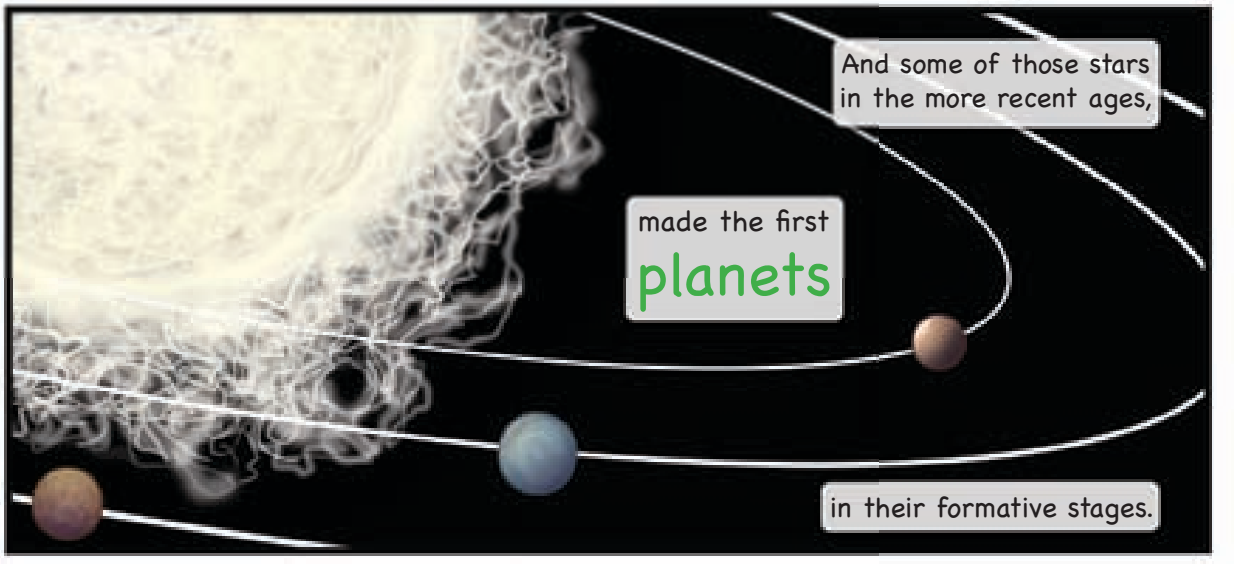
- John Ruskin

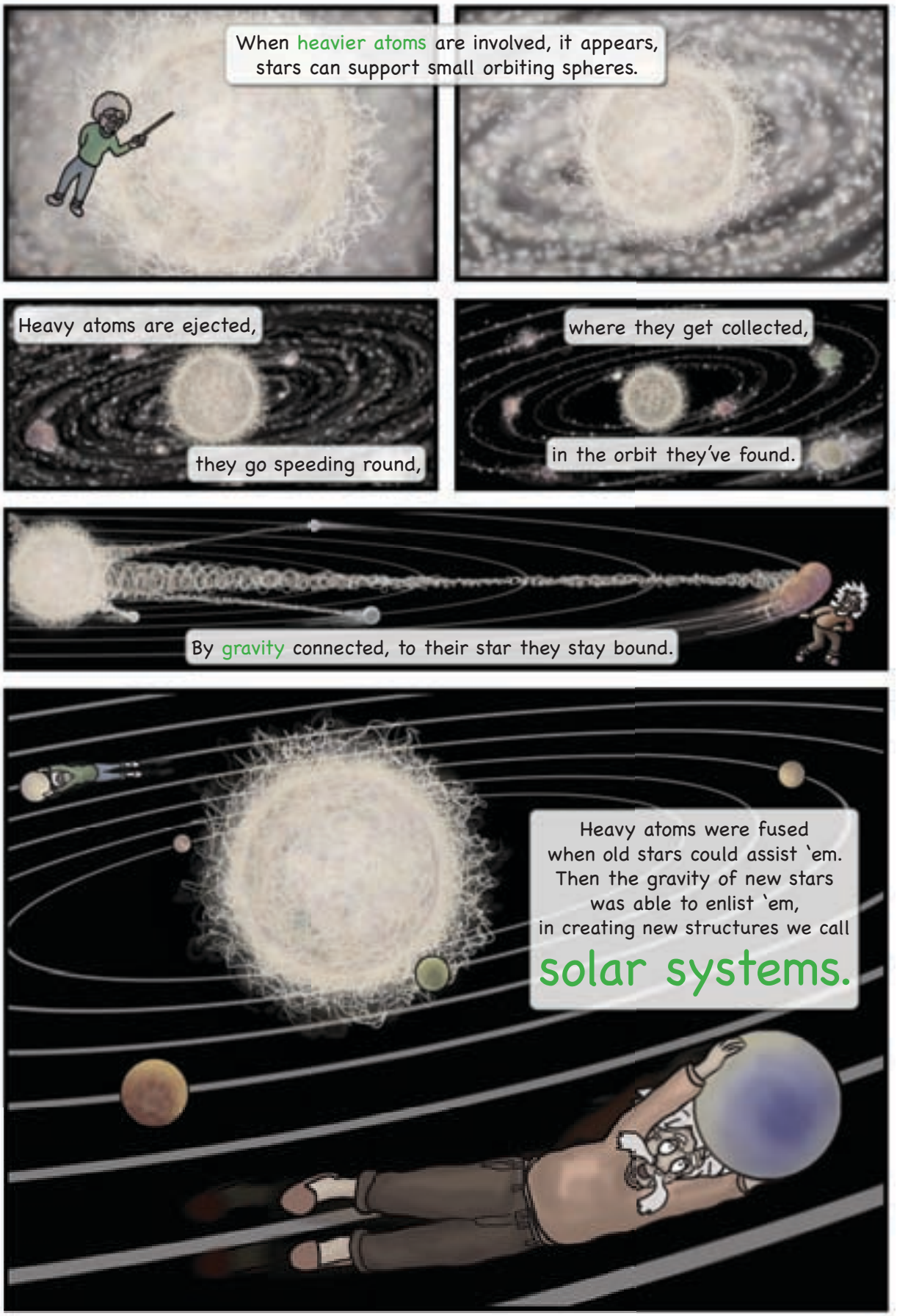

The universe
started out
tiny and dense,
made out of energy truly intense,
it expanded and cooled, becoming immense,
growing each moment in size and suspense.

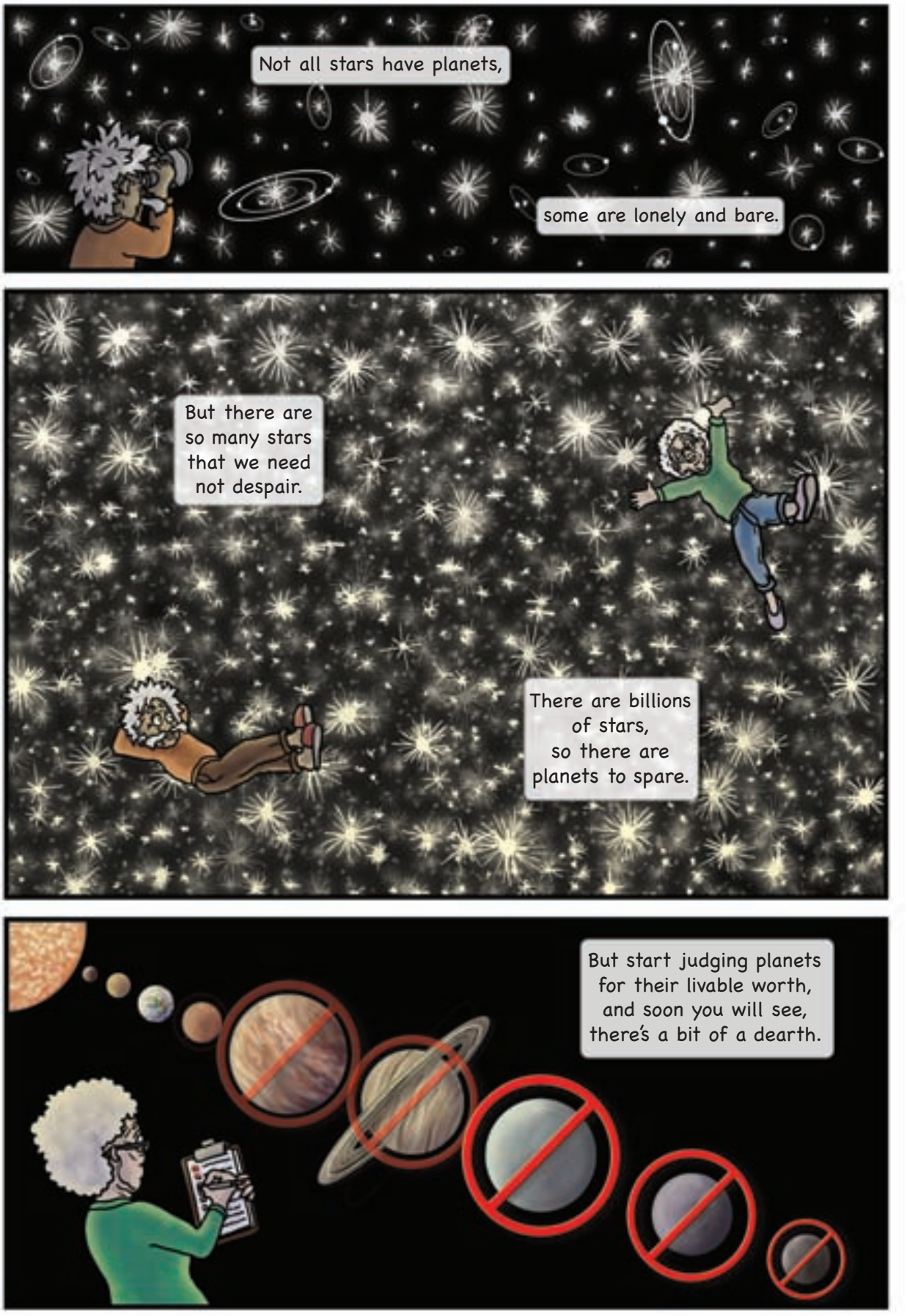

And it didn't take long for things to get weird,
as fundamental forces just up and appeared.


Then quickly
the quarks,
the first
particle
bits,
made out of
light,
in a bright
blinding blitz,
then hadrons
and atoms
in a flurry of fits.
They built into
stars
whose centers ignite,
as particle parts
turn back into light.


Atoms will fuse,
stars explode
and reform,
new stars
pull together,
old atoms
rewarm.


And some of those stars
in the more recent ages,
made the first
planets
in their formative stages.

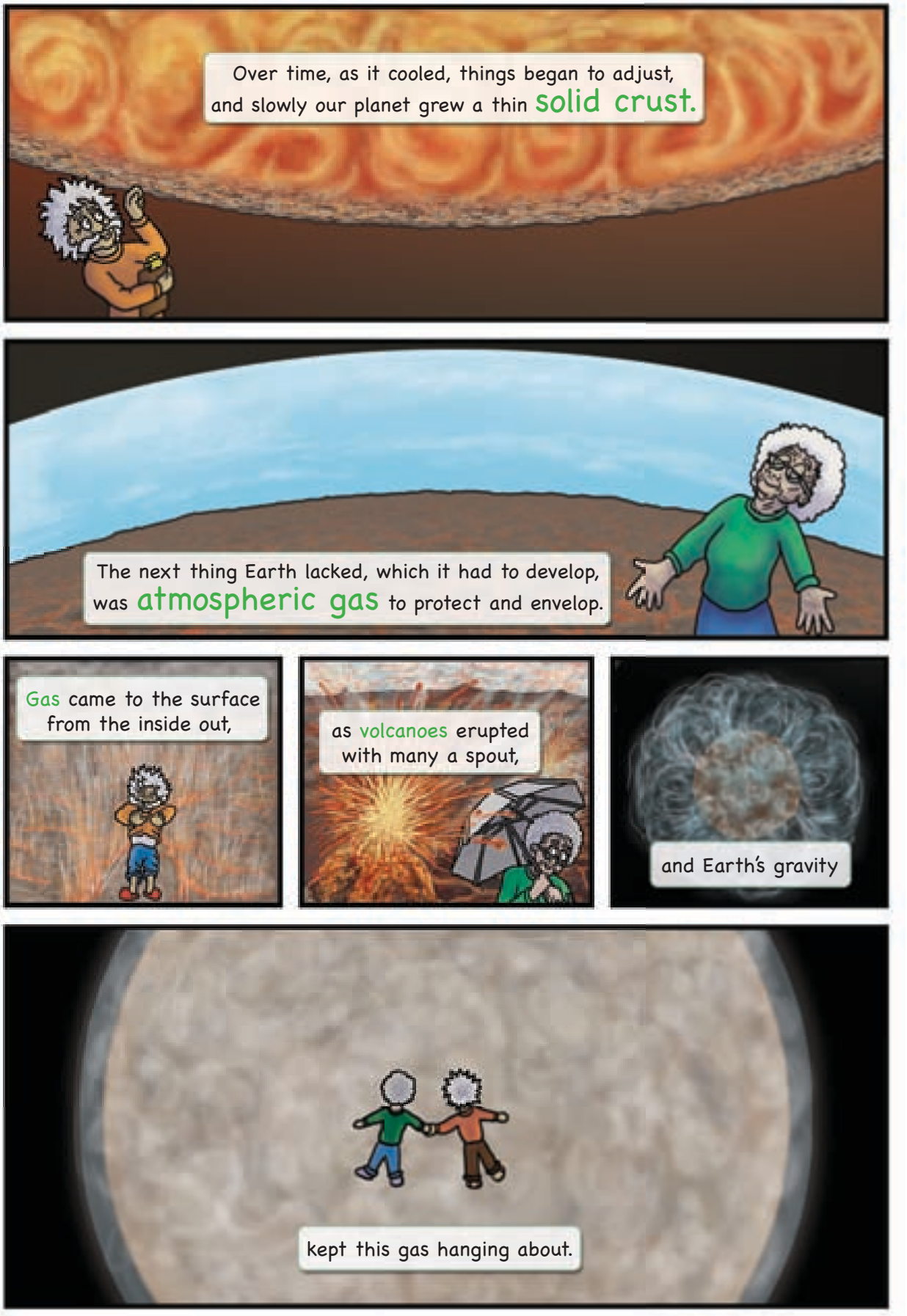

When heavier atoms are involved, it appears,
stars can support small orbiting spheres.
Heavy atoms are ejected,
they go speeding round,
where they get collected,
in the orbit they've found.
By gravity connected, to their star they stay bound.
Heavy atoms were fused
when old stars could assist 'em.
Then the gravity of new stars
was able to enlist 'em,
in creating new structures we call
solar systems.

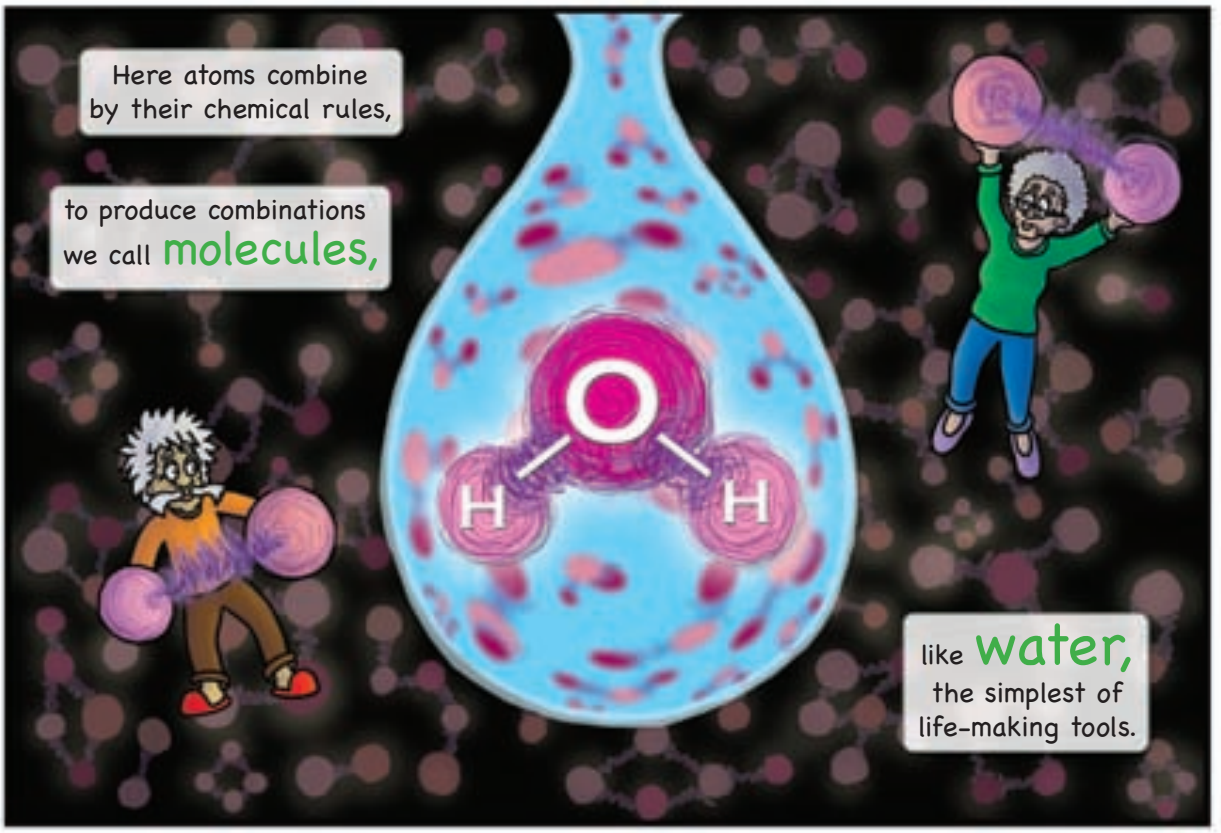

Not all stars have planets,
some are lonely and bare.
But there are so many stars that we need not despair.
There are billions of stars, so there are planets to spare.
But start judging planets for their livable worth, and soon you will see, there's a bit of a dearth.


But we know there was one star able to birth, the right sort of planet, and that planet is...
Earth.

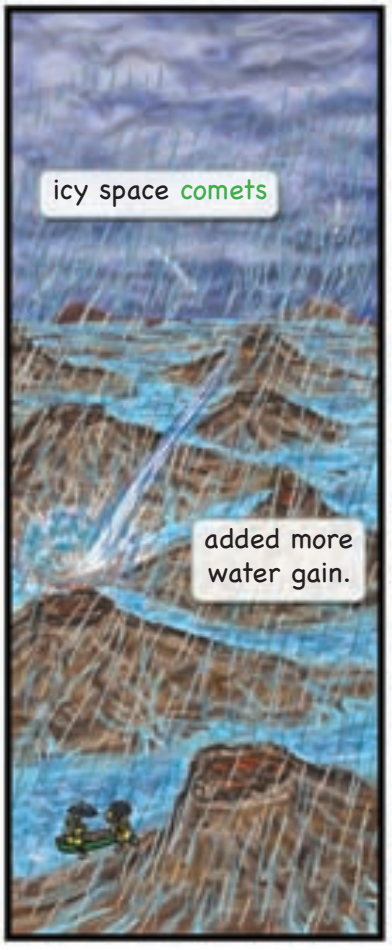

Our Earth is a planet
with features worth flaunting,
EARTH!!!
with all the right things
to make creatures worth wanting.
It's in a perfect place,
with the just-right position
to catch just enough
of our sun's light emission.
It's got the right atoms,
and the correct conditions,
Fe
Al
O
Si
for atoms to build
into basic nutrition.

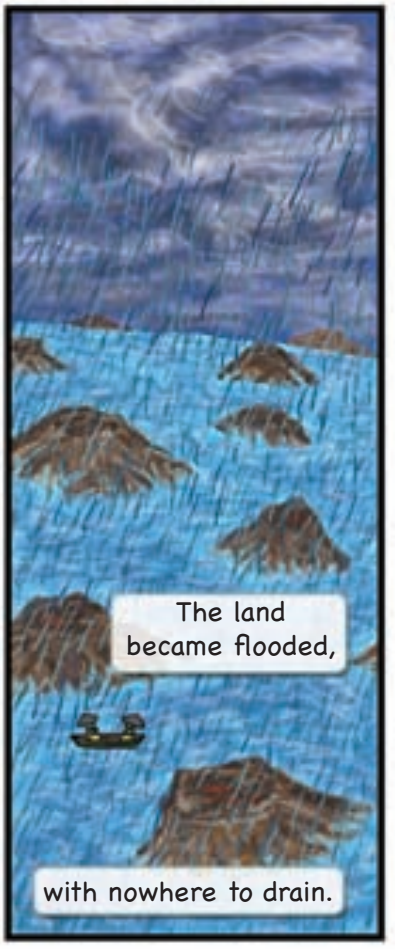

But at first the Earth was ugly and mean.
It was nothing compared with today's lively scene.
Nothing was living,
not one measly bean.
In fact, the surface was too hot to walk,
because early Earth was all
molten rock.

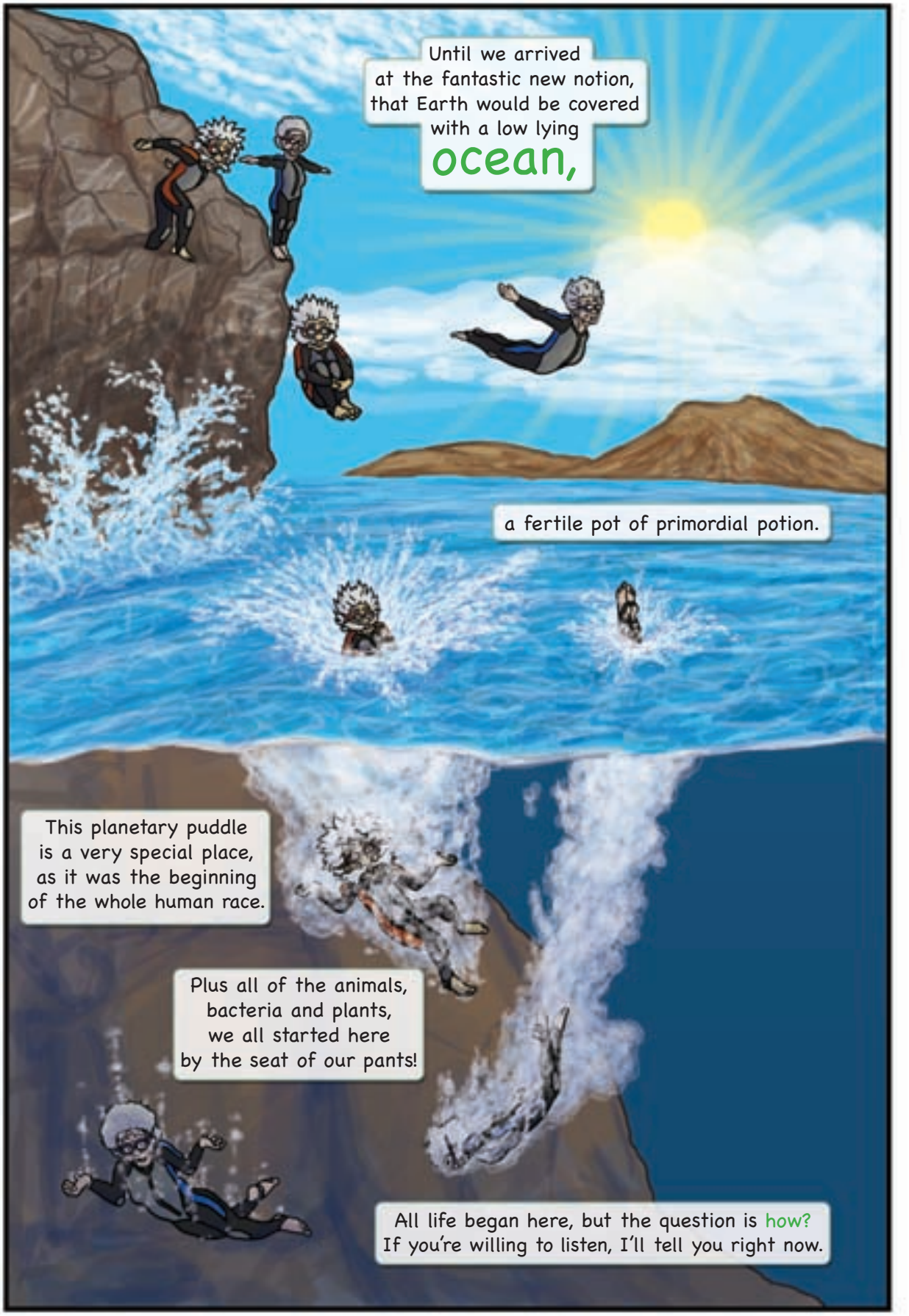

Over time, as it cooled, things began to adjust, and slowly our planet grew a thin solid crust.
The next thing Earth lacked, which it had to develop, was atmospheric gas to protect and envelop.
Gas came to the surface from the inside out,
as volcanoes erupted with many a spout,
and Earth's gravity
kept this gas hanging about.

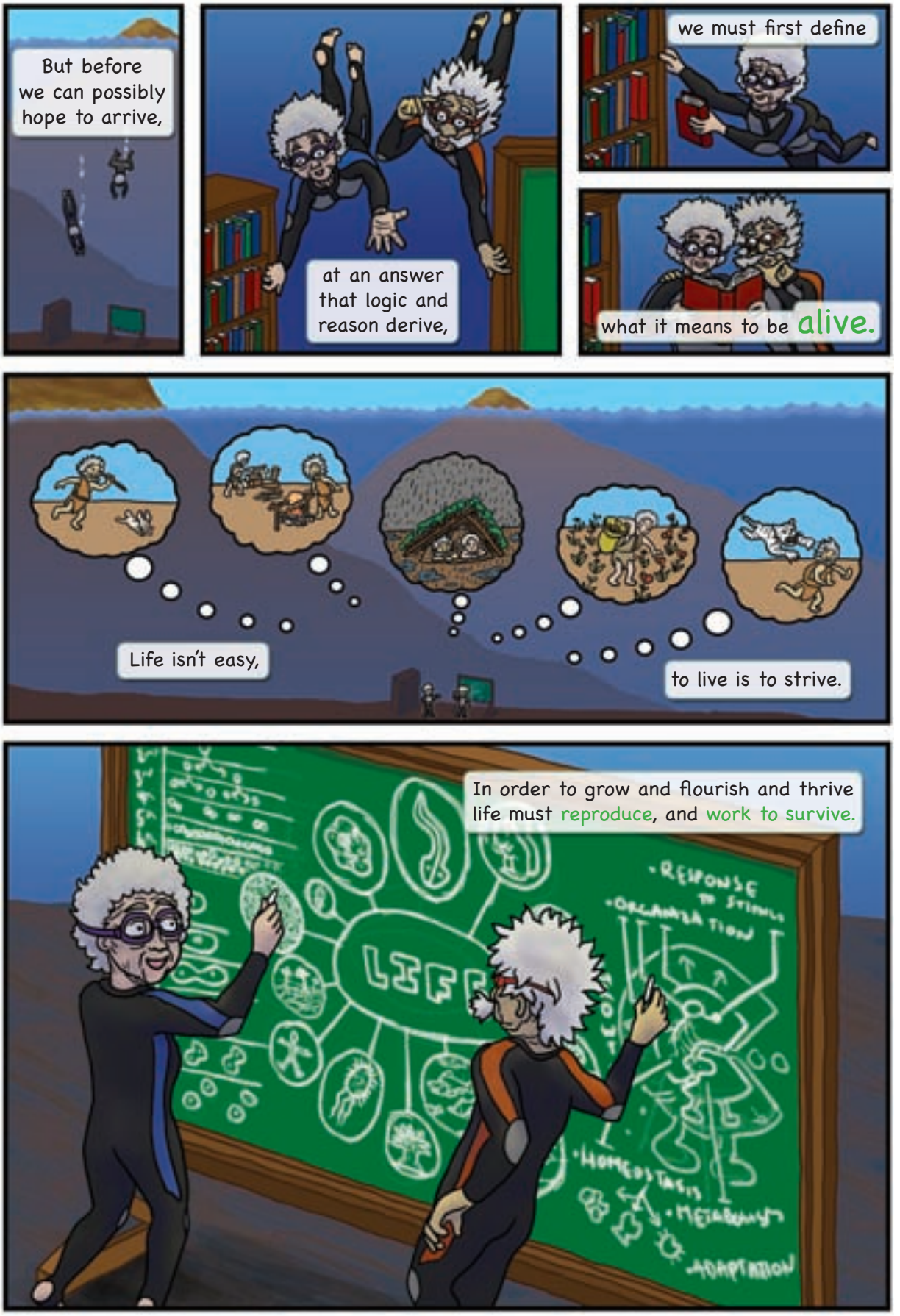

Here atoms combine by their chemical rules,
to produce combinations we call molecules,
O
H
H
like water, the simplest of life-making tools.

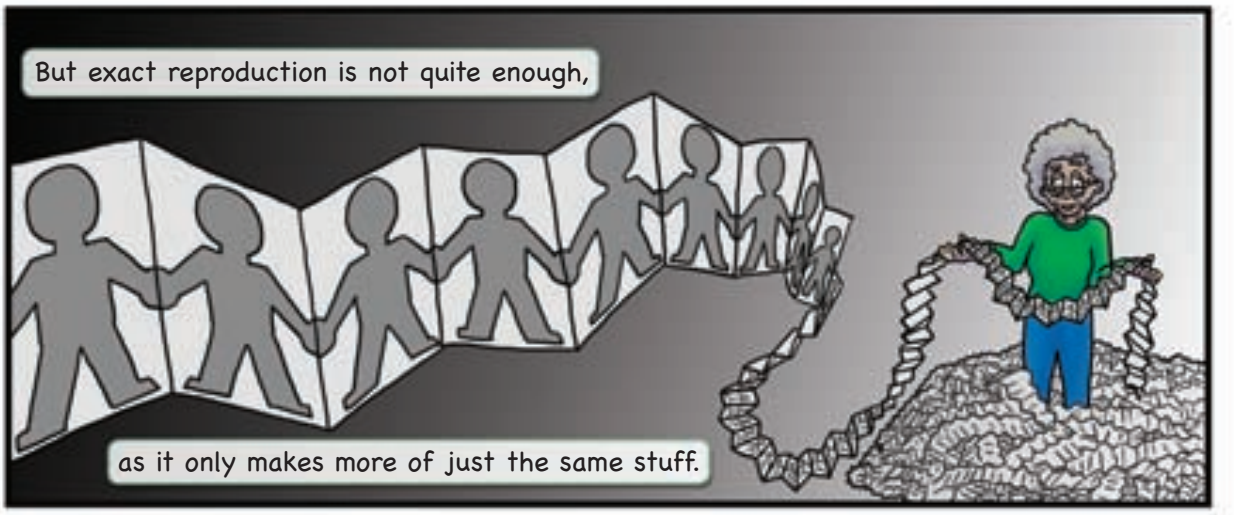

As the Earth cooled, it started to rain,

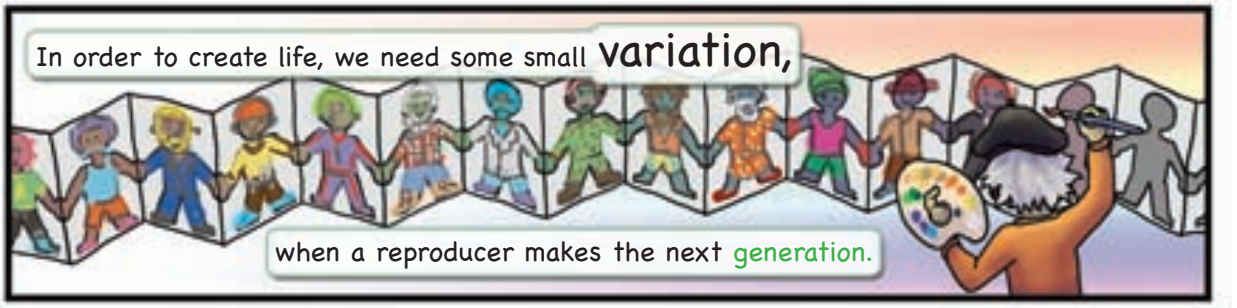

icy space comets
added more water gain.


The land became flooded,
with nowhere to drain.

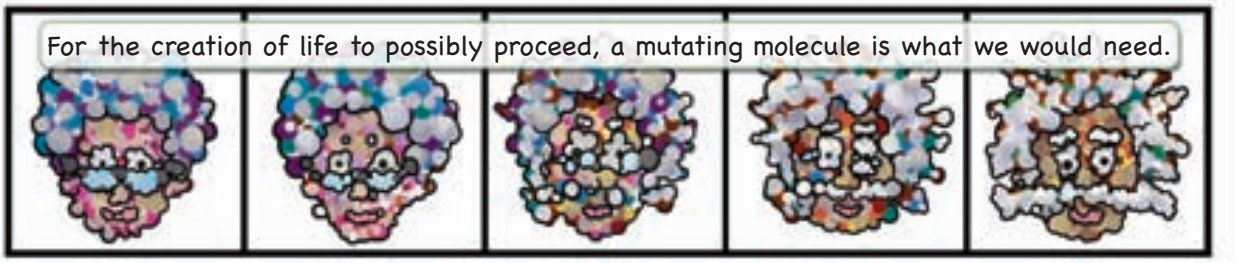

Until we arrived at the fantastic new notion, that Earth would be covered with a low lying ocean,
a fertile pot of primordial potion.
This planetary puddle is a very special place, as it was the beginning of the whole human race.
Plus all of the animals, bacteria and plants, we all started here by the seat of our pants!
All life began here, but the question is how? If you're willing to listen, I'll tell you right now.

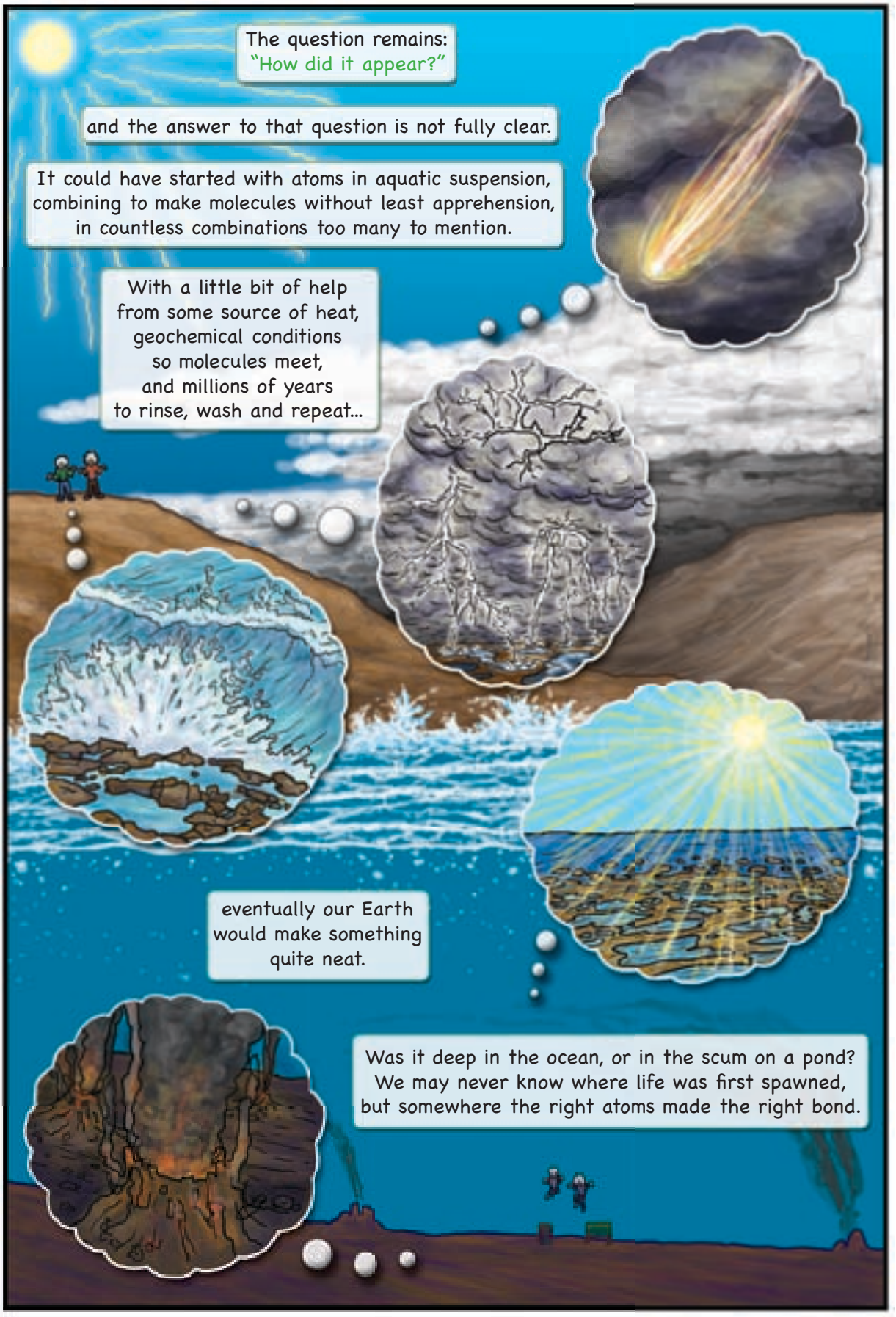

But before we can possibly hope to arrive,
at an answer that logic and reason derive,
we must first define
what it means to be alive.
Life isn't easy,
to live is to strive.
In order to grow and flourish and thrive life must reproduce, and work to survive.
LIFE
• RESPONSE TO STIMULI
• ORGANIZATION
• HOMEOSTASIS
• METABOLISM
• ADAPTATION

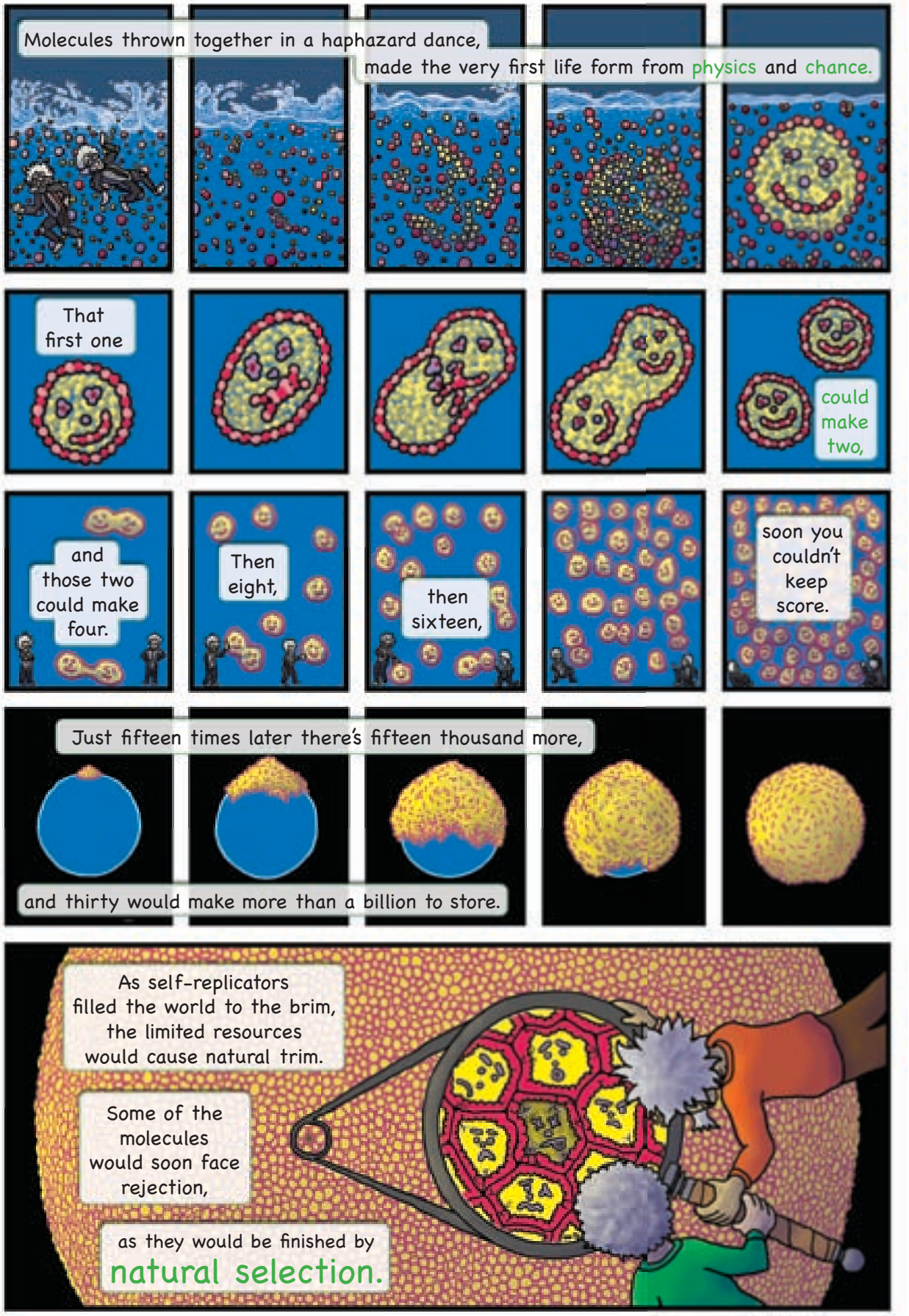

But exact reproduction is not quite enough,
as it only makes more of just the same stuff.


In order to create life, we need some small variation,
when a reproducer makes the next generation.

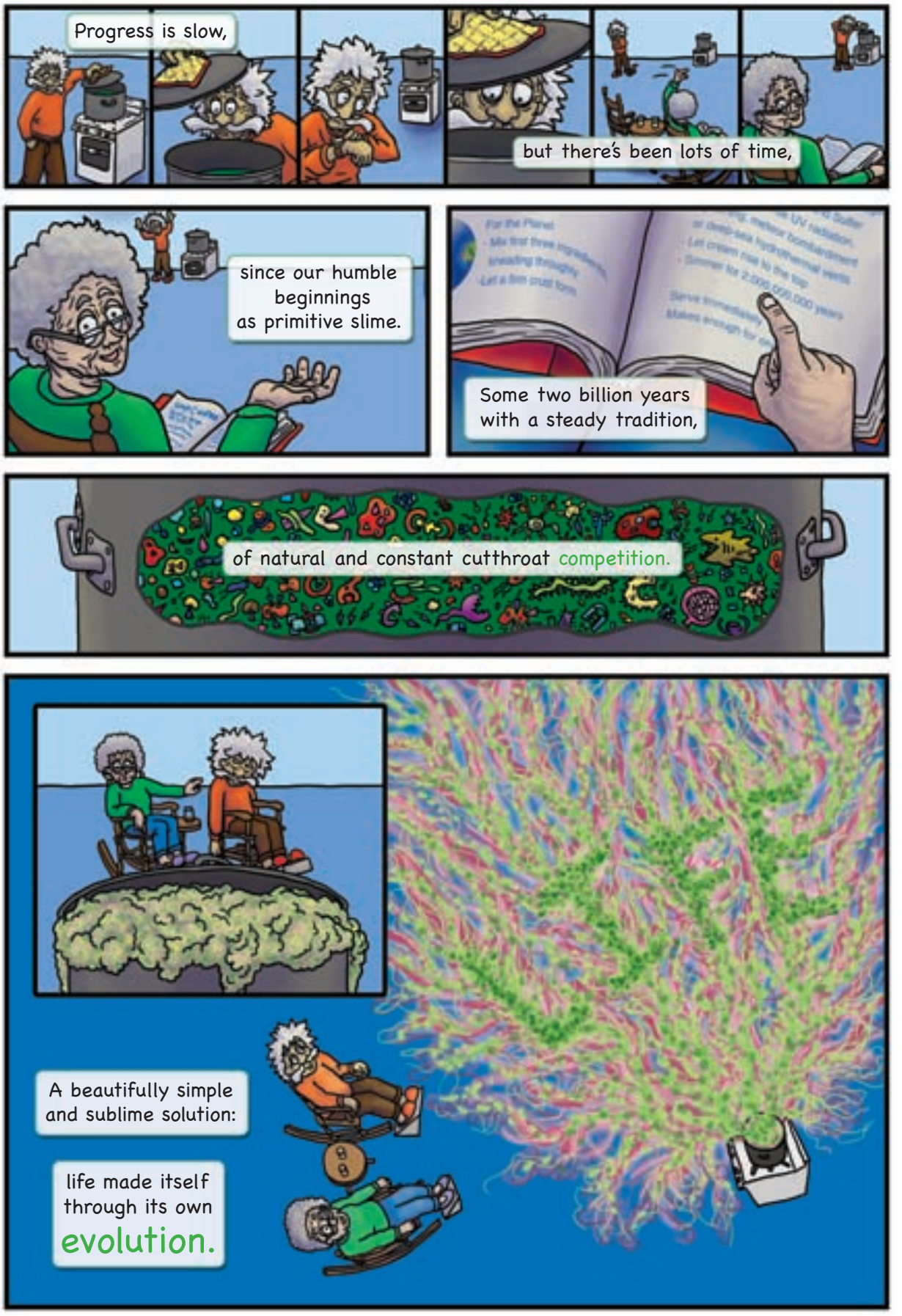

Mutations prevent the constancy curse,
allowing populations to become more diverse.

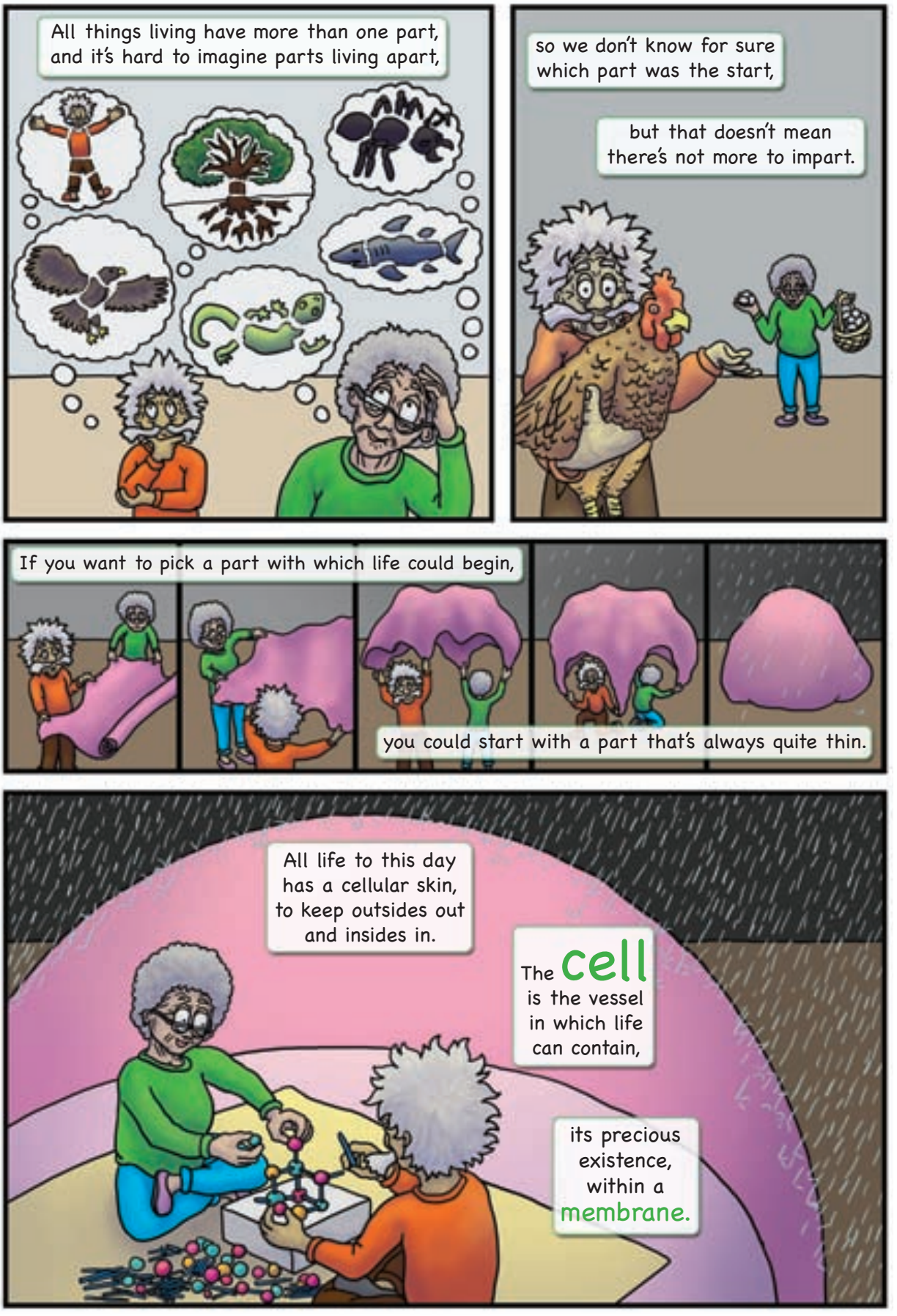

For the creation of life to possibly proceed, a mutating molecule is what we would need.

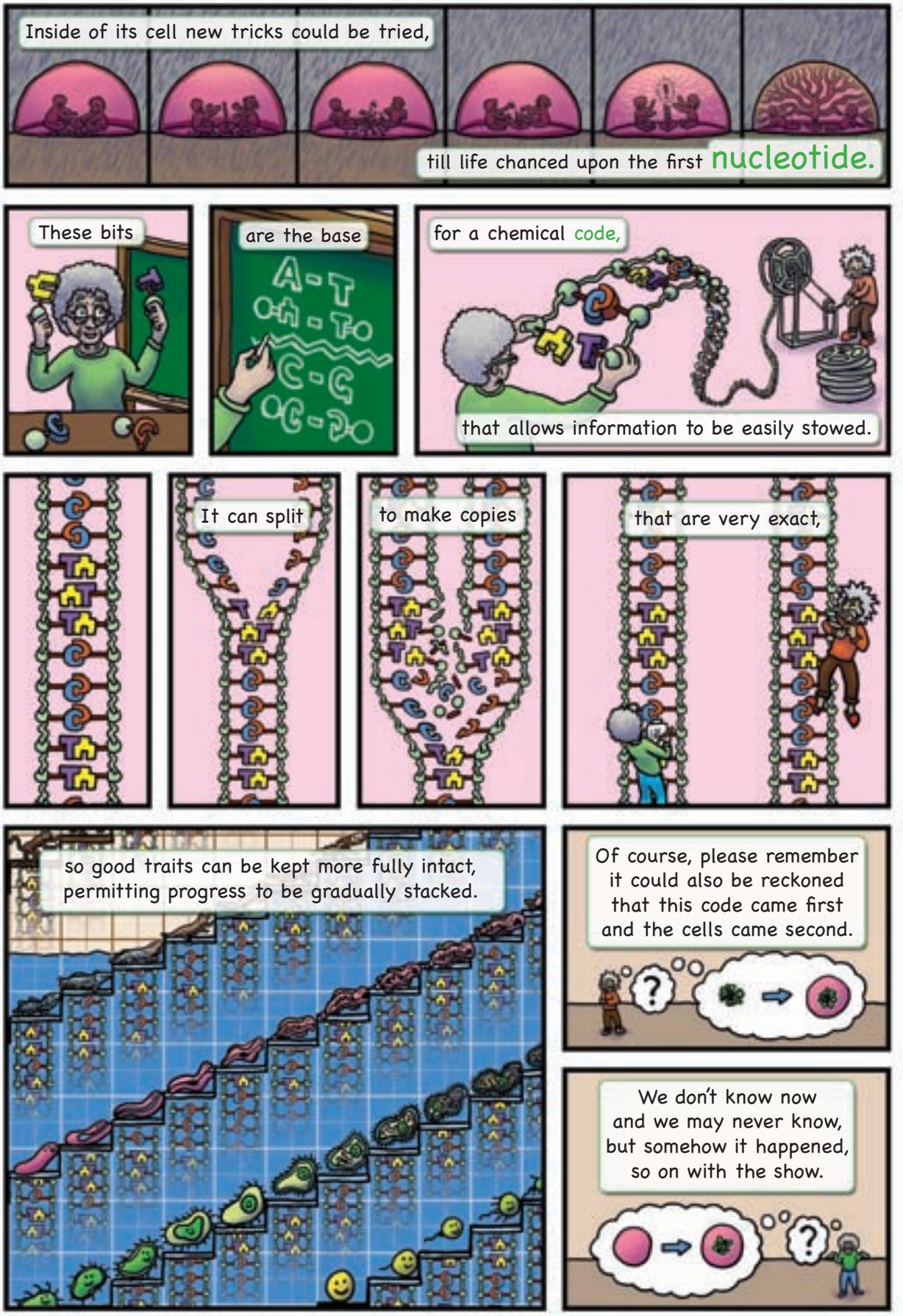

The question remains:
"How did it appear?"
and the answer to that question is not fully clear.
It could have started with atoms in aquatic suspension, combining to make molecules without least apprehension, in countless combinations too many to mention.
With a little bit of help from some source of heat, geochemical conditions so molecules meet, and millions of years to rinse, wash and repeat...
eventually our Earth would make something quite neat.
Was it deep in the ocean, or in the scum on a pond? We may never know where life was first spawned, but somewhere the right atoms made the right bond.

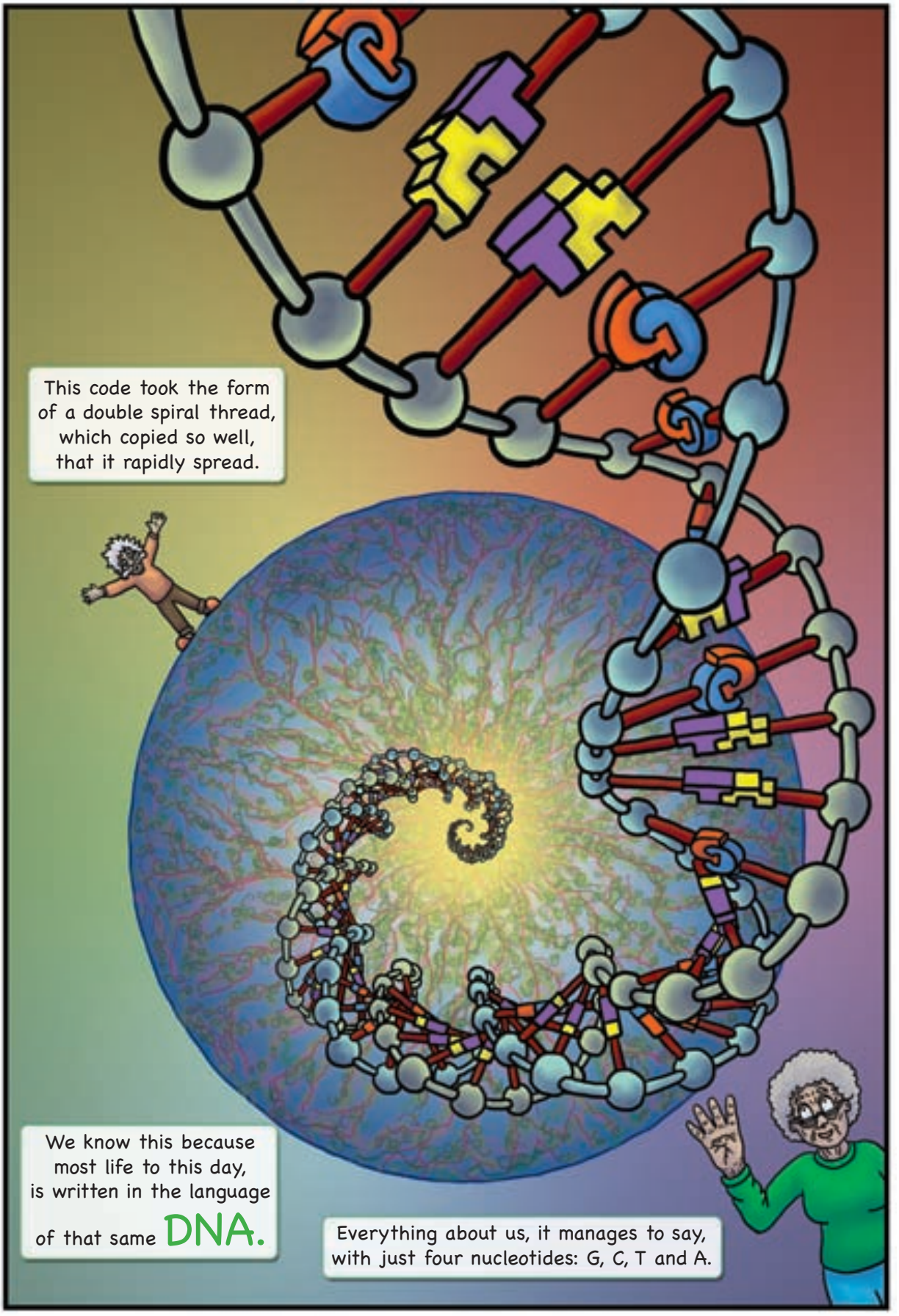

Molecules thrown together in a haphazard dance,
made the very first life form from physics and chance.
That first one
could make two,
and those two could make four.
Then eight,
then sixteen,
soon you couldn't keep score.
Just fifteen times later there's fifteen thousand more,
and thirty would make more than a billion to store.
As self-replicators filled the world to the brim, the limited resources would cause natural trim.
Some of the molecules would soon face rejection,
as they would be finished by
natural selection.

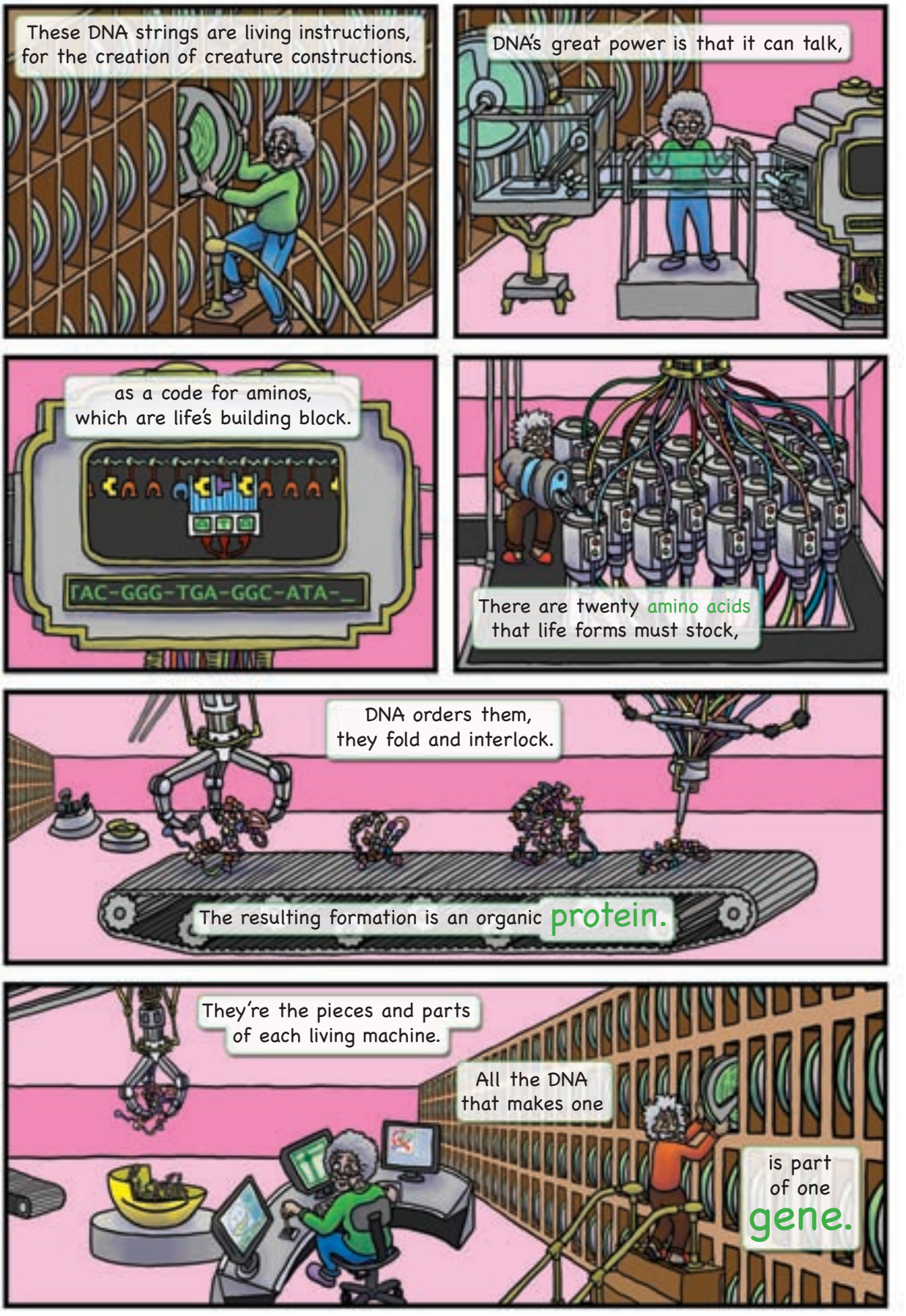

And here is where that variation is vital:
it makes the population
dynamic and tidal,
instead of identical,
static and idle.
The variety of versions
gets run through a sieve,
they compete for resources
and the better ones live.
It's a rowdy, unruly, disorganized mess,
with one simple rule that governs progress:
success is survival and survival success.
The poor reproducers
get left in the past,
ROUND 1
ROUND 2
ROUND 3
while the ones that succeed make copies that last.

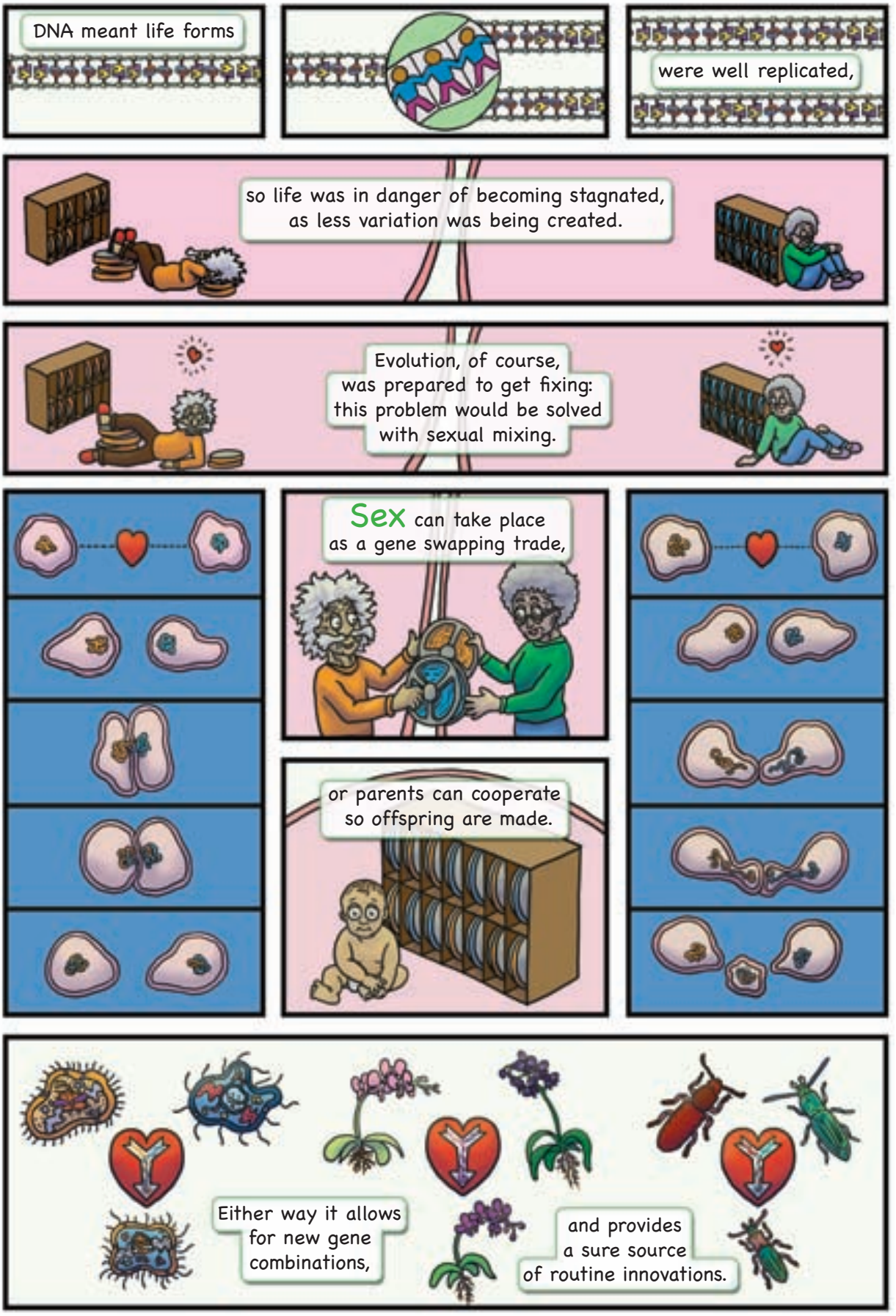

Progress is slow,
but there's been lots of time,
since our humble beginnings as primitive slime.
Some two billion years with a steady tradition,
of natural and constant cutthroat competition.
A beautifully simple and sublime solution:
life made itself through its own evolution.

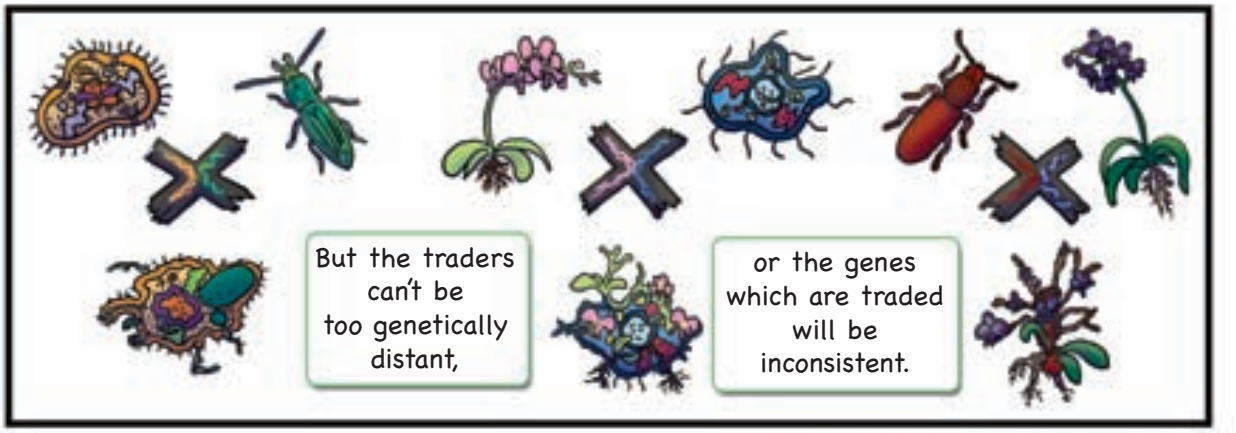

All things living have more than one part,
and it's hard to imagine parts living apart,
so we don't know for sure
which part was the start,
but that doesn't mean
there's not more to impart.
If you want to pick a part with which life could begin,
you could start with a part that's always quite thin.
All life to this day
has a cellular skin,
to keep outsides out
and insides in.
The cell
is the vessel
in which life
can contain,
its precious
existence,
within a
membrane.

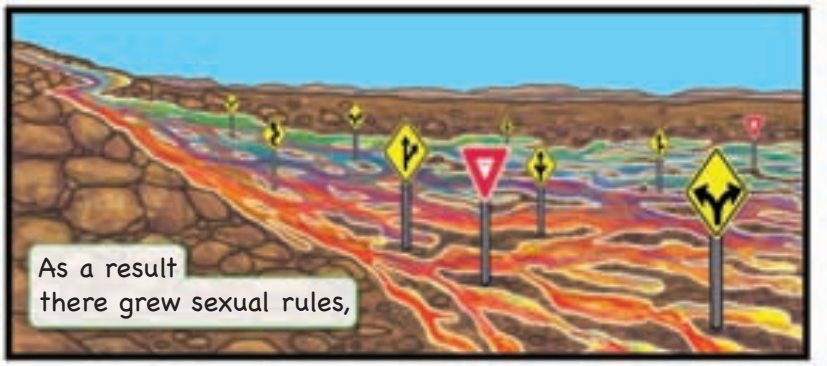

Inside of its cell new tricks could be tried,
till life chanced upon the first nucleotide.
These bits
are the base
A-T
T-A
C-G
G-C
for a chemical code,
that allows information to be easily stowed.
It can split
to make copies
that are very exact,
so good traits can be kept more fully intact,
permitting progress to be gradually stacked.
Of course, please remember
it could also be reckoned
that this code came first
and the cells came second.
?
We don't know now
and we may never know,
but somehow it happened,
so on with the show.
?

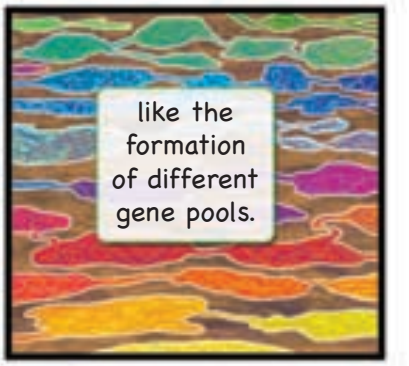

This code took the form of a double spiral thread, which copied so well, that it rapidly spread.
We know this because most life to this day, is written in the language of that same DNA.
Everything about us, it manages to say, with just four nucleotides: G, C, T and A.


These DNA strings are living instructions, for the creation of creature constructions.
DNA's great power is that it can talk,
as a code for aminos, which are life's building block.
TAC-GGG-TGA-GGC-ATA-_
There are twenty amino acids that life forms must stock,
DNA orders them, they fold and interlock.
The resulting formation is an organic protein.
They're the pieces and parts of each living machine.
All the DNA that makes one
is part of one gene.

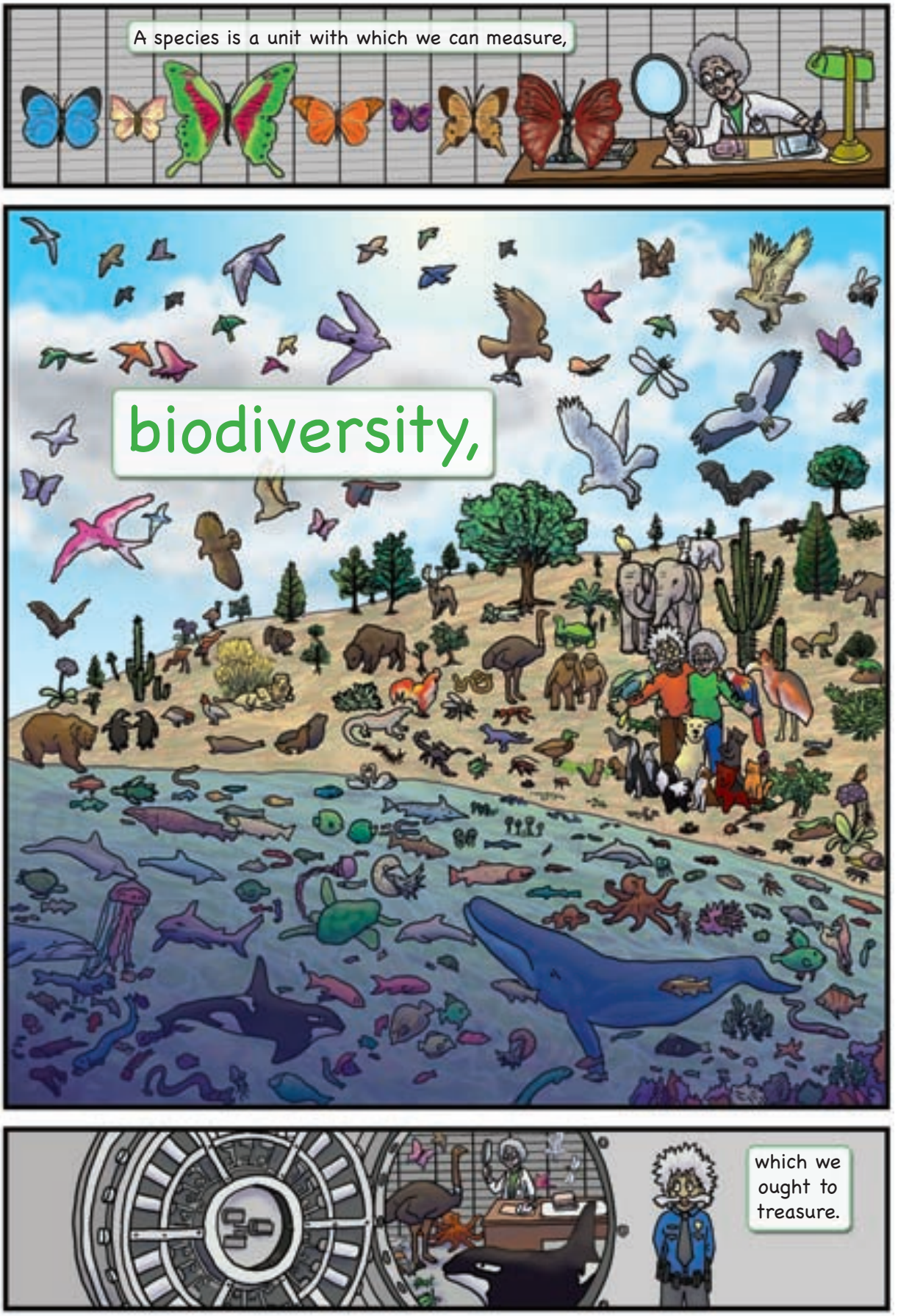

DNA meant life forms
were well replicated,
so life was in danger of becoming stagnated,
as less variation was being created.
Evolution, of course,
was prepared to get fixing:
this problem would be solved
with sexual mixing.
Sex can take place
as a gene swapping trade,
or parents can cooperate
so offspring are made.
Either way it allows
for new gene
combinations,
and provides
a sure source
of routine innovations.

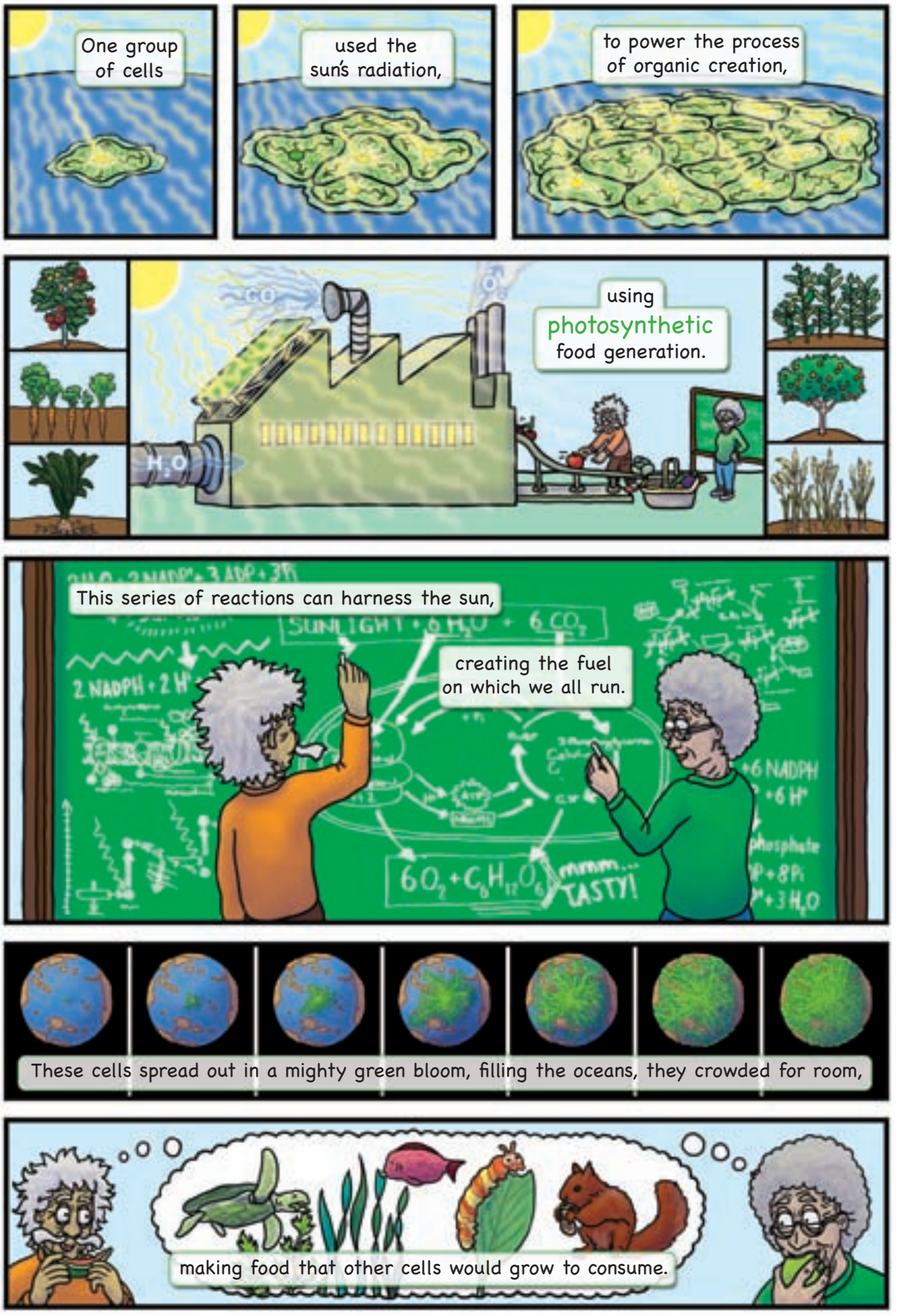

But the traders can't be too genetically distant,
or the genes which are traded will be inconsistent.

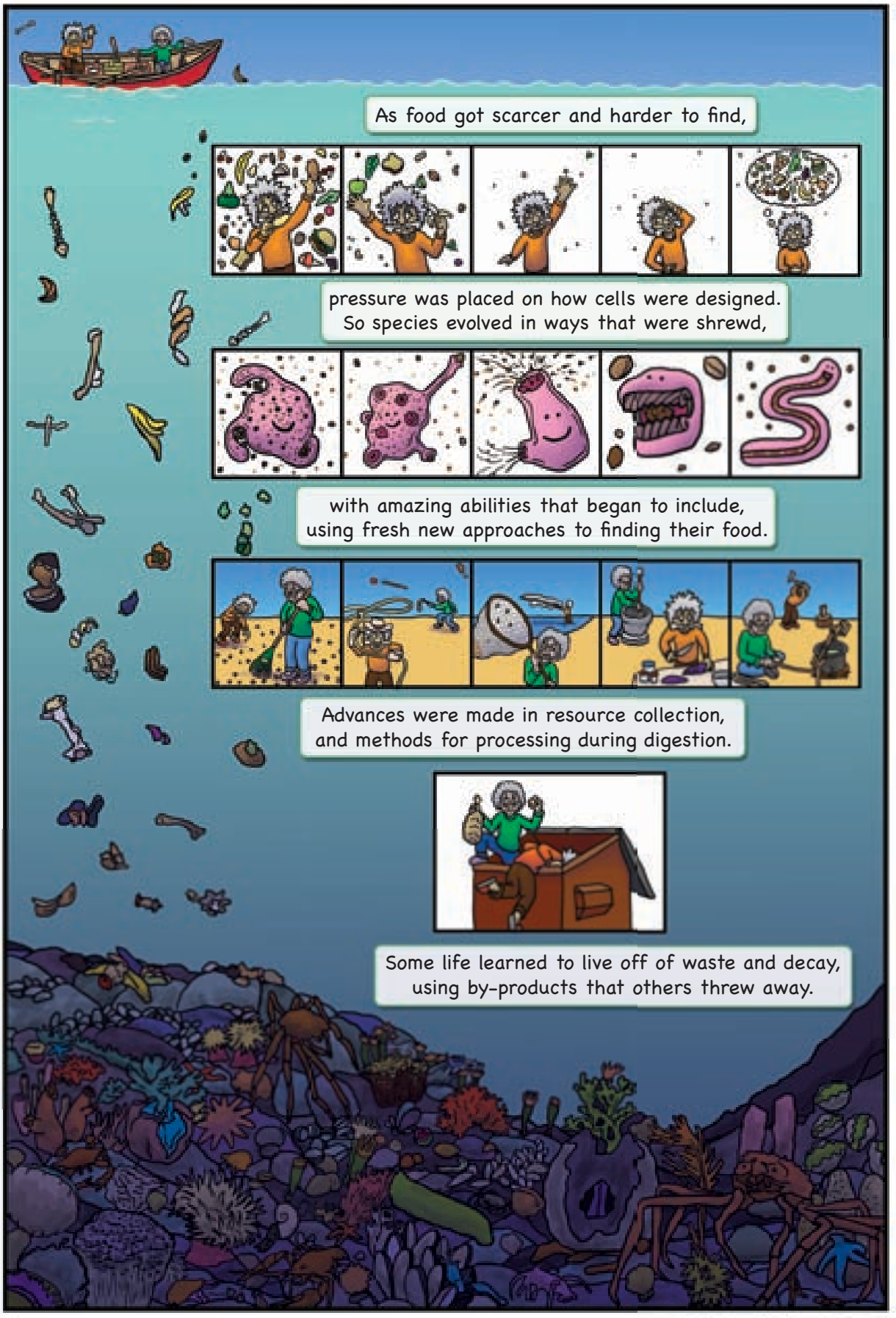

As a result there grew sexual rules,


like the formation of different gene pools.

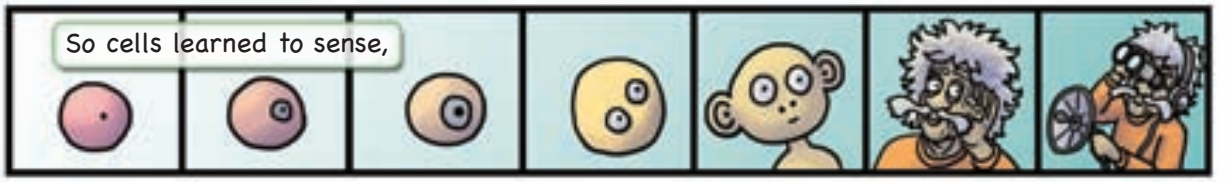

Each pool is a species, a life form distinct,
with its own set of genes, that are relatively linked,
traded just within species through sexual instinct.


A species is a unit with which we can measure,
biodiversity,
which we ought to treasure.

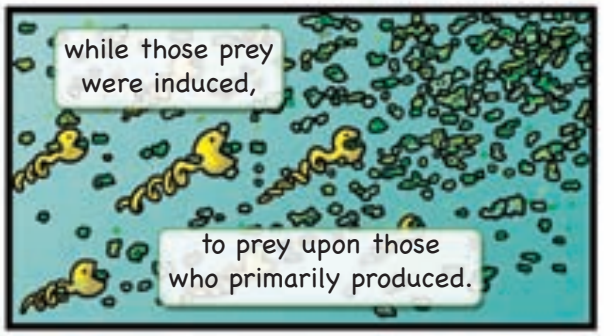

One group of cells
used the sun's radiation,
to power the process of organic creation,
using photosynthetic food generation.
This series of reactions can harness the sun,
creating the fuel on which we all run.
mmm... TASTY!
These cells spread out in a mighty green bloom, filling the oceans, they crowded for room,
making food that other cells would grow to consume.

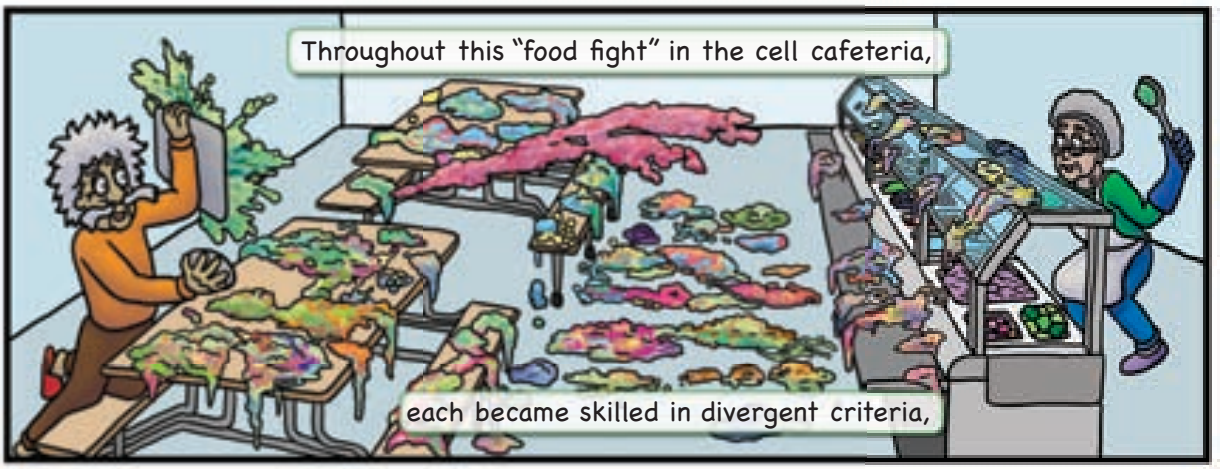

As food got scarcer and harder to find,
pressure was placed on how cells were designed. So species evolved in ways that were shrewd,
with amazing abilities that began to include, using fresh new approaches to finding their food.
Advances were made in resource collection, and methods for processing during digestion.
Some life learned to live off of waste and decay, using by-products that others threw away.

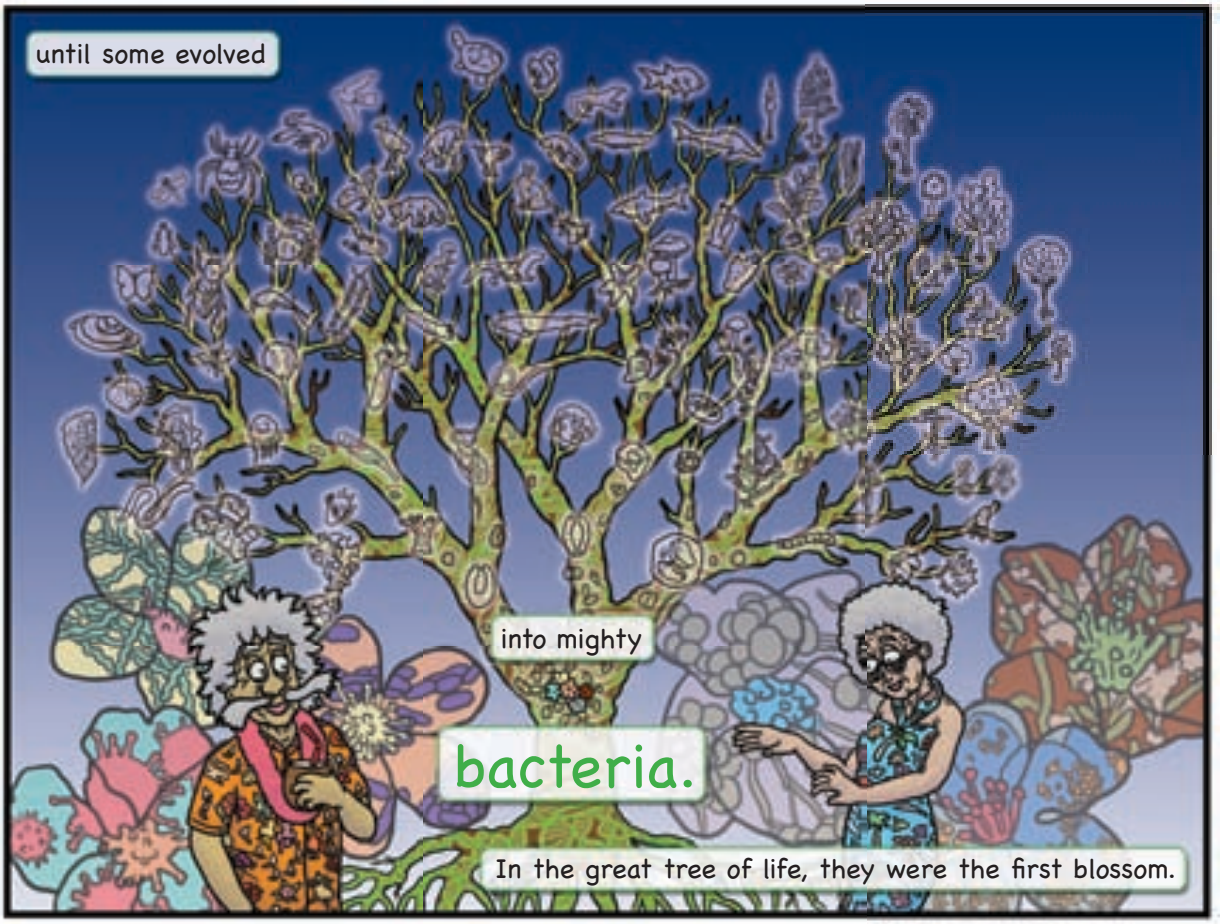
The pressure was on, evolution would remove, any little life form that failed to improve.



Each cell advanced along its own front, as some cells evolved into ones that would hunt.

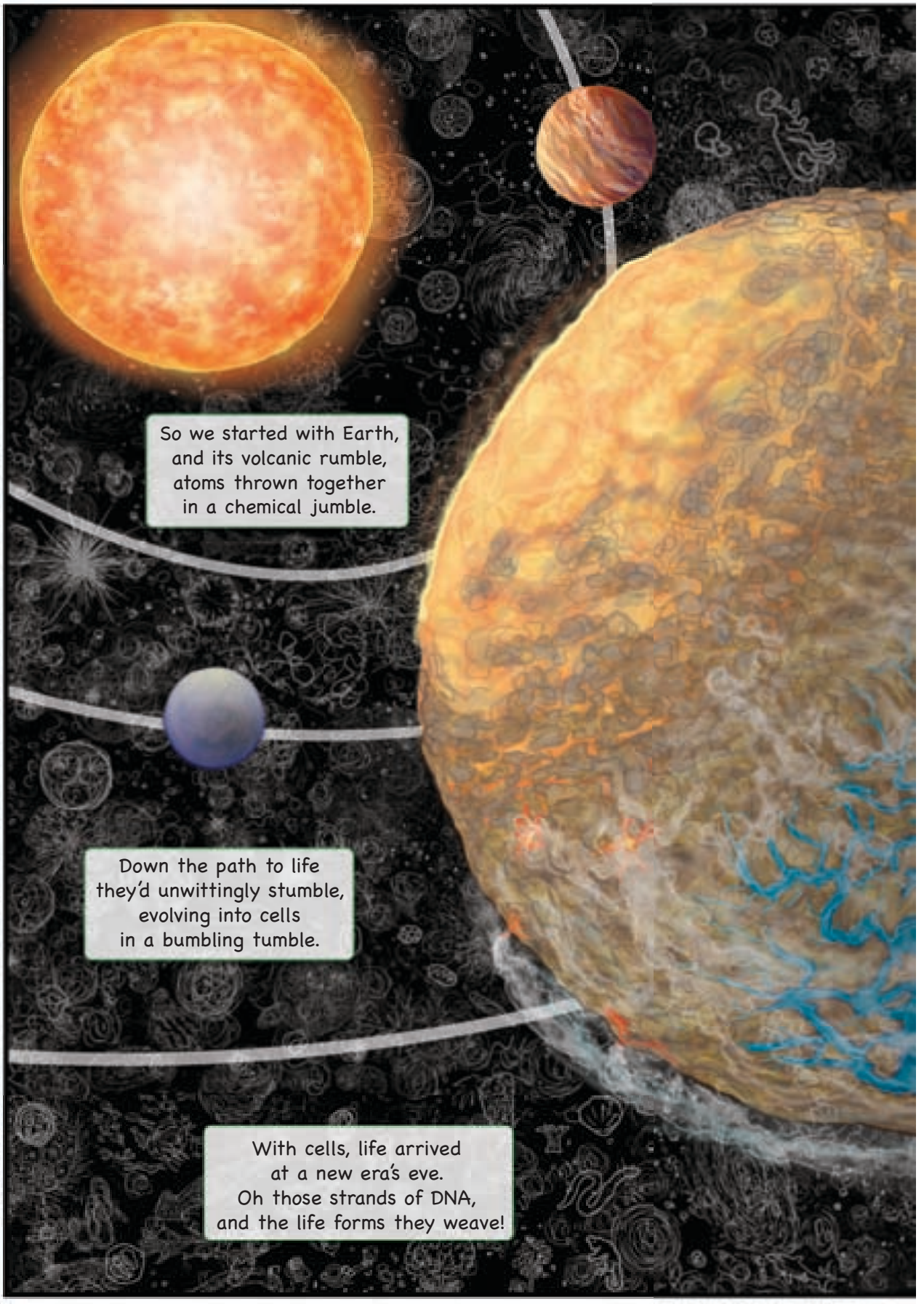


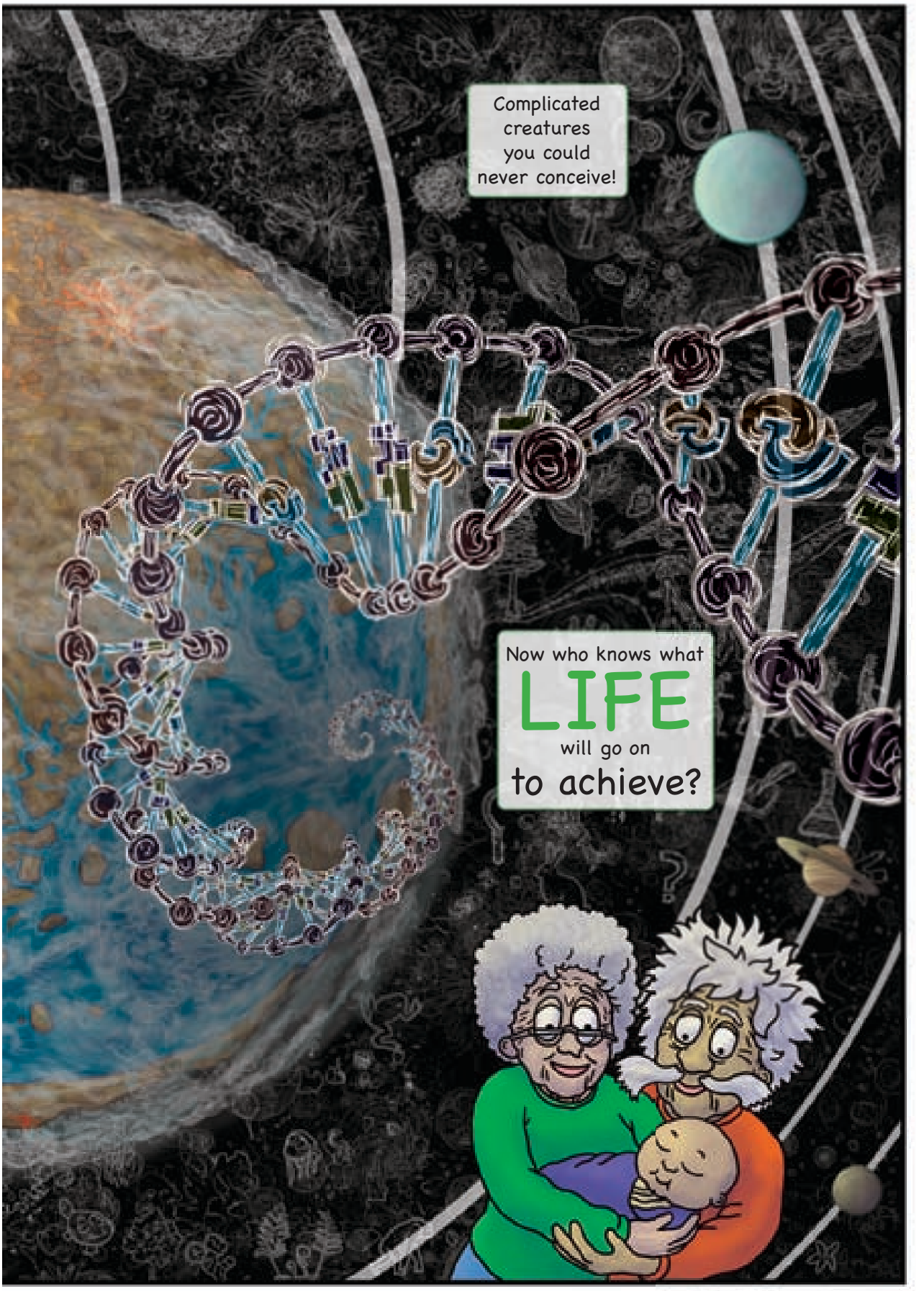

Throughout this "food fight" in the cell cafeteria,
each became skilled in divergent criteria,


until some evolved
into mighty
bacteria.
In the great tree of life, they were the first blossom.


Still popular now,
it's because they are awesome.


Much life would follow, but they were initial,
with their appearance, life on Earth was official.
It's Alive!
LIFE


So we started with Earth,
and its volcanic rumble,
atoms thrown together
in a chemical jumble.
Down the path to life
they'd unwittingly stumble,
evolving into cells
in a bumbling tumble.
With cells, life arrived
at a new era's eve.
Oh those strands of DNA,
and the life forms they weave!


Complicated creatures you could never conceive!
Now who knows what
LIFE
will go on
to achieve?

To be continued...

A Note from the Author:

I am not a professional scientist, just an enthusiastic amateur with a library card. I was able to write this book because of the countless people who have devoted their lives to furthering the scientific knowledge of the human race. As a result of their efforts, we now know more about ourselves and our place in the universe than we have ever known before.

However, there are still plenty of mysteries when it comes to exactly how, when, and where living organisms evolved from non-living elements. The only scientific explanation is that life created itself through a gradual process of natural selection. Scientists have developed some ideas as to how this may have happened, but we do not currently know which, if any, of their hypotheses are correct. We may never know.

While we do not know exactly how life began, we do know that it evolves. Evolution is a process whose existence is fully supported by science, like gravity or electricity. Without the concept of natural selection, there's very little about the organization of the organic world that makes any sense. It is the only model we have that can logically explain the diversity of life on Earth and it is quite simply one of the most illuminating ideas ever discovered by humankind.

This book is my tribute to science and evolution. It is my hope that it will inspire curiosity and enthusiasm in individuals who may not yet be aware that science is amazing. To this end I have tried to make this book engaging for the widest audience possible. It is not meant to be a comprehensive explanation of the scientific theories involved, and I have had to take some creative liberties for the sake of story, rhyme, rhythm and illustration. That being said, if you have any ideas about how I could improve this book, I'd love to hear them.

If you would like to learn more about this story, what it means and the science behind it, please visit my website at:

www.JLDunbar.com

or make a trip to your local library. If your curiosity still isn't satisfied, maybe you should become an evolutionary biologist!

About the Author

Jamie Dunbar lives in Oakland CA, where he helps run DogStarDaily.com,
the most comprehensive dog training resource on the internet.
Jamie went to Brown University where he majored in Sociology and Visual Art,
specializing in oil painting and bookmaking. In addition to art,
Jamie enjoys cooking, gardening, playing games of all sorts and of course...

...science.

James "Jamie" Lu Dunbar has self-published three other books.
You can view them all for free online, but if you appreciate them,
please consider buying a copy or two - they make wonderful gifts!

BANG!

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Colophon

I wrote the Universe Verse while living in Boston in 2006 & 2007.
I made regular use of the public libraries, researching illustrated children's books, graphic novels and the history of everything.
I illustrated and self-published the first book in the series: BANG!
in 2009 using CreateSpace, a digital printing service run by Amazon.

I raised the money to produce this book with the help of Kickstarter.com and the generosity of over 150 backers. Because of their support this book is illustrated in color and is available to the public for free as a digital file.

The illustrations began as doodles I made in the margins of my manuscripts. From these scattered ideas I made many small pencil sketches to organize the layout of each page. I scanned these into Photoshop, where I used countless reference images culled from Google to help me make the final illustrations using a Wacom drawing tablet, a lot of late nights, and a MacBook.

This font is Gill Sans, the story font is Chalkboard.

Did you enjoy this book?
If so, please join my mailing list by sending me an email.
You can find my email address online at: JLDunbar.com

Hopefully these comic books will be the foundation for a lot more educational resources in the future. I believe that this story is an important one for people to hear and understand and I'd like to see it presented in as many formats as possible. I hope to adapt this story into lesson plans, songs, animated videos, interactive eBooks and educational apps.
If you're interested in collaborating, please get in touch!

There is no wealth but life...
Life, including all its powers of love, of joy, and of admiration.

- John Ruskin (English art critic and social thinker)
Essay IV: "Ad Valorem," section 77