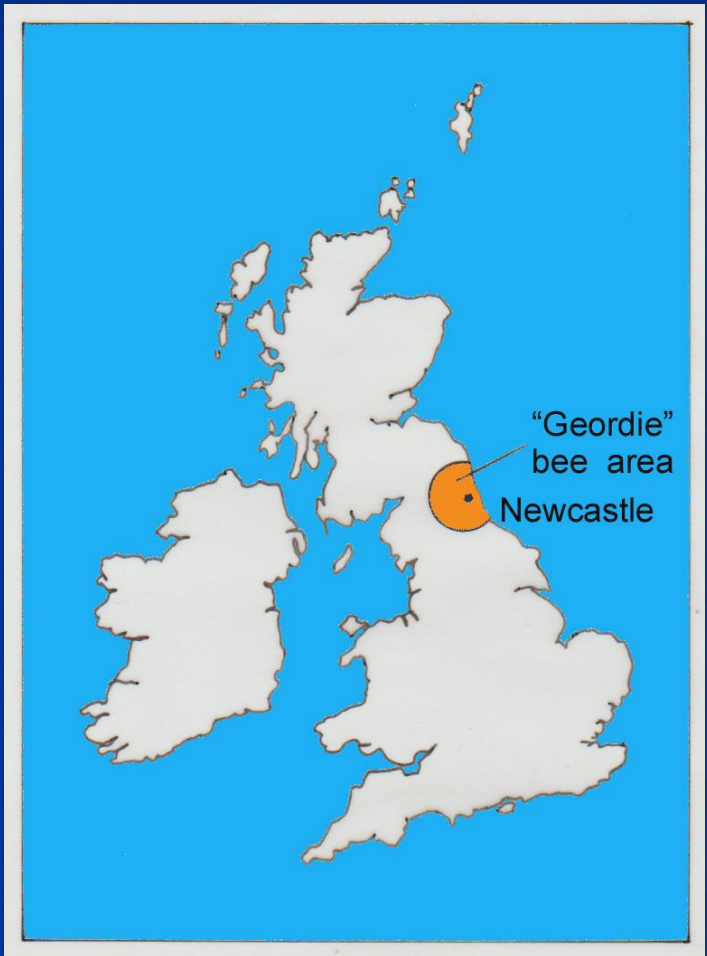
“Geordie Bees” Bite the Mite

Dorian Pritchard,

Dip Gen, PhD

SICAMM, 2018, Finland

“Geordie” is an affectionate nickname for the people of Newcastle. Most of my bees are native and near-native *Apis mellifera mellifera* from the Newcastle area.



One of my Geordie *Apis mellifera mellifera* foragers on Clematis

- My bees do not permit Varroa in their hives- I have not treated them in any way against Varroa since 2002!
- But I could not discover their secret.

Colony JB5

However, in 2010, one hybrid colony, JB5, developed a very heavy mite infestation.

I was delighted!

Over the summer, colony JB5 overcame the mites.

And what is more, the bees showed me how they did it!

These bees look similar to those of colony JB5, with many obviously hybrid workers, each with a ginger band on the abdomen.

Summary

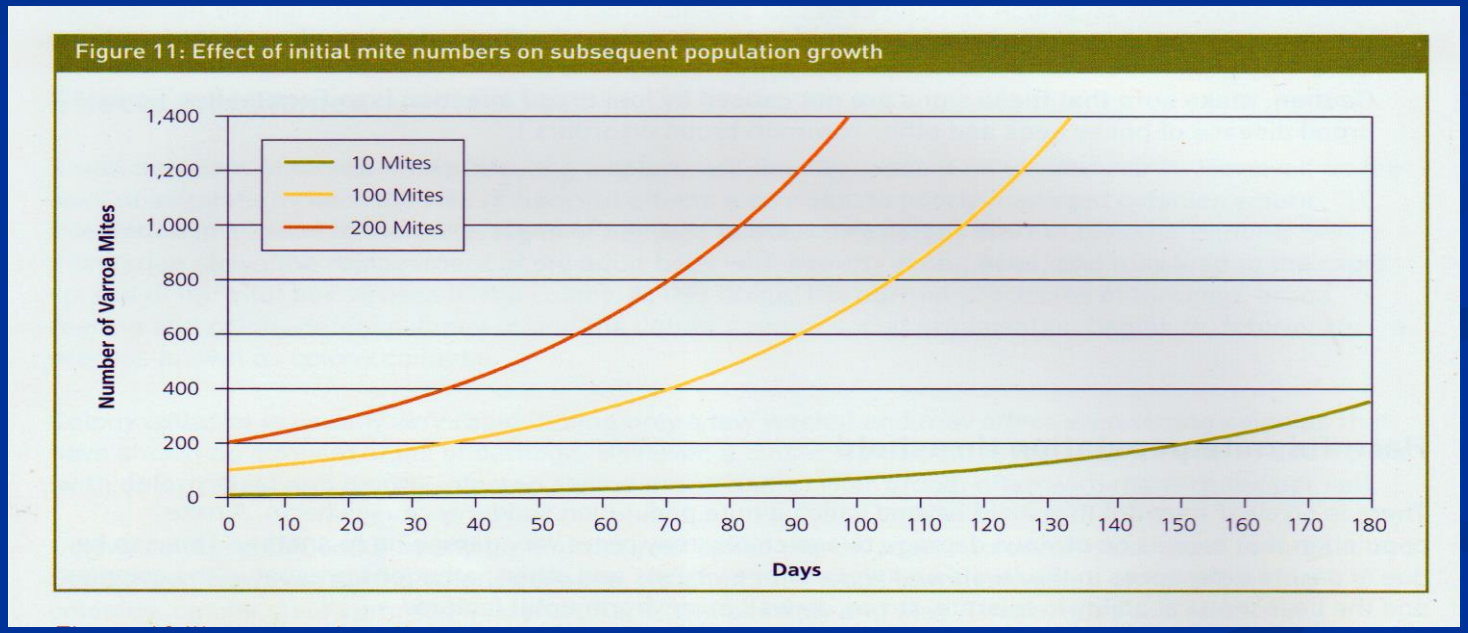
- I found that these (hybrid) Geordie bees killed mites by biting them with their mandibles; but they also did several other things.

- From this study, I deduce that native bees of North-East England may exploit *as many as nine* opportunities in a season to keep their hives free from mites.

THE CENTRAL DOGMA:

A few hundred varroa mites early in the season will proliferate exponentially and overwhelm a honey bee colony.

My observations argue against this.

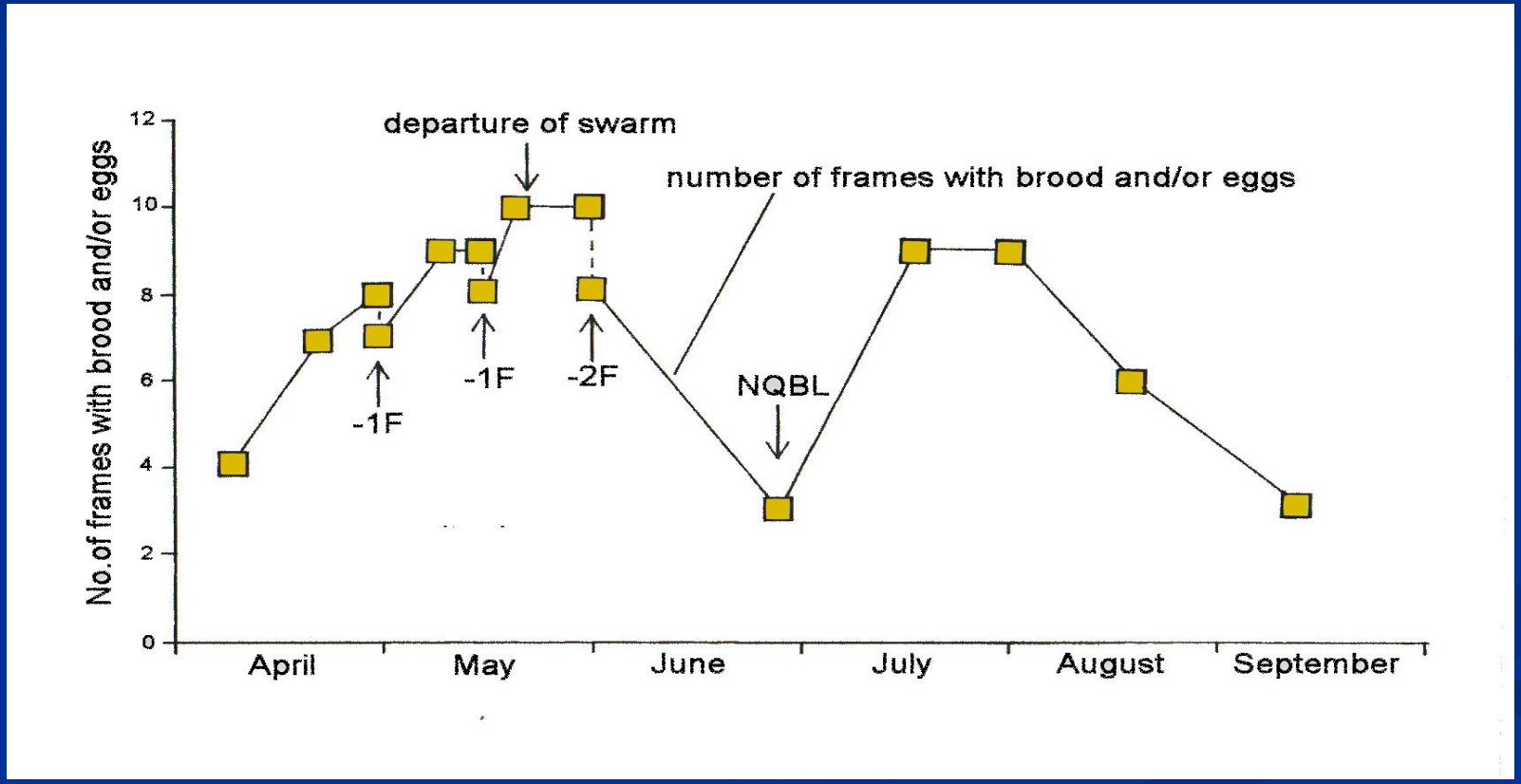


Ref.: Richard Ball, Mike Brown and Selwyn Wilkins, *Managing Varroa*, Food and Environment Agency, UK, 2009

Change of brood nest size in hive JB5, and other major events during the summer of 2010

-1F, -2F: removal of frames; NQBL: New Queen Began Laying

Note: brood nest size never fell below 3-4 frames

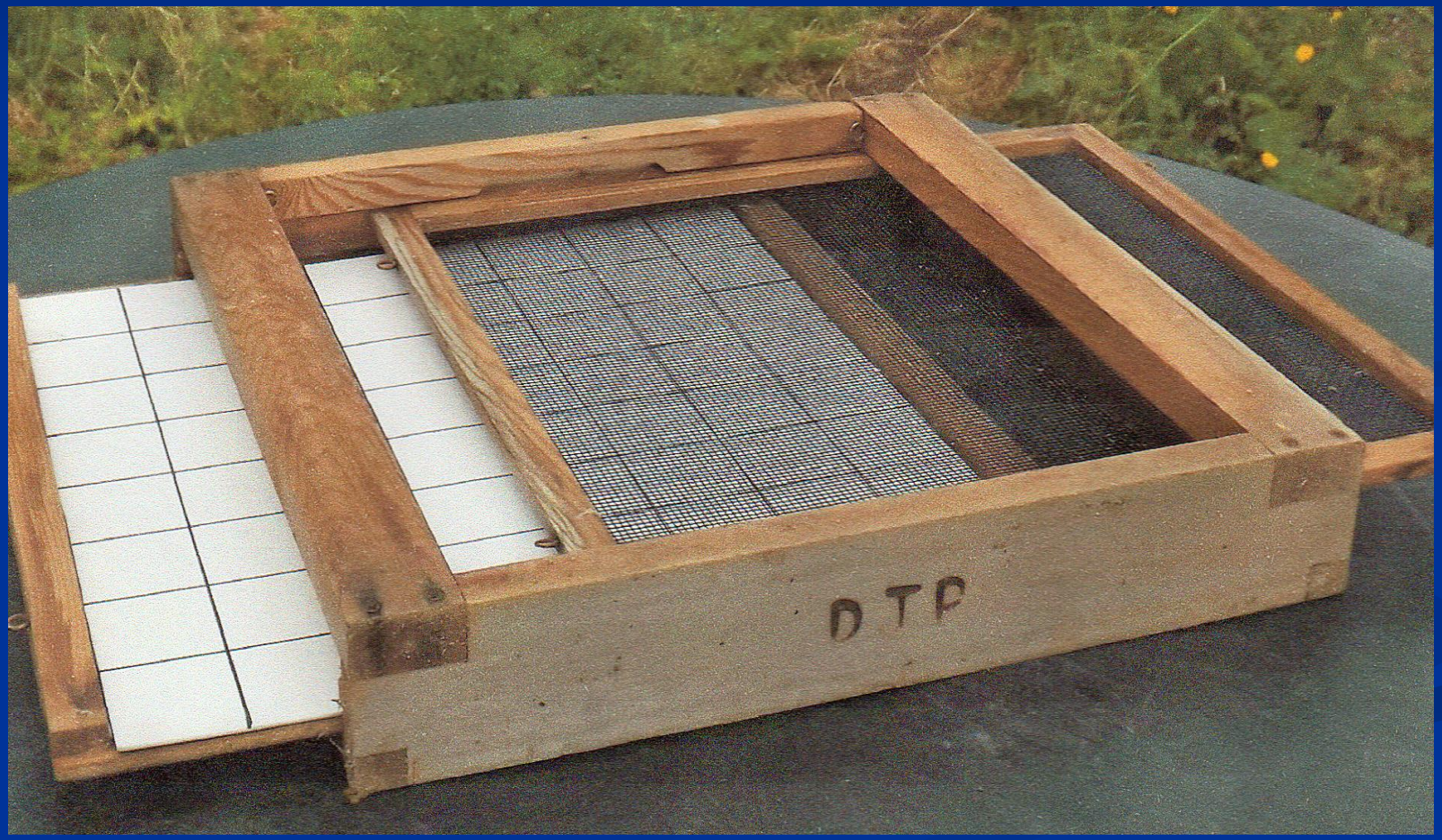


Pritchard, D J, 2012

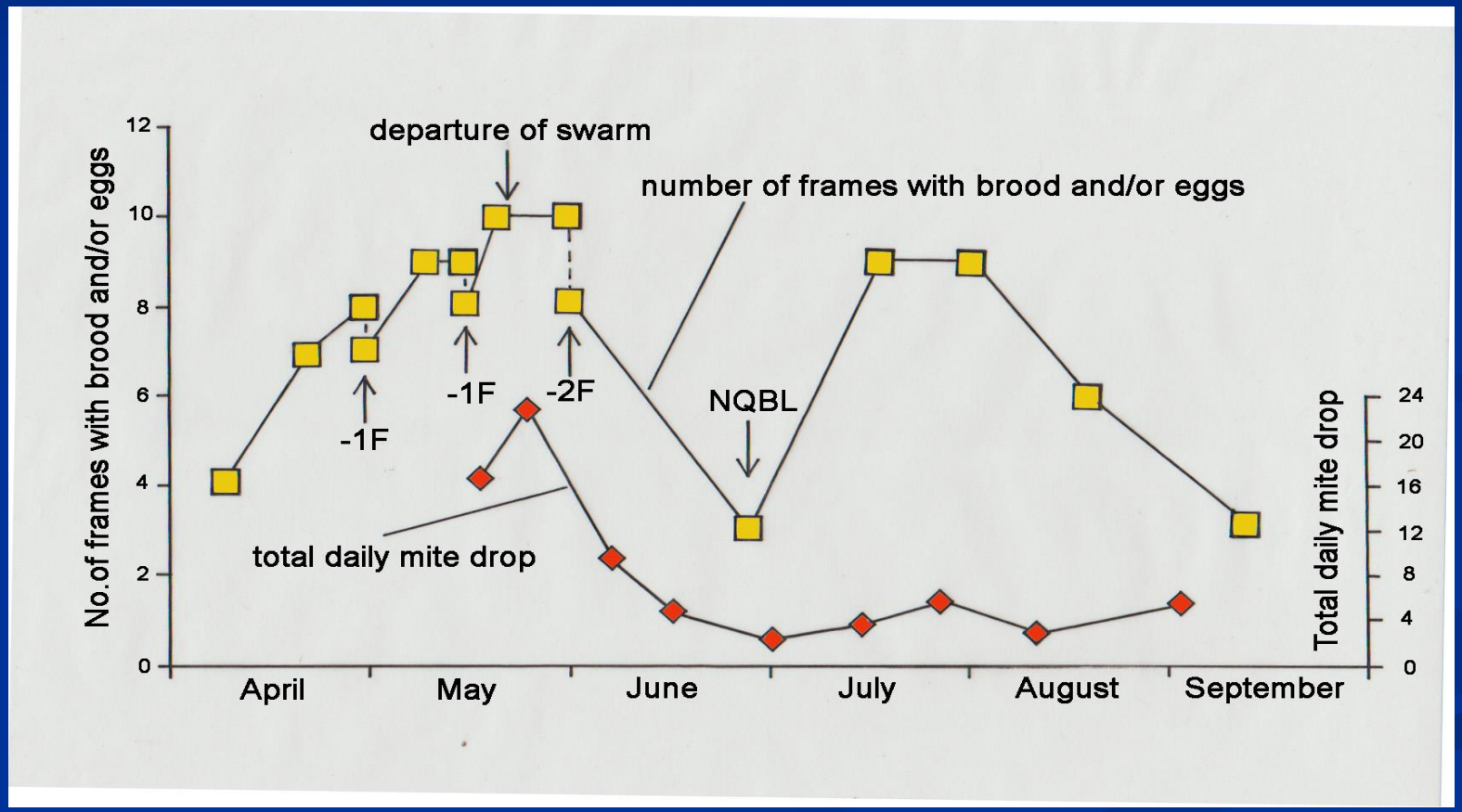
Minimal broodnest size

- There should have been no brood 4 weeks after the old queen stopped laying - pupae were probably dead in supposed "capped brood".
- Was the dead brood parasitized by varroa mites? If so, the Dark bee brood could be *hypersensitive to varroa infestation.*
- *Absence of VSH also may have enabled mite death by entombment.*
- Was this the colony's first line of defence?

Thornes' varroa floor

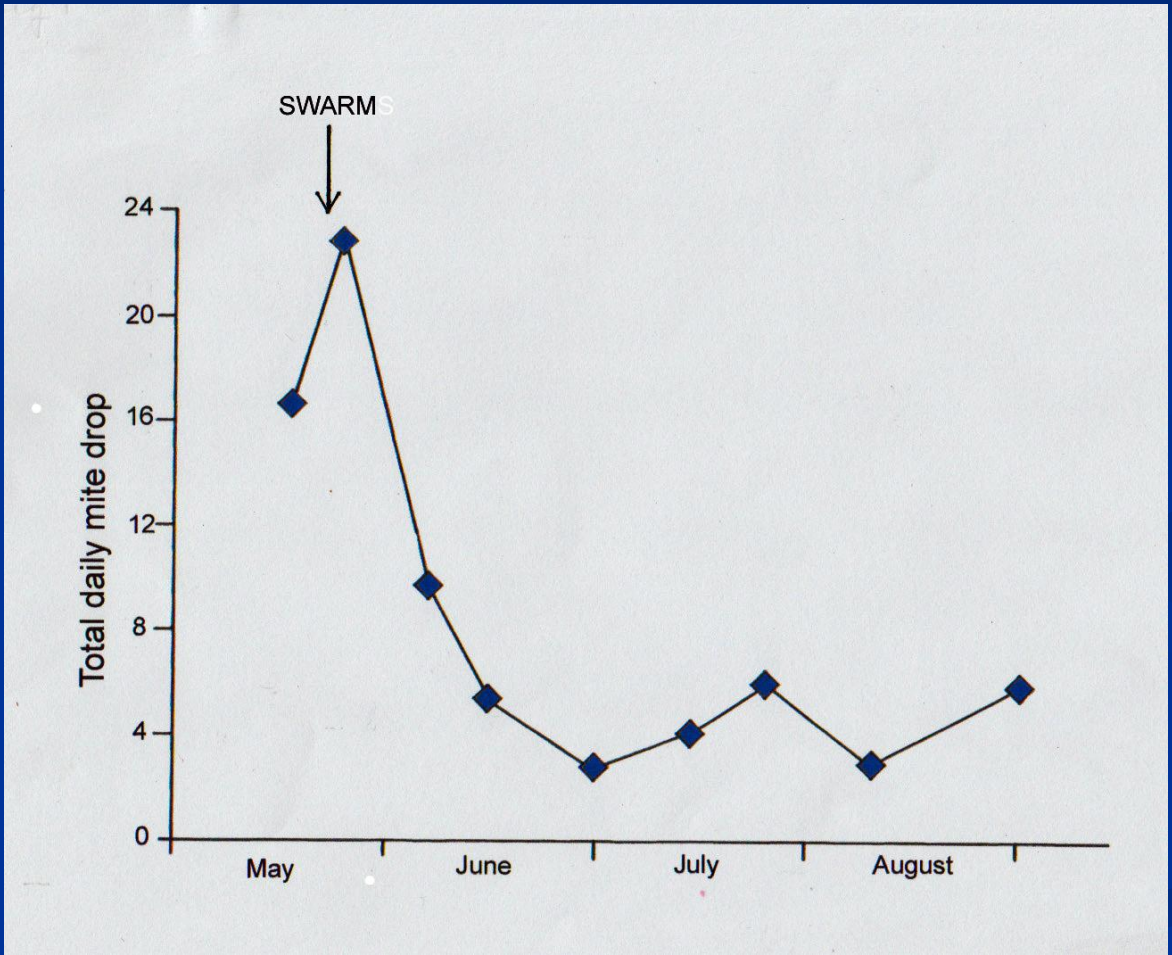


In late May, natural mite drop was 23 per day, nearly 6 times the supposedly lethal level. But in JB5, after swarming it dropped to a low level and never recovered.

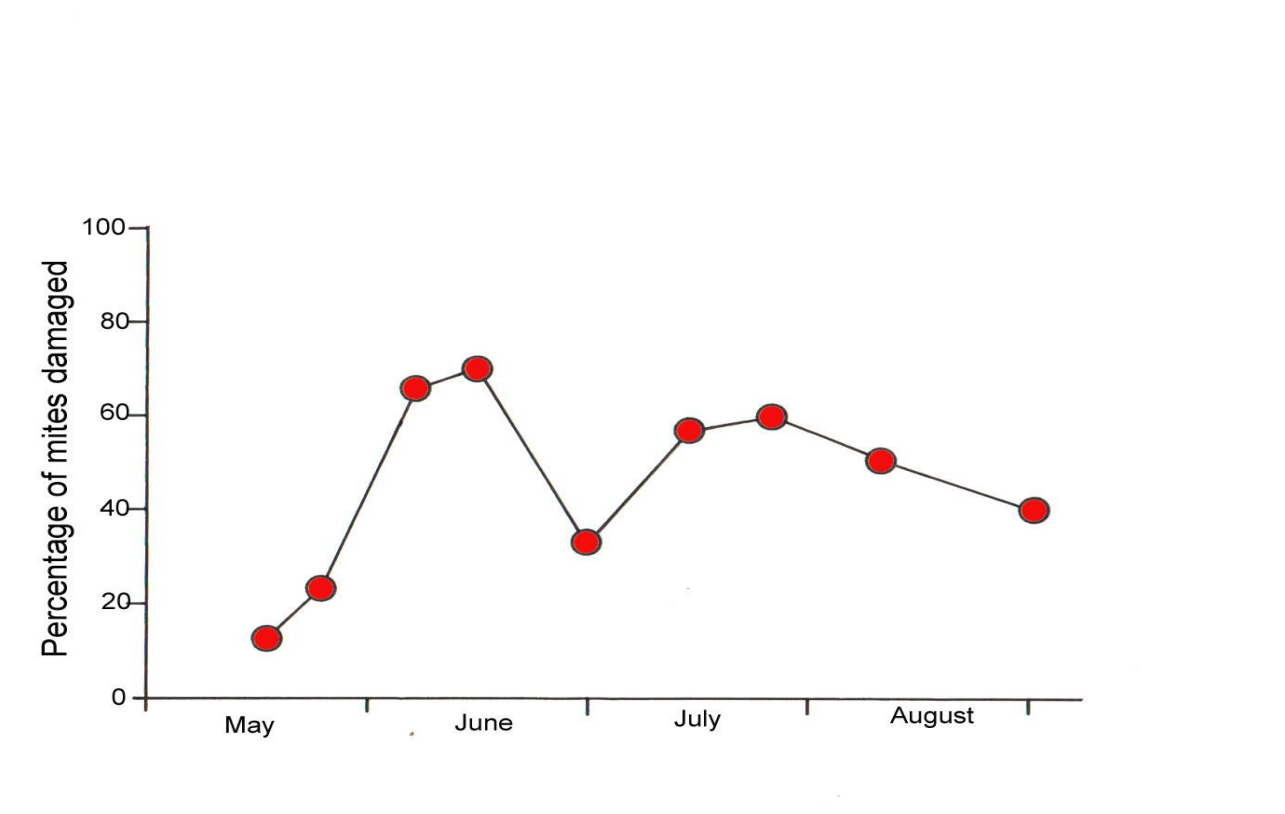


Pritchard, D J, 2012

There was no evidence of exponential increase in mite numbers; fallen mite numbers just dwindled away. The question now is why?



NB: However, the proportion of *severely damaged* fallen mites increased in a complex pattern!



These are intact, adult female Varroa mites

(Ref.: Ball, Brown and Wilkins, *Managing Varroa*,
The Food and Environment Agency, UK, 2009)


Figure 15: Close-up of adult female varroa mite


Figure 14: SEM varroa mite showing mouth parts, legs and ventral surface

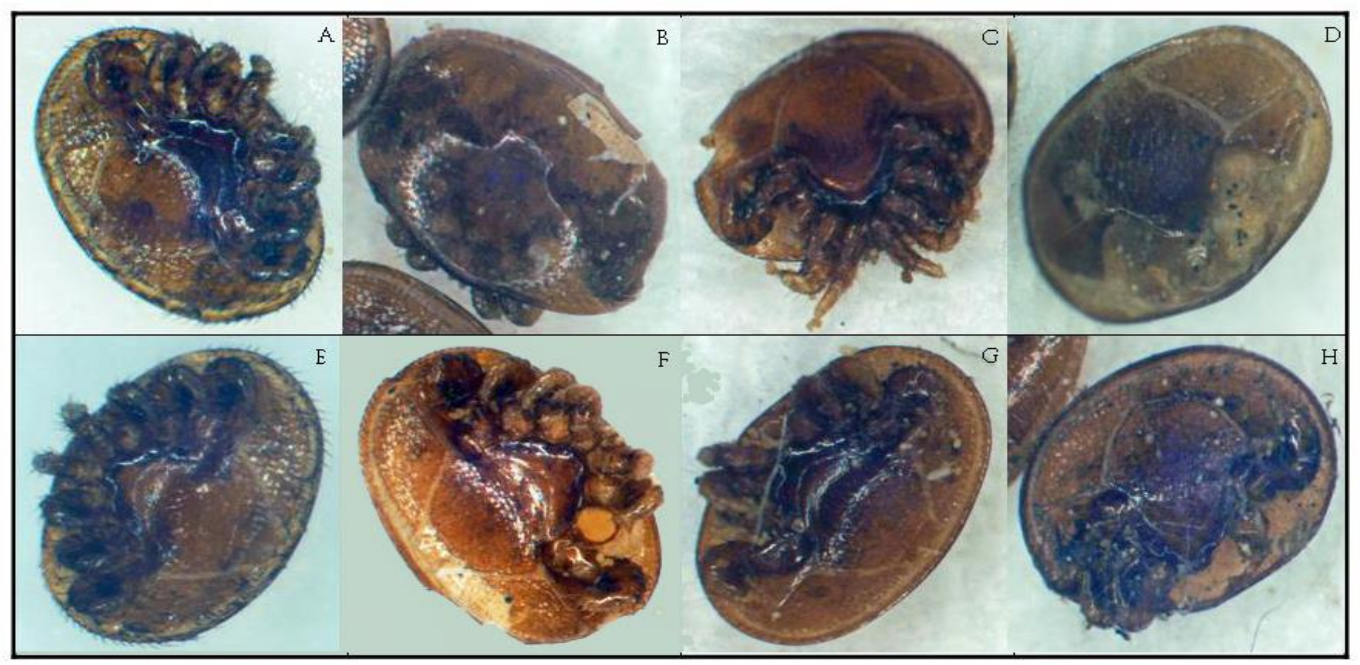
Many of the fallen mites showed severe physical damage

A,E: Intact mites, no obvious major damage.

B,C,F,G: Gashed idiosomas (carapaces) and loss of legs consistent with mandibular allogrooming.

D,H: Loss of all or several legs.

See Pritchard, D.J. 2016. Grooming by honey bees as a component of varroa resistant behaviour. *J. Apic. Res.* **55** (1) 38-48.

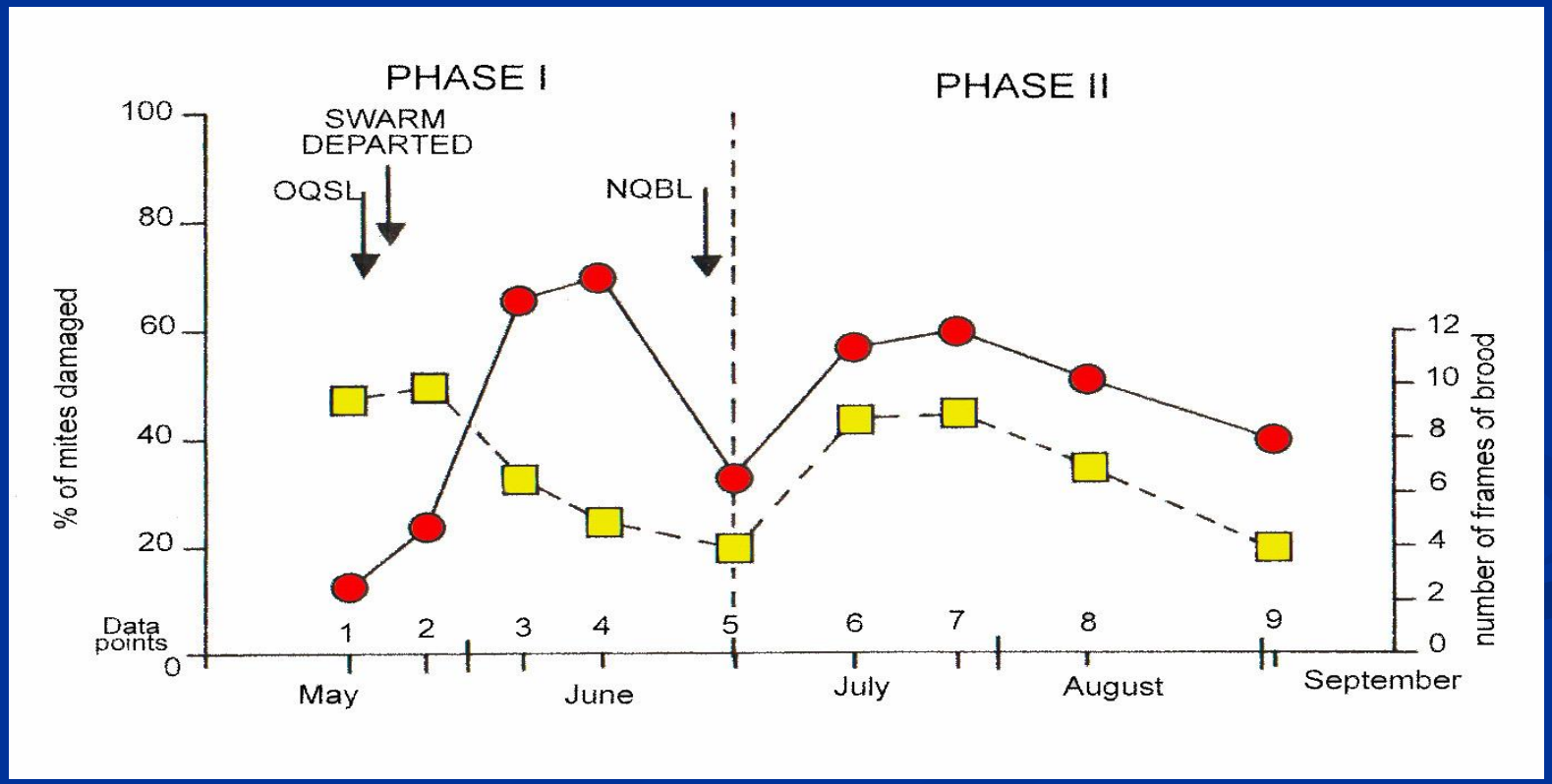


The patterns of colony growth and extent of mite damage show two distinct phases.

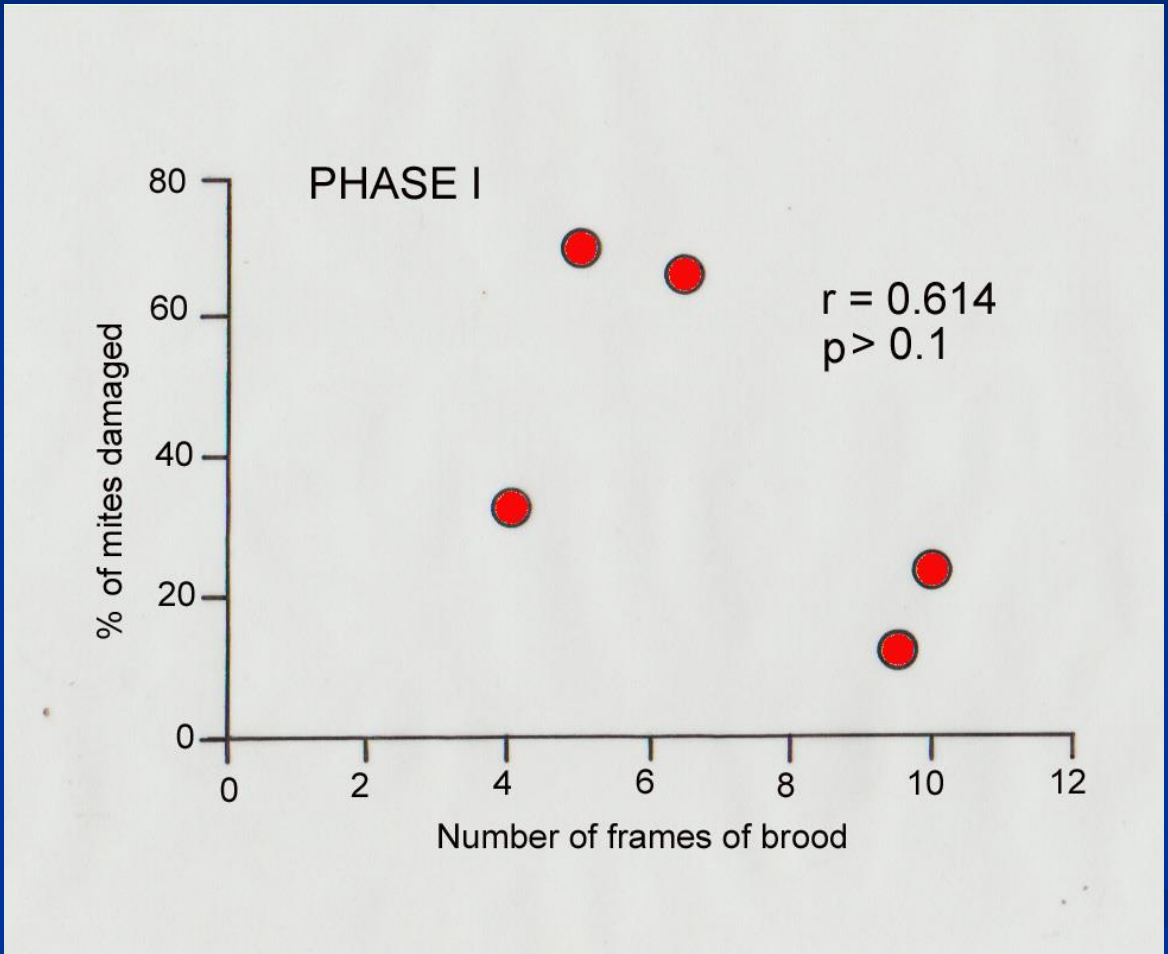
Data Points are numbered 1-9.

Note that DP5 marks the change from Phase I to Phase II.

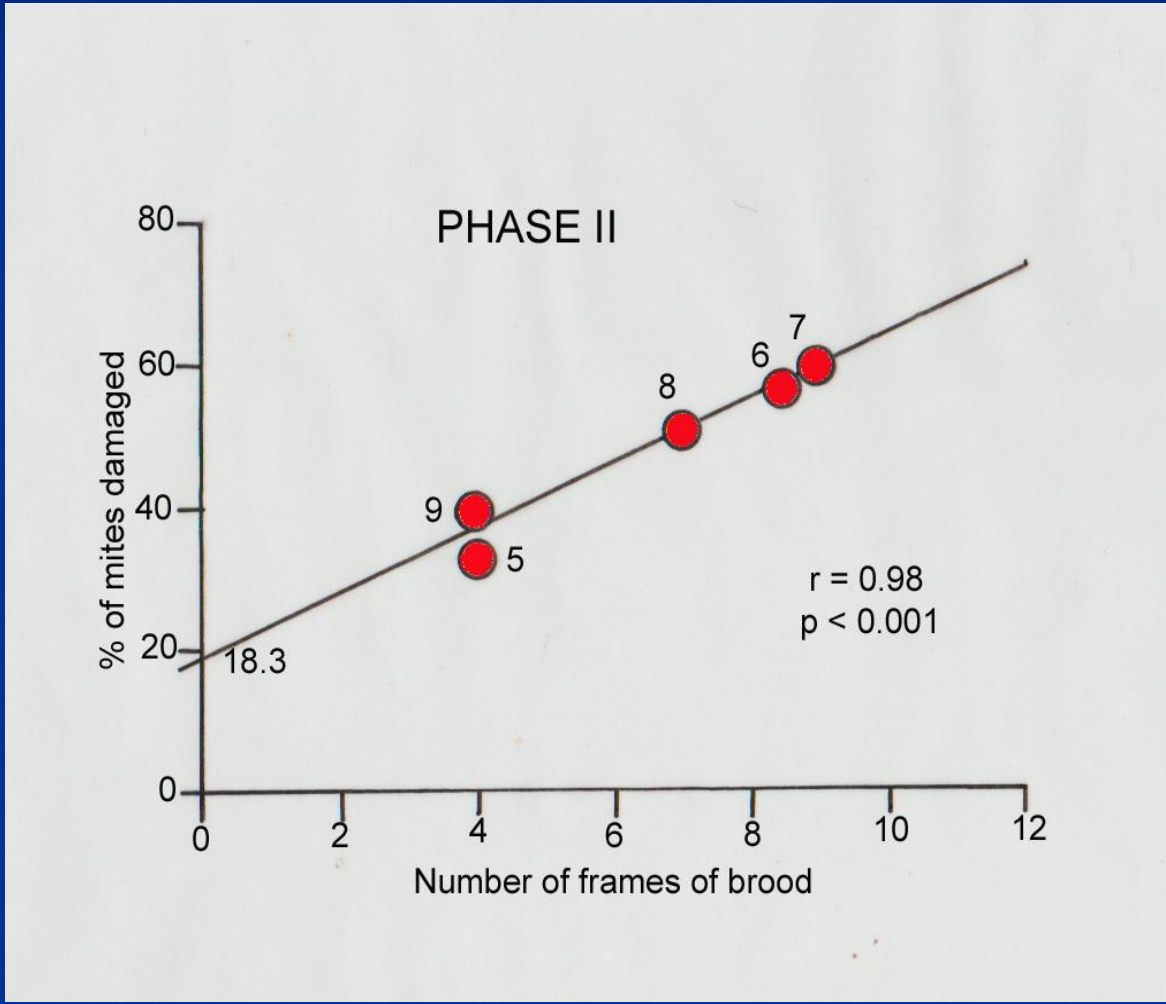
OQSL: Old Queen Stopped Laying; NQBL: New Queen Began Laying



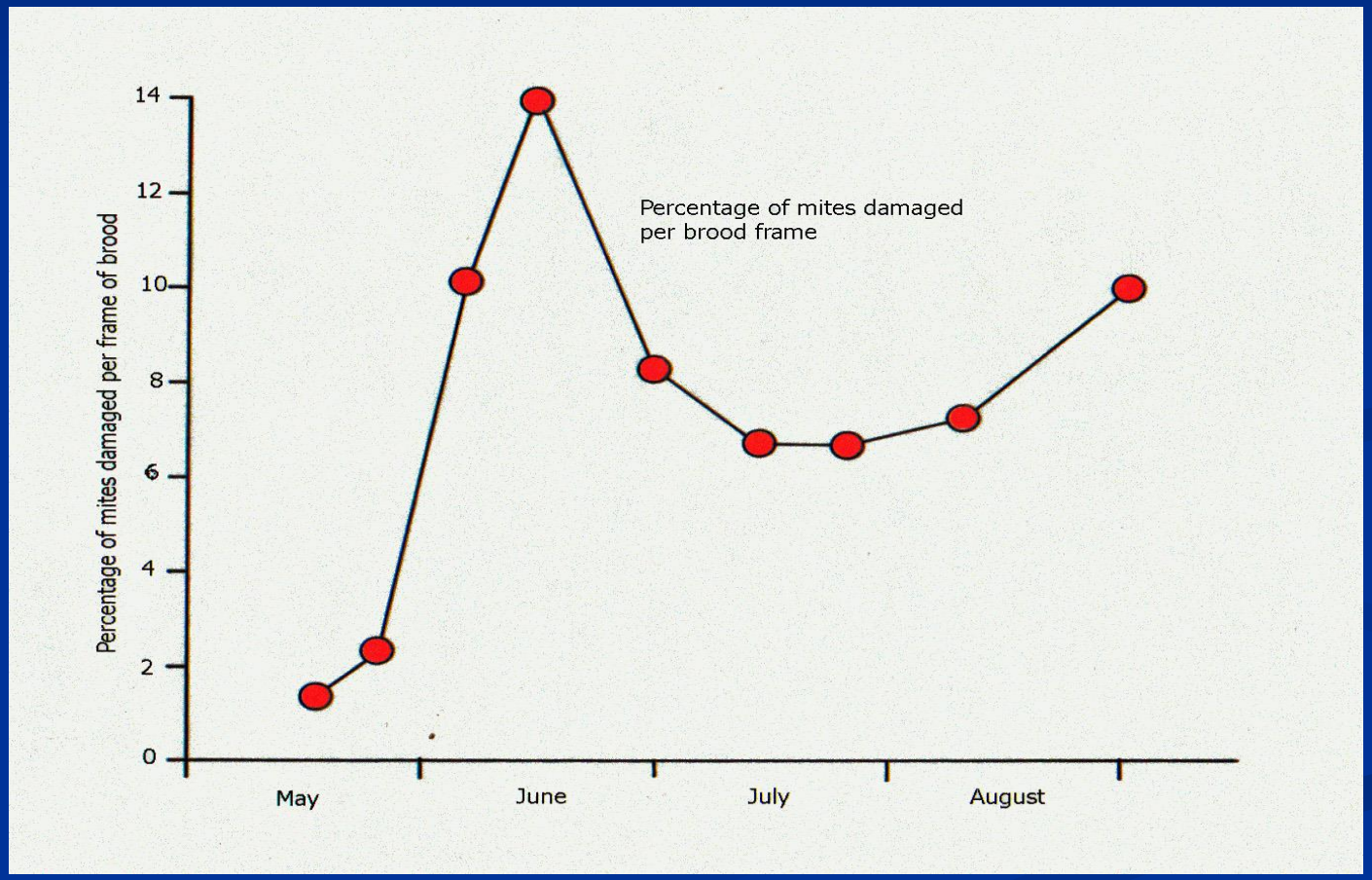
In Phase I there is no obvious relationship between broodnest size and % of mites damaged.



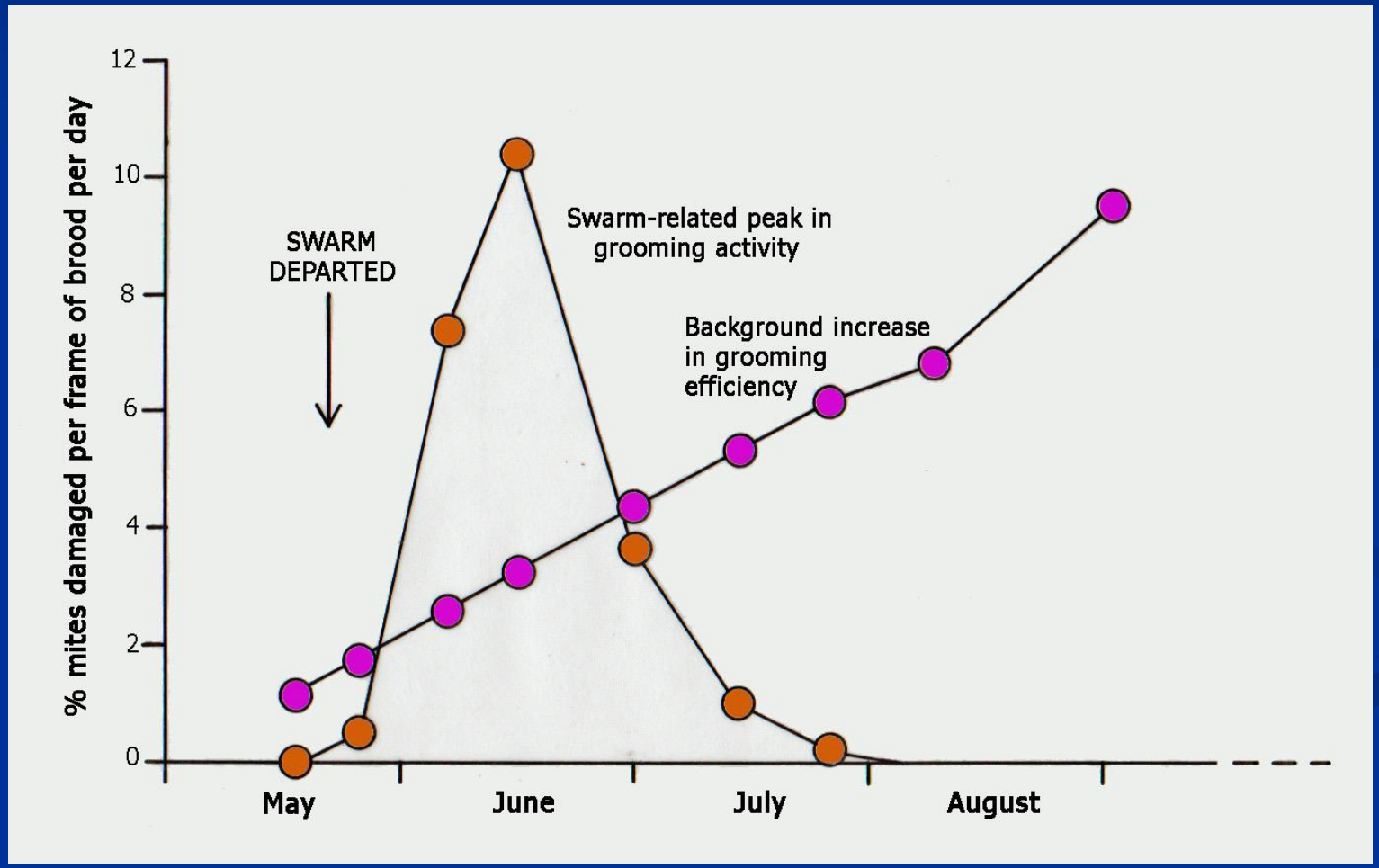
In Phase II % of mites damaged correlates very closely with number of frames of brood, irrespective of the order of the data points.



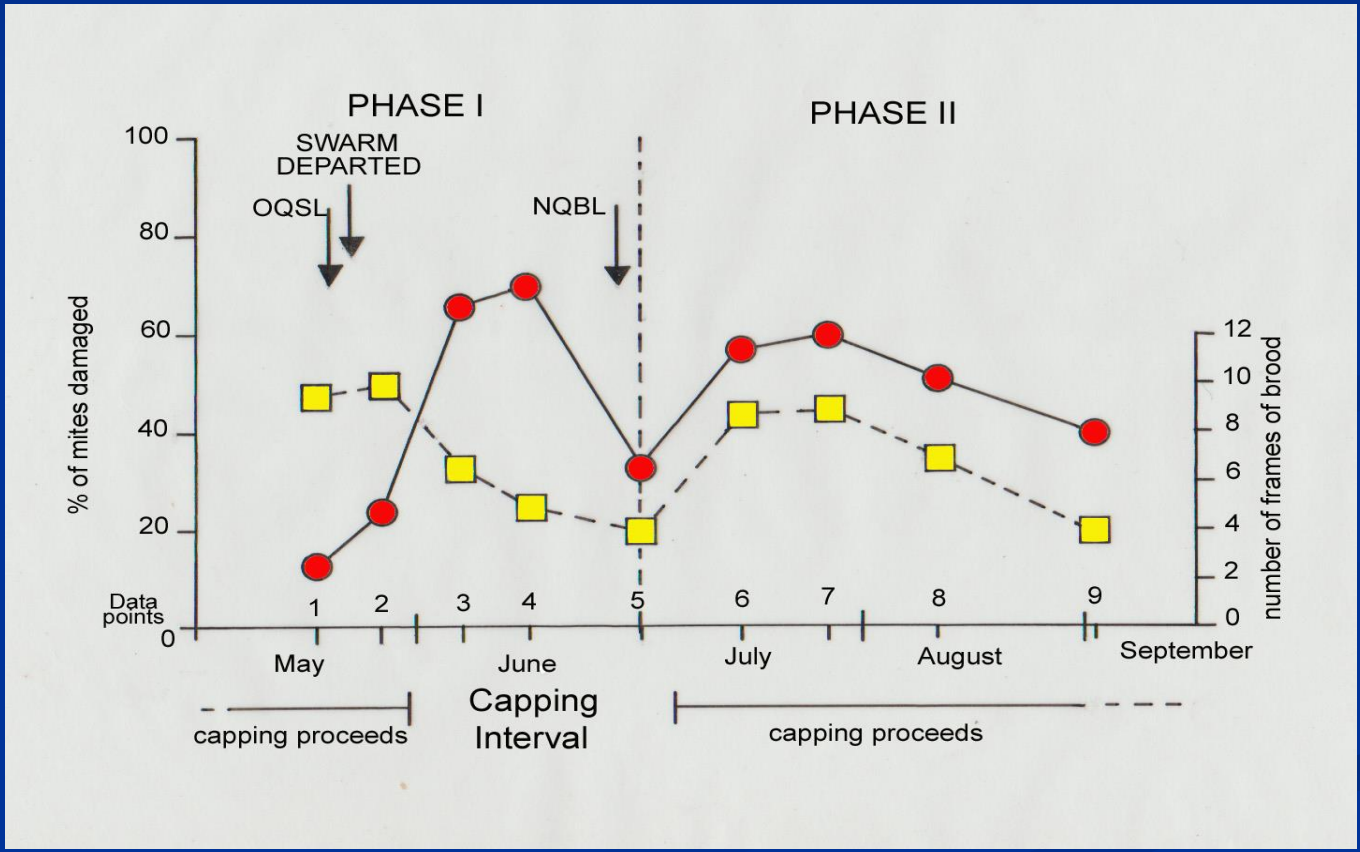
% of mites damaged, *per frame of brood*, varied strikingly across the season.



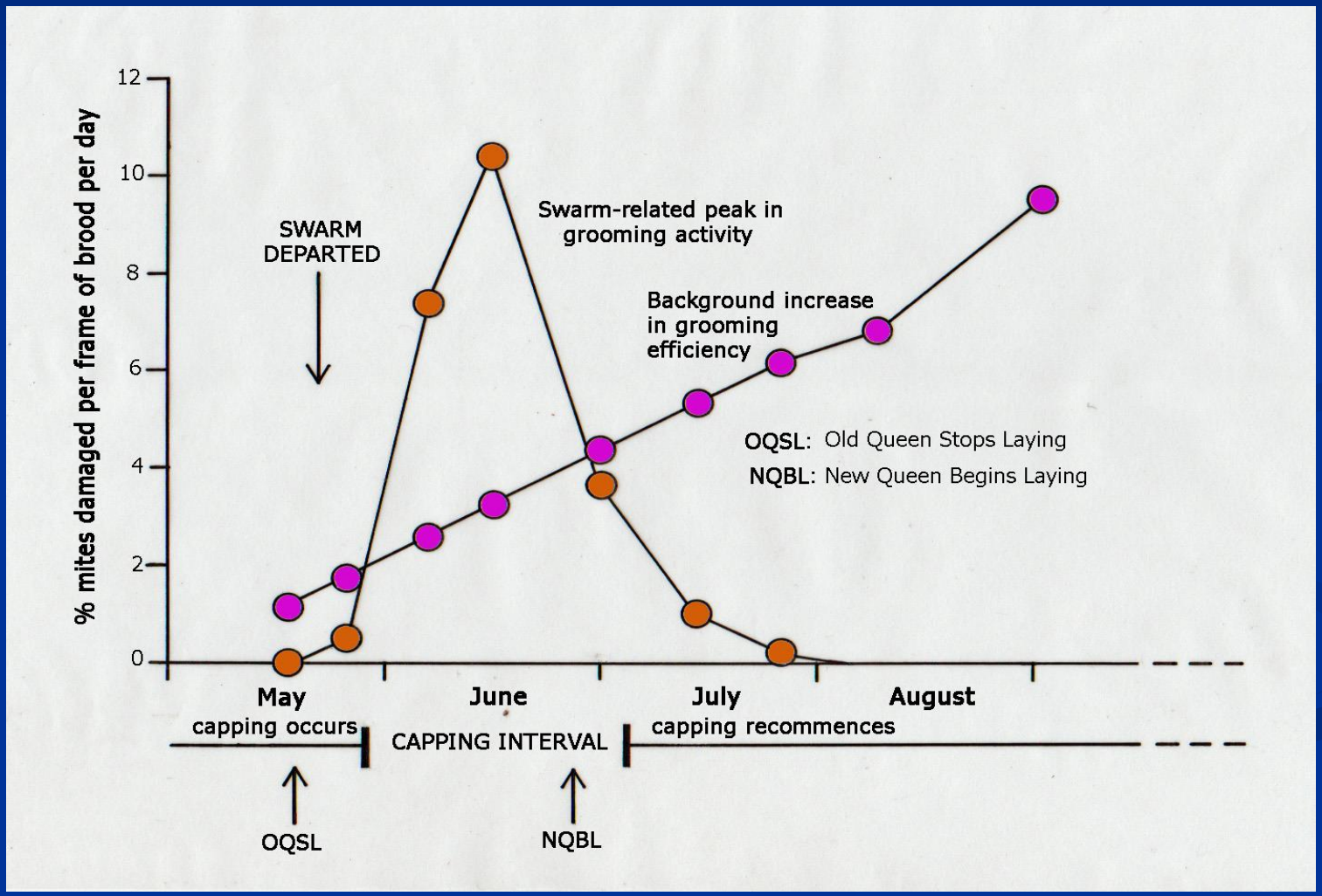
There seem to be two components to this pattern:
Orange: a dramatic peak in mite damage in mid-June, and
Purple: a steady increase throughout the summer.



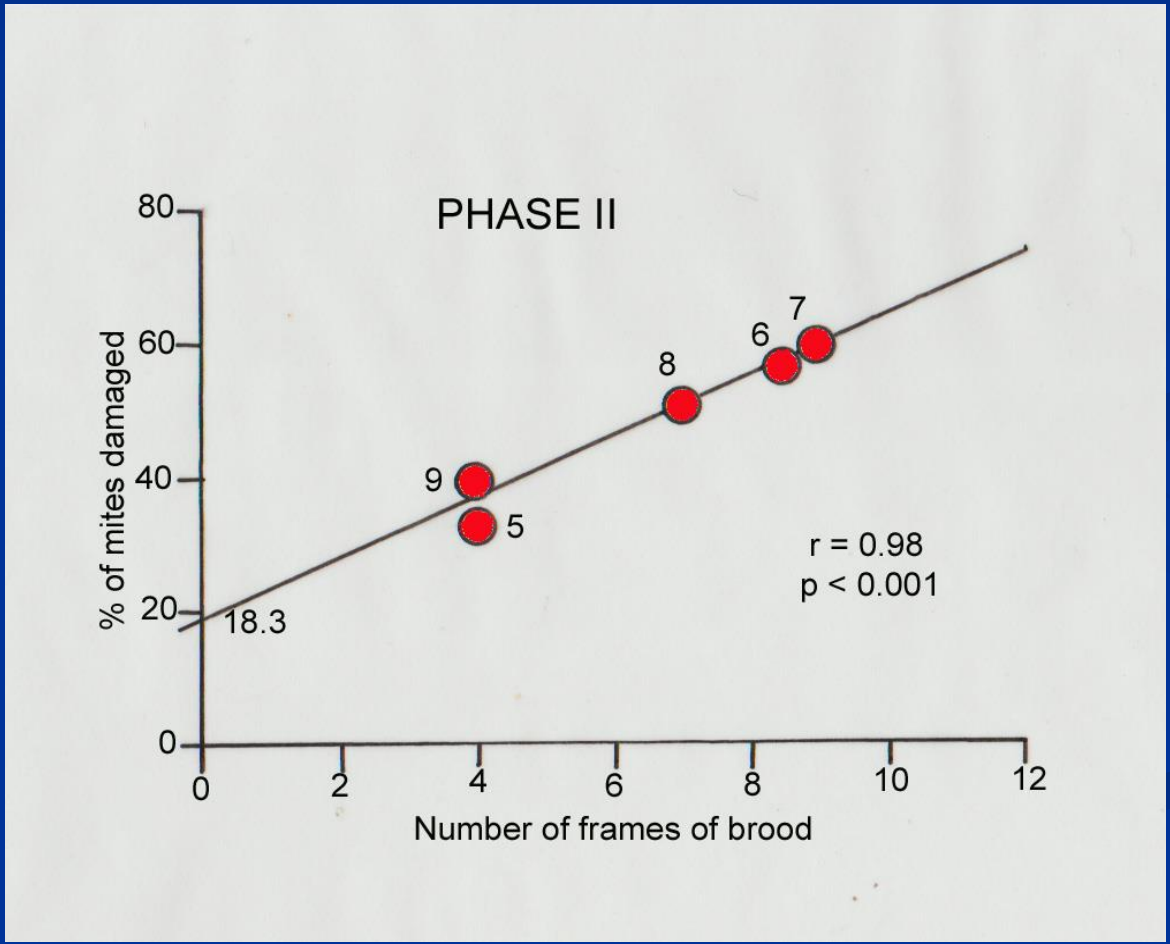
Note the *interval in brood capping* between the departure of the swarm and commencement of laying by the new queen.



The high peak for % damaged corresponds *precisely* to the Capping Interval – when phoretic mites have no hiding place from guard bees!



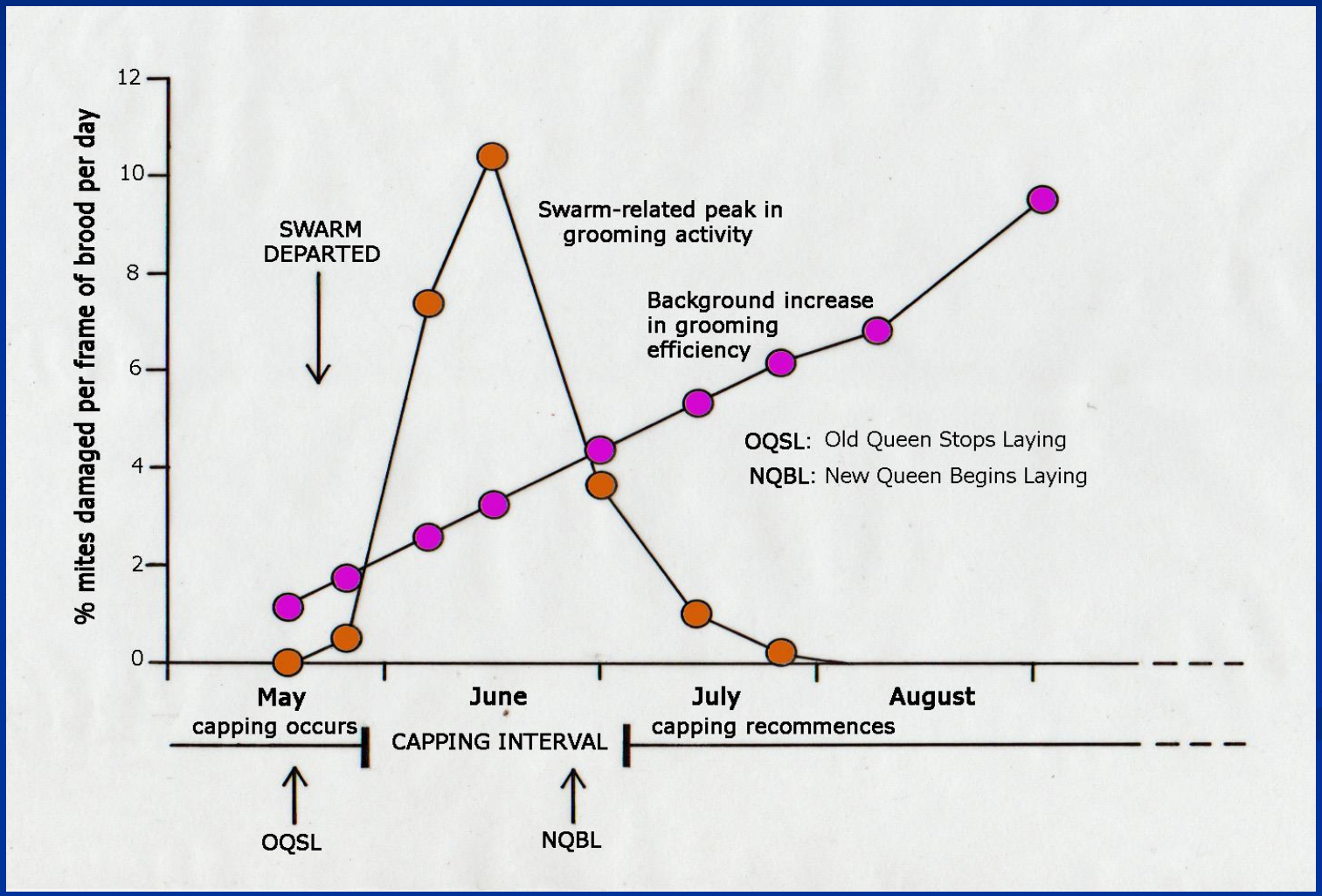
In growth phase II, the % of mites damaged correlates *almost perfectly* with number of frames of brood.
Why should that be?



Conclusion of the latter observation

- The graph shows that the capacity of allogroomers to injure mites increases in proportion to broodnest size.
- As the broodnest expands, open brood is more widely dispersed and mites are exposed to allogrooming guards for increasing lengths of time. This could be the explanation.

The background level of damage also increases *with time*.



Background increase in % of mites damaged

The colony apparently also gains in mite killing expertise as its experience of mites increases.

More allogroomers may be created, they may rove more widely, they may improve their individual skills and/or they may act cooperatively.

Probable Sequence of Events

- Low grade mite infestation

↓

Death of "Dark" brood and their mites

↓

Clogging of brood nest

↓

Absconding of old queen and many bees taking phoretic mites with them

- Extended brood break (+9 days)
- Mites unable to reproduce and remain in the phoretic state
- Emergency queen cells formed
- ↓
- Many young bees attacked by phoretic mites, inducing hormonal changes in them and triggering auto- and allo-grooming behaviour.
- ↓

- Bees kill phoretic mites in massive numbers –up to **70%!**
- Bees' expertise in mite killing increases, <u>but new brood provides safe havens!</u>
- ↓
- As brood nest expands, safe havens become ever more distant ,allowing allogroomers to catch and injure progressively more and more of them.
- ↓
- Mite reproduction reduces and eventually fails altogether

Brood Breaks

- Typically, Geordie bees have 3 brood breaks:
  - 1. After swarming
  - 2. During "the July forage gap"
  - 3. In mid-winter

  - At each of these, 2 things may happen that would reduce mite numbers:
  - 1. They cannot reproduce
  - 2. Allogroomers destroy them.
  - This makes a total of at least 9 opportunities for Geordie bees to destroy a mite infestation!

CAUTION

Removing mites by chemical treatment denies them an essential training experience.

If you want varroa-resistant bees, do not deny them the chance to learn what to do!

Throw away the poisons and let your bees fight their own battles and you will have lastingly healthy bees!

The end of JB5

- By the end of the summer of 2010, mite drop in hive JB5 was negligible and two supers of honey were taken.
- This colony came through the winter well, with a low over-winter mite drop.
- The new queen was ginger, as were the other 2 in the nukes set up in May, suggesting that *ginger hybrid bees may be more tolerant of brood infestation than "dark"*. All 3 colonies were later re-queened with dark queens from a different line.
- None of the hives given donor frames from JB5 developed mite infestations. Since 2010 virtually no mites have been seen in the apiary.

The Message

- The message is that Northern native *Apis mellifera mellifera* is quite capable of defending itself against *Varroa destructor* and can exploit possibly up to nine or more opportunities to do.
- So:

Just give your bees space

and trust them!

Thank you