

Identifying native honey bees

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DNA studies confirm the relationships

West European
subspecies



Commonly traded
Eastern subspecies

African subspecies

A. m. intermissa,
scutellata,
lamarckii

A. m. caucasica,
syriaca, anatolica



Apis mellifera mellifera

- A stocky bee
- Brown to black colour
- Long hairs, particularly noticeable towards the tip of the abdomen
- Tomentum bands reducing in width towards tip of abdomen
- Tendency towards supersedure
- Tendency for queens to remain productive over several years
- High drive to store pollen, sometimes below brood nest

Names

- Dark European honey bee
- Native honey bee
- Black bee
- 'Scottish', 'Irish', 'British', 'German', 'Dutch' etc

Ruttner and others describe colour as varying from dark brown to black with some types more black than others. Body colour very dark brown to black. Hairs pale brown, dark brown and black.

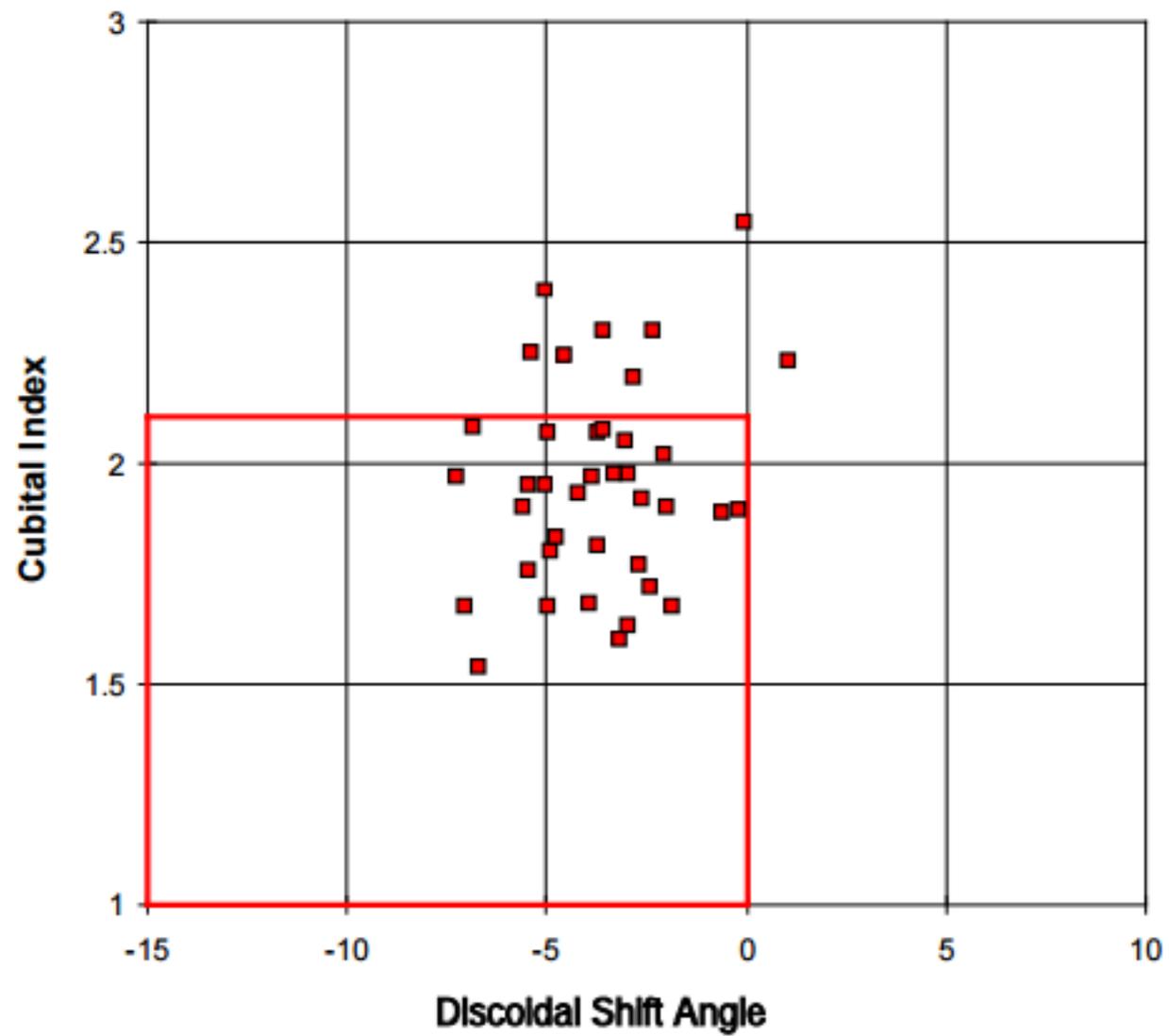
Tools for identifying pure stocks of Amm

- Eyes and dissecting microscope or even a digital camera
 - Body colour
 - Thorax hair colour dark
 - Abdomen tip hair length
 - Tomentum band width
 - Drone colour; pollen pattern; white cappings; cold weather flying; etc
- Wing morphometry: how reliable is it?
 - Great enthusiasm in some quarters for its use
 - Evidence generally does not support its use as a main means of identifying Amm
 - Best used to *exclude* hybridised colonies
- DNA lab
 - Used by researchers for a couple of decades
 - Increasing refined, increasingly useful
 - About to enter the era of wide availability of 'genetic array' technology

Wing morphometry

- Samples of about 30 to 50 wings scanned and analysed
- Most useful metrics 'Cubital Index' and 'Discoidal shift'
- Determined by measuring veins and junctions in wings
- Widely used program 'DrawWing' is freely available
- Caution is urged in the use of the technique
- Only suitable to exclude hybridised samples, not to confirm purity
- The sample is taken as a whole and a few outliers ignored

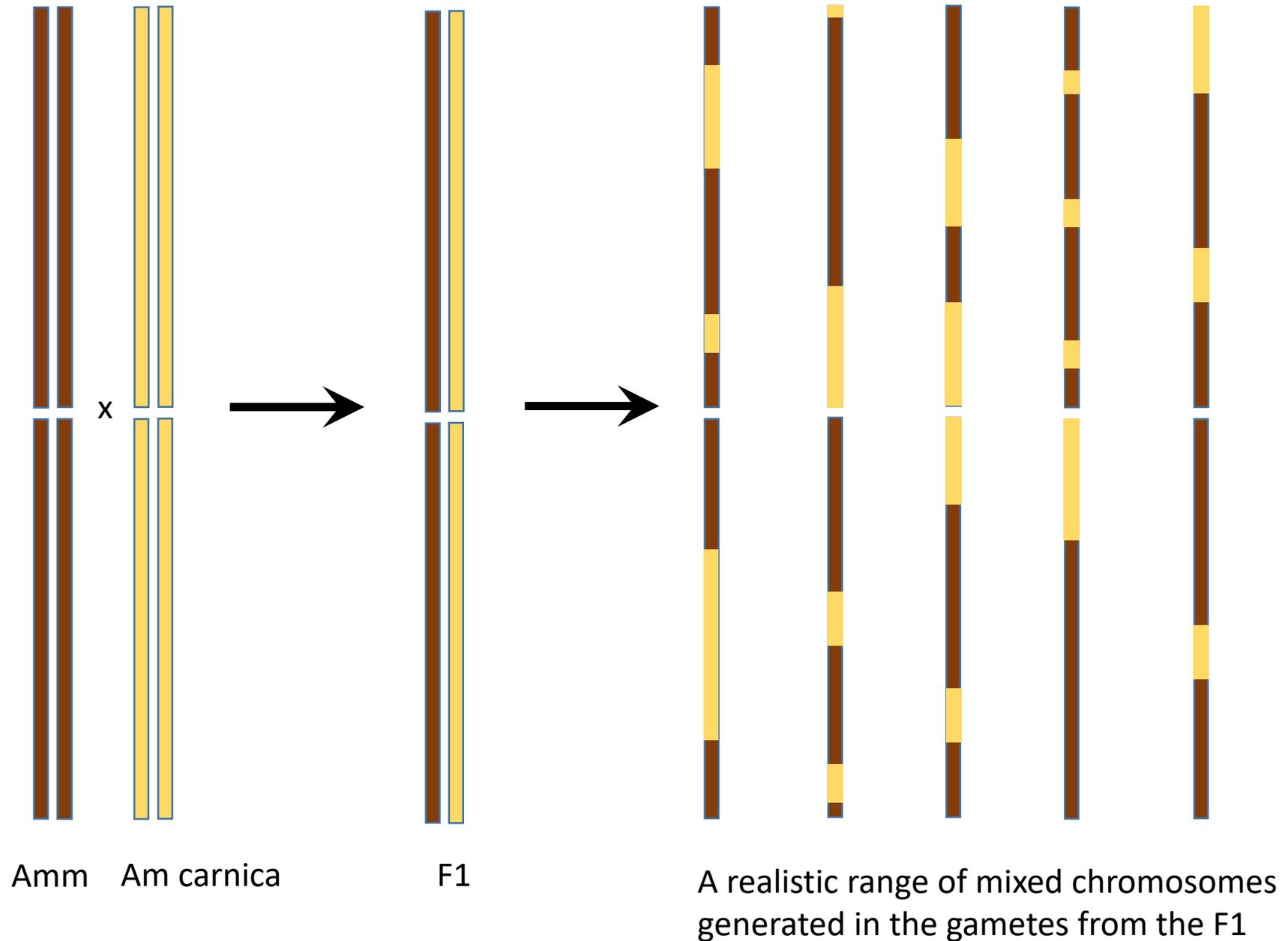
Cubital Index v Discoidal Shift Angle



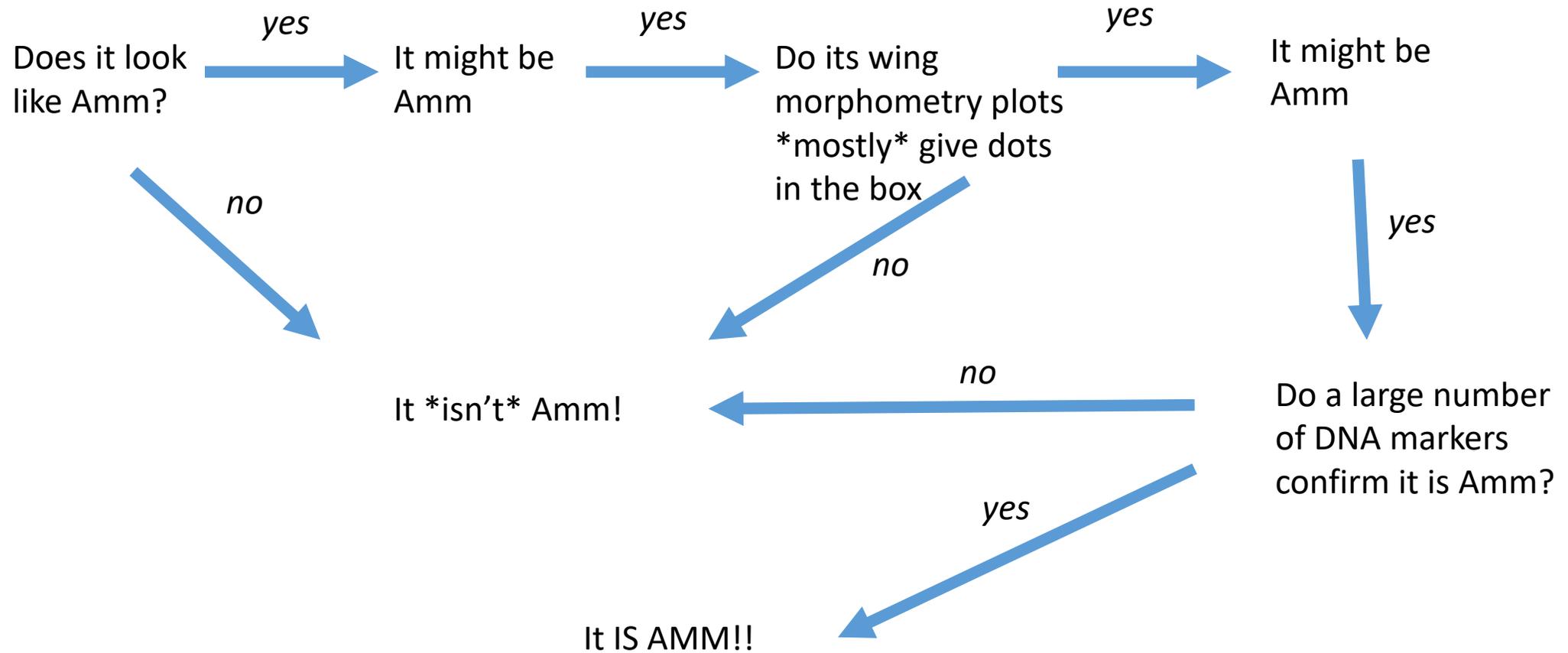
Questions raised on the over-use of wing metrics

- PhD student at NBU/University of Leeds studied the correlation of wing morphometry data with DNA marker data across the UK
- Almost no correlation between the two
- Casual observation by a researcher in Scotland recently confirmed that wing morphometry data can show excellent 'fit' to native honey bees in obviously hybridised colonies
- It is suggested that this is discontinued as a first line method of identifying native stocks

Mixing of genetics is rapid in honey bees: exceptionally high recombination rate



A sensible decision tree



DNA techniques advancing and becoming available

- Array technologies allow a very large number of 'SNPs' (essentially point mutations) to be assayed at reasonable cost
- Labs in Europe developing more targeted sets of DNA tests to discriminate subspecies

Myths surrounding native honey bees

- Angry, difficult to handle
- Slow to build, unsuitable for spring-flowering crops
- Small, unproductive colonies

These criticisms can apply to hybridised stock and stock that has not been subjected to breeding. Selected stocks of native honey bees can be gentle, strong and highly productive. Most problems with temper appear to arise when stocks hybridise with other races of honey bee.

Final thoughts

- DNA studies confirm a high level of purity (95% or so) of some stocks, ie Scottish stocks on Colonsay and Irish native honey bees
- A small amount of introgression will have taken place in these populations since importation started around 1850
- Importations included *Apis mellifera mellifera* from France, Netherlands, Germany so we have to accept that the original native stock will have changed somewhat over time from crossing with the similar continental forms
- Then, like today, imported stocks may have a reduced impact partly as the supply is usually to beekeepers less able to maintain their own stocks and less able to propagate them
- Not just the number but the accessibility of imported stock has increased over time putting the remaining stock in previously unaffected locations at higher risk than ever before