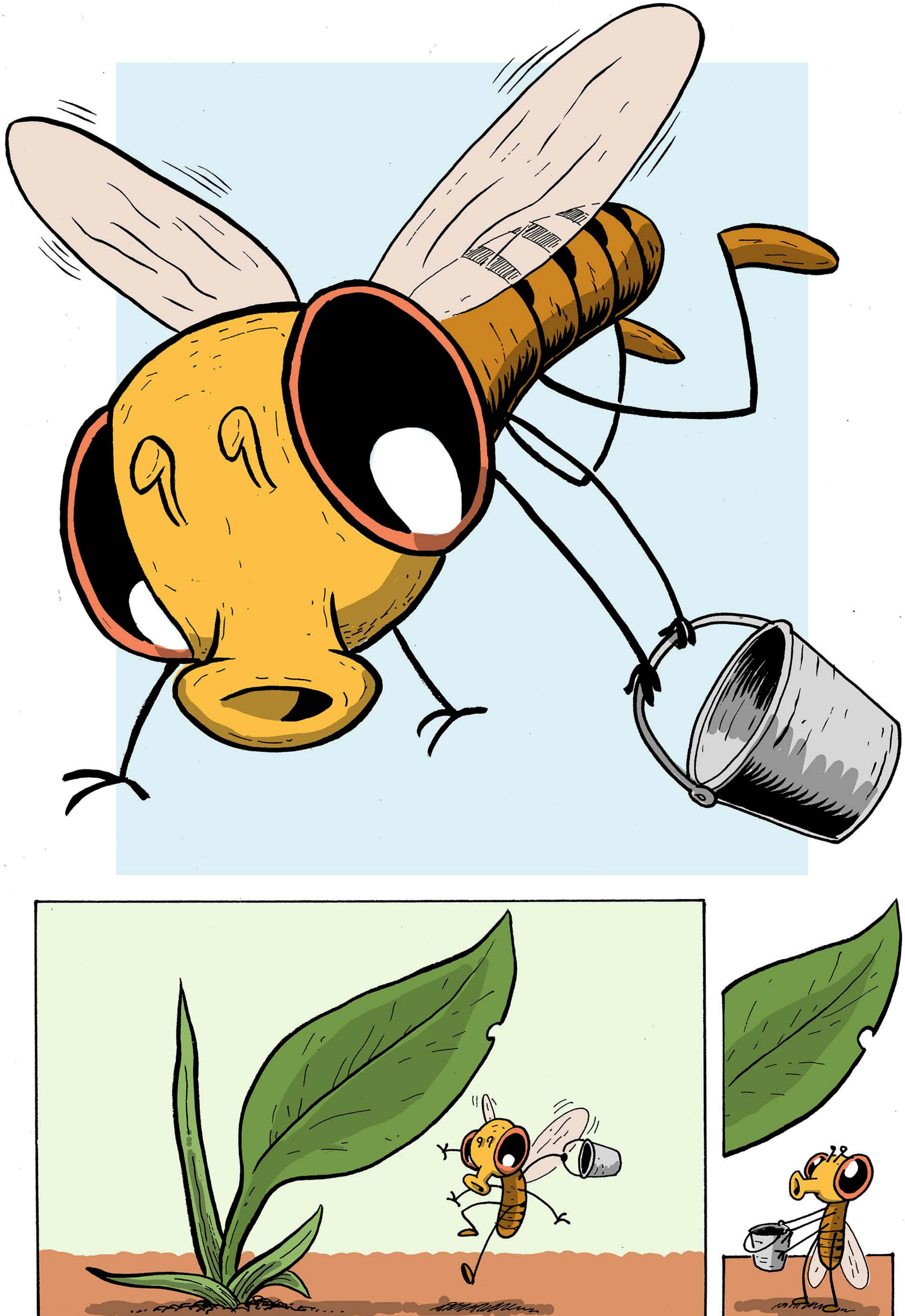
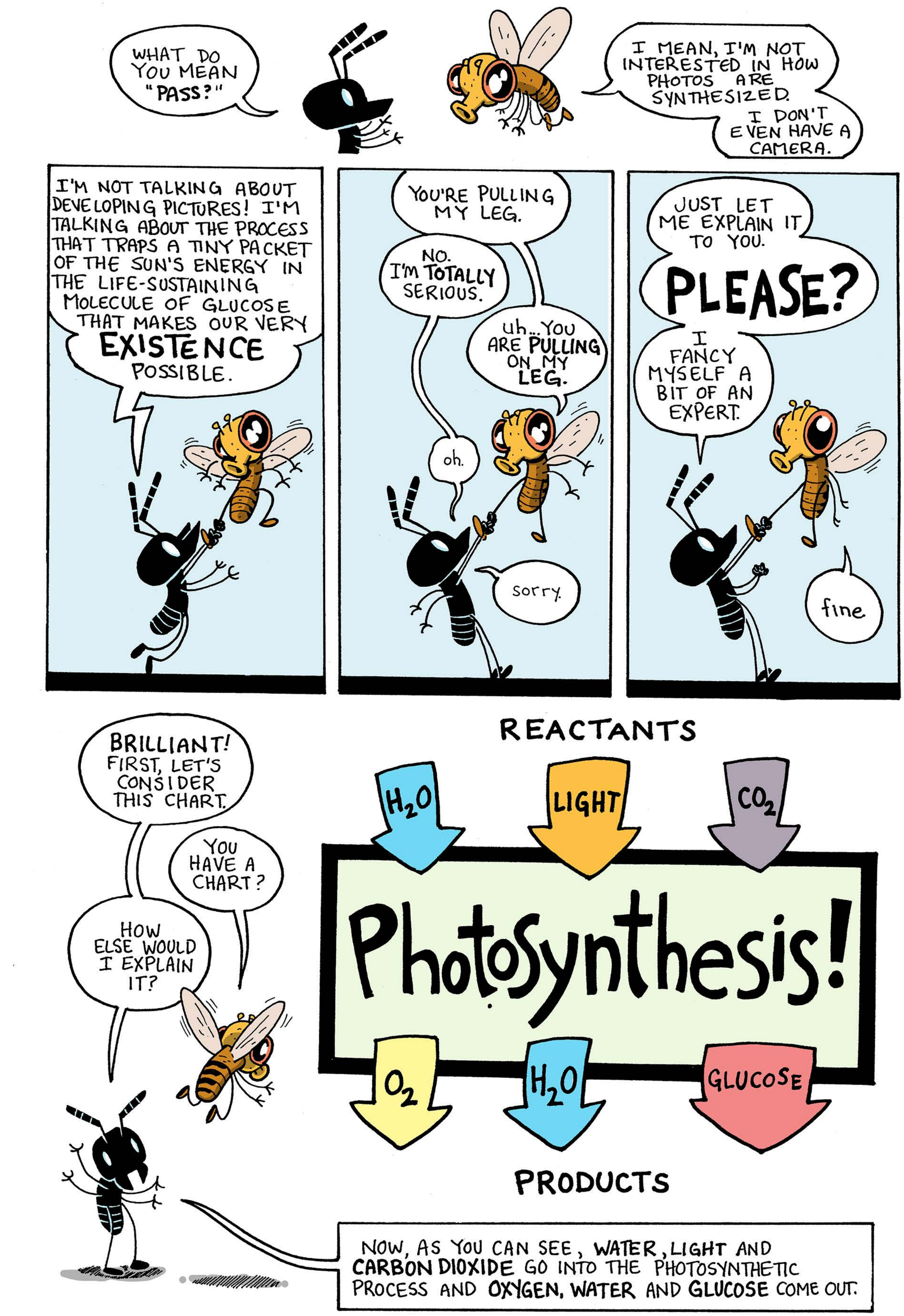
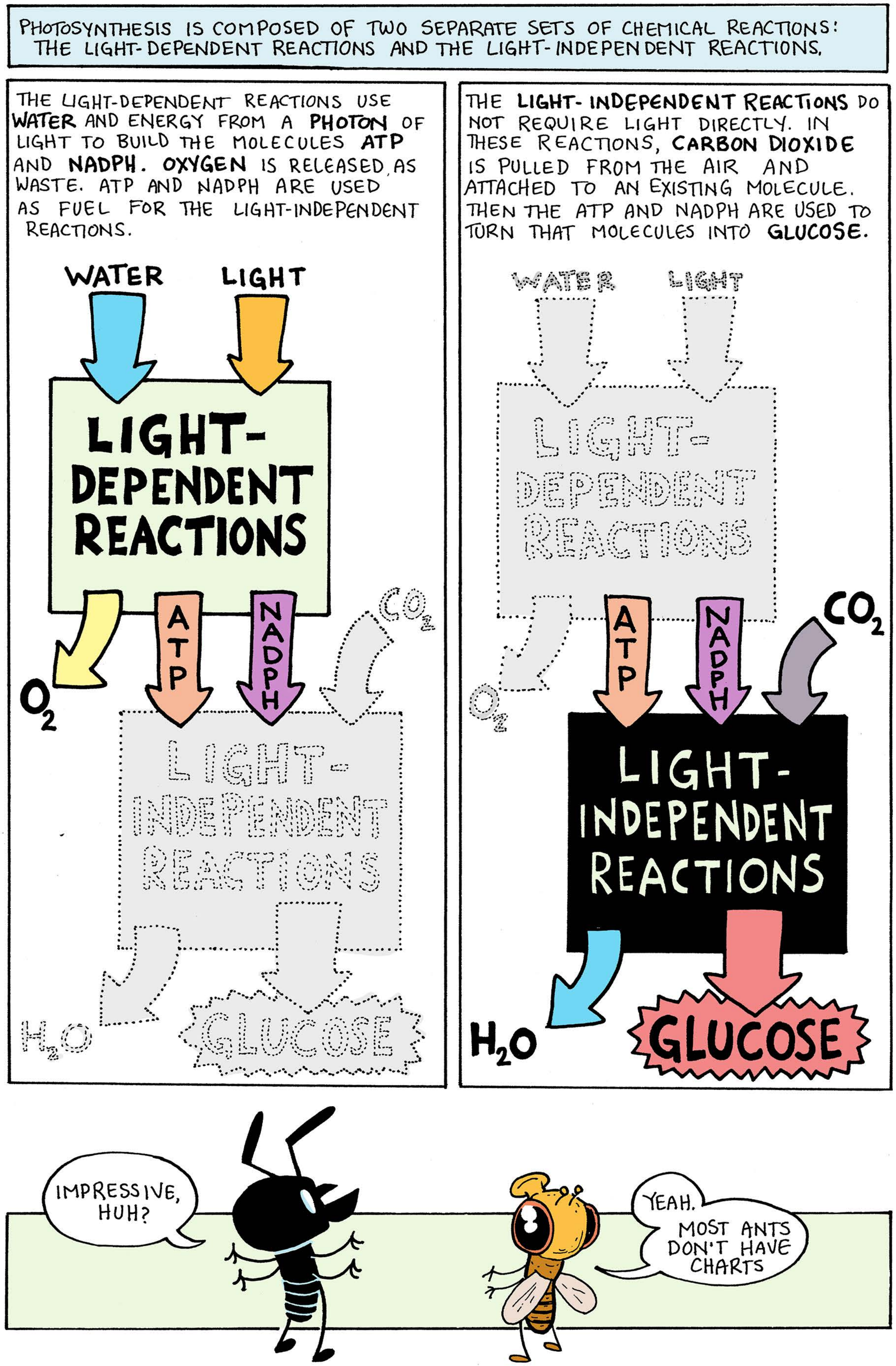
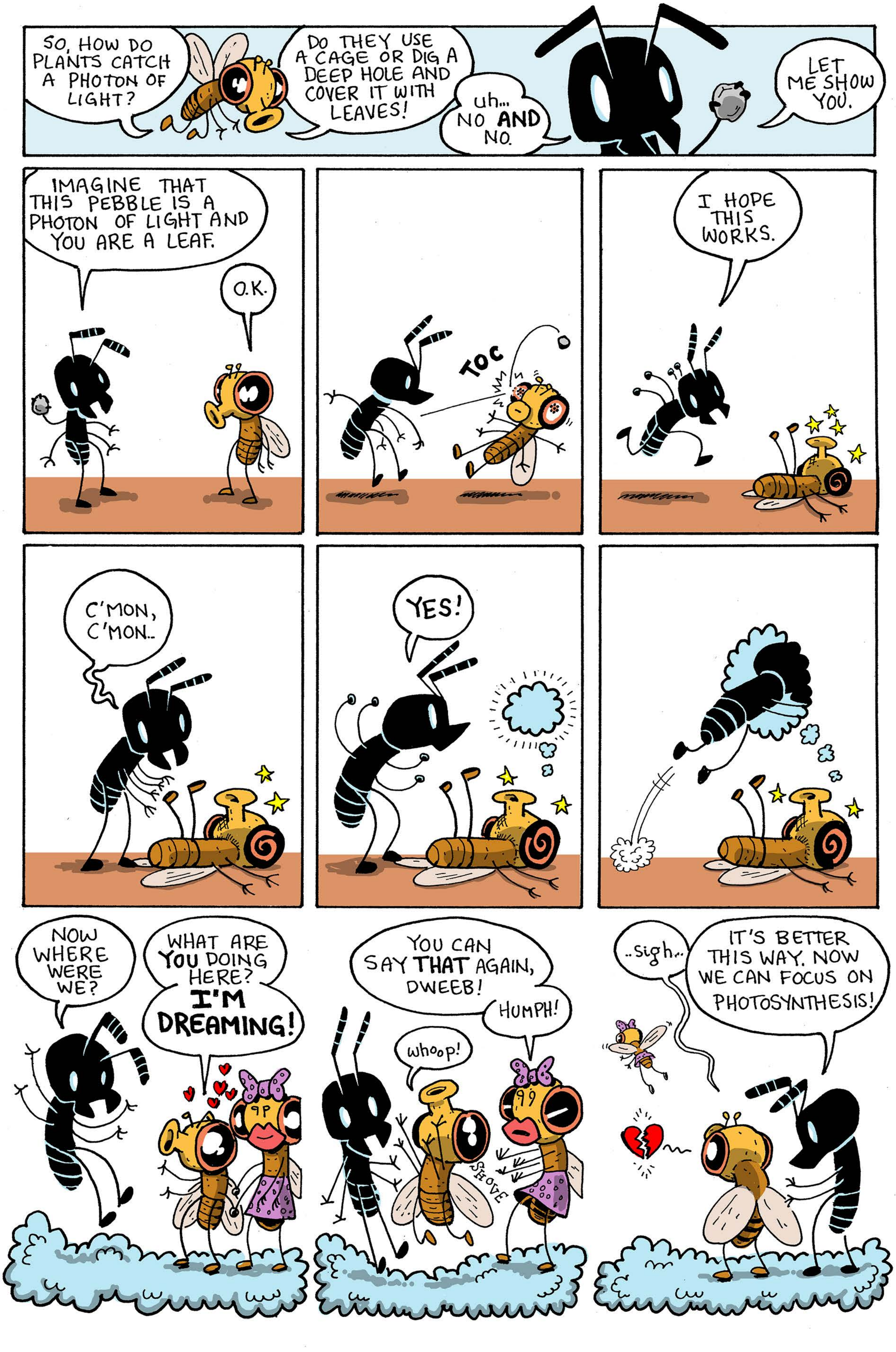


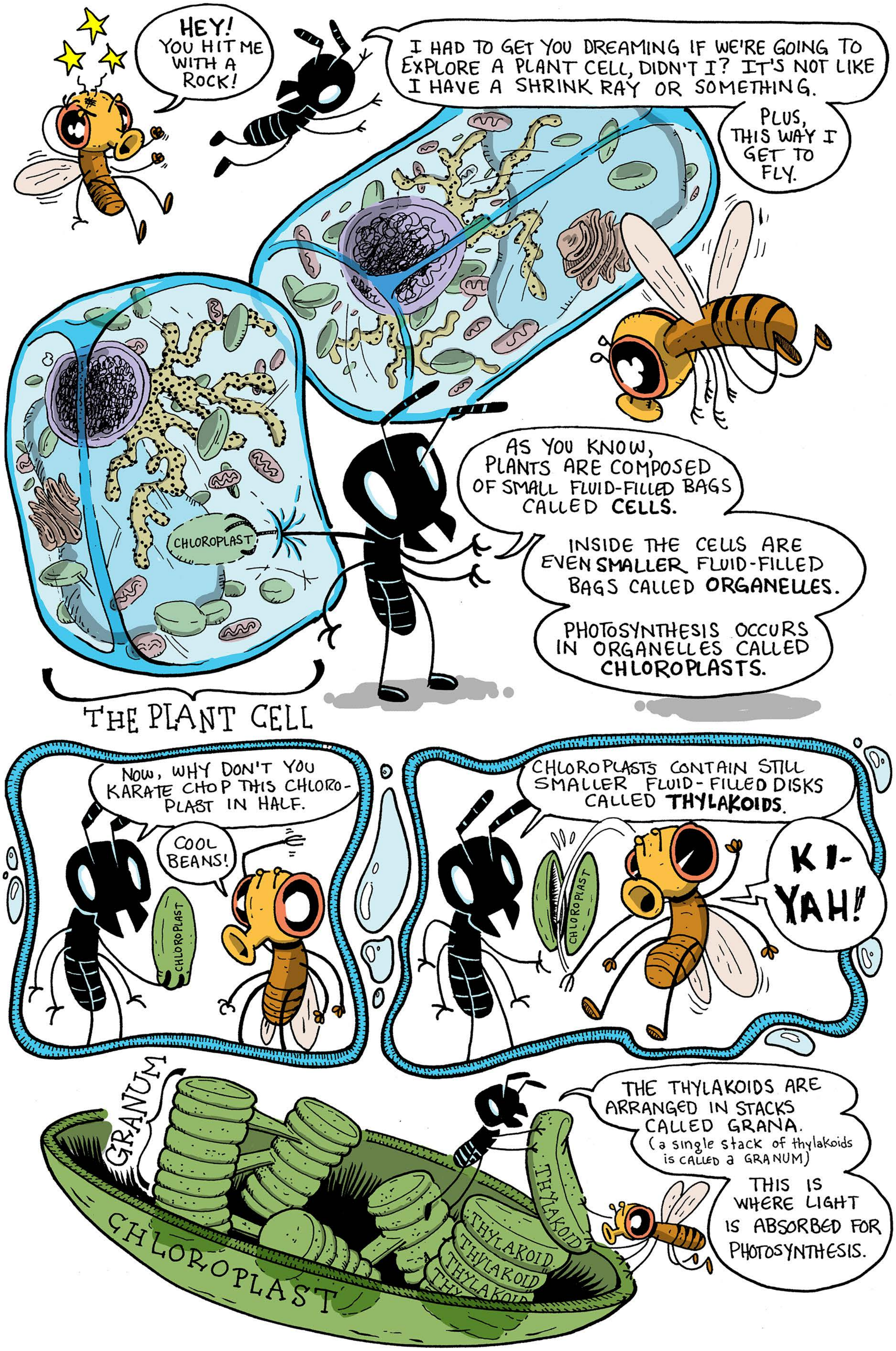
Written and Illustrated by Jay Hosler

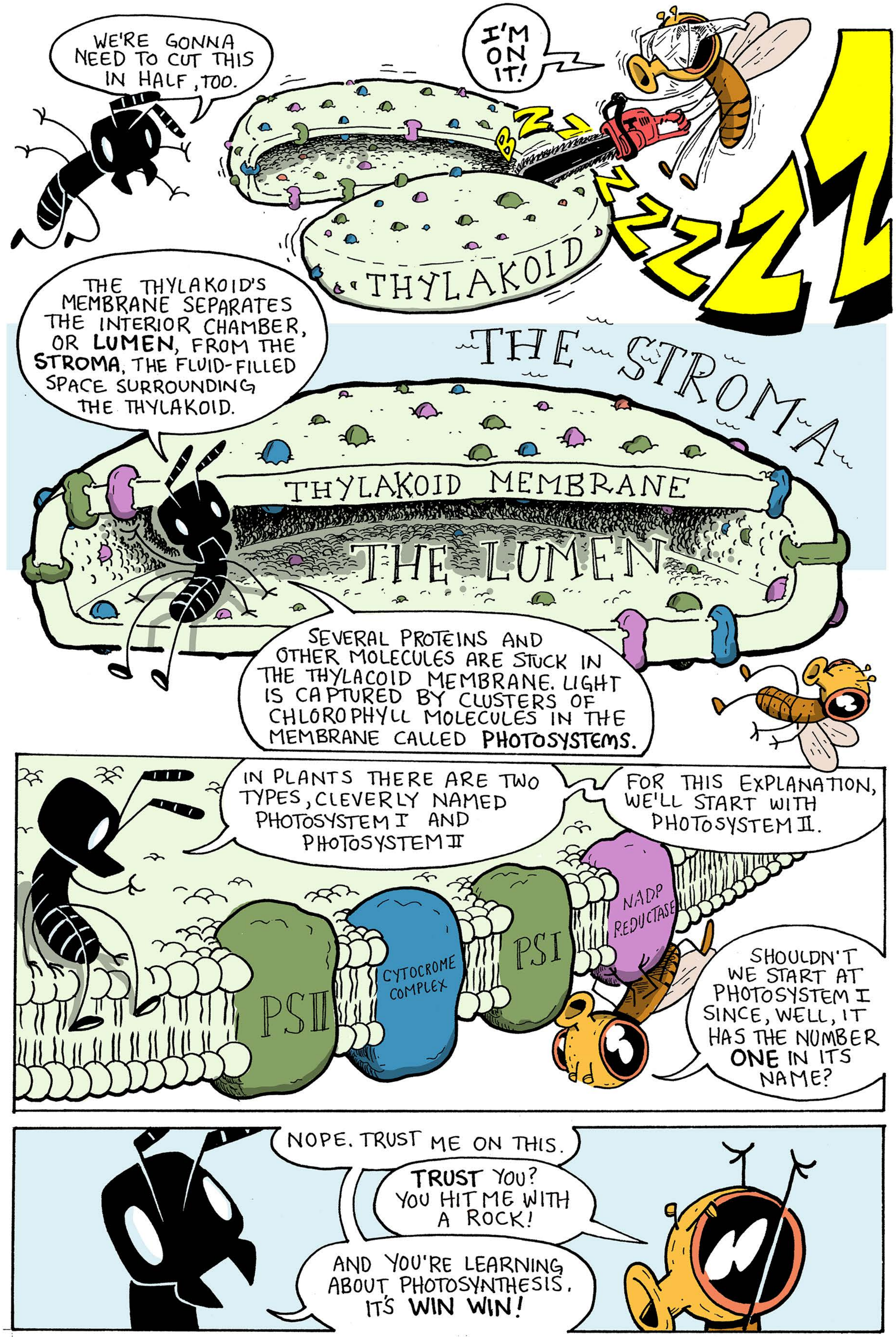

Photosynthesis
OR
"gimme some sugar"
STARRING WILBUR & ANT EDNA
?
WHAT ARE YOU DOING?
WAITING FOR THE SUGAR TO COME OUT.
THE WHAT?
THE SUGAR. I'M IN THE MOOD FOR SOMETHING SWEET.
SO, WHY ARE YOU STANDING UNDER A LEAF WITH A BUCKET?
I READ AN ARTICLE THAT SAID PLANTS COMBINE LIGHT, WATER AND CARBON DIOXIDE TO MAKE SUGAR.
...uh....
DID YOU READ THE WHOLE ARTICLE?
NOT YET. WHY?
BECAUSE IF YOU HAD YOU'D KNOW THAT PLANTS DON'T GO OOZING BUCKETFULLS OF SUGAR ALL OVER THE PLACE.
nuts.
I really wanted something sweet...
Y'KNOW WHAT'S REALLY SWEET? UNDERSTANDING PHOTOSYNTHESIS BETTER.
PASS.
HOSLER 2010

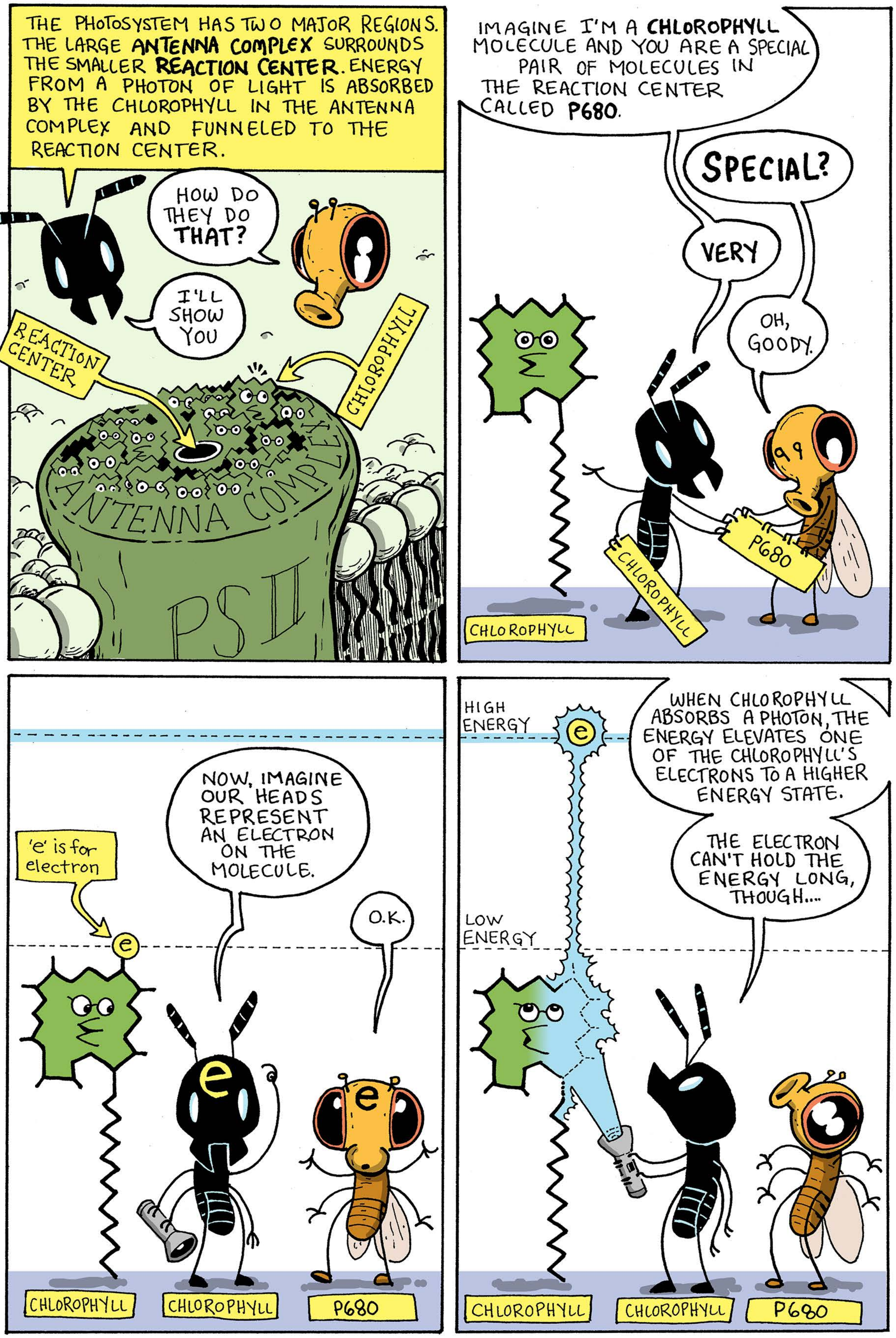

WHAT DO YOU MEAN "PASS?"
I MEAN, I'M NOT INTERESTED IN HOW PHOTOS ARE SYNTHESIZED.
I DON'T EVEN HAVE A CAMERA.
I'M NOT TALKING ABOUT DEVELOPING PICTURES! I'M TALKING ABOUT THE PROCESS THAT TRAPS A TINY PACKET OF THE SUN'S ENERGY IN THE LIFE-SUSTAINING MOLECULE OF GLUCOSE THAT MAKES OUR VERY EXISTENCE POSSIBLE.
YOU'RE PULLING MY LEG.
NO. I'M TOTALLY SERIOUS.
uh... YOU ARE PULLING ON MY LEG.
oh.
sorry.
JUST LET ME EXPLAIN IT TO YOU.
PLEASE?
I FANCY MYSELF A BIT OF AN EXPERT.
fine.
BRILLIANT! FIRST, LET'S CONSIDER THIS CHART.
YOU HAVE A CHART?
HOW ELSE WOULD I EXPLAIN IT?
REACTANTS
H_2O
LIGHT
CO_2
Photosynthesis!
O_2
H_2O
GLUCOSE
PRODUCTS
NOW, AS YOU CAN SEE, WATER, LIGHT AND CARBON DIOXIDE GO INTO THE PHOTOSYNTHETIC PROCESS AND OXYGEN, WATER AND GLUCOSE COME OUT.

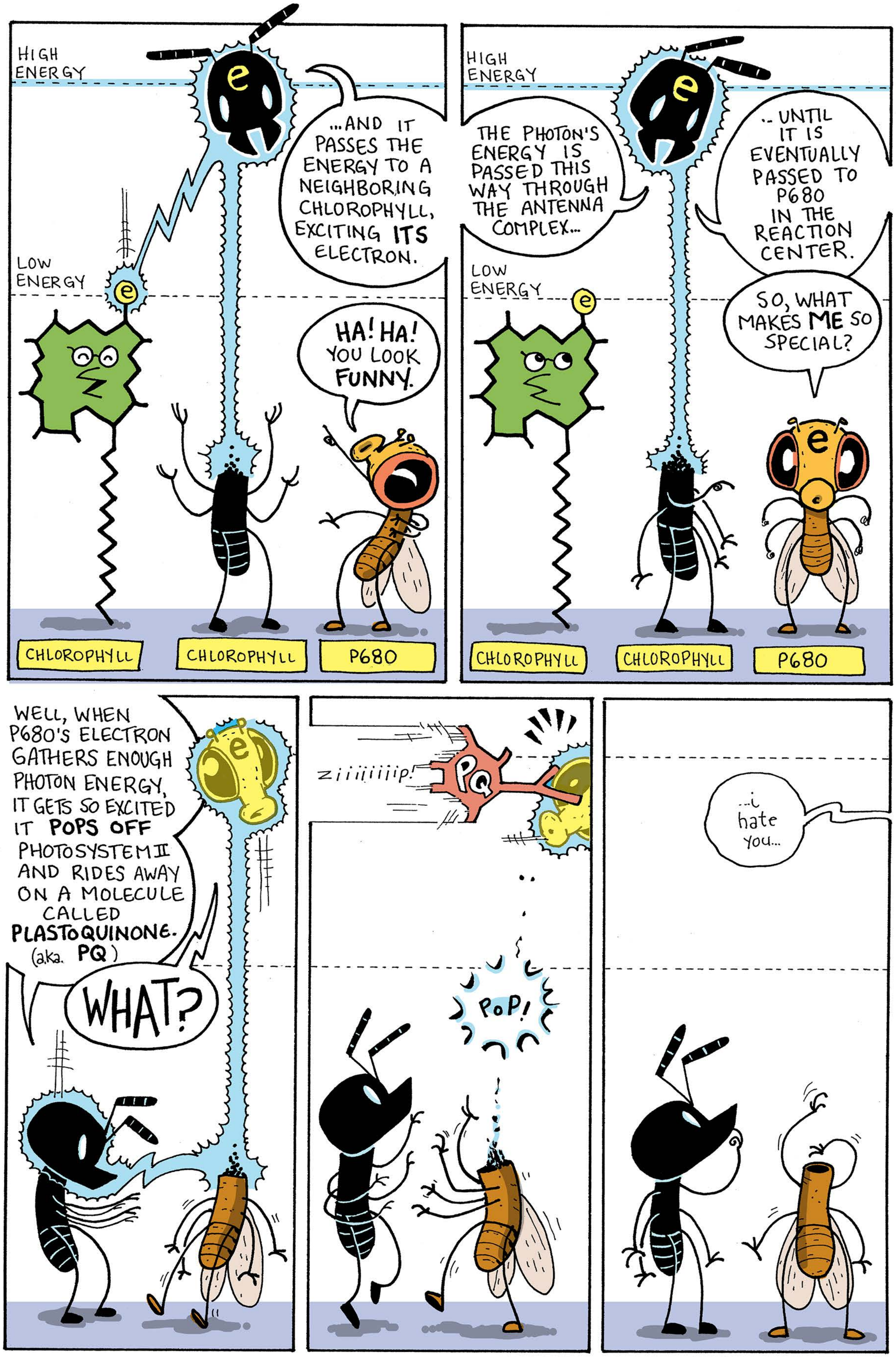

PHOTOSYNTHESIS IS COMPOSED OF TWO SEPARATE SETS OF CHEMICAL REACTIONS: THE LIGHT-DEPENDENT REACTIONS AND THE LIGHT-INDEPENDENT REACTIONS.
THE LIGHT-DEPENDENT REACTIONS USE WATER AND ENERGY FROM A PHOTON OF LIGHT TO BUILD THE MOLECULES ATP AND NADPH. OXYGEN IS RELEASED AS WASTE. ATP AND NADPH ARE USED AS FUEL FOR THE LIGHT-INDEPENDENT REACTIONS.
WATER
LIGHT
LIGHT-DEPENDENT REACTIONS
O_2
ATP
NADPH
CO_2
LIGHT-INDEPENDENT REACTIONS
H_2O
GLUCOSE
THE LIGHT-INDEPENDENT REACTIONS DO NOT REQUIRE LIGHT DIRECTLY. IN THESE REACTIONS, CARBON DIOXIDE IS PULLED FROM THE AIR AND ATTACHED TO AN EXISTING MOLECULE. THEN THE ATP AND NADPH ARE USED TO TURN THAT MOLECULES INTO GLUCOSE.
WATER
LIGHT
LIGHT-DEPENDENT REACTIONS
O_2
ATP
NADPH
CO_2
LIGHT-INDEPENDENT REACTIONS
H_2O
GLUCOSE
IMPRESSIVE, HUH?
YEAH.
MOST ANTS DON'T HAVE CHARTS

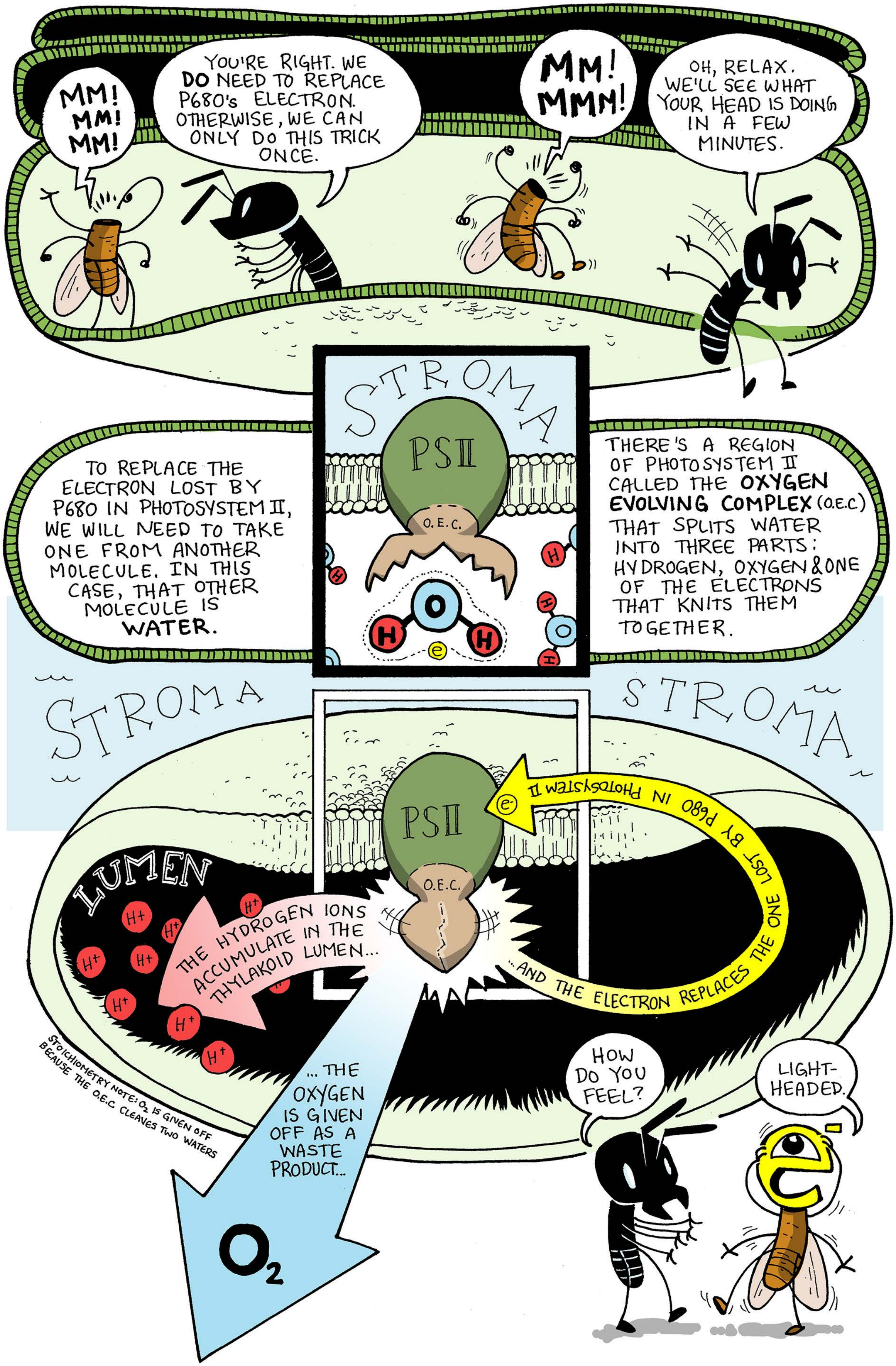

SO, HOW DO PLANTS CATCH A PHOTON OF LIGHT?
DO THEY USE A CAGE OR DIG A DEEP HOLE AND COVER IT WITH LEAVES!
uh... NO AND NO.
LET ME SHOW YOU.
IMAGINE THAT THIS PEBBLE IS A PHOTON OF LIGHT AND YOU ARE A LEAF.
O.K.
TOC
I HOPE THIS WORKS.
C'MON, C'MON..
YES!
NOW WHERE WERE WE?
WHAT ARE YOU DOING HERE? I'M DREAMING!
YOU CAN SAY THAT AGAIN, DWEEB!
HUMPH!
whoop!
SHOVE
..sigh..
IT'S BETTER THIS WAY. NOW WE CAN FOCUS ON PHOTOSYNTHESIS!

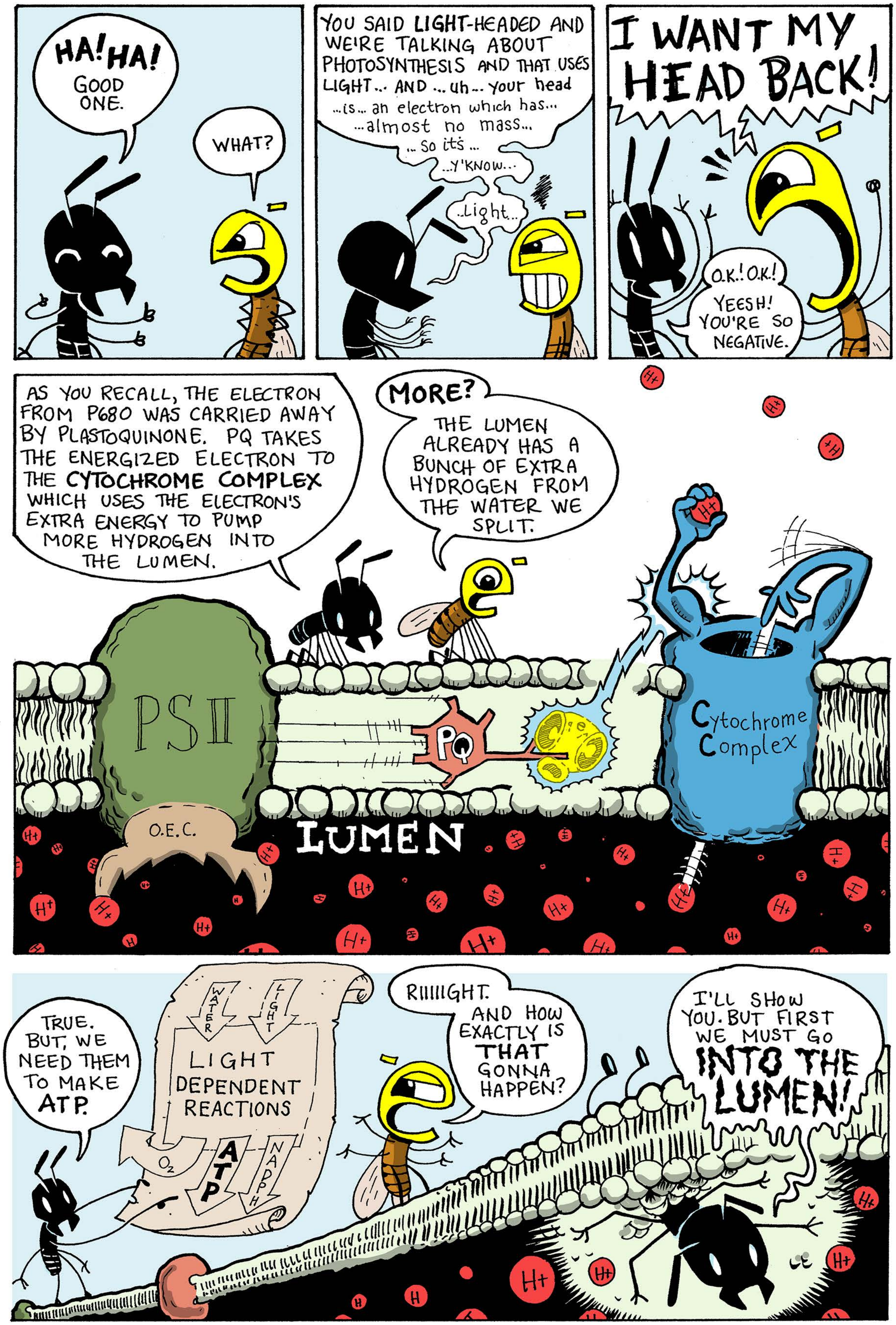

HEY! YOU HIT ME WITH A ROCK!
I HAD TO GET YOU DREAMING IF WE'RE GOING TO EXPLORE A PLANT CELL, DIDN'T I? IT'S NOT LIKE I HAVE A SHRINK RAY OR SOMETHING.
PLUS, THIS WAY I GET TO FLY.
AS YOU KNOW, PLANTS ARE COMPOSED OF SMALL FLUID-FILLED BAGS CALLED CELLS.
INSIDE THE CELLS ARE EVEN SMALLER FLUID-FILLED BAGS CALLED ORGANELLES.
PHOTOSYNTHESIS OCCURS IN ORGANELLES CALLED CHLOROPLASTS.
CHLOROPLAST
THE PLANT CELL
NOW, WHY DON'T YOU KARATE CHOP THIS CHLOROPLAST IN HALF.
COOL BEANS!
CHLOROPLAST
CHLOROPLASTS CONTAIN STILL SMALLER FLUID-FILLED DISKS CALLED THYLAKOIDS.
KI-YAH!
CHLOROPLAST
GRANUM
THE THYLAKOIDS ARE ARRANGED IN STACKS CALLED GRANA.
(a single stack of thylakoids is called a GRANUM)
THIS IS WHERE LIGHT IS ABSORBED FOR PHOTOSYNTHESIS.
THYLAKOID
THYLAKOID
THYLAKOID
THYLAKOID
THYLAKOID
CHLOROPLAST


WE'RE GONNA NEED TO CUT THIS IN HALF, TOO.
I'M ON IT!
BZZZ
ZZZZZZ
THYLAKOID
THE THYLAKOID'S MEMBRANE SEPARATES THE INTERIOR CHAMBER, OR **LUMEN**, FROM THE **STROMA**, THE FLUID-FILLED SPACE SURROUNDING THE THYLAKOID.
THE STROMA
THYLAKOID MEMBRANE
THE LUMEN
SEVERAL PROTEINS AND OTHER MOLECULES ARE STUCK IN THE THYLACOID MEMBRANE. LIGHT IS CAPTURED BY CLUSTERS OF CHLOROPHYLL MOLECULES IN THE MEMBRANE CALLED **PHOTOSYSTEMS**.
IN PLANTS THERE ARE TWO TYPES, CLEVERLY NAMED PHOTOSYSTEM I AND PHOTOSYSTEM II
FOR THIS EXPLANATION, WE'LL START WITH PHOTOSYSTEM II.
PSII
CYTOCROME COMPLEX
PSI
NADP REDUCTASE
SHOULDN'T WE START AT PHOTOSYSTEM I SINCE, WELL, IT HAS THE NUMBER **ONE** IN ITS NAME?
NOPE. TRUST ME ON THIS.
TRUST YOU? YOU HIT ME WITH A ROCK!
AND YOU'RE LEARNING ABOUT PHOTOSYNTHESIS. IT'S **WIN WIN**!

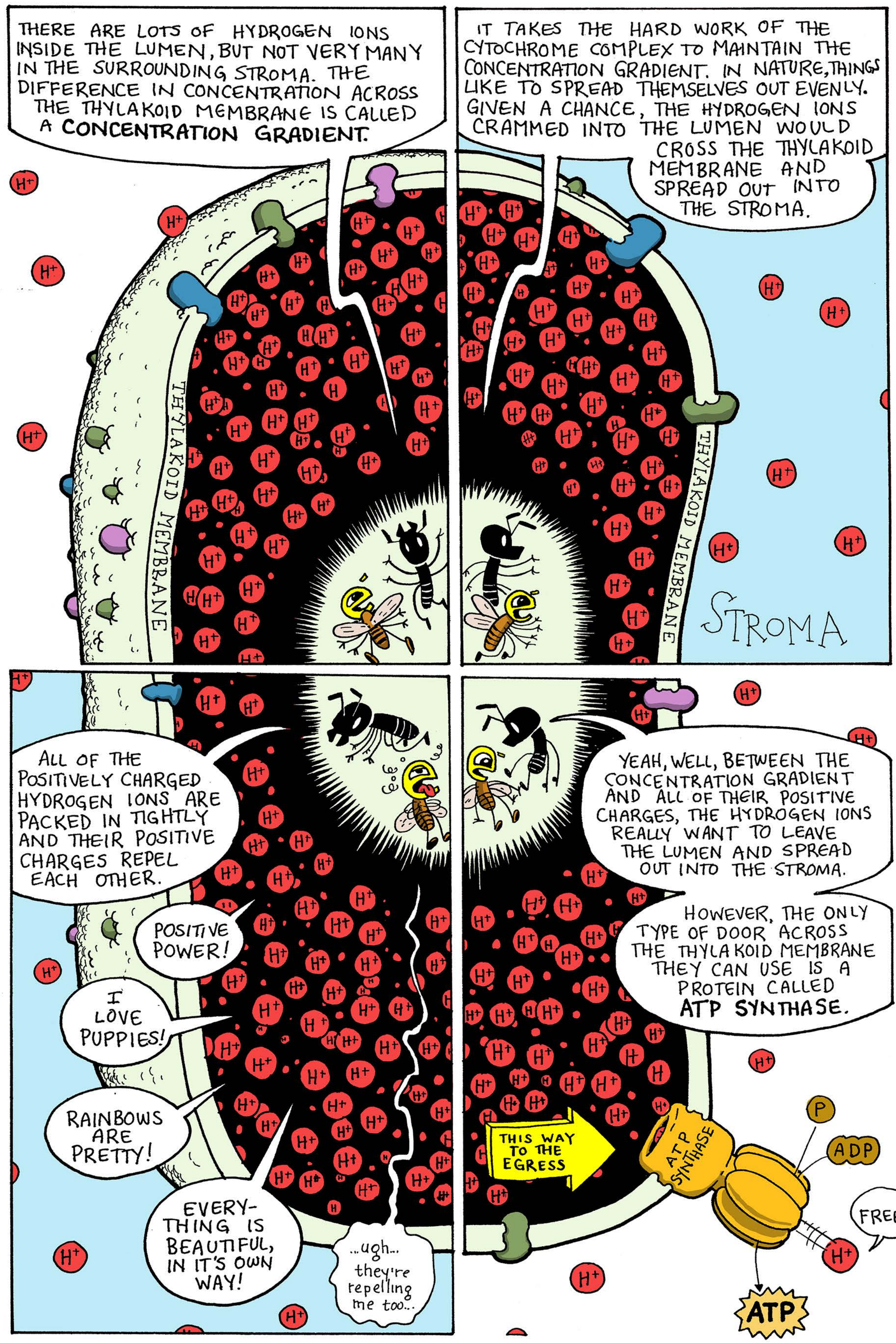

THE PHOTOSYSTEM HAS TWO MAJOR REGIONS. THE LARGE ANTENNA COMPLEX SURROUNDS THE SMALLER REACTION CENTER. ENERGY FROM A PHOTON OF LIGHT IS ABSORBED BY THE CHLOROPHYLL IN THE ANTENNA COMPLEX AND FUNNELED TO THE REACTION CENTER.
HOW DO THEY DO THAT?
I'LL SHOW YOU
REACTION CENTER
CHLOROPHYLL
ANTENNA COMPLEX
PS II
IMAGINE I'M A CHLOROPHYLL MOLECULE AND YOU ARE A SPECIAL PAIR OF MOLECULES IN THE REACTION CENTER CALLED P680.
SPECIAL?
VERY
OH, GOODY.
CHLOROPHYLL
CHLOROPHYLL
P680
NOW, IMAGINE OUR HEADS REPRESENT AN ELECTRON ON THE MOLECULE.
'e' is for electron
O.K.
CHLOROPHYLL
CHLOROPHYLL
P680
HIGH ENERGY
LOW ENERGY
WHEN CHLOROPHYLL ABSORBS A PHOTON, THE ENERGY ELEVATES ONE OF THE CHLOROPHYLL'S ELECTRONS TO A HIGHER ENERGY STATE.
THE ELECTRON CAN'T HOLD THE ENERGY LONG, THOUGH....
CHLOROPHYLL
CHLOROPHYLL
P680

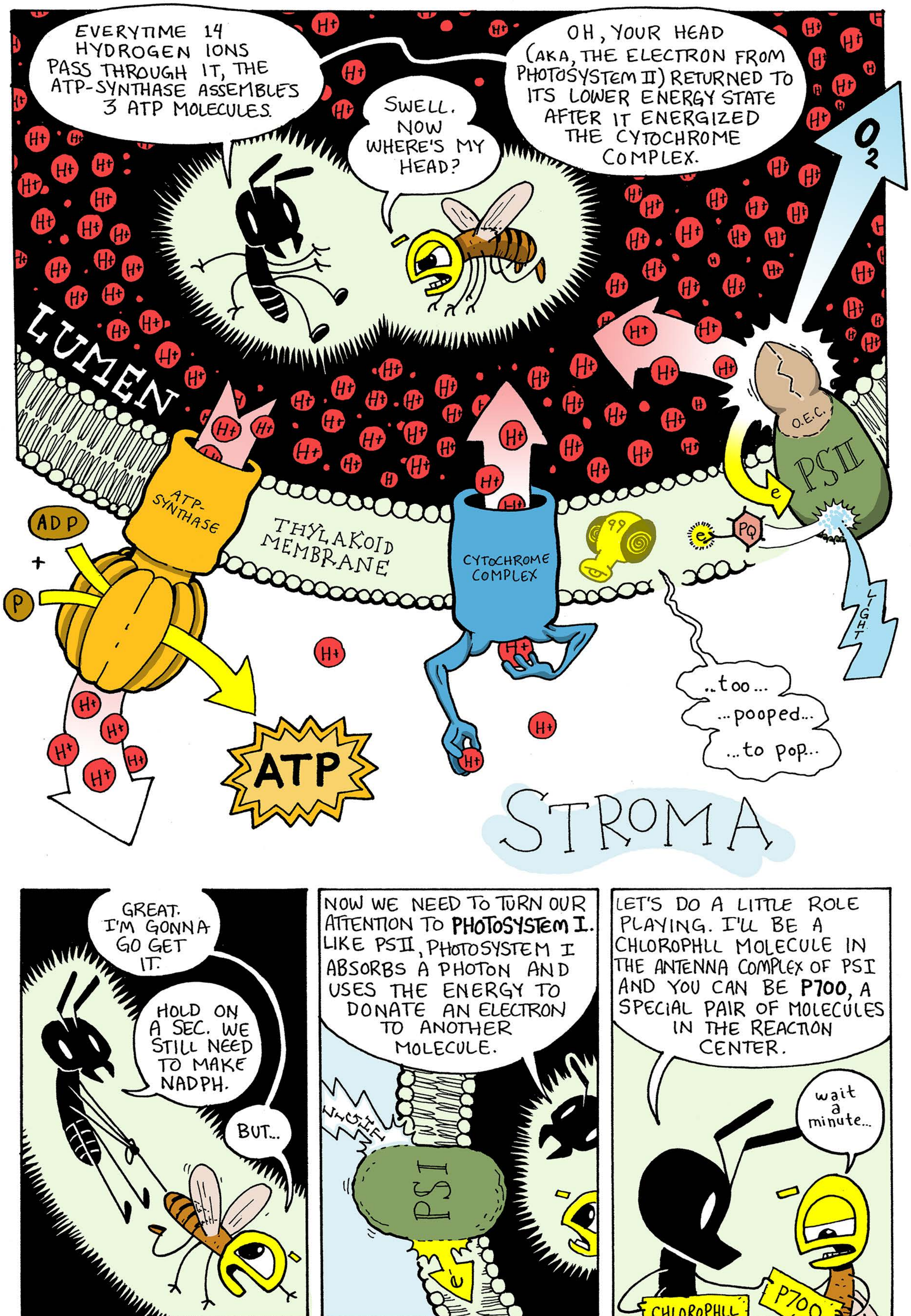

HIGH ENERGY
LOW ENERGY
...AND IT PASSES THE ENERGY TO A NEIGHBORING CHLOROPHYLL, EXCITING **ITS** ELECTRON.
HA! HA! YOU LOOK **FUNNY**.
CHLOROPHYLL
CHLOROPHYLL
P680
HIGH ENERGY
LOW ENERGY
THE PHOTON'S ENERGY IS PASSED THIS WAY THROUGH THE ANTENNA COMPLEX...
...UNTIL IT IS EVENTUALLY PASSED TO P680 IN THE REACTION CENTER.
SO, WHAT MAKES **ME** SO SPECIAL?
CHLOROPHYLL
CHLOROPHYLL
P680
WELL, WHEN P680'S ELECTRON GATHERS ENOUGH PHOTON ENERGY, IT GETS SO EXCITED IT **POPS OFF** PHOTOSYSTEM II AND RIDES AWAY ON A MOLECULE CALLED **PLASTOQUINONE.** (aka. **PQ**)
WHAT?
ziiiiiiip!
PQ
POP!
...i hate you...


MM! MM! MM!
YOU'RE RIGHT. WE DO NEED TO REPLACE P680's ELECTRON. OTHERWISE, WE CAN ONLY DO THIS TRICK ONCE.
MM! MMM!
OH, RELAX. WE'LL SEE WHAT YOUR HEAD IS DOING IN A FEW MINUTES.
TO REPLACE THE ELECTRON LOST BY P680 IN PHOTOSYSTEM II, WE WILL NEED TO TAKE ONE FROM ANOTHER MOLECULE. IN THIS CASE, THAT OTHER MOLECULE IS WATER.
STROMA
PS II
O.E.C.
THERE'S A REGION OF PHOTOSYSTEM II CALLED THE OXYGEN EVOLVING COMPLEX (O.E.C.) THAT SPLITS WATER INTO THREE PARTS: HYDROGEN, OXYGEN & ONE OF THE ELECTRONS THAT KNITS THEM TOGETHER.
STROMA
STROMA
LUMEN
PS II
O.E.C.
THE HYDROGEN IONS ACCUMULATE IN THE THYLAKOID LUMEN...
...AND THE ELECTRON REPLACES THE ONE LOST BY P680 IN PHOTOSYSTEM II
STOICHIOMETRY NOTE: O2 IS GIVEN OFF BECAUSE THE O.E.C CLEAVES TWO WATERS
... THE OXYGEN IS GIVEN OFF AS A WASTE PRODUCT...
O2
HOW DO YOU FEEL?
LIGHT-HEADED.

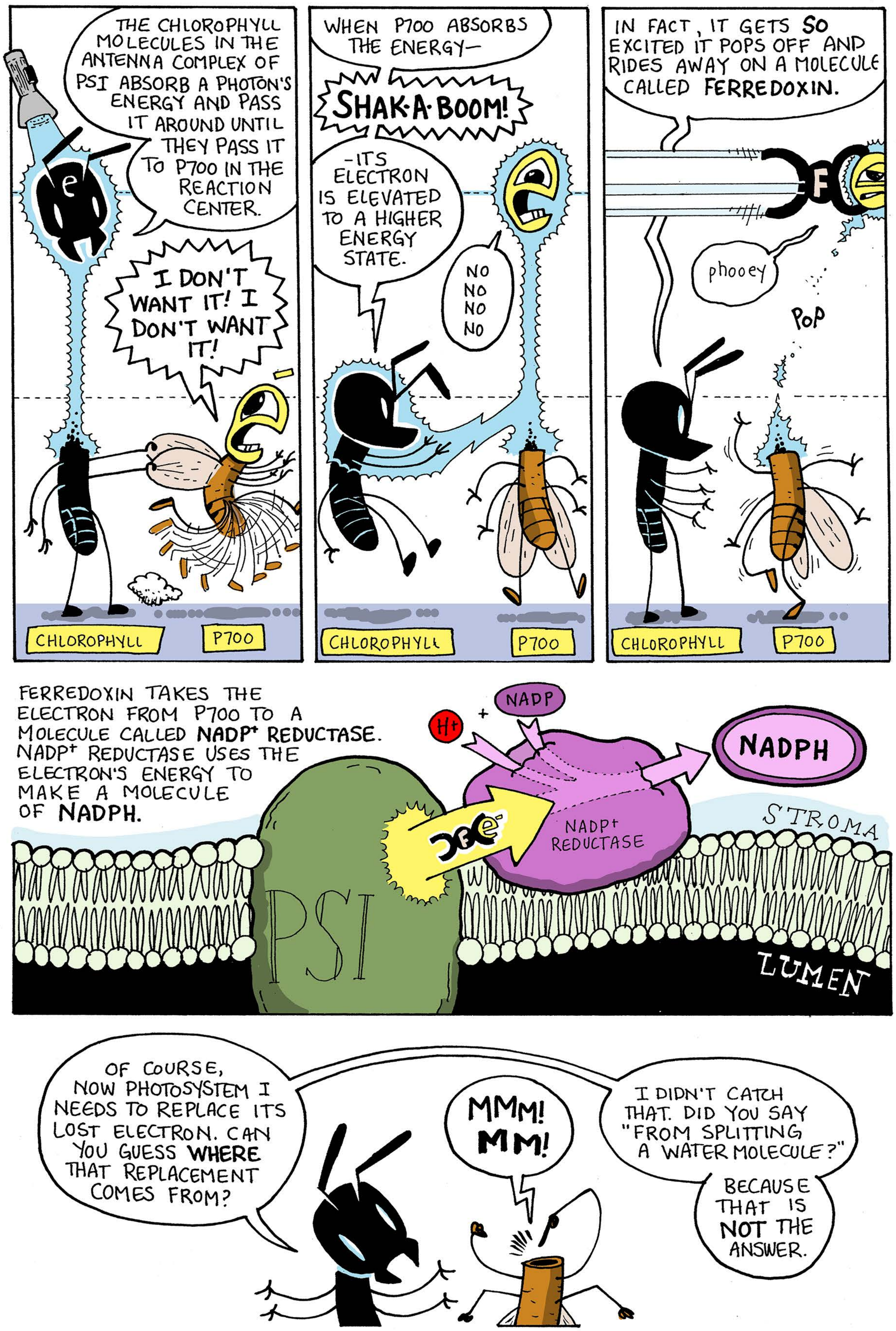


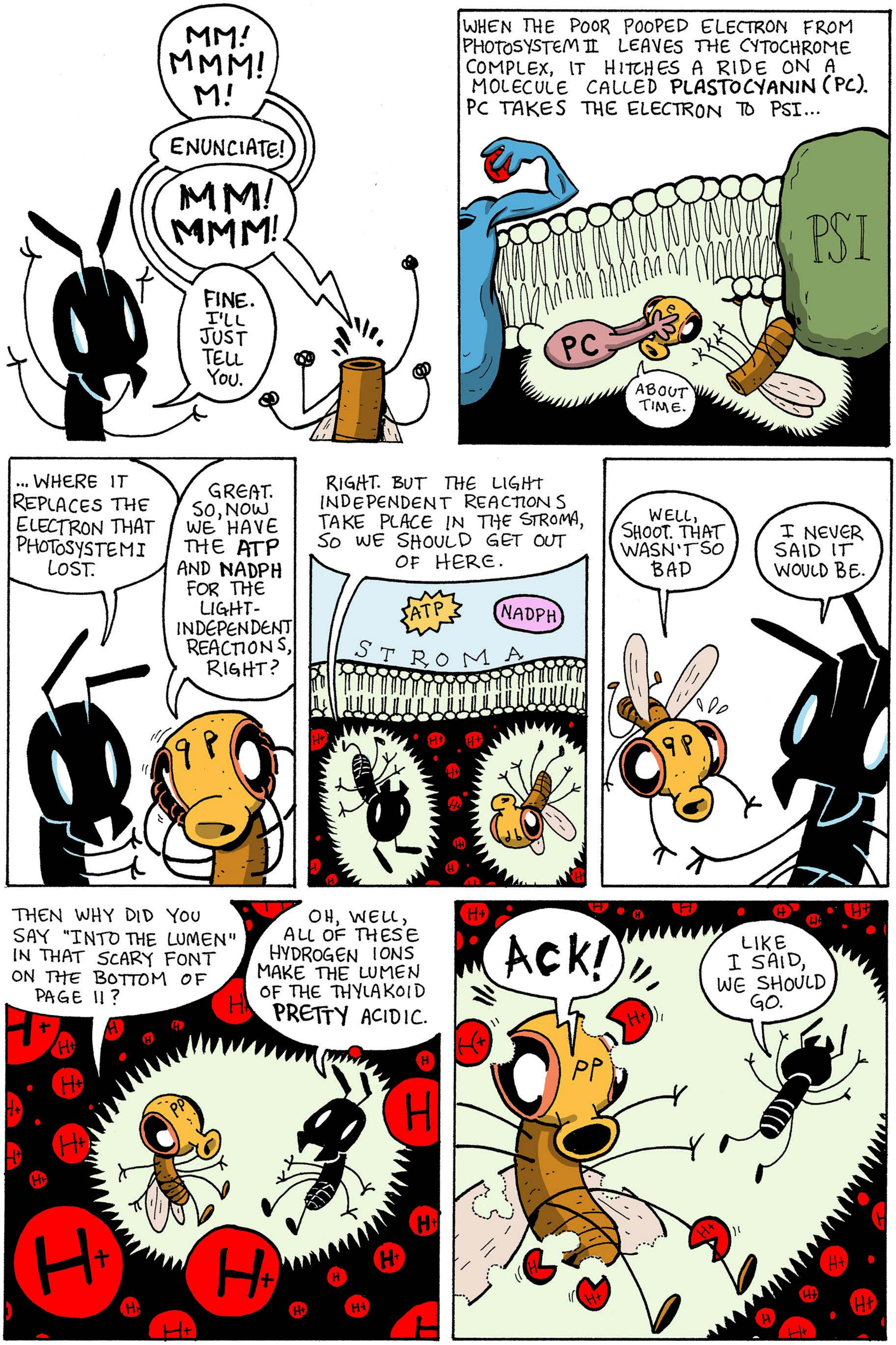
HA! HA! GOOD ONE.
WHAT?
YOU SAID LIGHT-HEADED AND WE'RE TALKING ABOUT PHOTOSYNTHESIS AND THAT USES LIGHT... AND ... uh... your head ...is... an electron which has... ...almost no mass... ...so it's ... ...Y'KNOW... ..Light..
I WANT MY HEAD BACK!
O.K.! O.K.! YEESH! YOU'RE SO NEGATIVE.
AS YOU RECALL, THE ELECTRON FROM P680 WAS CARRIED AWAY BY PLASTOQUINONE. PQ TAKES THE ENERGIZED ELECTRON TO THE CYTOCHROME COMPLEX WHICH USES THE ELECTRON'S EXTRA ENERGY TO PUMP MORE HYDROGEN INTO THE LUMEN.
MORE? THE LUMEN ALREADY HAS A BUNCH OF EXTRA HYDROGEN FROM THE WATER WE SPLIT.
PS II
PQ
Cytochrome Complex
O.E.C.
LUMEN
TRUE. BUT, WE NEED THEM TO MAKE ATP.
WATER
LIGHT
LIGHT DEPENDENT REACTIONS
O2
ATP
NADPH
RIIIIIGHT. AND HOW EXACTLY IS THAT GONNA HAPPEN?
I'LL SHOW YOU. BUT FIRST WE MUST GO INTO THE LUMEN!

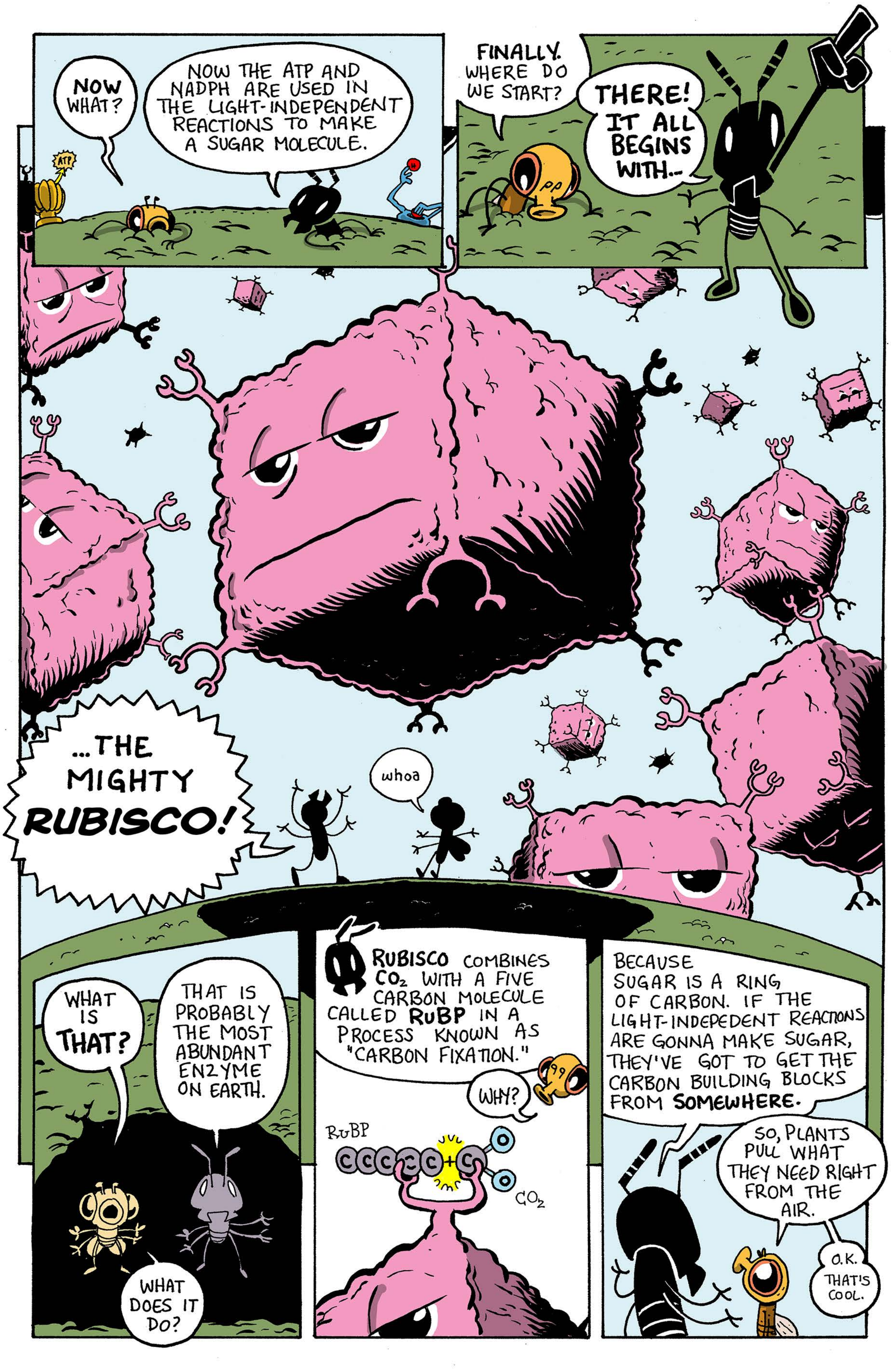

THERE ARE LOTS OF HYDROGEN IONS INSIDE THE LUMEN, BUT NOT VERY MANY IN THE SURROUNDING STROMA. THE DIFFERENCE IN CONCENTRATION ACROSS THE THYLAKOID MEMBRANE IS CALLED A **CONCENTRATION GRADIENT**.
IT TAKES THE HARD WORK OF THE CYTOCHROME COMPLEX TO MAINTAIN THE CONCENTRATION GRADIENT. IN NATURE, THINGS LIKE TO SPREAD THEMSELVES OUT EVENLY. GIVEN A CHANCE, THE HYDROGEN IONS CRAMMED INTO THE LUMEN WOULD CROSS THE THYLAKOID MEMBRANE AND SPREAD OUT INTO THE STROMA.
THYLAKOID MEMBRANE
THYLAKOID MEMBRANE
STROMA
ALL OF THE POSITIVELY CHARGED HYDROGEN IONS ARE PACKED IN TIGHTLY AND THEIR POSITIVE CHARGES REPEL EACH OTHER.
POSITIVE POWER!
I LOVE PUPPIES!
RAINBOWS ARE PRETTY!
EVERY-THING IS BEAUTIFUL, IN IT'S OWN WAY!
...ugh... they're repelling me too...
YEAH, WELL, BETWEEN THE CONCENTRATION GRADIENT AND ALL OF THEIR POSITIVE CHARGES, THE HYDROGEN IONS REALLY WANT TO LEAVE THE LUMEN AND SPREAD OUT INTO THE STROMA.
HOWEVER, THE ONLY TYPE OF DOOR ACROSS THE THYLAKOID MEMBRANE THEY CAN USE IS A PROTEIN CALLED **ATP SYNTHASE**.
THIS WAY TO THE EGRESS
ATP SYNTHASE
P
ADP
FREE!
ATP

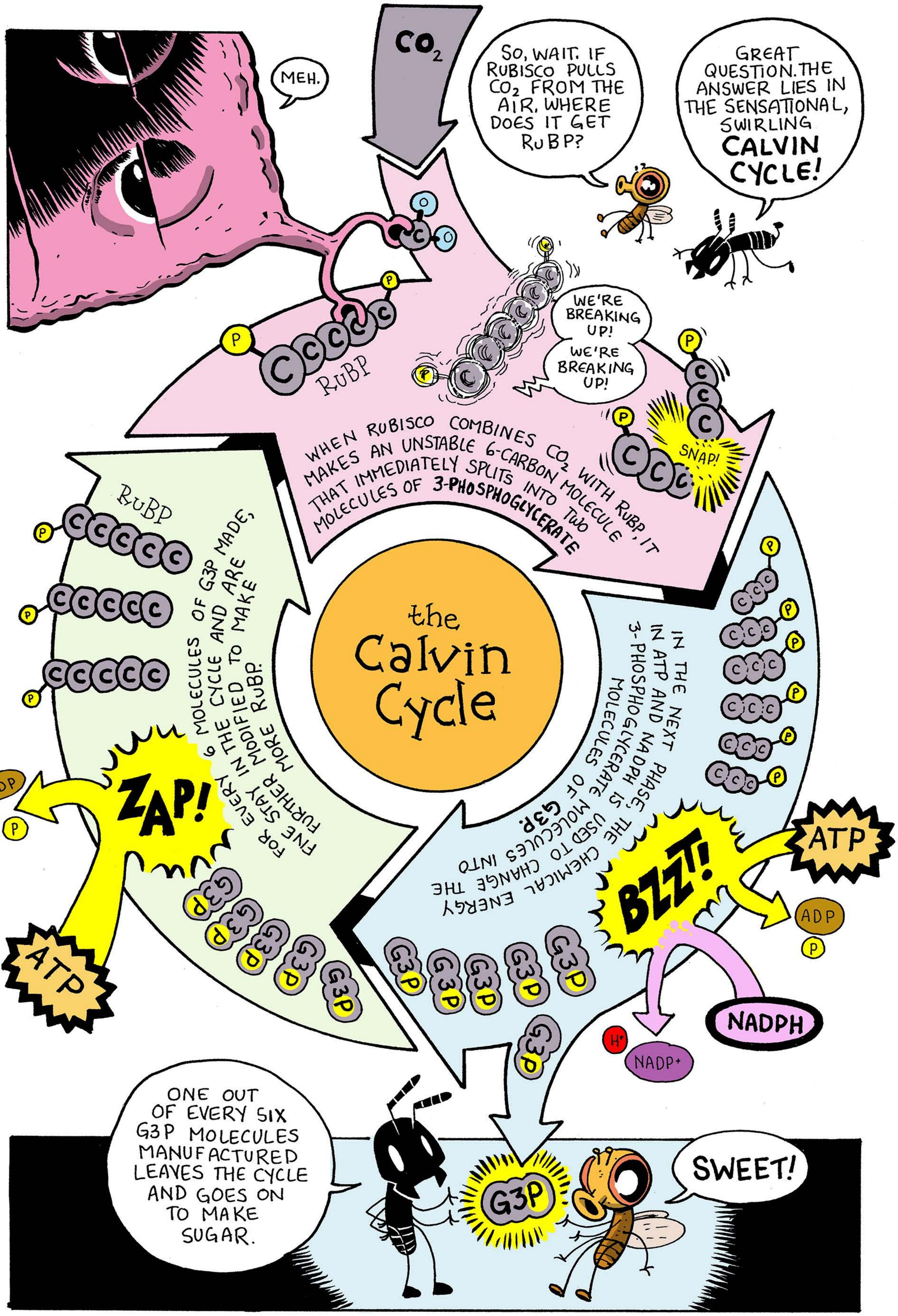


EVERYTIME 14 HYDROGEN IONS PASS THROUGH IT, THE ATP-SYNTHASE ASSEMBLES 3 ATP MOLECULES.
SWELL. NOW WHERE'S MY HEAD?
OH, YOUR HEAD (AKA, THE ELECTRON FROM PHOTOSYSTEM II) RETURNED TO ITS LOWER ENERGY STATE AFTER IT ENERGIZED THE CYTOCHROME COMPLEX.
O_2
LUMEN
O.E.C.
PSII
e
PQ
e
LIGHT
ATP-SYNTHASE
ADP
+
P
THYLAKOID MEMBRANE
CYTOCHROME COMPLEX
H+
ATP
..too...
...pooped...
...to pop..
STROMA
GREAT. I'M GONNA GO GET IT.
HOLD ON A SEC. WE STILL NEED TO MAKE NADPH.
BUT...
NOW WE NEED TO TURN OUR ATTENTION TO PHOTOSYSTEM I. LIKE PSII, PHOTOSYSTEM I ABSORBS A PHOTON AND USES THE ENERGY TO DONATE AN ELECTRON TO ANOTHER MOLECULE.
PSI
e
LET'S DO A LITTLE ROLE PLAYING. I'LL BE A CHLOROPHLL MOLECULE IN THE ANTENNA COMPLEX OF PSI AND YOU CAN BE P700, A SPECIAL PAIR OF MOLECULES IN THE REACTION CENTER.
wait a minute...
CHLOROPHLL
P700

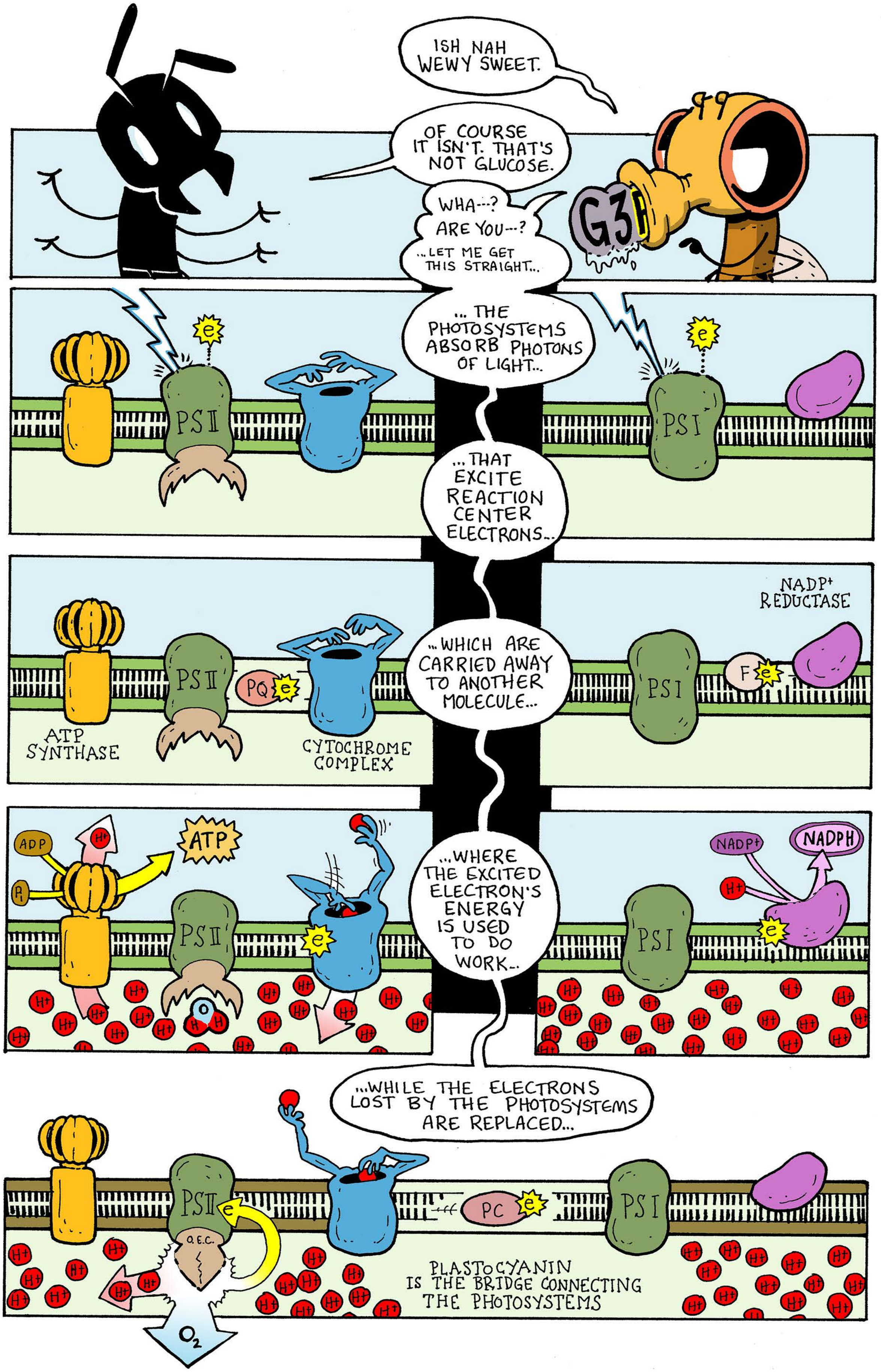

THE CHLOROPHYLL MOLECULES IN THE ANTENNA COMPLEX OF PSI ABSORB A PHOTON'S ENERGY AND PASS IT AROUND UNTIL THEY PASS IT TO P700 IN THE REACTION CENTER.
e
I DON'T WANT IT! I DON'T WANT IT!
CHLOROPHYLL
P700
WHEN P700 ABSORBS THE ENERGY—
SHAK-A-BOOM!
—ITS ELECTRON IS ELEVATED TO A HIGHER ENERGY STATE.
NO NO NO NO
CHLOROPHYLL
P700
IN FACT, IT GETS SO EXCITED IT POPS OFF AND RIDES AWAY ON A MOLECULE CALLED FERREDOXIN.
F
phooey
POP
CHLOROPHYLL
P700
FERREDOXIN TAKES THE ELECTRON FROM P700 TO A MOLECULE CALLED NADP+ REDUCTASE. NADP+ REDUCTASE USES THE ELECTRON'S ENERGY TO MAKE A MOLECULE OF NADPH.
H+
+
NADP
NADPH
NADP+ REDUCTASE
STROMA
PSI
LUMEN
OF COURSE, NOW PHOTOSYSTEM I NEEDS TO REPLACE ITS LOST ELECTRON. CAN YOU GUESS WHERE THAT REPLACEMENT COMES FROM?
MMM! MM!
I DIDN'T CATCH THAT. DID YOU SAY "FROM SPLITTING A WATER MOLECULE?"
BECAUSE THAT IS NOT THE ANSWER.

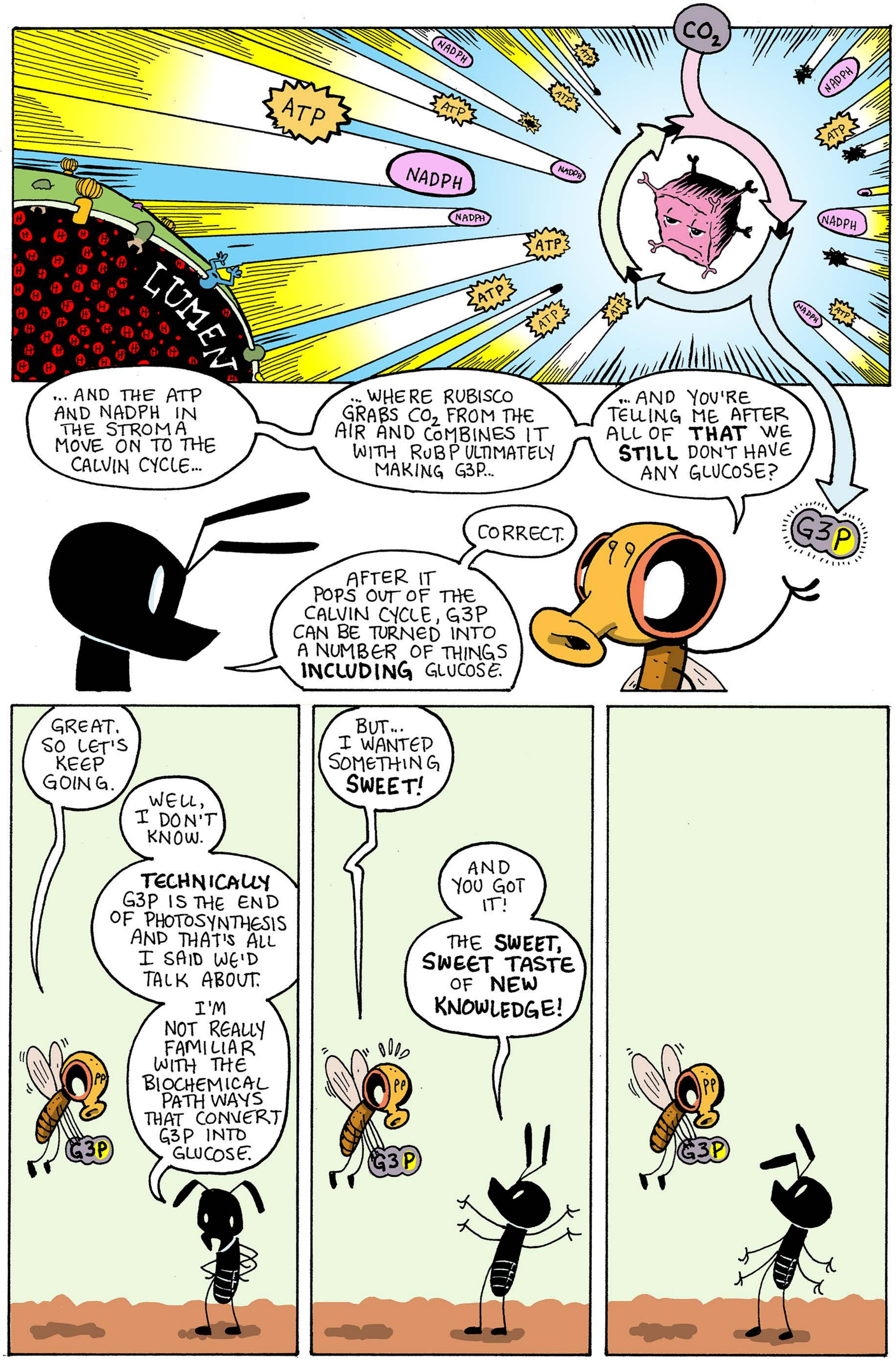

MM! MMM! M!
ENUNCIATE!
MM! MMM!
FINE. I'LL JUST TELL YOU.
WHEN THE POOR POOPED ELECTRON FROM PHOTOSYSTEM II LEAVES THE CYTOCHROME COMPLEX, IT HITCHES A RIDE ON A MOLECULE CALLED **PLASTOCYANIN (PC)**. PC TAKES THE ELECTRON TO PSI...
PSI
PC
ABOUT TIME.
...WHERE IT REPLACES THE ELECTRON THAT PHOTOSYSTEM I LOST.
GREAT. SO, NOW WE HAVE THE **ATP** AND **NADPH** FOR THE LIGHT-INDEPENDENT REACTIONS, RIGHT?
RIGHT. BUT THE LIGHT INDEPENDENT REACTIONS TAKE PLACE IN THE STROMA, SO WE SHOULD GET OUT OF HERE.
ATP
NADPH
STROMA
WELL, SHOOT. THAT WASN'T SO BAD
I NEVER SAID IT WOULD BE.
THEN WHY DID YOU SAY "INTO THE LUMEN" IN THAT SCARY FONT ON THE BOTTOM OF PAGE 11?
OH, WELL, ALL OF THESE HYDROGEN IONS MAKE THE LUMEN OF THE THYLAKOID **PRETTY** ACIDIC.
ACK!
LIKE I SAID, WE SHOULD GO.


NOW WHAT?
ATP
NOW THE ATP AND NADPH ARE USED IN THE LIGHT-INDEPENDENT REACTIONS TO MAKE A SUGAR MOLECULE.
FINALLY. WHERE DO WE START?
THERE! IT ALL BEGINS WITH...
...THE MIGHTY RUBISCO!
whoa
WHAT IS THAT?
THAT IS PROBABLY THE MOST ABUNDANT ENZYME ON EARTH.
WHAT DOES IT DO?
RUBISCO COMBINES CO_2 WITH A FIVE CARBON MOLECULE CALLED RuBP IN A PROCESS KNOWN AS "CARBON FIXATION."
WHY?
RuBP
CO_2
BECAUSE SUGAR IS A RING OF CARBON. IF THE LIGHT-INDEPEDENT REACTIONS ARE GONNA MAKE SUGAR, THEY'VE GOT TO GET THE CARBON BUILDING BLOCKS FROM SOMEWHERE.
SO, PLANTS PULL WHAT THEY NEED RIGHT FROM THE AIR.
O.K. THAT'S COOL.



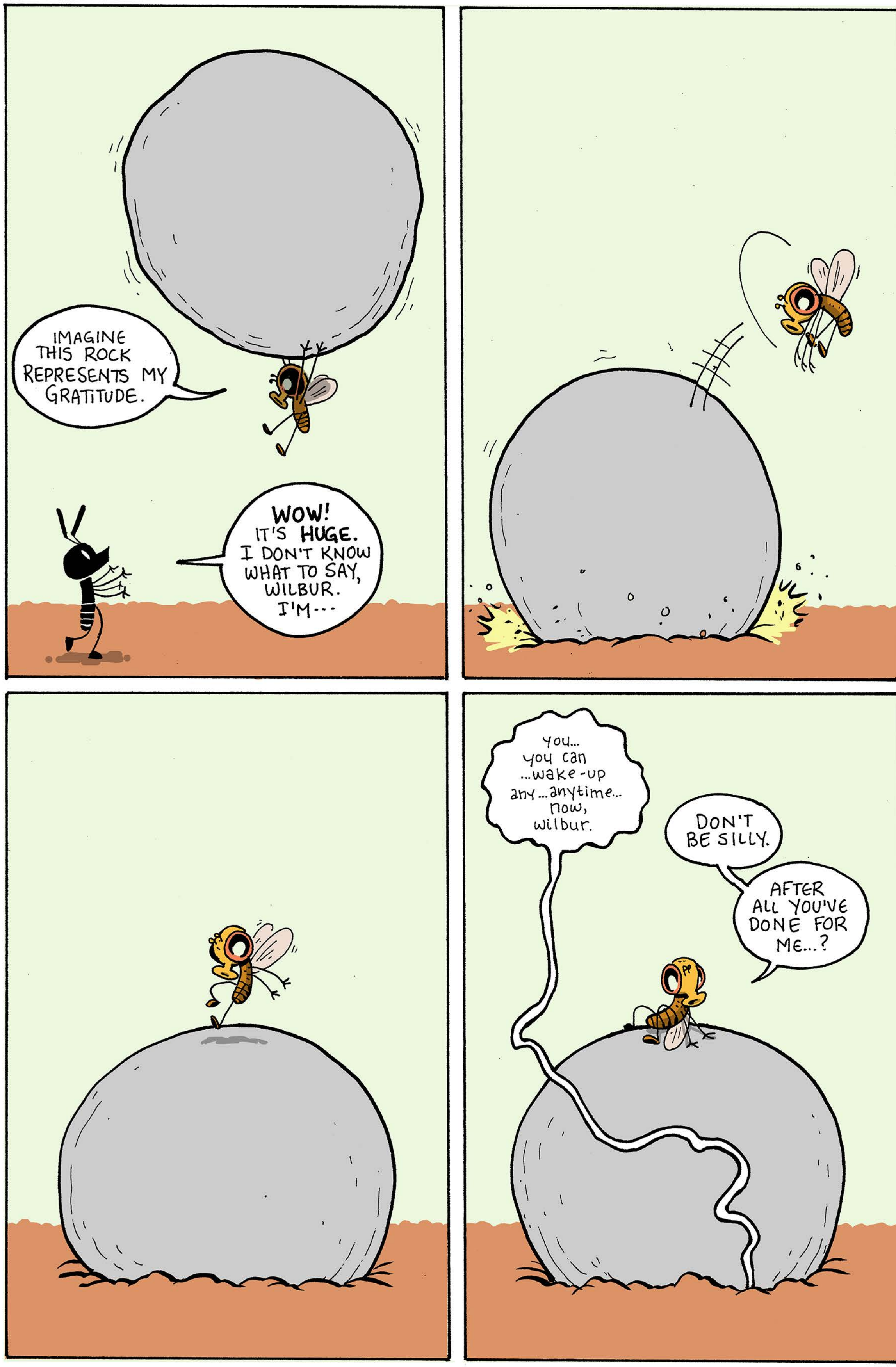
MEH.
CO_2
SO, WAIT. IF RUBISCO PULLS CO_2 FROM THE AIR, WHERE DOES IT GET RUBP?
GREAT QUESTION. THE ANSWER LIES IN THE SENSATIONAL, SWIRLING **CALVIN CYCLE!**
RUBP
WE'RE BREAKING UP!
WE'RE BREAKING UP!
SNAP!
WHEN RUBISCO COMBINES CO_2 WITH RUBP, IT MAKES AN UNSTABLE 6-CARBON MOLECULE THAT IMMEDIATELY SPLITS INTO TWO MOLECULES OF **3-PHOSPHOGLYCERATE**
the Calvin Cycle
IN THE NEXT PHASE, THE CHEMICAL ENERGY IN ATP AND NADPH IS USED TO CHANGE THE 3-PHOSPHOGLYCERATE MOLECULES INTO MOLECULES OF **G3P.**
BZZT!
ATP
ADP
NADPH
H^+
$NADP^+$
RUBP
FOR EVERY 6 MOLECULES OF G3P MADE, FIVE STAY IN THE CYCLE AND ARE FURTHER MODIFIED TO MAKE MORE RUBP!
ZAP!
ADP
ATP
G3P
ONE OUT OF EVERY SIX G3P MOLECULES MANUFACTURED LEAVES THE CYCLE AND GOES ON TO MAKE SUGAR.
SWEET!

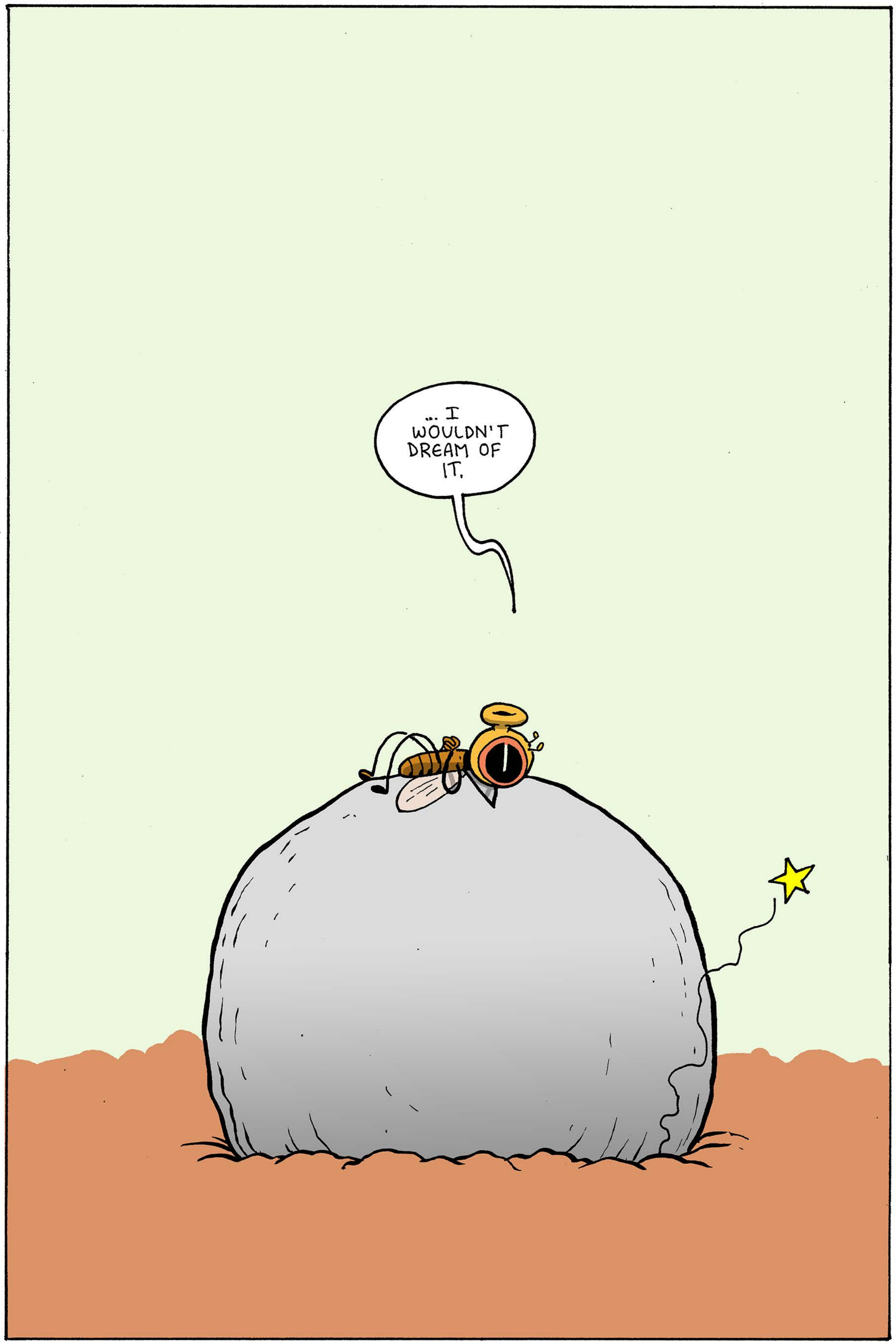

ISH NAH WEWY SWEET.
OF COURSE IT ISN'T. THAT'S NOT GLUCOSE.
WHA---? ARE YOU---? ...LET ME GET THIS STRAIGHT...
G3P
... THE PHOTOSYSTEMS ABSORB PHOTONS OF LIGHT...
PSII
PSI
...THAT EXCITE REACTION CENTER ELECTRONS...
NADP+ REDUCTASE
...WHICH ARE CARRIED AWAY TO ANOTHER MOLECULE...
PQ
F
ATP SYNTHASE
CYTOCHROME COMPLEX
ADP
ATP
NADP+
NADPH
...WHERE THE EXCITED ELECTRON'S ENERGY IS USED TO DO WORK...
...WHILE THE ELECTRONS LOST BY THE PHOTOSYSTEMS ARE REPLACED...
O.E.C.
PC
PLASTOCYANIN IS THE BRIDGE CONNECTING THE PHOTOSYSTEMS
O2



LUMEN
ATP
NADPH
CO_2
G3P
...AND THE ATP AND NADPH IN THE STROMA MOVE ON TO THE CALVIN CYCLE...
...WHERE RUBISCO GRABS CO_2 FROM THE AIR AND COMBINES IT WITH RUBP ULTIMATELY MAKING G3P...
...AND YOU'RE TELLING ME AFTER ALL OF **THAT** WE **STILL** DON'T HAVE ANY GLUCOSE?
CORRECT.
AFTER IT POPS OUT OF THE CALVIN CYCLE, G3P CAN BE TURNED INTO A NUMBER OF THINGS **INCLUDING** GLUCOSE.
GREAT. SO LET'S KEEP GOING.
WELL, I DON'T KNOW.
TECHNICALLY G3P IS THE END OF PHOTOSYNTHESIS AND THAT'S ALL I SAID WE'D TALK ABOUT.
I'M NOT REALLY FAMILIAR WITH THE BIOCHEMICAL PATHWAYS THAT CONVERT G3P INTO GLUCOSE.
BUT... I WANTED SOMETHING **SWEET**!
AND YOU GOT IT!
THE **SWEET, SWEET TASTE** OF **NEW KNOWLEDGE**!


GEE-WHIZ, WILBUR. IF YOU REALLY WANTED SOMETHING SWEET YOU COULD HAVE CONJURED IT ANYTIME.
YOU ARE **DREAMING** AFTER, ALL.
G3P
WILBUR?
WOULD YOU SNAP OUT OF IT!
I JUST WENT TO A **LOT** OF TROUBLE TO EXPLAIN SOMETHING **AMAZING.**
I THINK YOU OWE ME A THANK-YOU.
WHA--?
OH..OH..YES, YOU'RE RIGHT.
I'M BEING RUDE.
let's see...
..how can i express my thanks..?
AH!
THIS WILL WORK!


IMAGINE THIS ROCK REPRESENTS MY GRATITUDE.
WOW! IT'S HUGE. I DON'T KNOW WHAT TO SAY, WILBUR. I'M---
you... you can ...wake-up any...anytime... now, wilbur.
DON'T BE SILLY.
AFTER ALL YOU'VE DONE FOR ME...?


... I WOULDN'T DREAM OF IT.