



Sunshine Hill
FARM LLC

Sunshine Hill Farm, LLC

Wax and Wonky Comb | EAS 2026

Montgomery County Beekeepers Association
MONTGOMERY 4H CLUB



NOVEMBER 8, 2026

Honeycomb

Understanding and Promoting Comb Construction

Bees building wax, Good comb construction, Avoiding Wonky Comb



15+ year hobbyist beekeeper – 15 to 20 hives

EAS Master Beekeeper

Past President – NWNJBA

Day Job > Medical Affairs IT, Bristol Myers Squibb

Beekeeping Podcaster

Managed Mentoring Program for Getting Started in Beekeeping

INTRODUCTION
– Kevin Inglin

Our Home Yard

**HONEYCOMB
THE HEART**

**FACEBOOK
BEGINNING
BEEKEEPERS**

**HONEYCOMB
FORMATION**

**HONEYBEES
BUILDING
WAX**

**THE
FORMULA**

**THE
COMB
ZONE**

**PLASTIC
FOUNDATION
PROBLEMS**

**WONKY
COMB**

**BEST
PRACTICES**

**HONEYCOMB
THE HEART**

Honeycomb is the Heart of the Hive

- **It is literally the bee's home**
 - It serves as a place for their food storage
 - It serves as the vessel for the nursery
 - Comb factors in their overwintering ability
 - It plays a vital role in kin recognition within honeybee colonies
 - It enables chemical communication among colony inhabitants



Let's Examine Honeycomb



CONSTRUCTION

- How is honeycomb made?



CONDITIONS

- What conditions facilitate the creation of honeycomb?



BENEFITS

- The benefits and detractors to comb construction

Let's Examine Honeycomb



CONDITIONS

- What conditions facilitate the creation of honeycomb?



BENEFITS

- The benefits and detractors to comb construction



WHY WE CARE

- Why we should care about honeycomb as a resource

Let's Examine Honeycomb



BENEFITS

- The benefits and detractors to comb construction



WHY WE CARE

- Why we should care about honeycomb as a resource



SETUP

- How can we setup the bees to make the best quality comb

Let's Examine Honeycomb



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- Why we should care about honeycomb as a resource



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- How can we setup the bees to make the best quality comb



MANAGE

- In what ways should we manage our comb

Let's Examine Honeycomb



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MANAGE

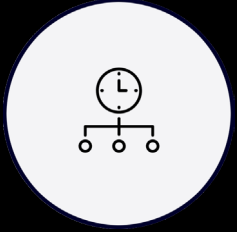
- In what ways should we manage our comb



NO WONKY!

- How do we avoid the dreaded wonky comb

Let's Examine Honeycomb



MANAGE

- In what ways should we manage our comb



NO WONKY!

- How do we avoid the dreaded wonky comb

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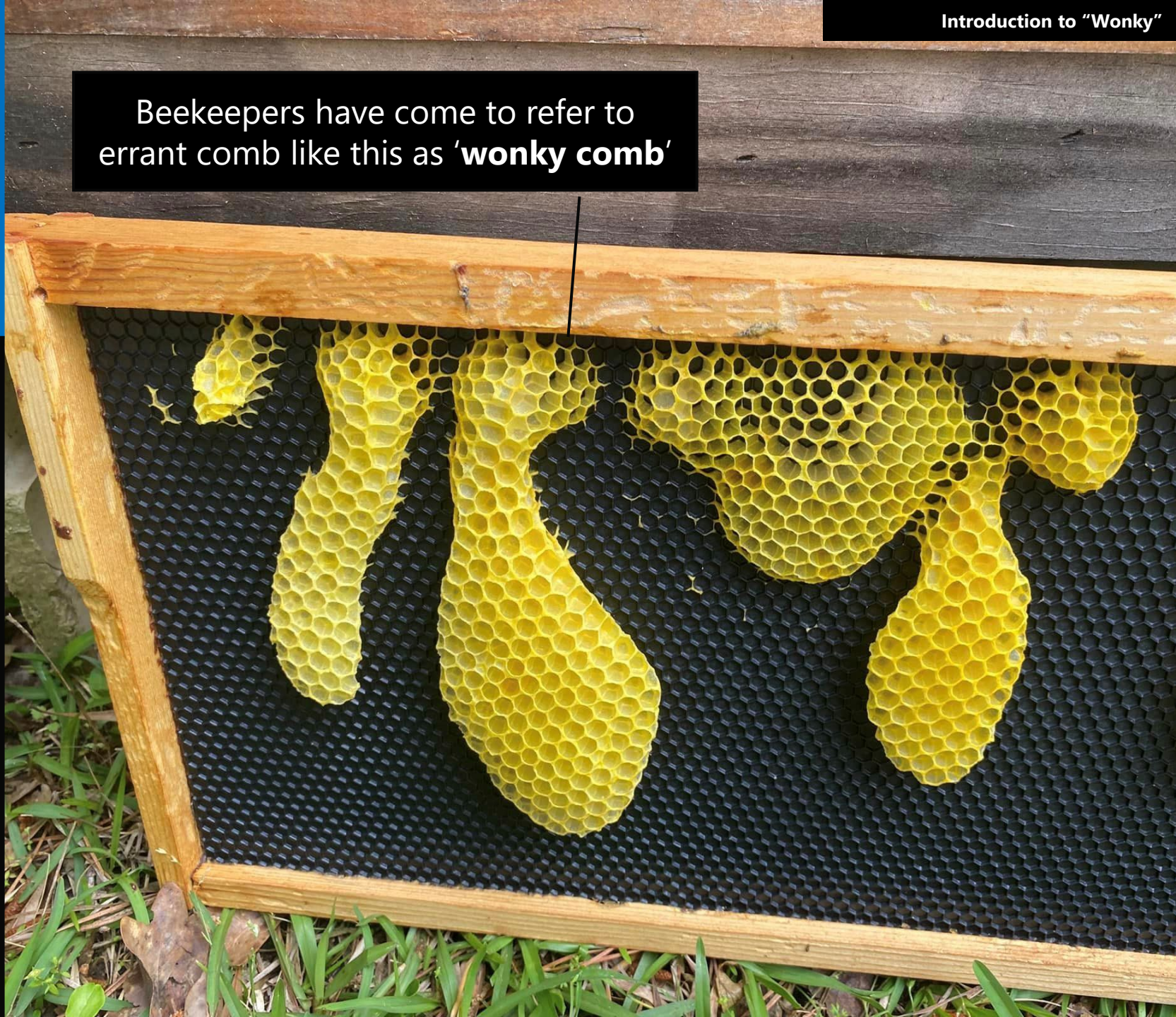
**FACERBOOK
BEGINNING
BEEKEEPERS**

This is terribly
important in
beekeeping

How can we avoid
the dreaded Wonky
Comb because it is
a terrible way to
start beekeeping

Introduction to "Wonky"

Beekeepers have come to refer to
errant comb like this as '**wonky comb**'





Every Year: Wonky Comb Problems Surface

**HONEYCOMB
FORMATION**



To build comb: The factory must be in order

Hans G. Hornbostel

- Hans G. Hornbostel | German Scientist (1744)

**FIRST TO
RECOGNIZE
THAT WAX
DID NOT
COME FROM
FLOWERS**

Up until that time the
prevailing wisdom was that
wax came from flowers

Hans G. Hornbostel

- Hans G. Hornbostel | German Scientist (1744)

**HANS WAS
THE FIRST TO
DESCRIBE
FLAKES ON
THE BEES**

He observed that worker bees carried wax scales and concluded they must have secreted them rather than collected them.

Hans G. Hornbostel

- Hans G. Hornbostel | German Scientist (1744)

**HANS WAS
THE FIRST TO
DESCRIBE
FLAKES ON
THE BEES**

This is the earliest documented scientific recognition that bees produce wax flakes (scales) from their own bodies

John Hunter

Someone that studies the physical structures of animals

- John Hunter— British Anatomist and Naturalist (1792)

Almost 50
years later

**JOHN
HUNTER
PROVIDED
ADDITIONAL
CONTEXT**

Hunter made the first attempt to define the origin of wax secretion, proposing it was an oily secretion produced by bees

BEESWAX PRODUCTION

Beeswax is made by young worker honeybees

- The **WAX GLAND COMPLEX** (WGC), located bilaterally in the abdomen of worker bees
 - The WGC is the secretory glands responsible for beeswax synthesis in honeybees
- The peak period of WGC secreting beeswax is **10–18 days** after a new bee emerges
 - Once worker bees reach the age of 21 days, the glands begin to deteriorate with the secretion activity decreasing

BEESWAX PRODUCTION

Beeswax is made by young worker honeybees

- **Wax gland development is influence by nutrition**
 - Young workers need abundant energy and raw materials to grow the gland cells that will later secrete wax
 - During this developmental window, the glands undergo intense protein synthesis and high-energy metabolism, which requires strong food intake
- **Resource Scarcity**
 - Early in the season, when resources are scarce, **workers may emerge with underdeveloped wax glands**
 - Nature may not be supplying the nutrition needed to fuel proper gland growth
 - This can inhibit wax drawing capabilities early on

BEESWAX PRODUCTION

Beeswax is made by young worker honeybees

- Not all bees will acquire functional glands at the same rates, and to the same extent
 - There could be bees not engaged in wax making, but they do produce some wax from their glands and drop it in the hive
- **Wax creation is proportionate to colony size**
 - Larger colonies have more bees assigned to wax production

BEESWAX PRODUCTION

Beeswax is made by young worker honeybees

It is secreted as a liquid from four pairs of wax glands on abdominal plates on the underside of a bee's body

The liquid wax spreads over the surface of these plates, and, on contact with air, the wax hardens and forms a single wax scale

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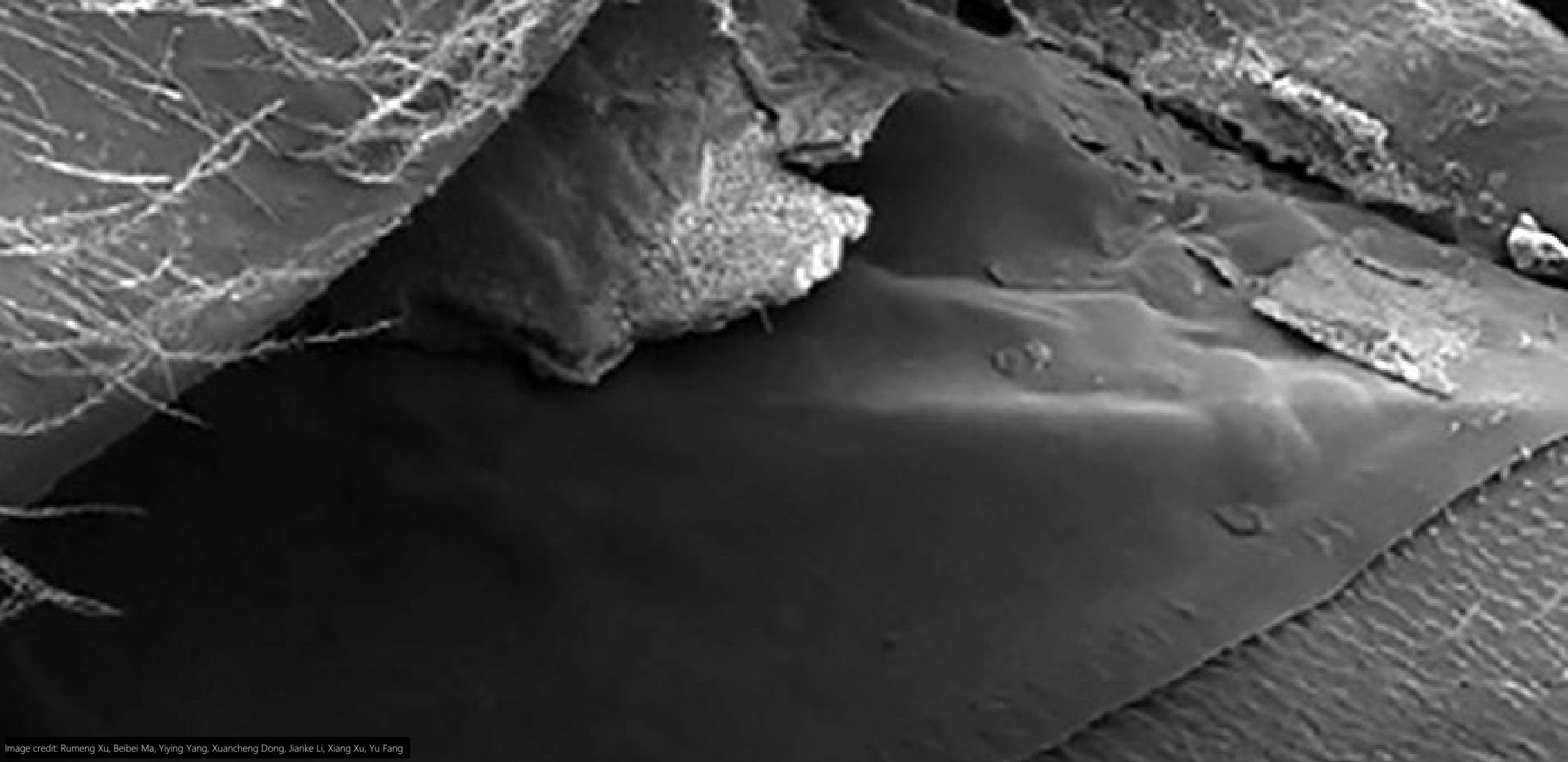


Image credit: Rumeng Xu, Beibei Ma, Yiyang Yang, Xuancheng Dong, Jianke Li, Xiang Xu, Yu Fang

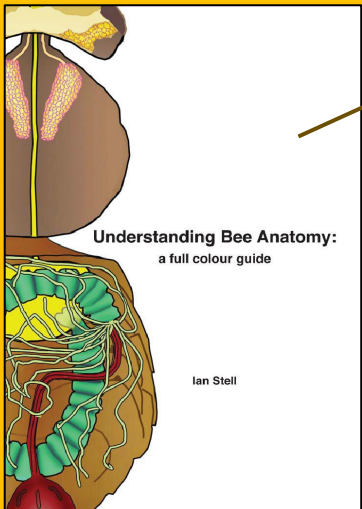
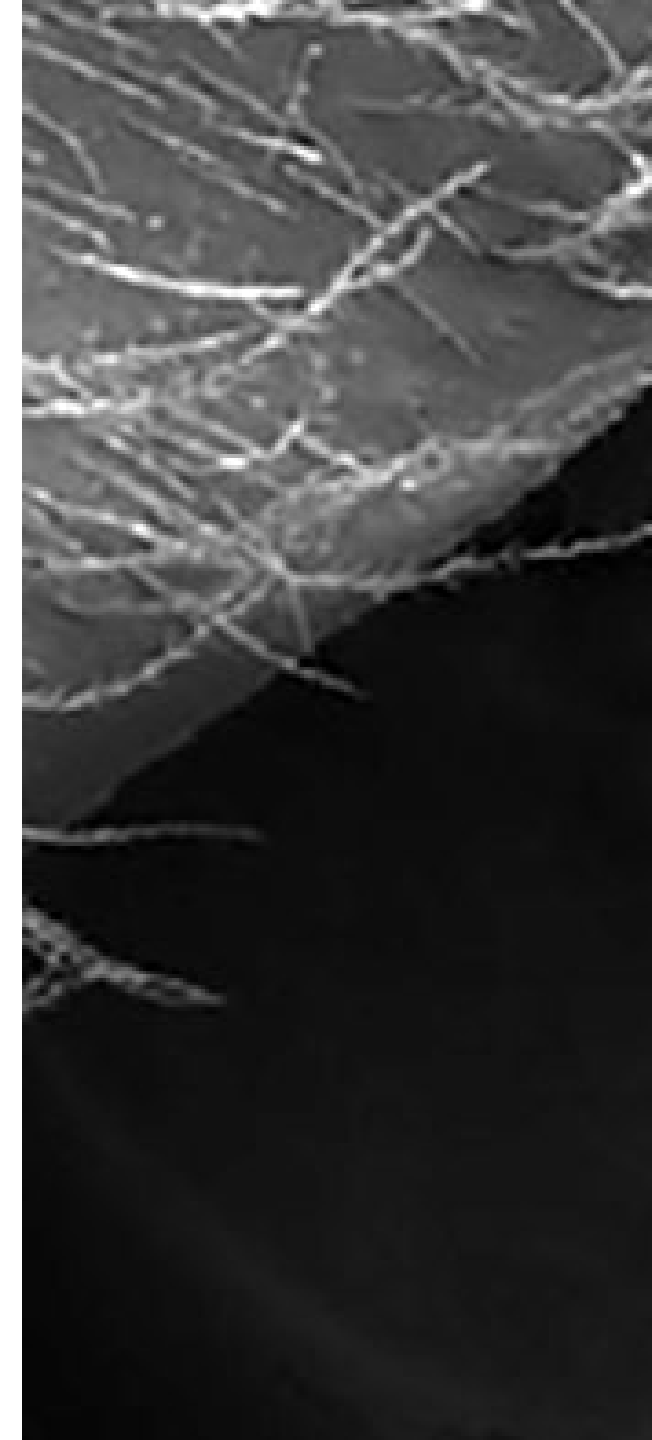
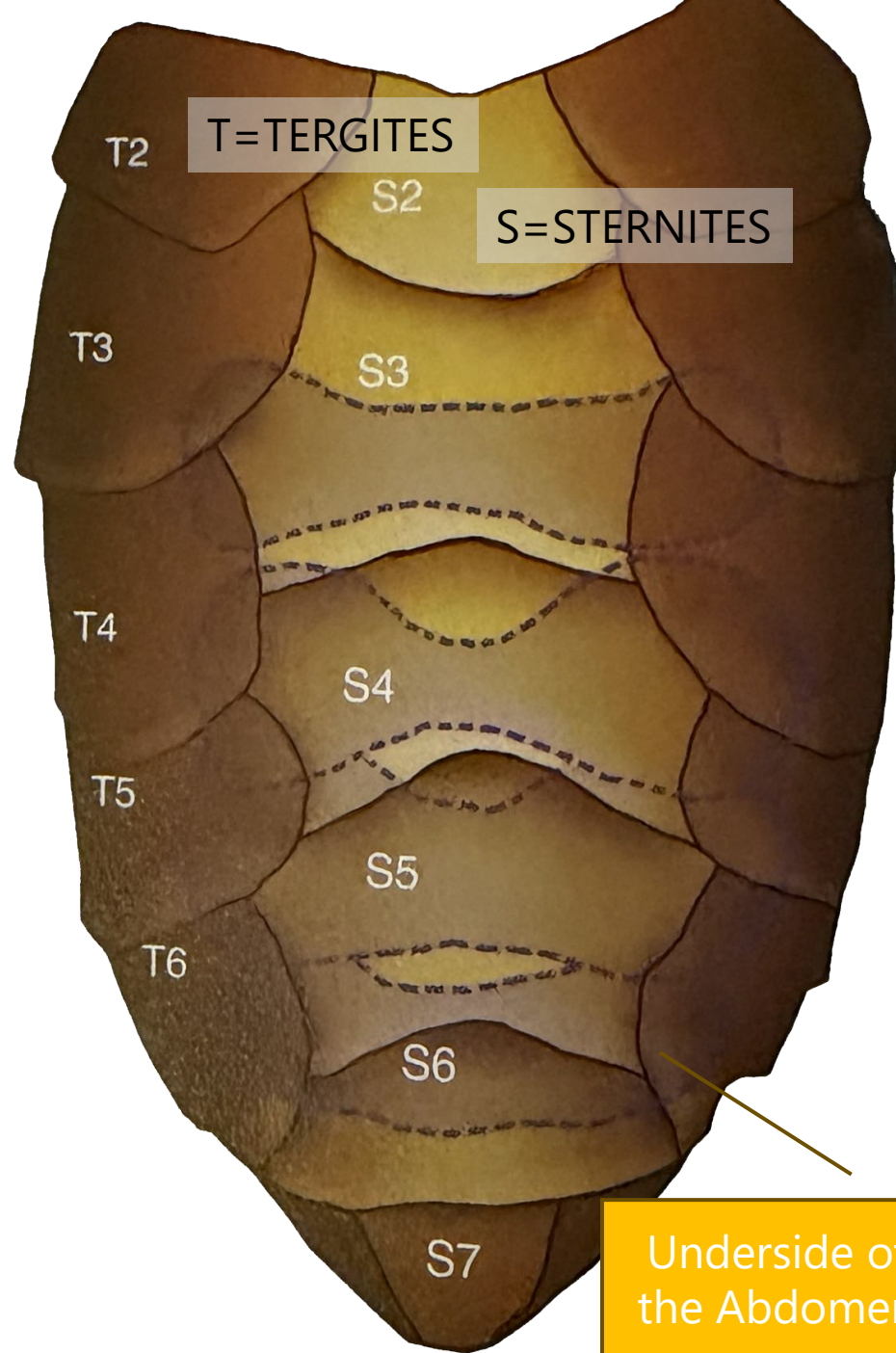
ARTICLE · [Volume 27, Issue 3](#), 109279, March 15, 2024 · [Open Access](#)

Proteome-metabolome profiling of wax gland complex reveals functional changes in honeybee, *Apis mellifera* L.

Magnification, Honeybee wax mirrors, no wax

□ **There are four pairs of wax glands**

- On Sternites S4 to S7
- The mirrors are on the parts of the sternites overlapped by adjacent plates



*The diagram
is from
this great
book...*

Ian Stell
Understanding
Bee Anatomy

Underside of
the Abdomen



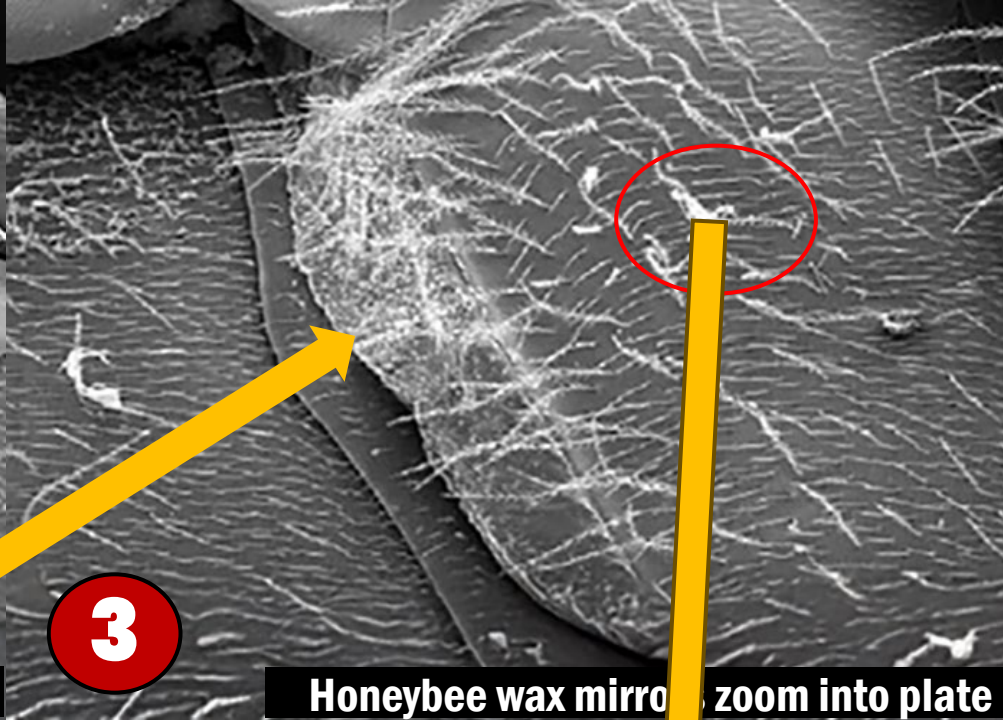
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Honeybee wax mirrors, no wax



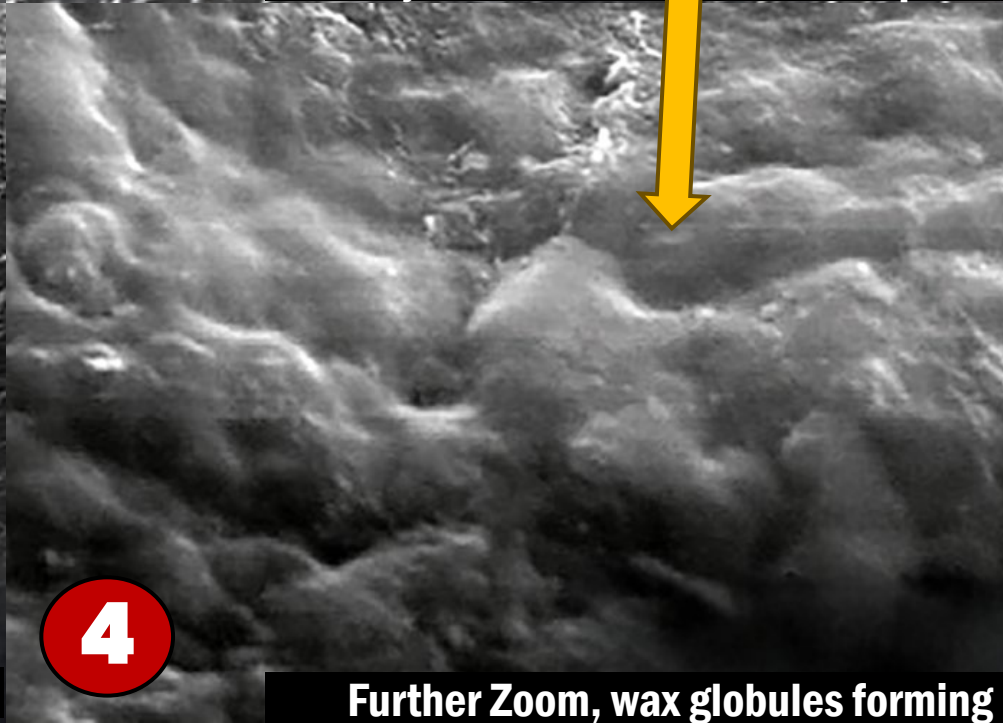
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Wax Mirror, Closer, some wax beginning



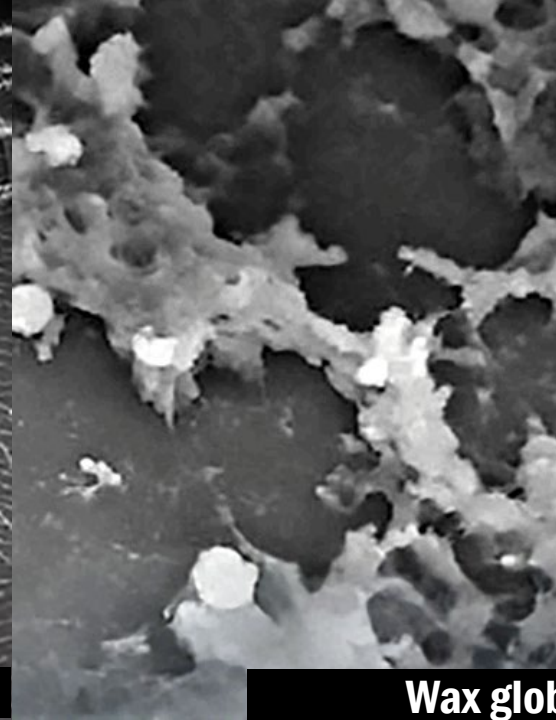
3

Honeybee wax mirror, zoom into plate

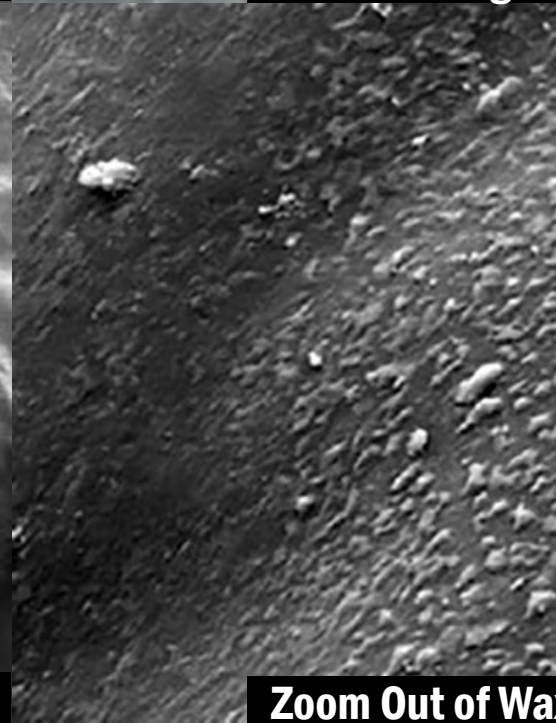


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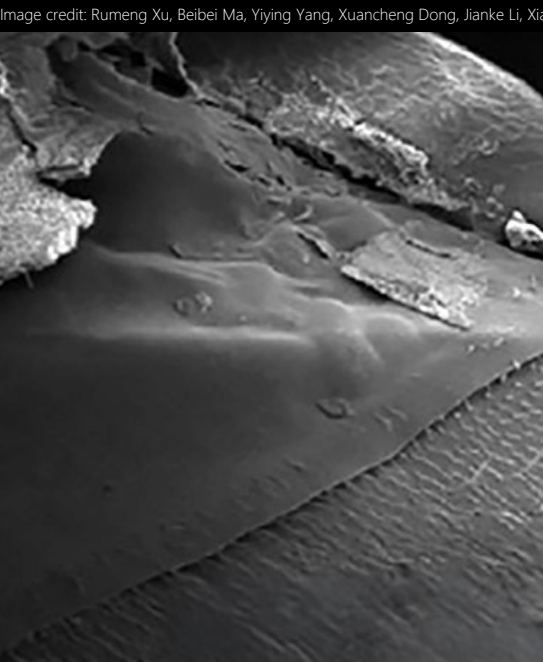
Further Zoom, wax globules forming



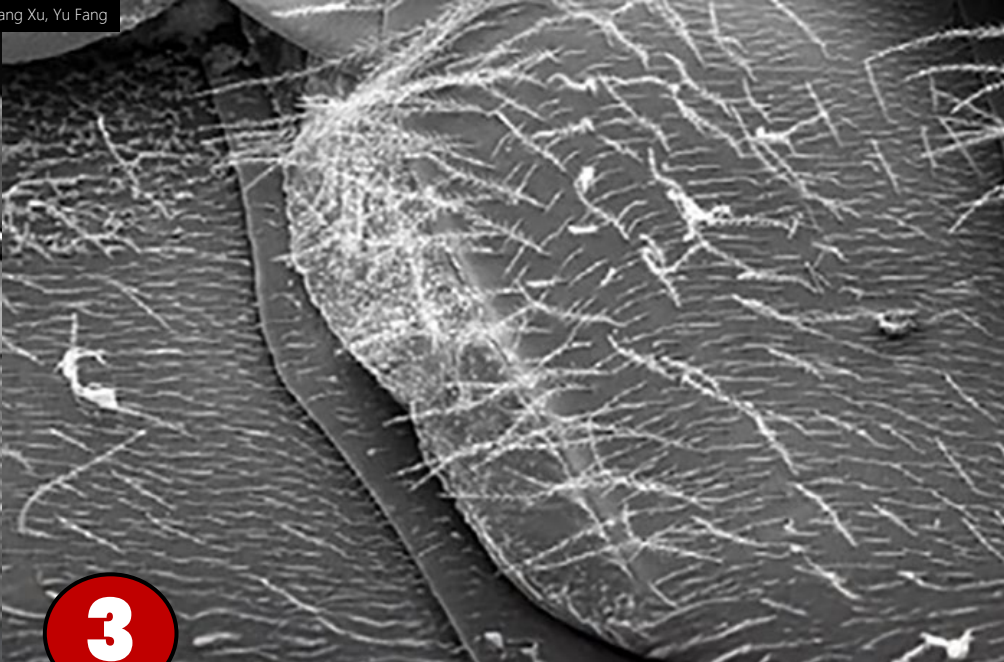
Wax glob



Zoom Out of Wax

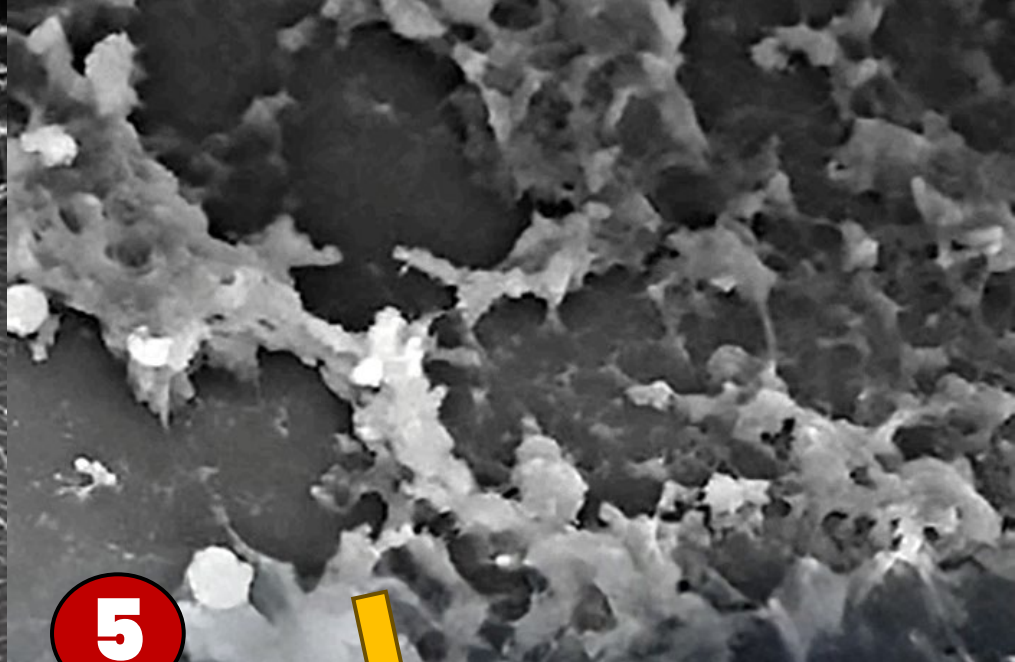


Honeybee wax mirrors, no wax



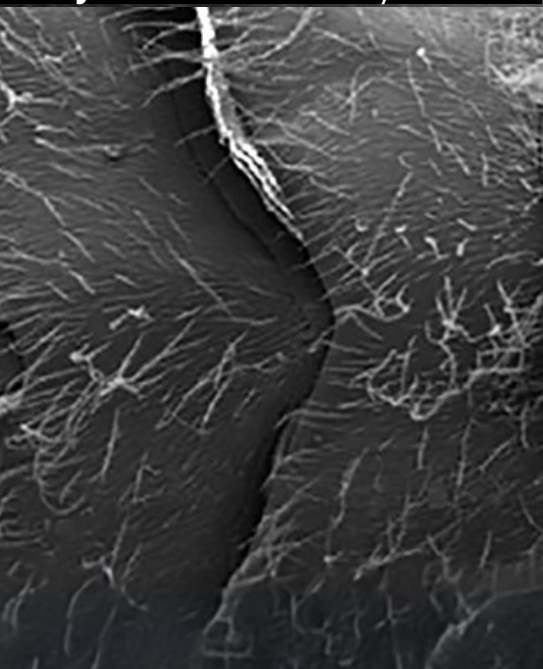
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Honeybee wax mirrors zoom into plate

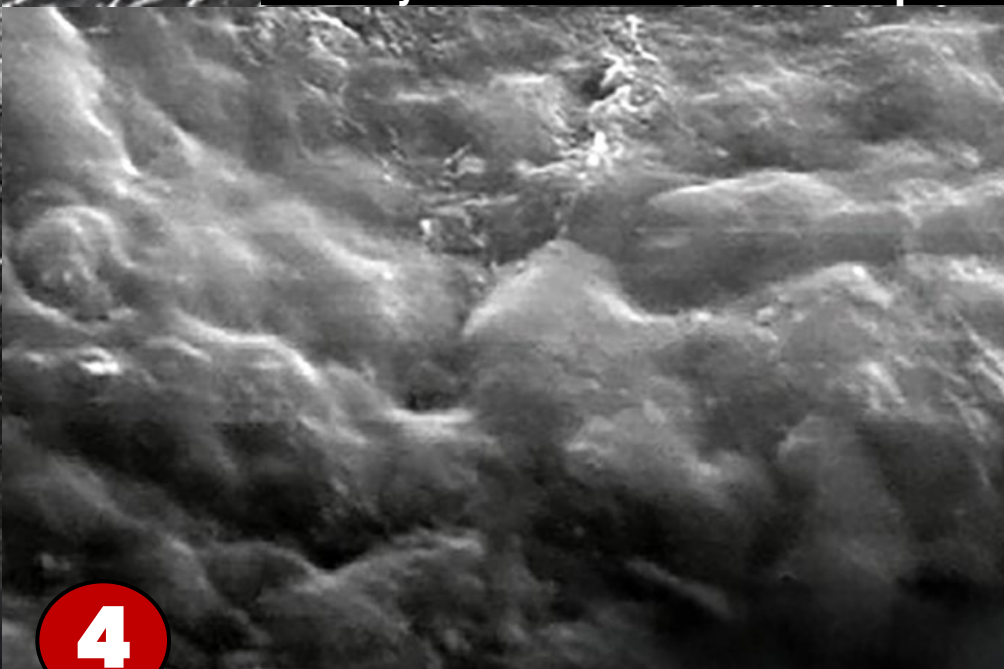


5

Wax globules collecting together

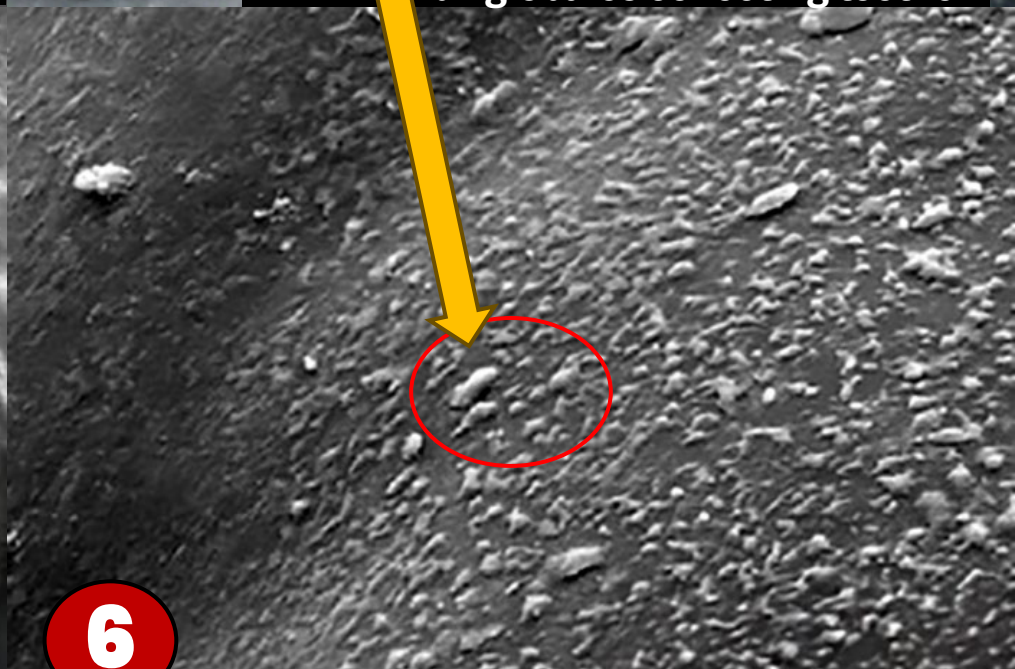


, Closer, some wax beginning



4

Further Zoom, wax globules forming



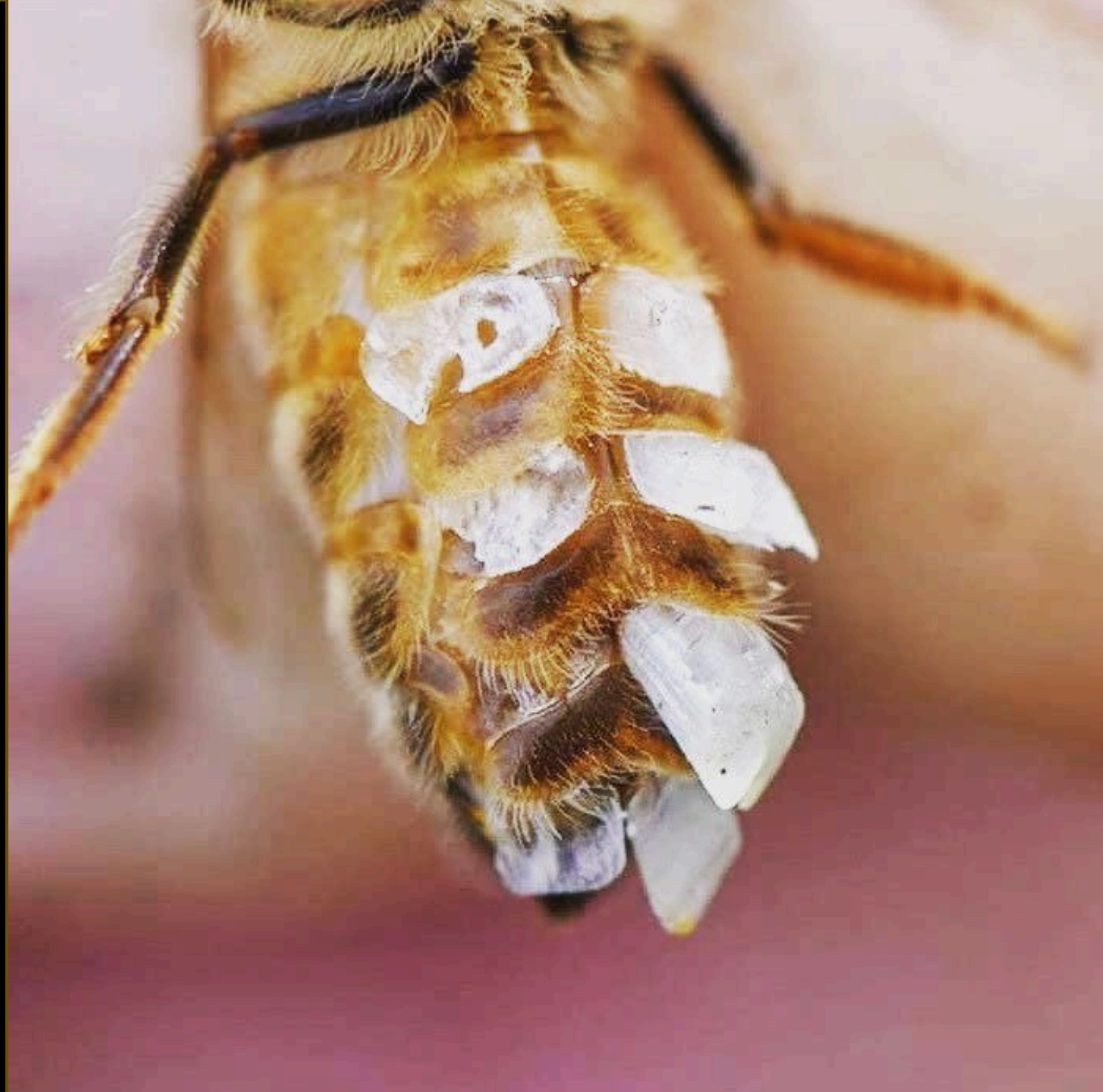
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Zoom Out of Wax that will build to flake



Eventually....
Fully formed flakes of
wax on the underside
of the bee

**It takes
about 12
hours for a
bee to make
8 wax flakes**



Colonies with Older Populations



Colonies with Older Populations

Once workers age past their peak wax-secreting stage, their glands atrophy and they lose the ability to produce wax.

Older bees cannot regain this ability once it's lost

Old populations often revert to recycling tactics for wax



**THE
FORMULA**

AS BEEKEEPERS: WHAT MIGHT WE NEED HONEYCOMB FOR?

**STARTING
NEW
HIVES**

**BUILDING
OUT
SPLITS**

**MAKING
NUCS**

**REPLACING
OLD COMB**

When do we typically do this work? **SPRING, EARLY IN THE SEASON**

In the early season, what will bees need so they can build wax?
THEY NEED A NUMBER OF THINGS

Components of Building Comb



PROJECT:
BUILDING COMB

DRAWN BY:
DESIGN TEAM

DATE:
05/20/2024

SCALE:
1:1

UNITS:
INCHES

HONEYCOMB CONSTRUCTION NATURE'S ENGINEERING

Bees work together with precision to build strong, efficient, hexagonal cells.

1 WAX SECRETION

Worker bees secrete wax scales from glands on their abdomens.



2 FESTOONING CHAINS

Bees link together in chains, creating a living scaffold from which wax is built.



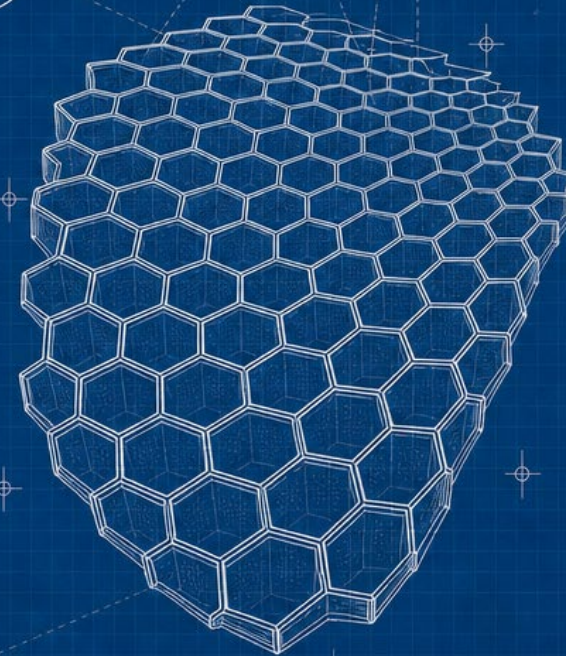
3 CELL BUILDING

Bees shape and mold wax into hexagonal cells using their legs and mandibles.



4 COMPLETED HONEYCOMB

A strong, lightweight structure with maximum storage and minimum material.



TEMPERATURE CONTROL



Bees maintain hive temperature at ~34–36°C (93–97°F) for optimal wax malleability.

HEXAGONAL ADVANTAGE



- Maximum storage
- Minimum wax use
- Strong & efficient
- No gaps between cells

COORDINATED EFFORT



Thousands of bees work in harmony, each performing specialized roles.

MATERIAL



Beeswax
Lightweight
Durable
Slightly elastic

FUN FACT



A strong colony can build 1 frame of honeycomb in just a few days.



PROJECT: HONEYCOMB CONSTRUCTION

DRAWN BY: DESIGN TEAM

DATE:
05/20/2024

SCALE:
1:1

UNITS:
MILLIMETERS

NOTES:

- Built from the top down.
- Cells are typically 5–6 mm in diameter.
- Worker bees prefer uniform cell size for efficiency.
- Structure supports honey storage, brood rearing, and hive stability.



Wax production
reaches its PEAK
when vegetation
blooms

Wax secretion is
triggered when
resources are in
abundance

NECTAR
WATER
POLLEN

+ RESOURCES

+Population
expansion means
bees with wax
glands activated

There must be a
full contingent of
wax building bees
in the population

LOTS
OF
BEES!

+POPULATION

+Temperature
Zones hot enough
to conduct wax
building

There must
sufficient heat
control where wax
is being made

MAINTAIN
HIGH
TEMPS

+TEMPERATURE

+FOUNDATION

If there is foundation present for the bees to build upon

Especially if it is adjacent to brood rearing and the colony is growing

+CONGESTION

When the colony is congested and the bees need more places to store resources, they will be more compelled to build honeycomb to alleviate congestion

+GENETICS

Some bee lines are genetically wired to build comb aggressively, while others are conservative and only draw wax when absolutely necessary

+OTHER FACTORS AT PLAY

+ RESOURCES
+ POPULATION
+ TEMPERATURE
+ OTHER FACTORS AT PLAY

= IDEAL WAX CONDITIONS

**HONEYBEE'S
BUILDING
WAX**

+ RESOURCES



**6 LB Honey >
1 LB Beeswax**





**A single frame
requires about
 $1/5^{\text{th}}$ of a pound
of beeswax**



**A single frame
requires about
 $1/5^{\text{th}}$ of a pound
of beeswax**

**The wax production
required for 10 deep
frames is estimated to
be around **2.2 lbs****



DO BEES EAT HONEY TO MAKE WAX?

Why do they say it takes 6 pounds of honey

Bees **consume nectar** during the nectar flow to make wax...

So why is always stated as 6 to 8 pounds of honey?

DO BEES EAT HONEY TO MAKE WAX?

So why is always
stated as 6 to 8
pounds of
honey?

It is just easier to convert
sugars required for the job
using honey as a source
because the sugar
concentration is more
consistent

HOLD ON...

No One Said there was going to be math involved!

HOLD ON...

No One Said there was going to be math involved!

So then, how much **nectar** is needed for 10 frames?

The 2.2 pounds of wax for a 10-Frame Deep...

Nets out to **50 to 60 pounds of nectar**

*Or sugar solution equivalent of **about 3.5 gallons***

By the way, they need water and pollen (1.5 to 2 pounds) to do the work too

*There is no test, and you
are not going to have to remember
these facts.*

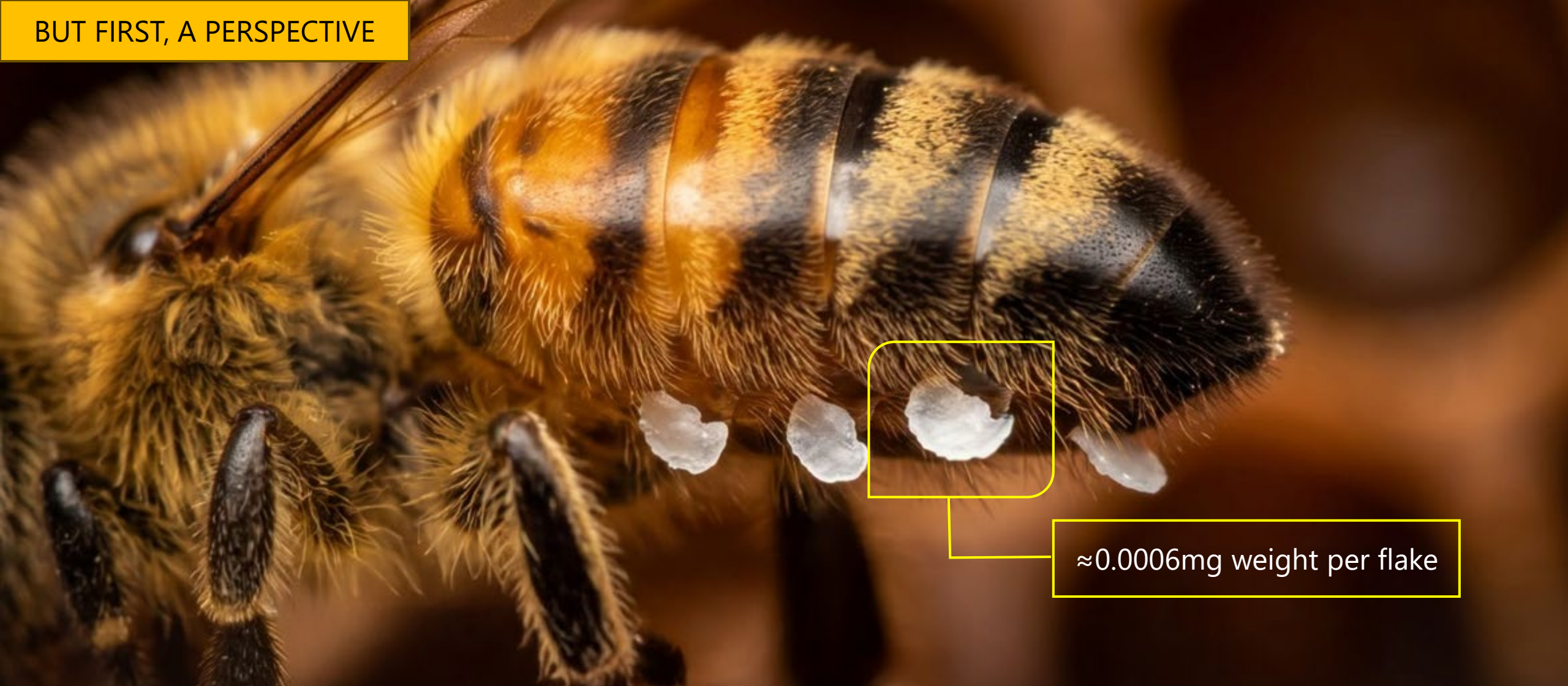
*What is important is
to get the takeaway*

THE TAKEAWAY

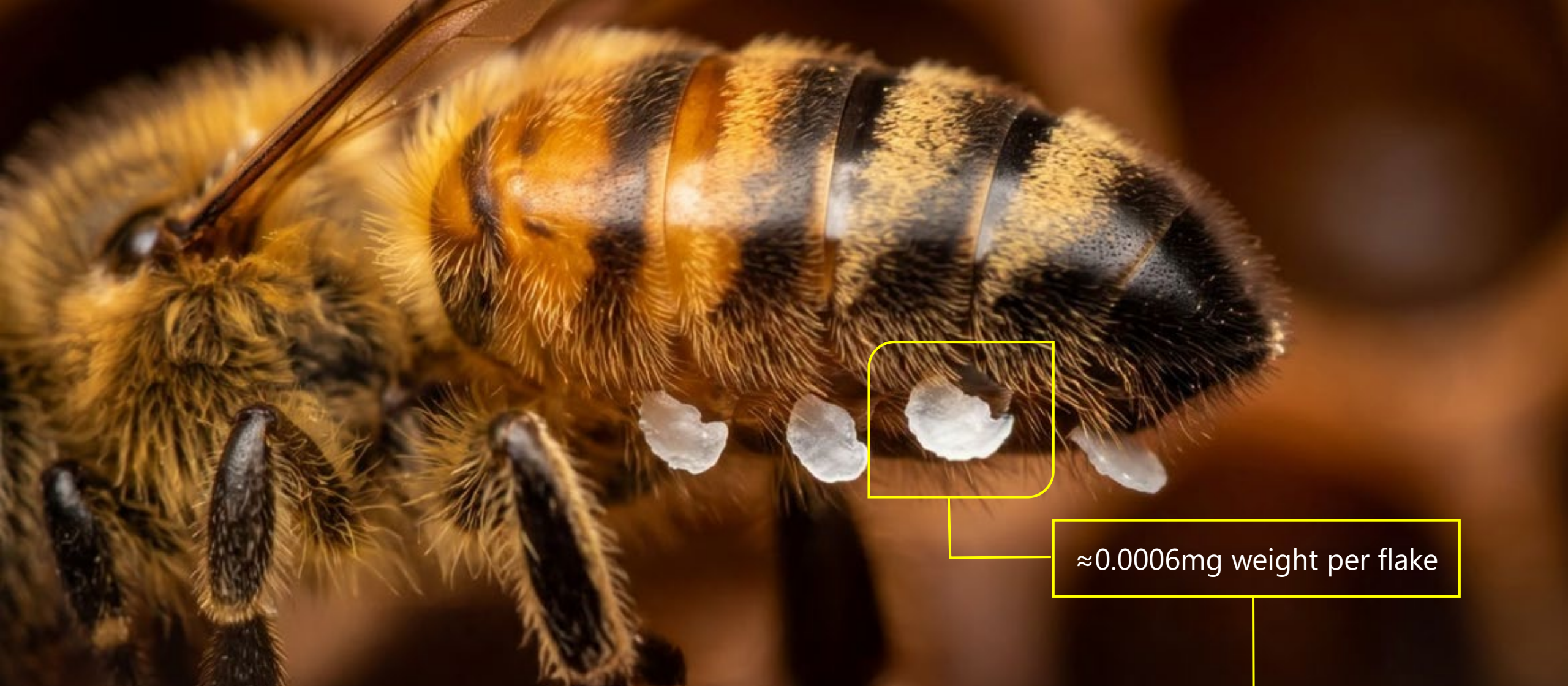
It takes an
ABUNDANCE of RESOURCES
especially nectar to supply a
colony that is conducting a wax
building operation

Includes pollen
and water

BUT FIRST, A PERSPECTIVE



$\approx 0.0006\text{mg}$ weight per flake

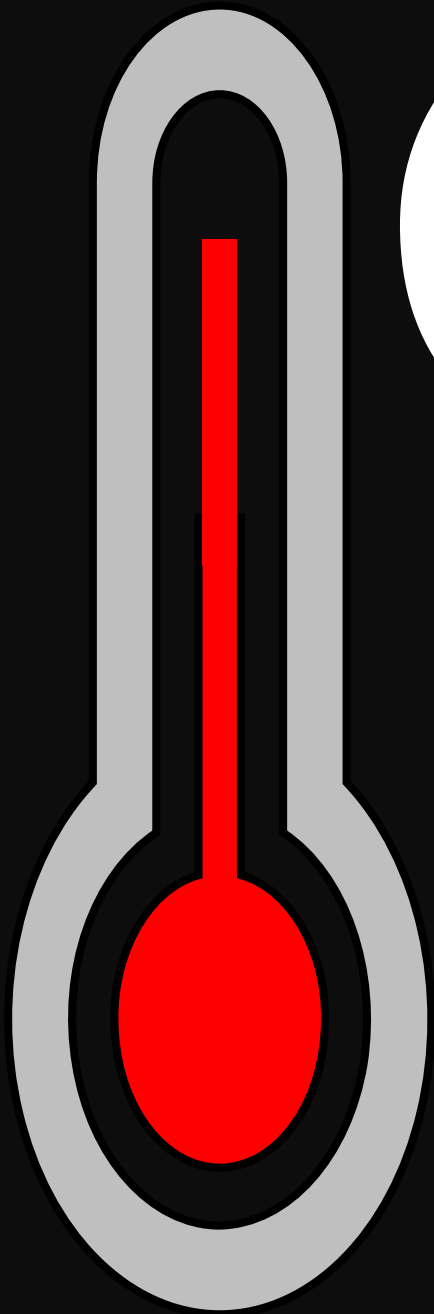


1 pound divided by .0006mg $\approx$ 700,000 flakes

THE TAKEAWAY

It takes an
**LARGE NUMBER OF WAX
AGE BEES** to supply a colony
that is conducting a wax
building operation

**THE
COMB
ZONE**



92.5°

~33.6
37.6 °C

Wax Zone
Temperatures

to 99.7°

92.5° to 99.7°

Wax Zone
Temperatures

**Honeybees need to maintain high temperatures
when building honeycomb**

Significantly warmer than
surrounding nest areas

92.5° to 99.7°

Wax Zone
Temperatures

**Wax behaves as a thermoplastic at these temperatures
This is why the comb-building area is kept so warm**

Wax must be softened for it
to be workable

92.5° to 99.7°

Wax Zone
Temperatures

Bees do not build comb at ambient
hive temperatures

They create a localized hot zone
specifically for wax manipulation.

THE TAKEAWAY

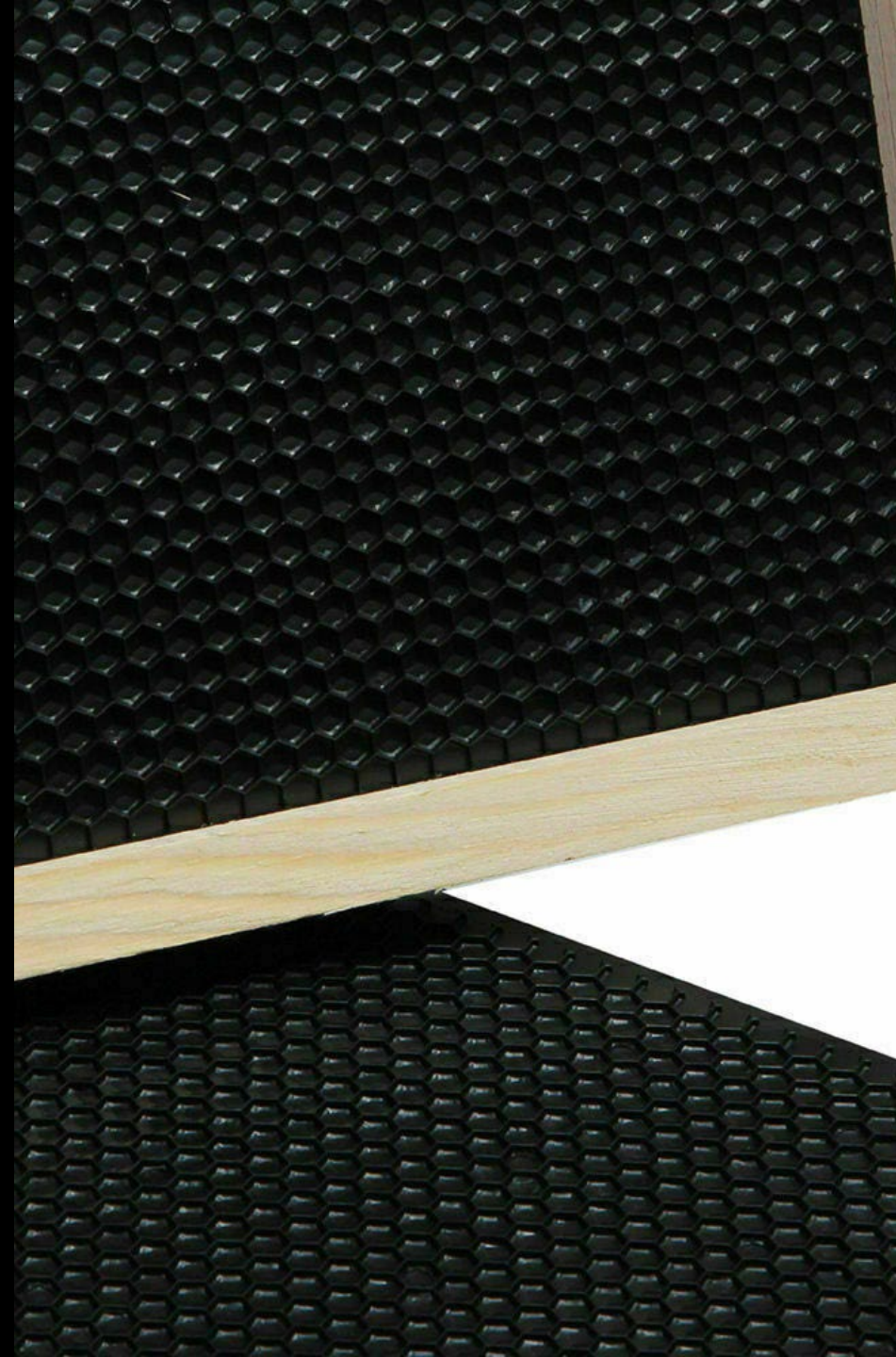
There must be a **HIGH
NUMBER OF BEES** working
to be able to maintain **WAX
ZONE TEMPERATURES**

**PLASTIC
FOUNDATION
PROBLEMS**

PLASTIC PROBLEMS

Inadequate Coatings from the factory

- **Inadequate Wax on the Ribs**
 - Requires a coating of beeswax on the top edges of all the ridges across the entire face
 - Too many times, plastic foundation sheets are sold with little to no coatings
 - They can also be inconsistent from edge to edge
 - Wax should be visible on the edges with a slight odor of wax

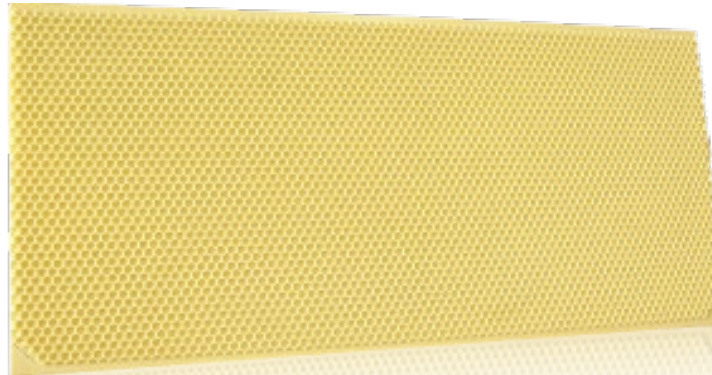
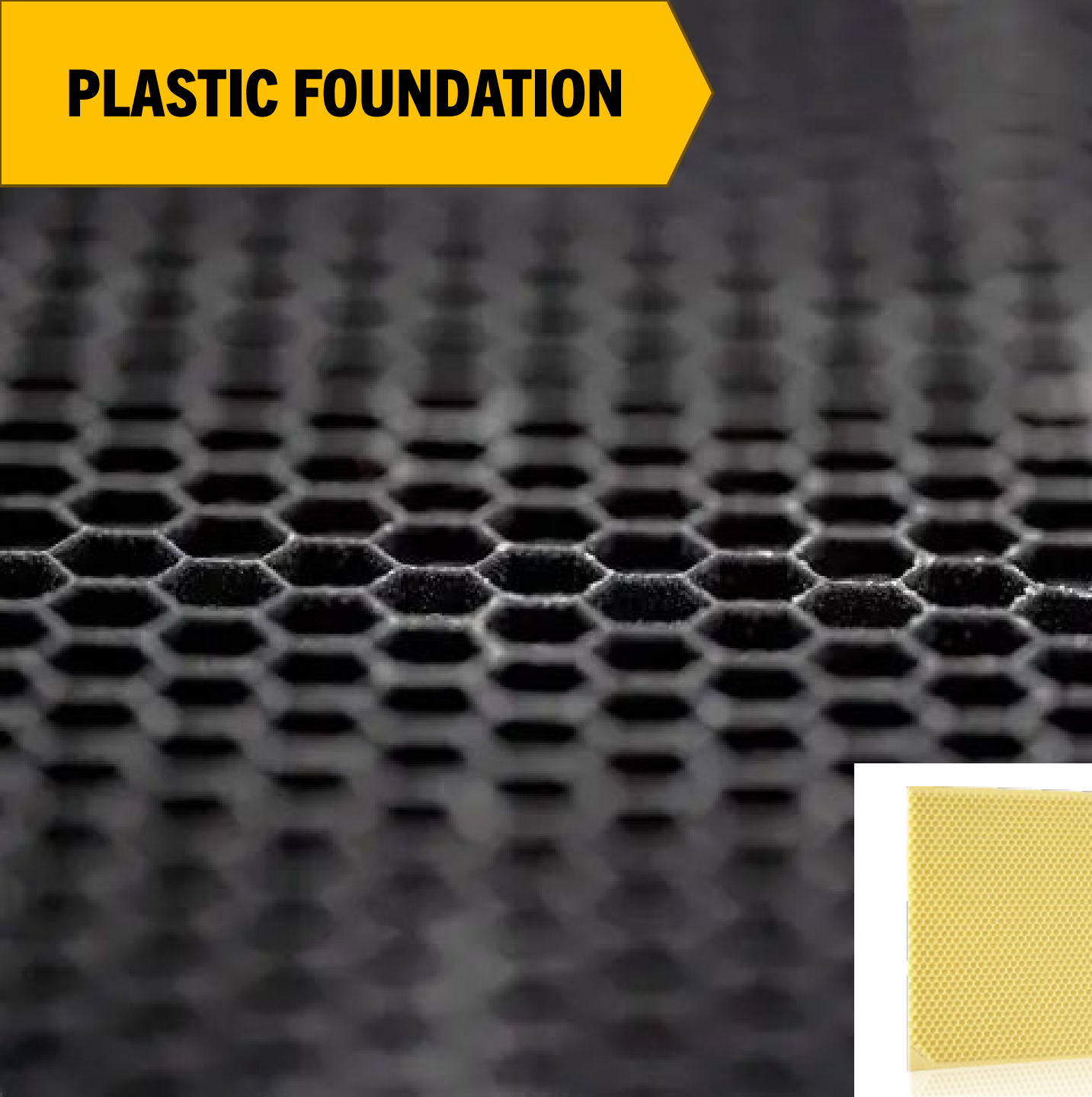


PLASTIC MANUFACTURING

- Consider the source of plastic for PLASTIC FOUNDATION
 - Not all plastics are the same
 - Reputable bee supply houses know the supply chain and ensure that high quality plastic is used for plastic substrates
- Plastic can be problematic in many ways
 - The formulation of the plastic could be a problem (ingredients)
 - The release agents left behind in manufacturing (tainted coatings)

Plastic Could be the Problem

PLASTIC FOUNDATION



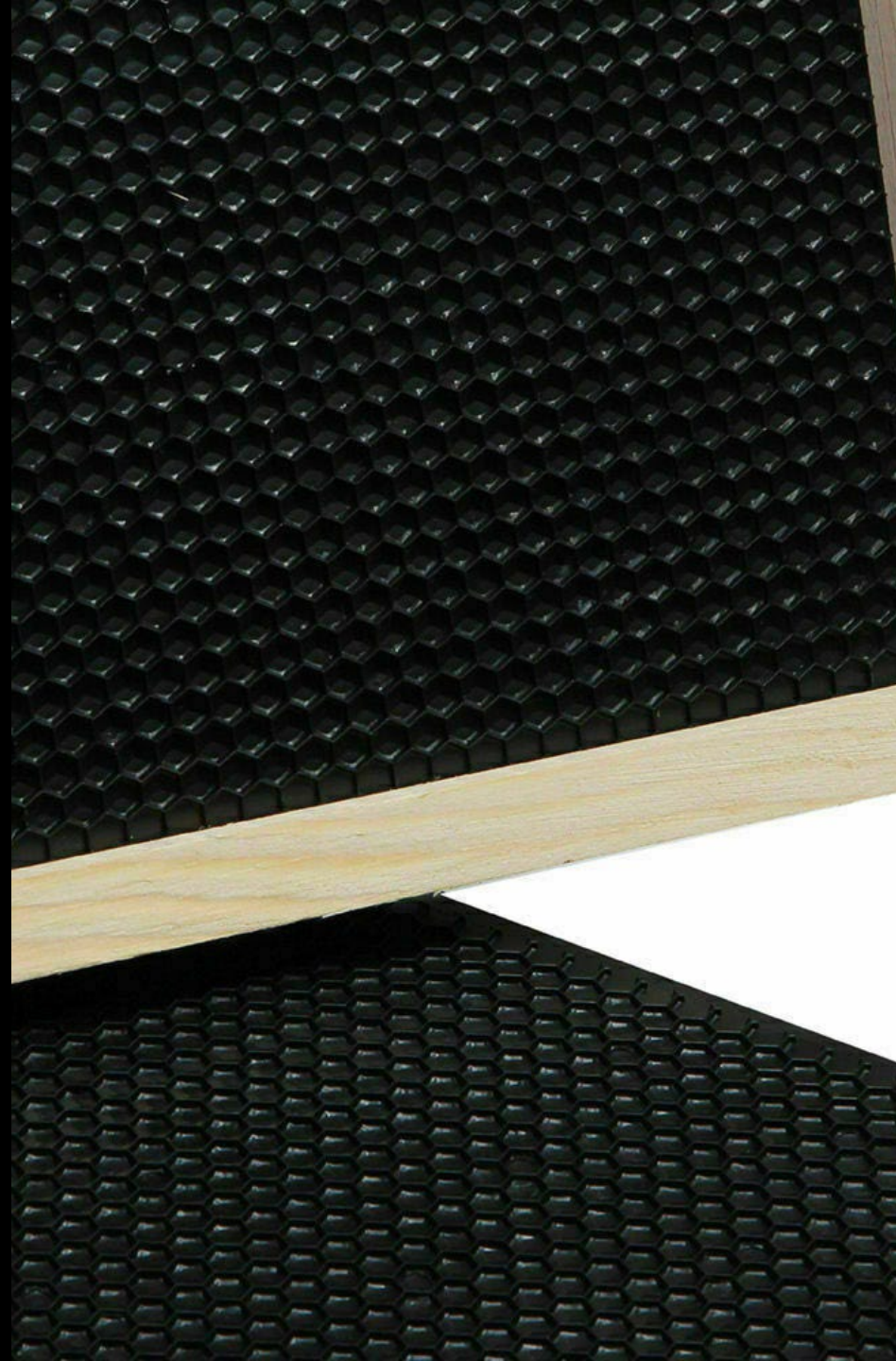
RITE-CELL[®]

- DEEPER CELLS
- HEAVIER CORE
- SHARPER CELL EDGES

COATING PROBLEMS

WAX COATINGS

- **Not pure 100% beeswax**
 - Sometimes manufacturers cheat and use non-beeswax to cut costs
 - Honeybees might be reluctant to build on plastic frames if the wax is not pure beeswax
- **Tainted Wax**
 - Sometimes wax becomes tainted in storage
 - The wax absorbs something, or impacted by the manufacturing process



Avoid Undesirable WAX COATINGS & Exposures

ONLY PURE BEESWAX

- Use your own fresh 'known' beeswax
- If buying; **buy from only reputable suppliers** that know wax coatings
 - **Low cost often equates to adulterated coatings** – coatings that have may been exposed to chemicals or mixed with lower quality waxes
 - Avoid outlets that source from overseas
- Again, Honeybees are highly sensitive to poor quality wax coatings
- Use care when storing wax – Wax is good at absorbing whatever it is exposed to

GOOD COATINGS GONE BAD!

Good Coatings – But the Bees Strip it Off

Good coating go in, then things go sideways

- Frames with adequate coatings are placed in the nest for bees to build out
- Bees in need of wax, **come and strip the coating off surfaces**
 - They repurpose the wax for use elsewhere; This leaves a frame with no coating
- Often bees come in and build wonky comb on the stripped surface

Setup a wax coating operation, *shake the bees off*, recoat and replace

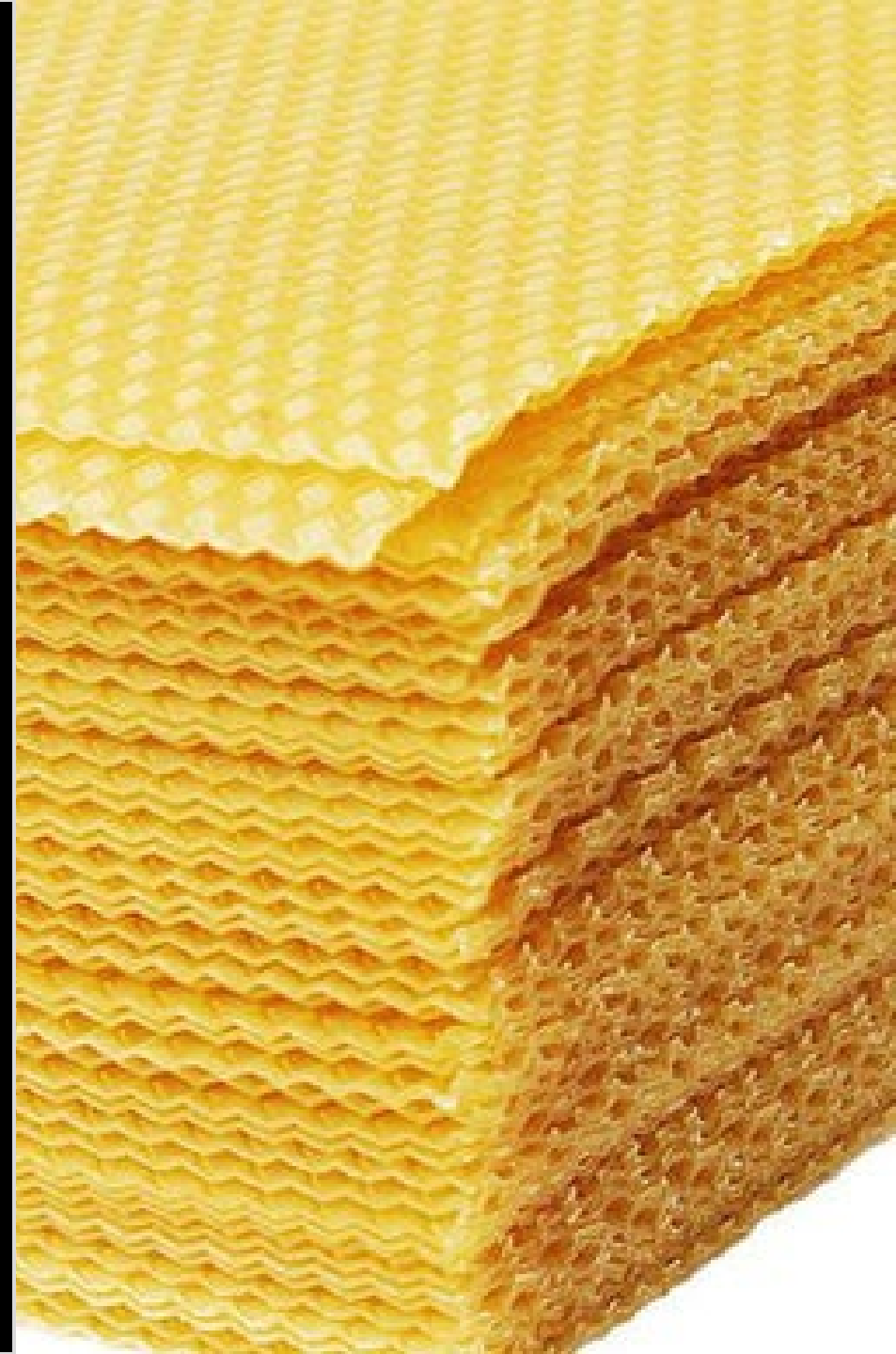
Wax, Problems & Pluses

Wax Foundation: Fragile/Finnicky

- Wax when it is cold is very fragile
- The age-old problem with wax is blowouts: Crimp wire helps
- Sometimes it does not hang well in the frame; even when it is pinned

Wax Foundation: Better for Bees

- Bees build comb faster on wax foundation
- Wax is more conducive to vibration communications
 - Bees communicate by vibrating on the comb – in contrast plastic negates vibration
- Beekeeper benefits here and there
 - Example, cutting out queen cells



FIXING FOUNDATION

This foundation
was sprayed
with a wax
coating.

Is this a good idea?

Spraying Wax

**Wax Sprayed vs Plain
Plastic Foundation**

Spraying
**Yes,
It is
OK**

Fussy, but it can be done

- Use **clean, filtered beeswax** (cappings wax is ideal)
- Heat wax to **160–170°F** so it atomizes but doesn't scorch
- Apply **light, even coats** — multiple passes are better than one heavy one
- Keep the sprayer warm so wax doesn't clog
- Coat both sides; **avoid filling the cell bottoms**
- A thin, even mist is better than a thick, drippy layer.

PROBABLY THE MOST POPULAR METHOD

- Use **clean, filtered beeswax** (cappings wax is ideal)
- Take a block of clean wax and **heat it** with a heat gun, or some other means
- **Rub it across the ribs** and deposit the wax evenly across the rib surfaces
- Avoid depositing wax in the base of the cell indentations as much as possible
- Try to find a balance of a decent coating without getting heavy globs
- **Coat every cell rib**, across the frame from top to bottom, from side to side

Wax Crayon Rubbing...

Heated Wax Application

- A cold 'crayon' of wax was used to rub wax on the ribs at the top of the frame
- A warm 'crayon' heated with a skillet was used for the bottom half
- Slightly warmed waxed, rubbed on the ribs, seems to make quite a difference in the bees drawing it out to comb.

Wax Crayon Rubbing...



What about Rolling?

HOW TO ROLL WAX ONTO PLASTIC FOUNDATION

- **Use clean, filtered beeswax** — impurities cause streaks and poor adhesion.
- **Heat wax to 150–165°F** so it stays fluid without scorching.
- **Use a warm foam roller** for an even coat that doesn't shed fibers.
- **Apply thin, even layers** — several light passes are better than one heavy one.
- **Keep the wax tray warm** so the roller loads consistently.
- **Coat both sides**, with a slightly heavier coat for better acceptance.



Paint Brush?



Paint Brush?

PAINT BRUSH

- Dip into melted wax
- Horizontal painting
 - Helps apply to ribs – without filling the bottoms
- Dedicated Brush
 - Not good for anything else after this

Redo Wax Foundation, *Sure*

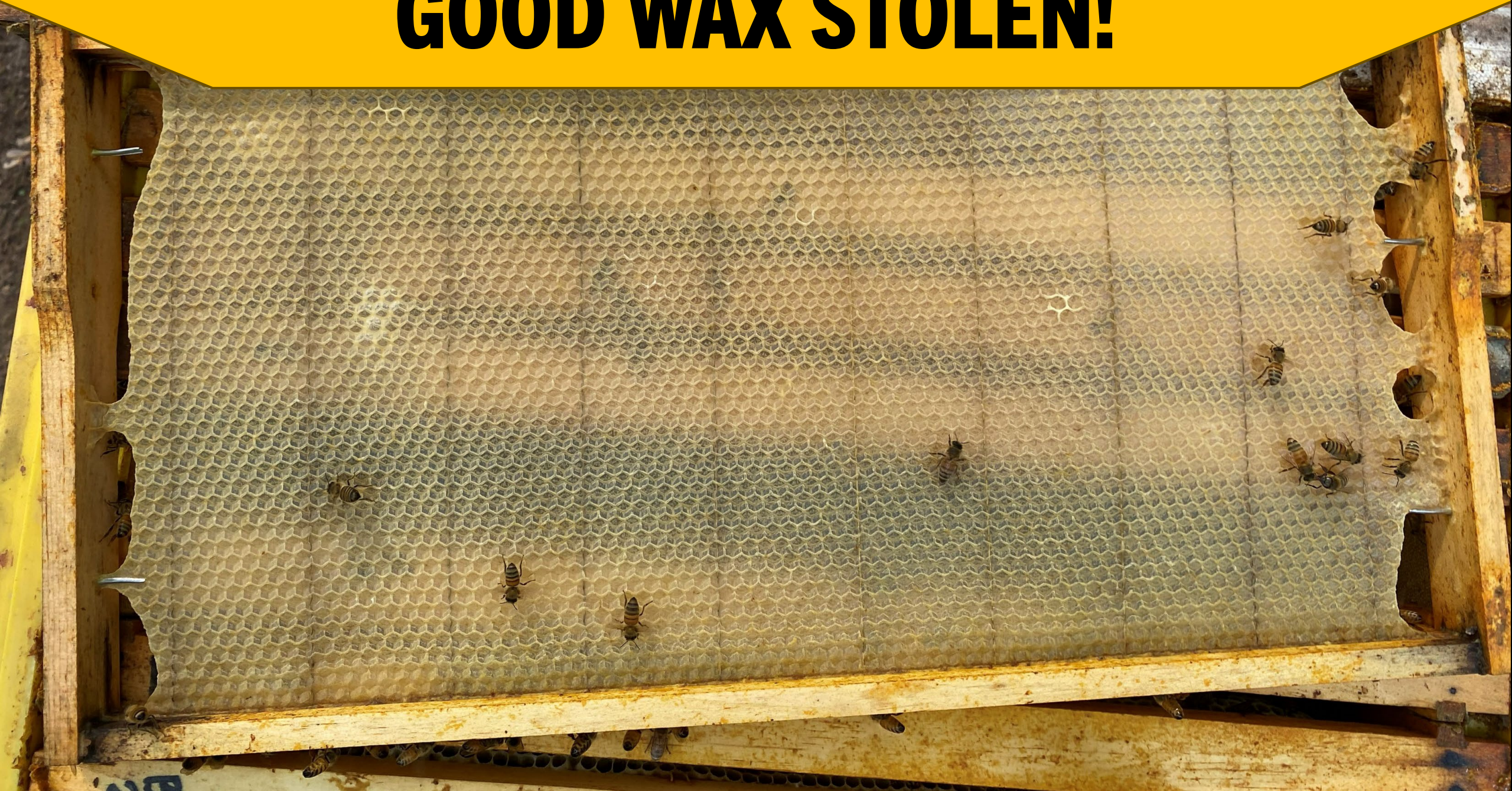
- Scrape off any remnants of honeycomb with a hive tool
- Power wash off any residual wax and reapply wax
 - Sometimes you can use a high-pressure air nozzle and blow the bits off the plastic
- Some soak comb in a caustic soda solution for a day or more and then it washes off with a high pressure spray

Is it Economical?

- For the cost of new foundation sheets, it might be more efficient to just buy new – **what is your time worth?**
- It is personal preferences whether you want to go this route

**What
about
reuse?**

GOOD WAX STOLEN!



GOOD WAX STOLEN!



Dealing with Holes

Often you can just leave it

- Bees will build comb and fix the holes in wax
- Sometimes the holes are extensive
 - If you find they really did a number on the wax, consider replacing it
 - With big holes they will often draw drone brood comb early in the season
 - You could also cut up other wax sheets to repair it

**WONKY
CONFE**

WHAT GOOD LOOKS LIKE

High Populations; Building Boom

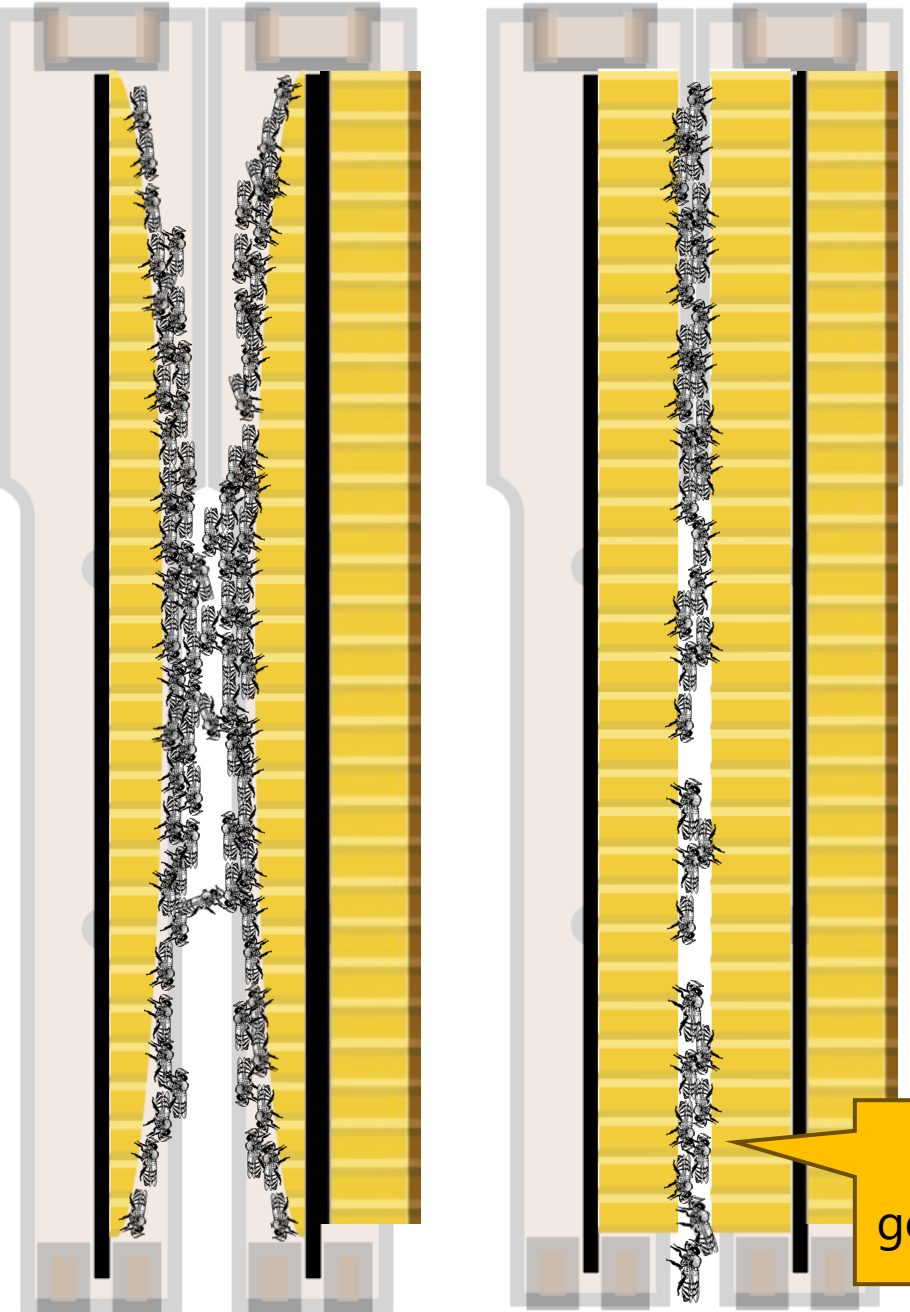
Workers build adjoining frames

- They build opposite sides at the same time
- They meet in the middle
- The space constraints force bee space



High Populations; Building Boom

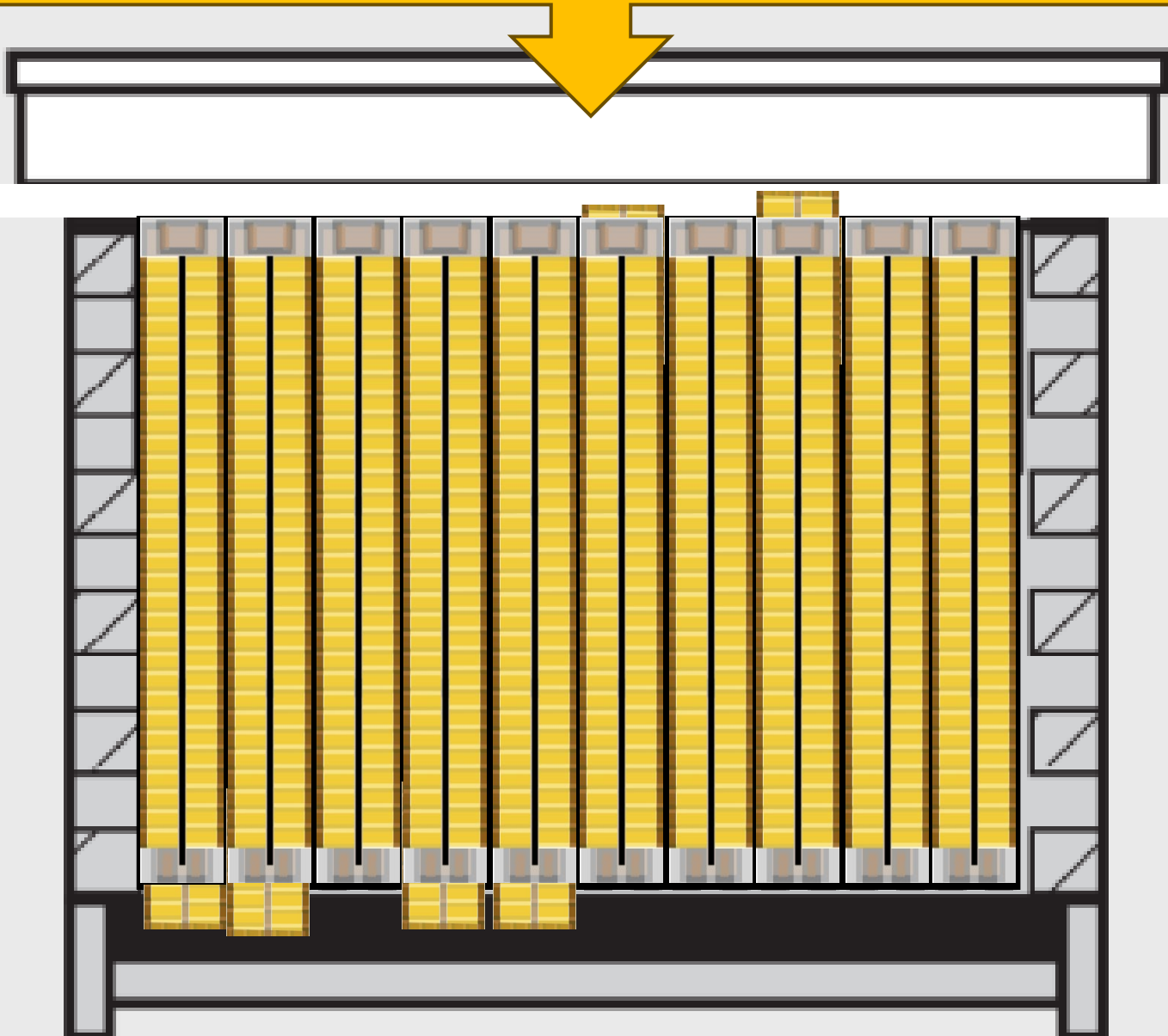
- Bees contacting bees on either side signal them to stop
- The spacing of the frames controls the depth of the cells



The diagram shows a cross-section of a beehive with two yellow frames. Bees are shown on the frames and in the space between them. A speech bubble points to the bees on the right frame.

This is what
good looks like

What's Going on Here?



Too much of good thing

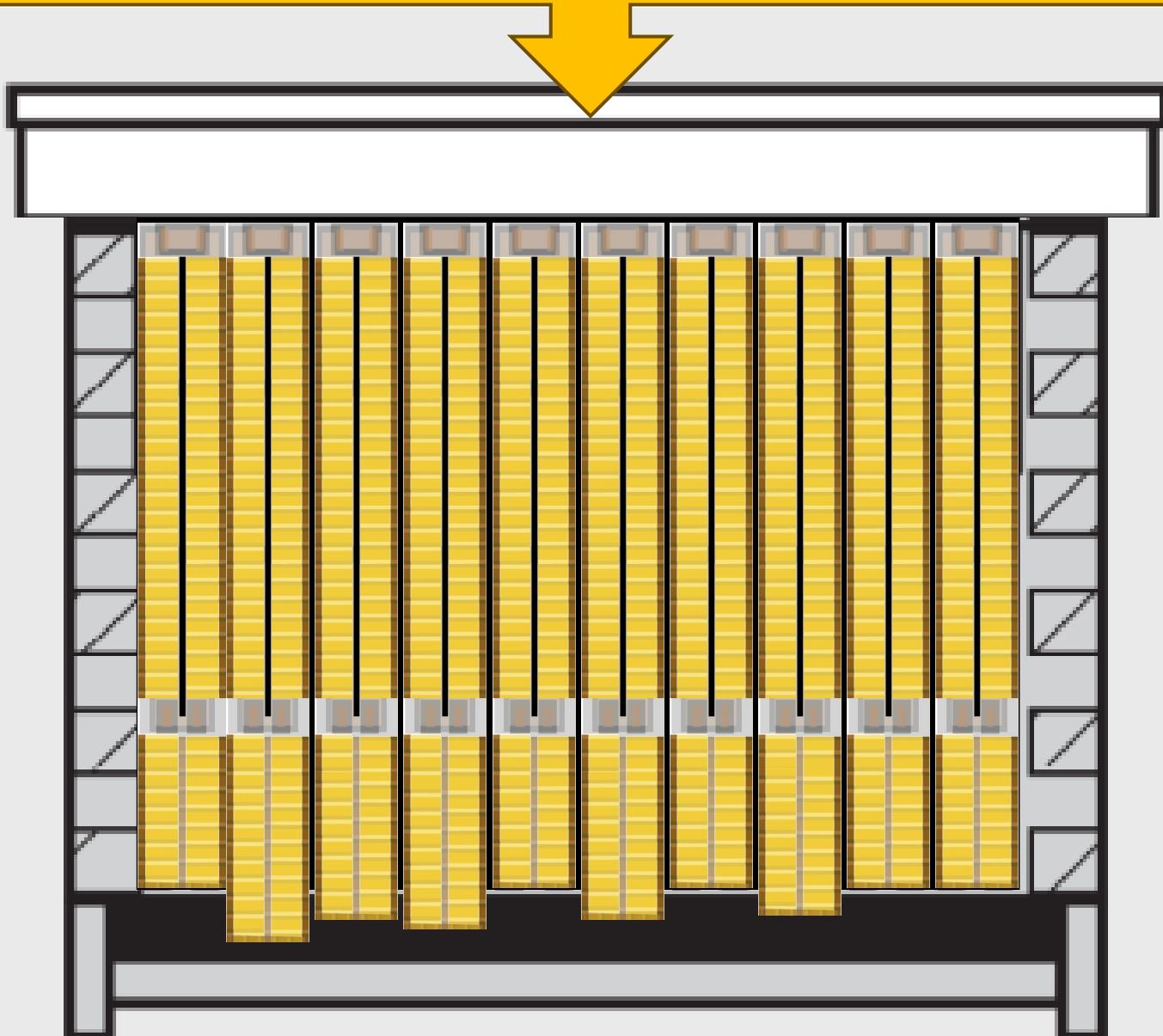
Comb below deep

- They could want to build so much that they build over bottom board

Comb above frames

- They might build in the margins and above the top bars
- They may build on the inner cover or under the roof

What's Going on Here?



Mediums in a Deep

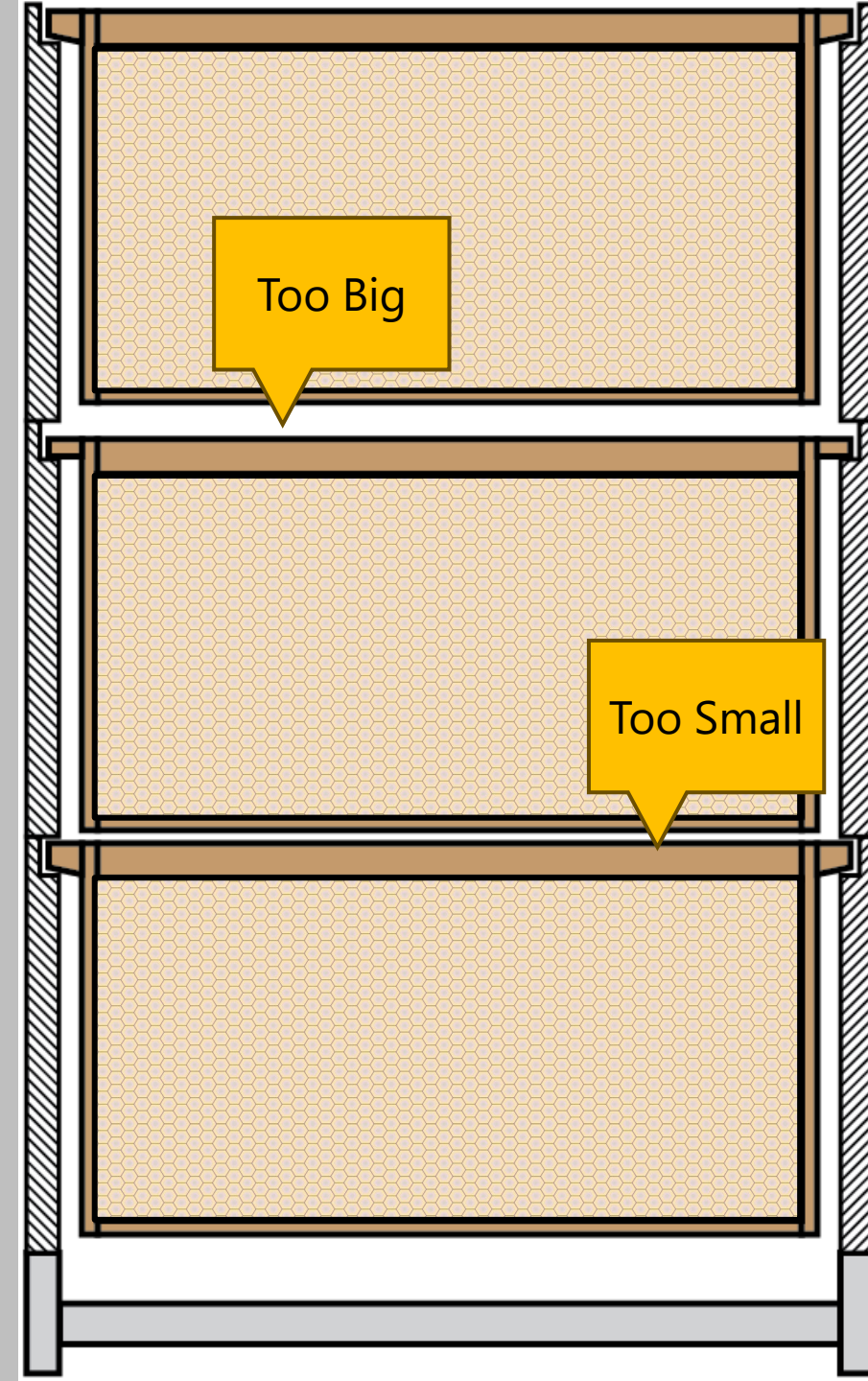
- Sometimes it is an errant frame...
- Sometimes it is a mistake made by a new beekeeper
- Other times it is done on purpose (drone culling)
- Fixing this – if it is broken – is a matter of cutting off the errant comb and putting in the right frames
- *Reuse maybe?*

EQUIPMENT SPACING

Frames Hanging In Woodenware

How frames hang in the boxes matters

- Gaps between walls – excess comb
- Gaps from frame tops to frames above
 - Bees build excess comb or they propolize frames
- Gaps under frames, over bottom board
- Medium Frames in deep boxes
- Mismatched frames (different suppliers)
 - Frames from different suppliers are different dimensions. Sometimes it leads to inadvertent gaps that violate bee space
 - We coined this problem as **The Frame Game**



The Frame Game



Too Much Space below the frames



Image credit: Levi Edvalson

Outer Space VIOLATIONS

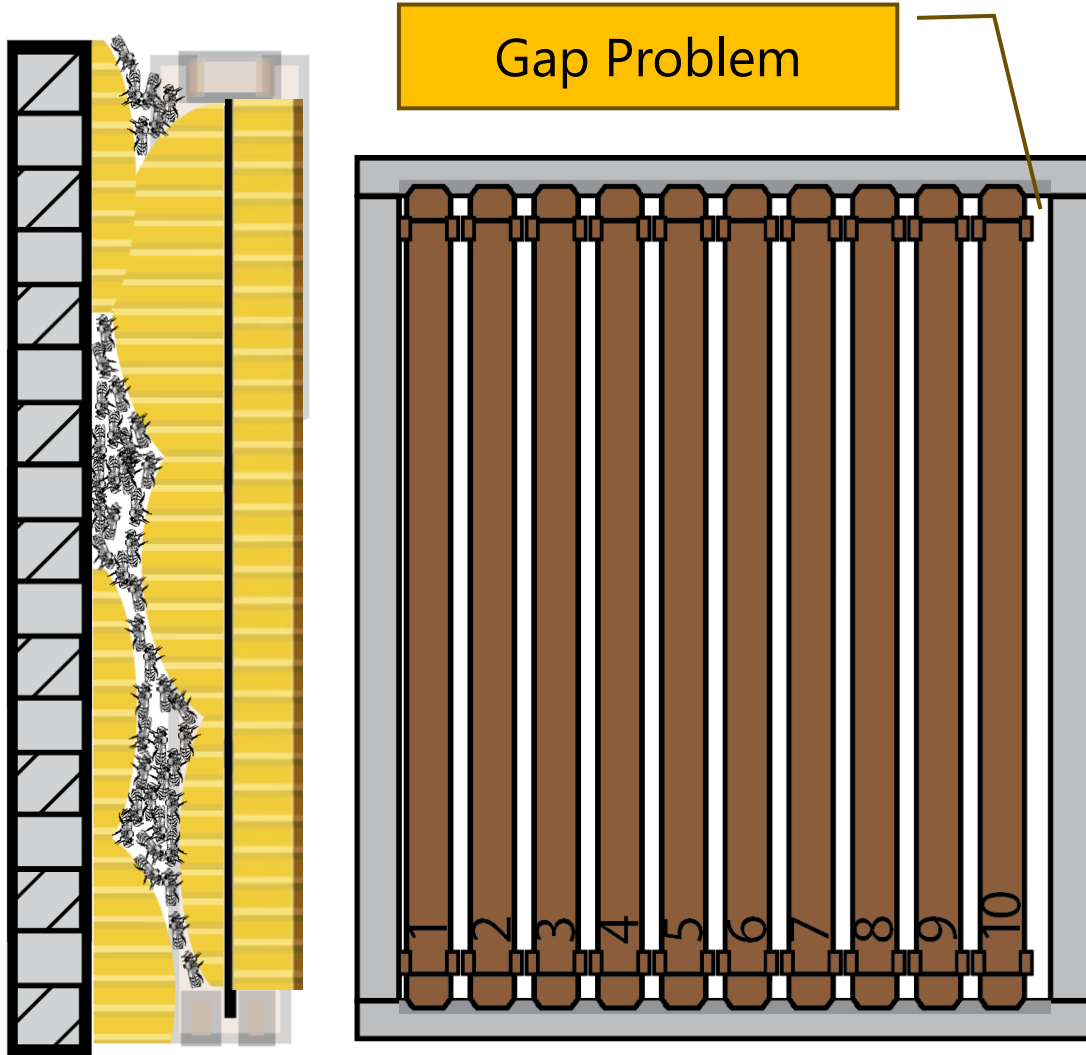
Frame 1 and 10 problems

- Bees will build into the open available space
- This is a frame that was too far away from the woodenware
- It could be caused by unconventional boxes that are too wide
- It can be caused by frames that are a mismatch to the wood box



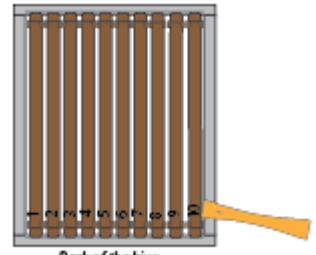
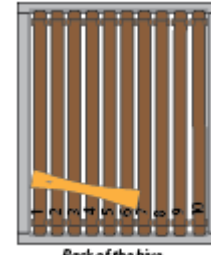
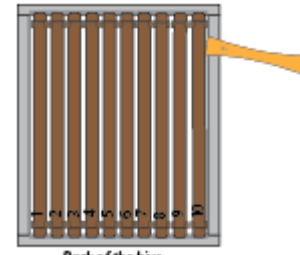
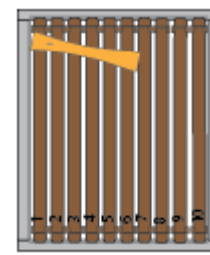
Excess Space on the Outside

Too much space between frame 10 and the wall



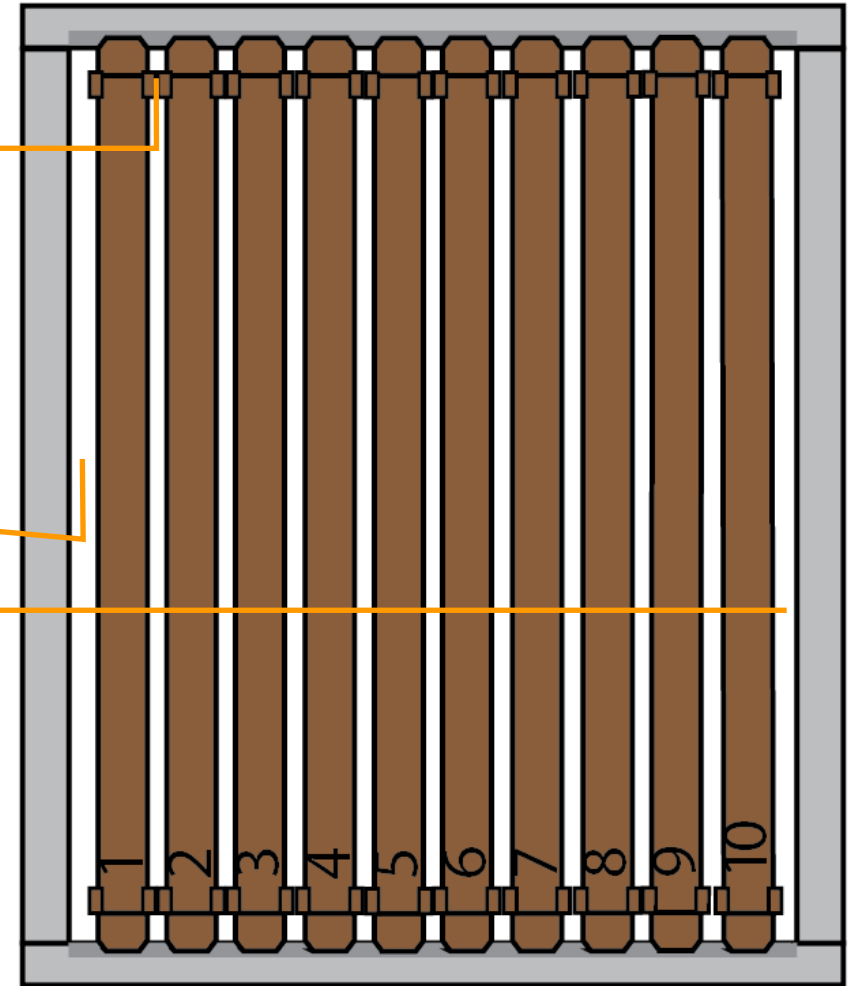
Mind the GAPS

- Keep your frames tight and centered
- Use a hive tool to push the frame together so the shoulders touch
- Even the space on both sides
- If you keep the frames pushed to one side it could result in a gap between the frame and outer wall
- With the violation of bee space, the bees will attach this to the hive box

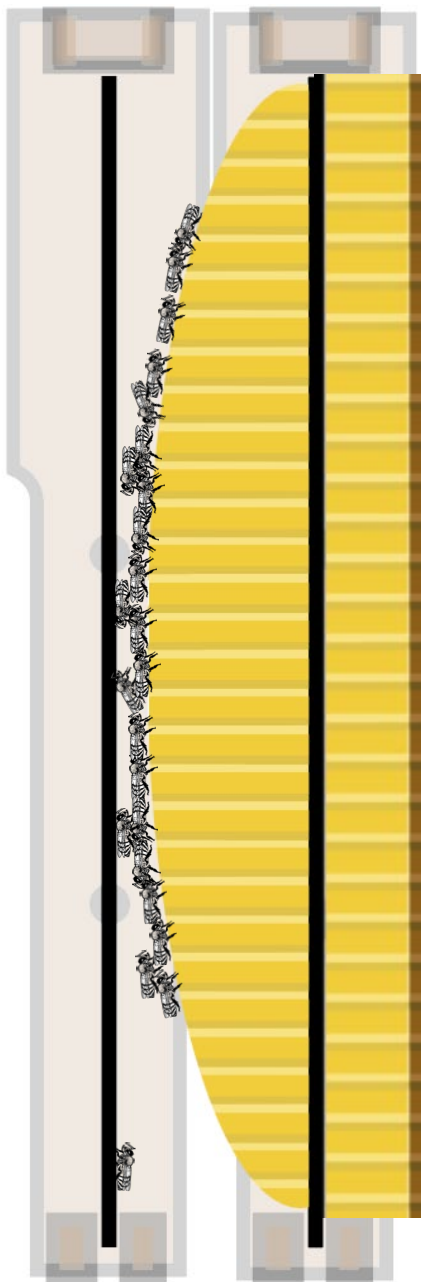


Shoulders
Touching

Even Space
Both Sides



Back of the hive

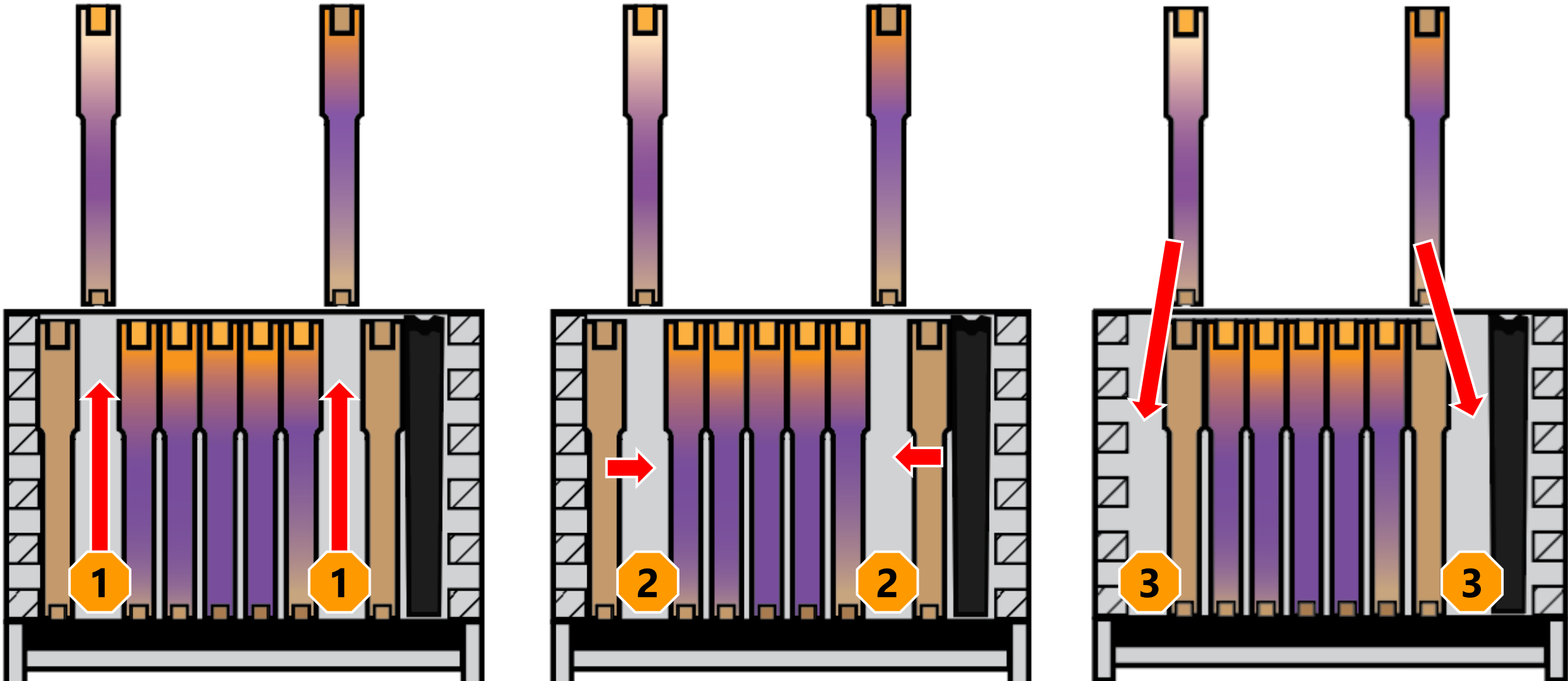


Excess Space, Limited Bees

- Toward the end of a nectar flow
 - Less population, less resources; the job slows down
- When there are fewer bees doing the job...
 - **No bees on the far side**
 - Bees will build without encountering bees on the other side
 - They will build into the empty space
 - Common on the outer frames*
 - Thwart this by placing frames next to built out frames

*Swapping Frame to the Interior

Setting bees up to build comb against comb. Also moving frames closer to the nest incentivizes bees to build comb



Building Wonky Blobs

Wax building in irregular blobs

- Sometimes wax building bees build on deposits
- Other times the bees gather together and build as a unit
- They might not have the heat to warm the space, so they build in an irregular manner
- Often when you see this pattern there are too few bees, not enough heat, not enough resources, or a combination thereof



Building Wonky Blobs

Wax building in irregular blobs

- This can also occur when the bees strip the wax coatings off of frame surfaces
- As noted earlier, inspect for stripped coatings and fix the frames before this happens



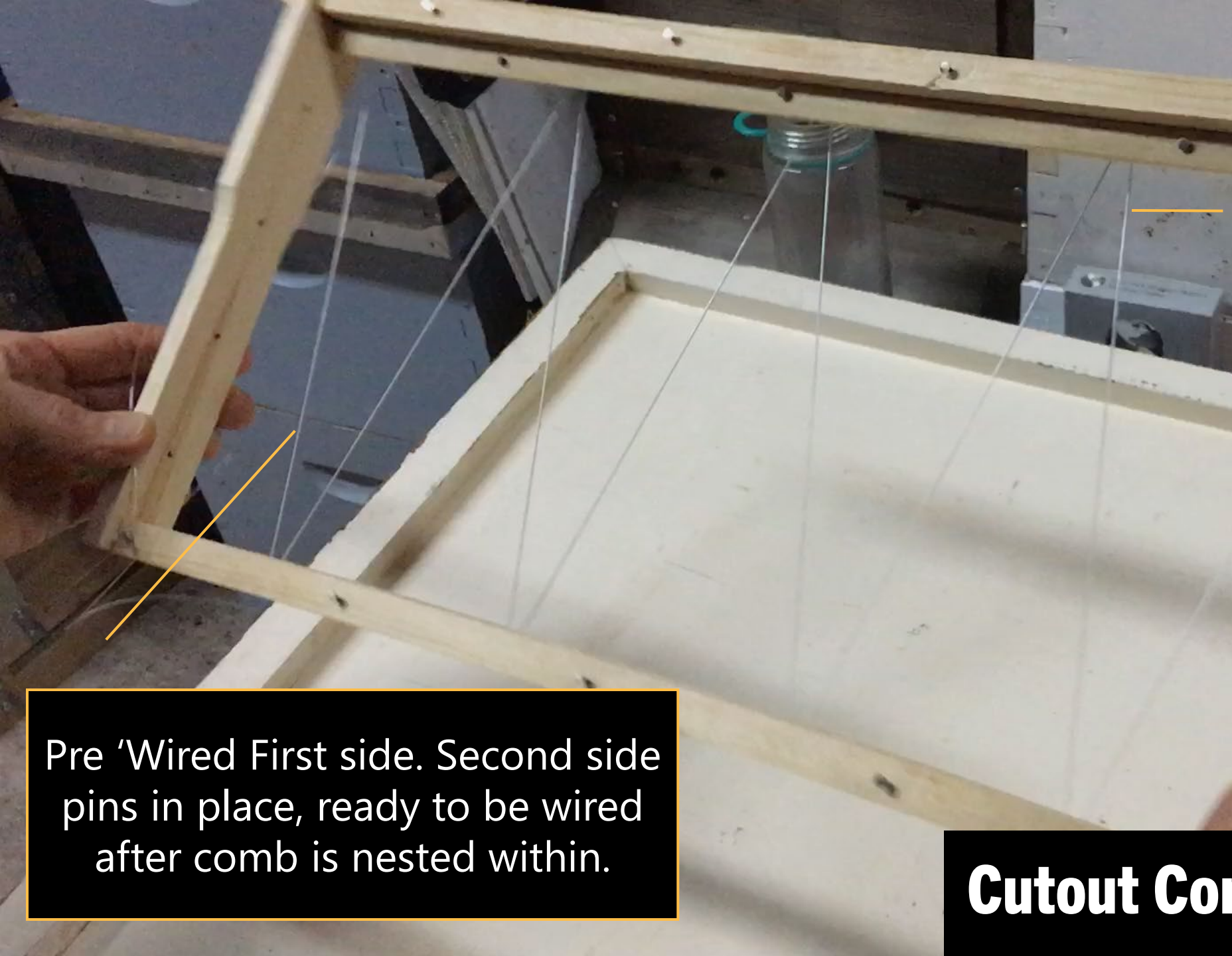


Oops!

Missing Frame(s)

If you leave a frame out....

- Bees will build into the open available space
- They will attach comb to whatever is above
 - They could also affix the comb on things sitting alongside
- **Recovery:** Cut it out and rubber band it into a wooden frame



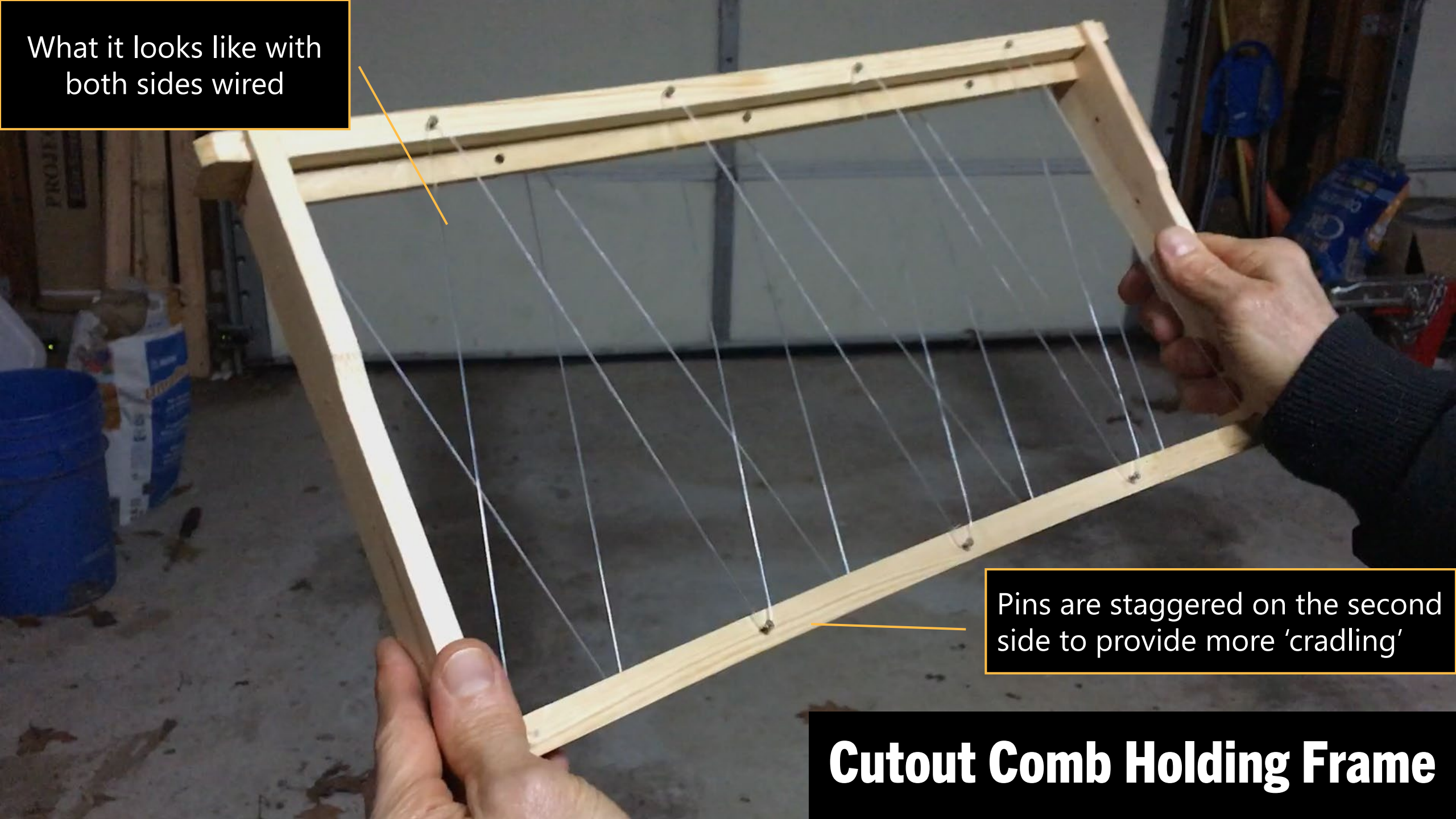
80-pound test Fishing wire



Pre 'Wired First side. Second side pins in place, ready to be wired after comb is nested within.

Cutout Comb Holding Frame

What it looks like with
both sides wired



Pins are staggered on the second
side to provide more 'cradling'

Cutout Comb Holding Frame

**Bad
Evil
Things
Happen
With
Slotted
Frames**



**BEST
PRACTICES**

Foundation Storage

Store Foundation Well

- Keep it in a cool dry place
- **Make sure it is not near any volatiles that could taint it**
- Use it as quickly as possible
 - The fresher the wax is, the more odor it maintains
 - Strong wax odor is more enticing to the bees
- Use care if using wax during cold conditions
 - It becomes very brittle when cold
 - Warm it up before use





**LET'S TALK ABOUT
FIXING THIS**



Fix Poorly Placed Comb

Scrape it off, Reapply

- Shake the bees off the frame
- Pull the frame and scrape off the errant wax
- Melt the wax and reapply it using one of the methods shown earlier
- Place it back into the hive – close to the brood nest

**LET'S TALK ABOUT
FIXING THIS**



**LET'S TALK ABOUT
FIXING THIS**

Fix Poorly Placed Comb

Set them up for success to rebuild

- Place the rewax frame against drawn comb on both sides
- Keep spacing tight and compact
- **Feed the bees**
- Confirm the colony is actively producing brood so there are wax making bees
 - Or put it in a colony that will is currently capable of building wax
- Keep things closed up so they can maintain the heat required for the operation



BetterComb
by Betterbee

BETTERCOMB

No longer being
manufactured



Image credit: Virginia and Vicki | Pemi-Baker Beekeepers Assoc.

The **DAVID WADE** APPROACH

Place foundation along the edges and let the bees repurpose the wax to build honeycomb – a great method to get frames drawn out for those times where bees are not drawing comb

4/14 R4

Visual Redistribution of the rolls, this works...





Inspect Regularly

Find and Correct Early

- Check for errant comb
- Catch and scrape off bad comb before it gets to far
 - Being proactive is efficient use of worker bee time
 - Do not let them get to far building comb that is unusable
 - You want them concentrating efforts on building good, usable comb





LIVE WITH IT

- Rotate bad 'mostly usable comb' to the bottom.
- Sort it out next spring when the bees move up



Control Heat

- Close off screened bottom boards
 - Insert bottom board plastic
- Keep entrances smaller with entrance guards
- Reduce ventilation to help keep heat in the interior chamber
- Work with bees trying to warm the space for wax production



Collect Errant Comb

Keep a zip-top bag

- Use it for rewaxing
- Reserve it for the David Wade Approach



Employ Nucleus Colonies

Workhorse Comb Builders

- Nuc colonies: Great at building comb
- Compact; Bees want to build wax for brood in their small space
- Michael Palmer talks about employing them to be **comb building factories**

- ◀ IT IS AVENTAGEOUS to use **POLY NUCS**
 - Great heat control inside these boxes
 - This one is 6 frames, which means more resources/workforce to build out wax
 - It is compact with a top feeder above

Employ Swarms

Workhorse Comb Builders

- Prime Swarms are naturally stocked with wax building bees
- A swarm in search of a new home needs to build comb in the new location
- They tend to be very good at building out honeycomb



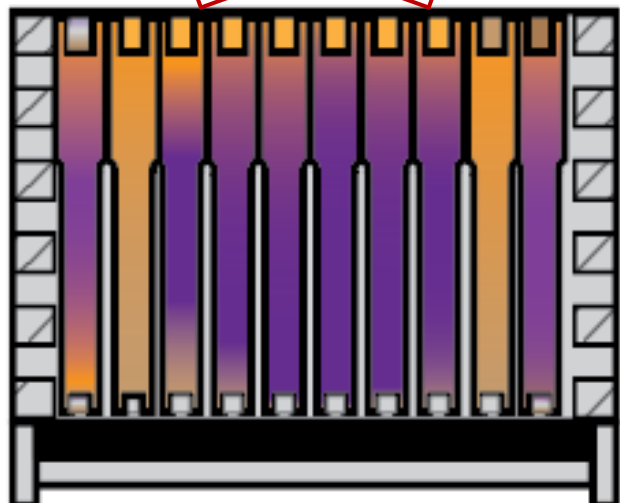
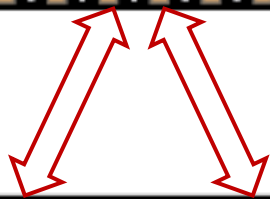
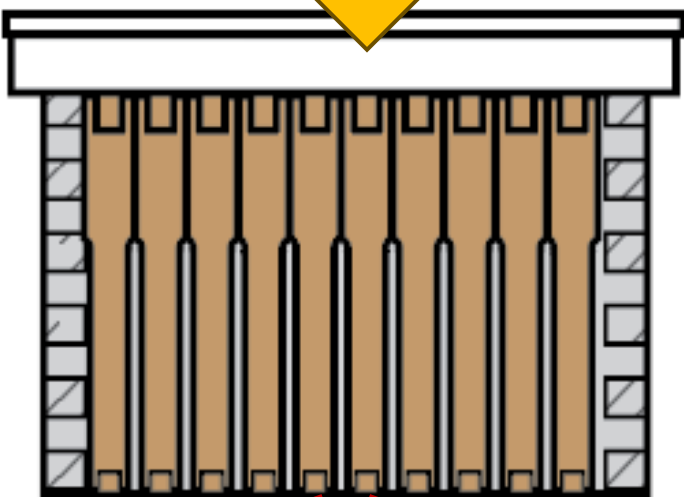
Feed Wax Building Bees

Continually Supply Food

- Keep feeding bees that are in wax building mode to extend wax creation windows
- As summer comes, bees have heat, wax building bees, and resources (if you keep supplying them)
- Feeding also keeps queens laying – this keeps the workforce going a little bit longer
- One to one sugar solution – *keeps it going*



When adding a new box



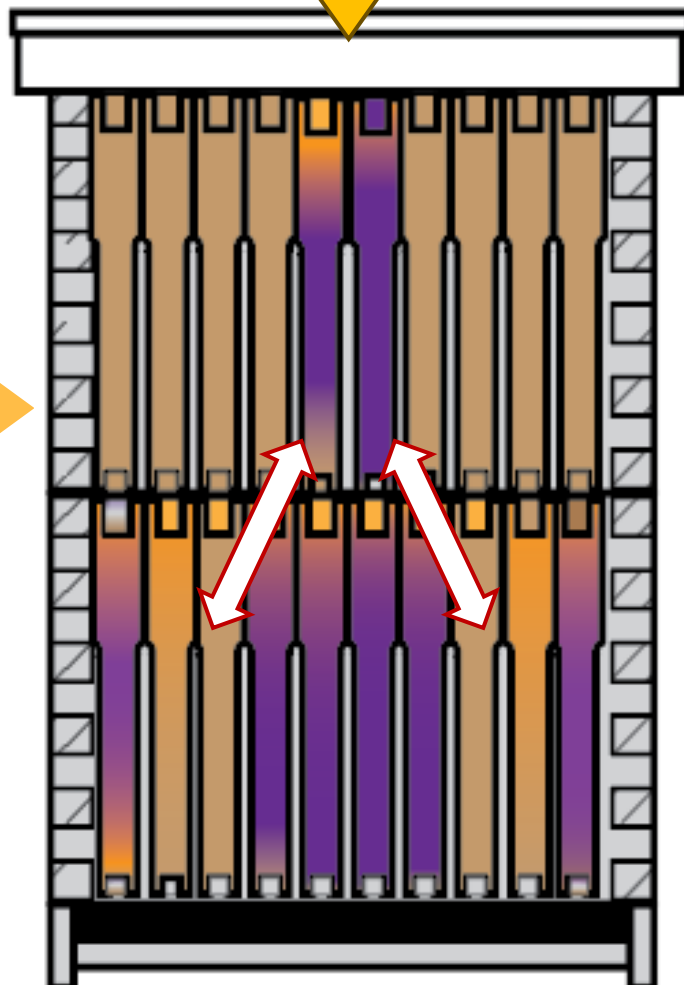
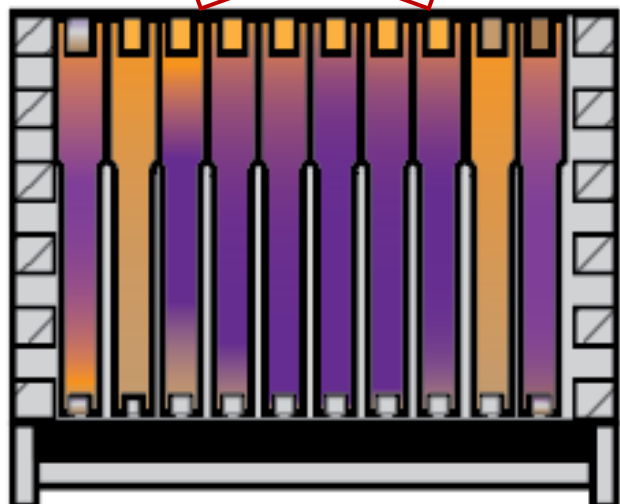
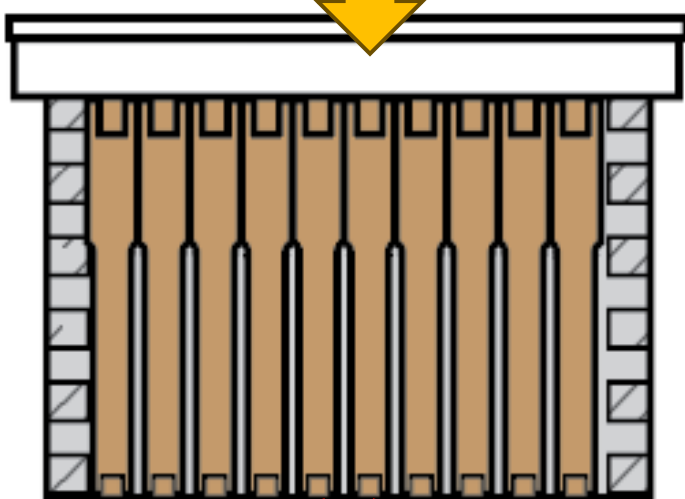
Moving to Two Boxes

Enticing Bees to Move Up

- Moving two of the brood frames up

When adding a new box

Swap some frames up



Moving to Two Boxes

Enticing Bees to Move Up

- Moving two of the brood frames up
 - Center them over the bottom box
 - The two frames will draw the bees up into the second box
 - Note: Perhaps Overengineered as the bees will move up without this; but it seems to be a worthwhile practice

Be mindful of weather impacts to incoming resources. Example, **long rains thwart nectar gathering**



With a rain event, gather takes a pause, and this can hamper wax production – *consider feeding*

Keep Varroa Contained

Maintain healthy colonies

- Sick, unhealthy, parasitized bees, may not be up to the task of building out comb



Prep Foundation

Warm and Spray

- **Place frames in the sun** before inserting
- **Spray new foundation** with sugar solution
 - This introduces comb to worker bees – they come to clean it off
 - It doesn't hurt that they are consuming sugar solution either



Festooning

Bees 'Festoon' to build wax

- They hang in chains and this plays a role in drawing straight honeycomb



Image credit: TheBeeMD

Image credit: Gross Encounters of the Furred Kind

What are these?



Image credit: David Haslet Photo

What are these?

Bee Stairs...

You often see these and formations for "hive beetle jails" on bottom boards



Image credit: David Haslet Photo

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