



John and Morna Stoakley's Scottish Bee Survey



John Durkacz
Presented at SICAMM Conference Aviemore 2009
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Background Information

John and Morna

- **Moved to Scotland in 1968**
- **Developed their beekeeping interests**
- **Eventually running 50 stocks in the Borders**
- **Were closely involved with BIBBA for many years**

Activities Organised




- 1990 Bee Morphometry Workshops in Stobo
- 1994 Survey of Scottish Bees
- Practical Demonstrations on Queen Rearing
- Demonstrations on the use of Mininucs for mating

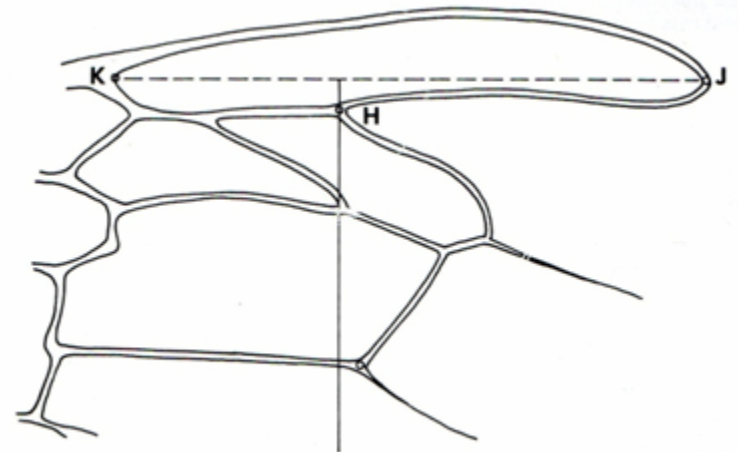
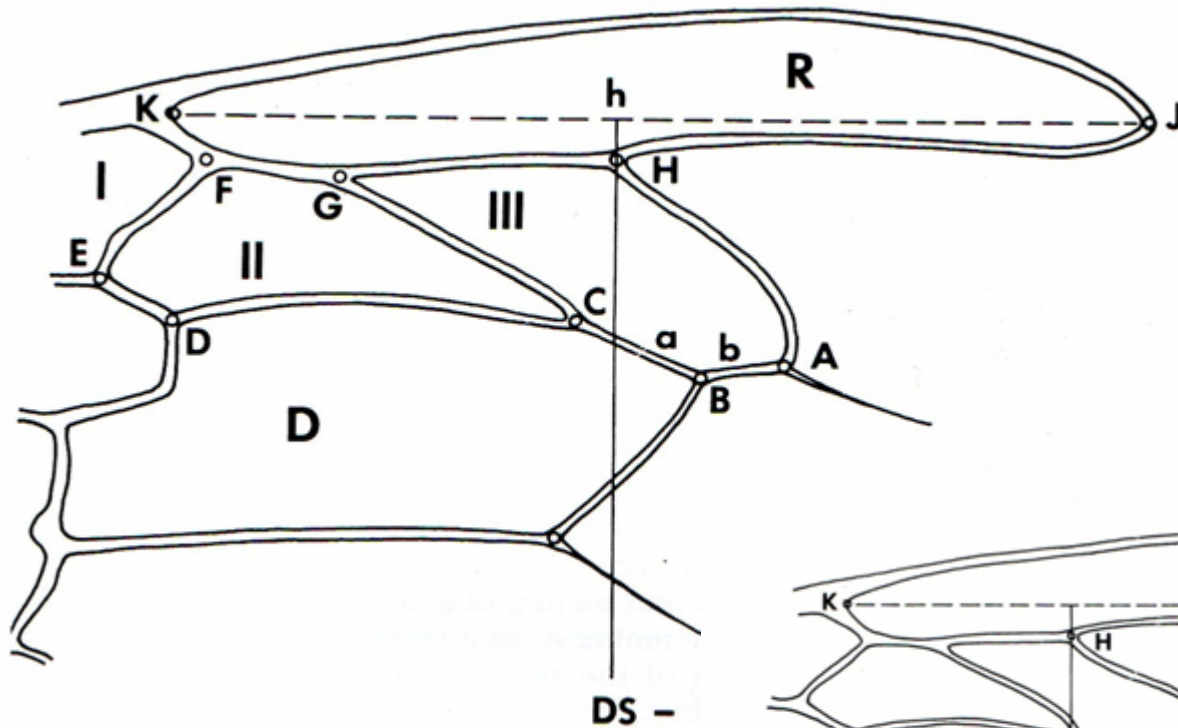


Bee Wing Morphometry

Background Information

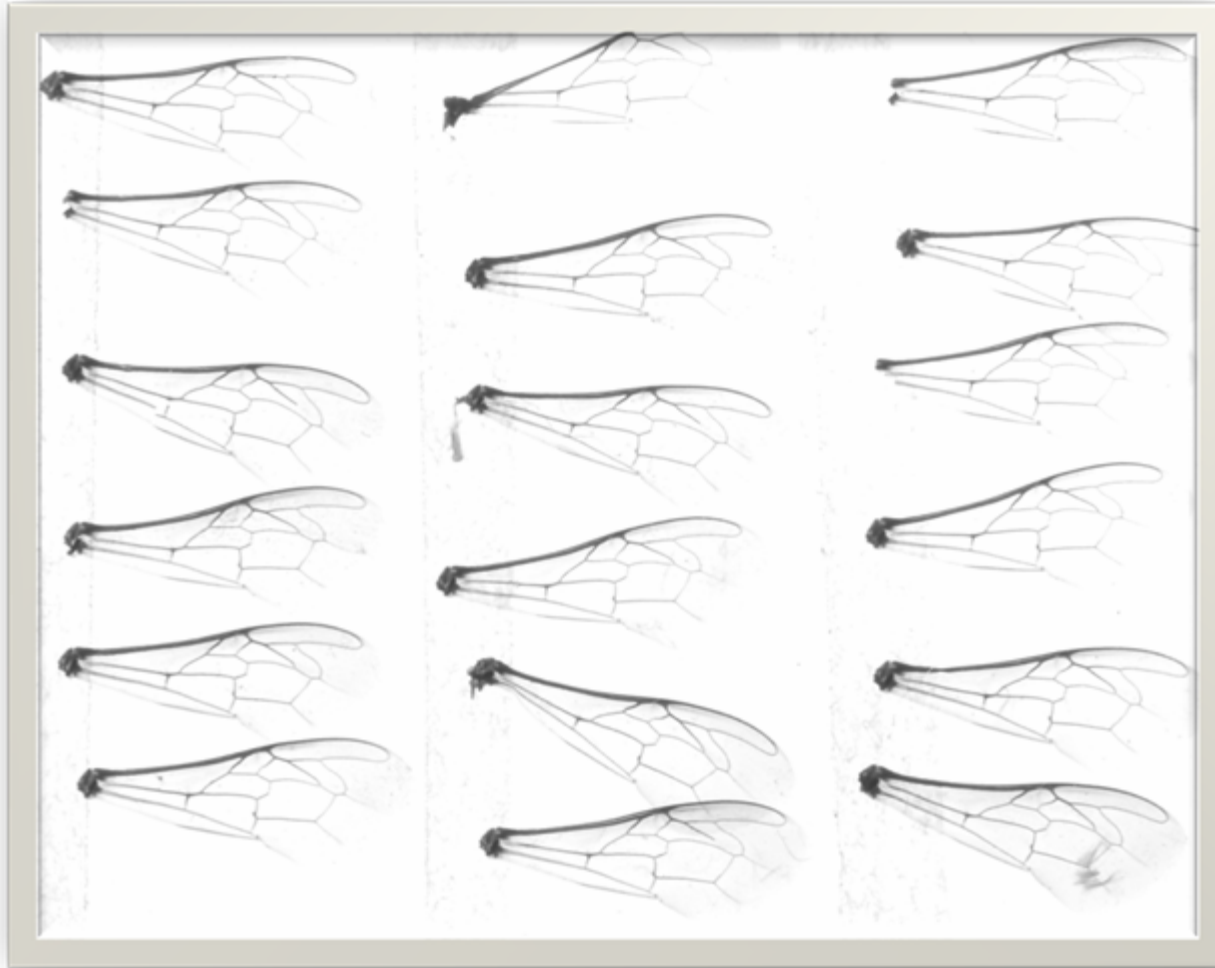
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- **Apis mellifera sp. have a huge area of distribution**
 - **Evolved by geographical isolation and ecological adaptations**
 - **Work of Alpatov and Goetze introduce Biometrics**
 - **Wing morphometry is one discriminating character**
 - **Ruttner and John Dews develop further data presentations**

Measurement of the Discoidal Shift



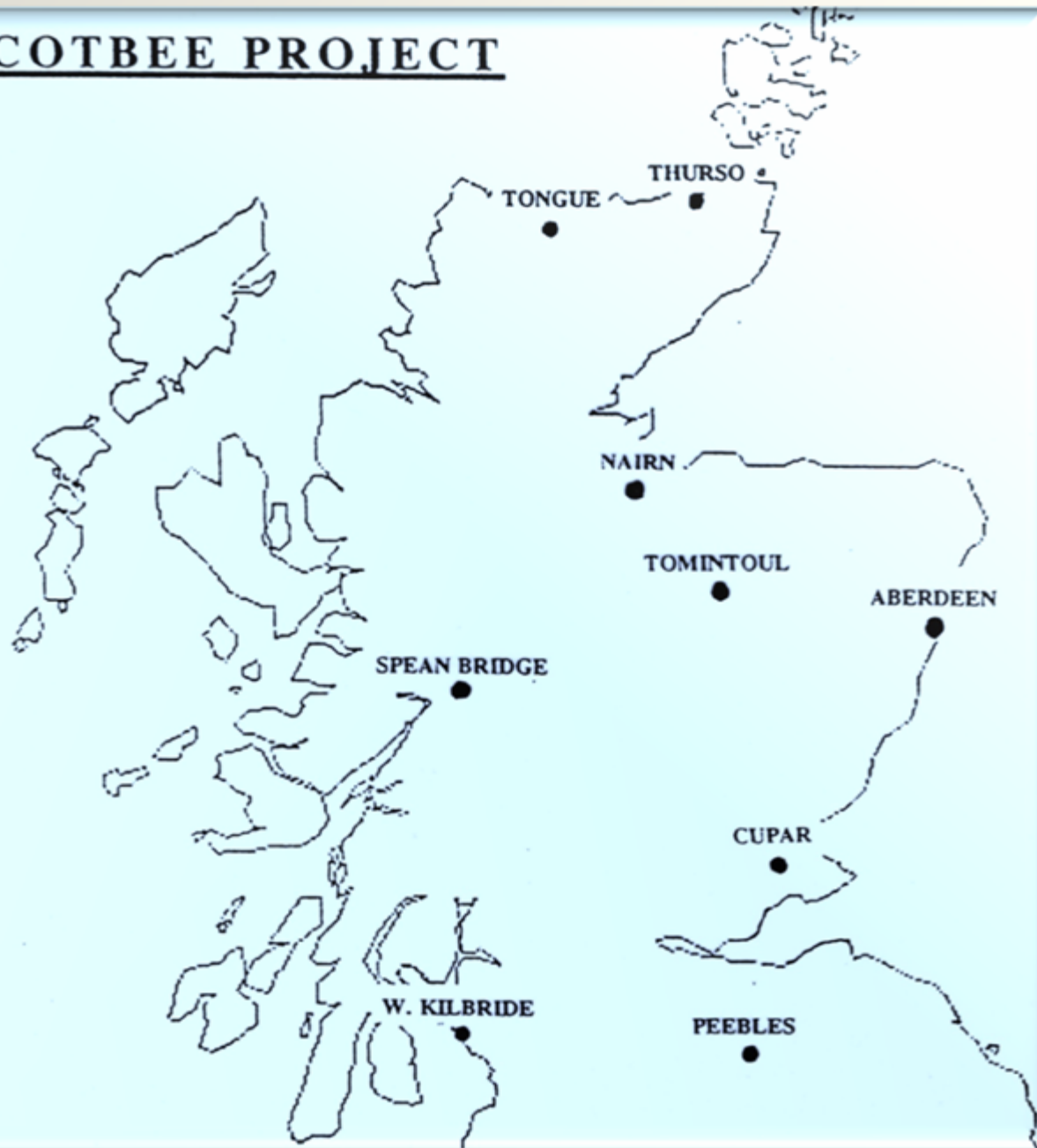


Preparation of Wings



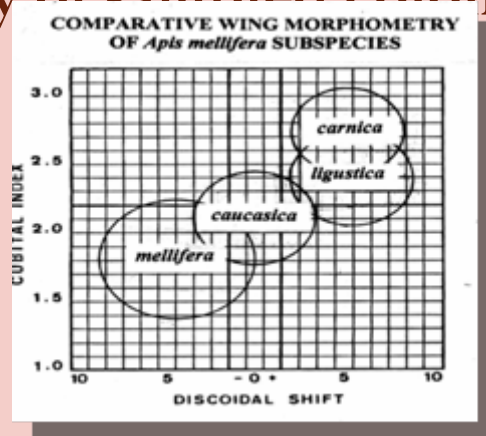
Mounting Wings on Slides

SCOTBEE PROJECT



What were the objectives?

- To discover the incidence of Amm in Scotland
- Carry out statistical analysis
- Determine if any significant differences in the morphometry of sampled colonies



SCOTBEE PROJECT - OVERALL SUMMARY Values of Cubital Index in ascending order

| LOCATION | CUBITAL INDEX | | | | | | DISCOIDAL SHIFT | | |
|---------------|---------------|-----------|----------------------------|-------|------------------|-------|-----------------|-------|----|
| | MEAN | STD. DEV. | RANGE | | 95% CONF. LIMITS | | MEAN | RANGE | |
| | | | <i>i.e. extreme values</i> | | OF THE MEAN | | | | |
| | | | LOWER | UPPER | LOWER | UPPER | | | |
| TONGUE | 1.54 | 0.185 | 1.2 | 1.9 | 1.47 | 1.61 | -4.97 | -7 | -3 |
| PEEBLES | 1.57 | 0.134 | 1.3 | 1.8 | 1.52 | 1.62 | -4.97 | -8 | -1 |
| TONGUE | 1.57 | 0.153 | 1.2 | 1.9 | 1.51 | 1.63 | -2.53 | -5 | -1 |
| ABERDEEN | 1.64 | 0.157 | 1.3 | 1.9 | 1.58 | 1.70 | -1.00 | -6 | 3 |
| CUPAR (FIFE) | 1.64 | 0.184 | 1.3 | 2.0 | 1.57 | 1.71 | -3.52 | -6 | 0 |
| CUPAR (FIFE) | 1.65 | 0.191 | 1.3 | 2.0 | 1.58 | 1.72 | -1.87 | -4 | 2 |
| TOMINTOUL | 1.65 | 0.221 | 1.2 | 1.9 | 1.57 | 1.73 | -2.87 | -6 | -1 |
| TOMINTOUL | 1.66 | 0.135 | 1.3 | 2.0 | 1.61 | 1.71 | -3.33 | -7 | -1 |
| CUPAR (FIFE) | 1.66 | 0.150 | 1.4 | 2.0 | 1.60 | 1.72 | -2.36 | -5 | 2 |
| TONGUE | 1.66 | 0.190 | 1.3 | 2.1 | 1.57 | 1.74 | -5.05 | -8 | -2 |
| NAIRN | 1.68 | 0.170 | 1.4 | 2.1 | 1.61 | 1.74 | -0.30 | -3 | 3 |
| TONGUE | 1.68 | 0.170 | 1.3 | 2.0 | 1.62 | 1.75 | -5.43 | -8 | -3 |
| TOMINTOUL | 1.69 | 0.200 | 1.3 | 2.3 | 1.62 | 1.77 | -2.33 | -6 | 1 |
| THURSO | 1.70 | 0.177 | 1.3 | 2.1 | 1.64 | 1.77 | -1.20 | -5 | 1 |
| PEEBLES | 1.71 | 0.177 | 1.4 | 2.0 | 1.64 | 1.78 | -2.87 | -7 | 2 |
| PEEBLES | 1.71 | 0.191 | 1.3 | 2.0 | 1.64 | 1.78 | -2.70 | -6 | 1 |
| WEST KILBRIDE | 1.72 | 0.199 | 1.3 | 2.2 | 1.65 | 1.80 | -1.03 | -3 | 2 |
| NAIRN | 1.73 | 0.186 | 1.3 | 2.2 | 1.66 | 1.80 | -0.97 | -5 | 2 |
| TOMINTOUL | 1.73 | 0.235 | 1.3 | 2.1 | 1.64 | 1.82 | -3.27 | -6 | -1 |
| THURSO | 1.74 | 0.204 | 1.5 | 2.3 | 1.66 | 1.81 | -3.17 | -6 | 1 |
| WEST KILBRIDE | 1.75 | 0.253 | 1.3 | 2.7 | 1.66 | 1.84 | -0.73 | -4 | 2 |
| ABERDEEN | 1.77 | 0.220 | 1.3 | 2.1 | 1.69 | 1.85 | -1.67 | -5 | 0 |
| PEEBLES | 1.78 | 0.156 | 1.5 | 2.1 | 1.73 | 1.84 | -3.40 | -5 | -1 |
| SPEAN BRIDGE | 1.78 | 0.180 | 1.5 | 2.2 | 1.72 | 1.85 | -2.27 | -5 | 0 |
| ABERDEEN | 1.78 | 0.209 | 1.5 | 2.2 | 1.70 | 1.86 | -1.90 | -7 | 2 |
| CUPAR (FIFE) | 1.78 | 0.248 | 1.2 | 2.2 | 1.69 | 1.87 | -0.87 | -5 | 3 |
| CUPAR (FIFE) | 1.81 | 0.173 | 1.5 | 2.1 | 1.75 | 1.87 | -2.10 | -7 | 3 |
| WEST KILBRIDE | 1.82 | 0.199 | 1.5 | 2.2 | 1.75 | 1.89 | -0.70 | -5 | 2 |
| PEEBLES | 1.85 | 0.159 | 1.6 | 2.3 | 1.79 | 1.91 | -1.77 | -5 | 1 |
| TOMINTOUL | 1.87 | 0.313 | 1.4 | 2.5 | 1.76 | 1.99 | -2.30 | -5 | 0 |
| THURSO | 1.89 | 0.226 | 1.5 | 2.7 | 1.81 | 1.97 | -1.83 | -6 | 2 |
| ABERDEEN | 1.91 | 0.218 | 1.5 | 2.4 | 1.83 | 1.99 | -1.70 | -4 | 1 |
| SPEAN BRIDGE | 1.91 | 0.257 | 1.4 | 2.5 | 1.82 | 2.01 | -2.47 | -6 | 1 |
| THURSO | 1.96 | 0.274 | 1.5 | 2.4 | 1.85 | 2.06 | -1.37 | -4 | 1 |
| CUPAR (FIFE) | 2.00 | 0.263 | 1.6 | 2.7 | 1.88 | 2.11 | -3.08 | -5 | 0 |
| WEST KILBRIDE | 2.01 | 0.314 | 1.4 | 2.6 | 1.89 | 2.12 | 0.73 | -3 | 4 |
| THURSO | 2.02 | 0.412 | 1.5 | 3.0 | 1.87 | 2.18 | -2.17 | -5 | 2 |
| SPEAN BRIDGE | 2.03 | 0.346 | 1.5 | 3.0 | 1.90 | 2.16 | -4.20 | -6 | -1 |
| WEST KILBRIDE | 2.05 | 0.230 | 1.6 | 2.4 | 1.97 | 2.14 | 0.67 | -3 | 3 |
| SPEAN BRIDGE | 2.06 | 0.258 | 1.6 | 2.5 | 1.96 | 2.15 | -2.47 | -5 | 1 |
| NAIRN | 2.09 | 0.176 | 1.8 | 2.5 | 2.03 | 2.16 | -1.83 | -5 | 2 |

SCOTBEE PROJECT

RANGE TESTS TO COMPARE

MEAN CUBITAL INDICES WITHIN APIARIES

TOMINTOUL

| | | | | | |
|-----------|------|------|------|------|------|
| Hive no. | 2 | 9 | 8 | 10 | 1 |
| Hive mean | 1.65 | 1.66 | 1.69 | 1.73 | 1.87 |

THURSO

| | | | | | |
|-----------|------|------|------|------|------|
| Hive no. | 7 | 1 | 5 | 10 | 6 |
| Hive mean | 1.70 | 1.74 | 1.89 | 1.96 | 2.02 |

WEST KILBRIDE

| | | | | | |
|-----------|------|------|------|------|------|
| Hive no. | 1 | 4 | 6 | 8 | 10 |
| Hive mean | 1.72 | 1.75 | 1.82 | 2.01 | 2.05 |

ABERDEEN

| | | | | |
|-----------|------|------|------|------|
| Hive no. | 39 | X | F | B7 |
| Hive mean | 1.64 | 1.77 | 1.78 | 1.91 |

SCOTBEE PROJECT

RANGE TESTS TO COMPARE

MEAN CUBITAL INDICES WITHIN APIARIES

SPEAN BRIDGE

| | | | | |
|-----------|------|------|------|------|
| Hive no. | 7 | 3 | 8 | 6 |
| Hive mean | 1.78 | 1.91 | 2.03 | 2.06 |

NAIRN

| | | | |
|-----------|------|------|------|
| Hive no. | 4 | 2 | 1 |
| Hive mean | 1.68 | 1.73 | 2.09 |

PEEBLES

| | | | | | |
|-----------|------|------|------|------|------|
| Hive no. | 1 | 7 | K | I | I+ |
| Hive mean | 1.57 | 1.71 | 1.71 | 1.78 | 1.85 |

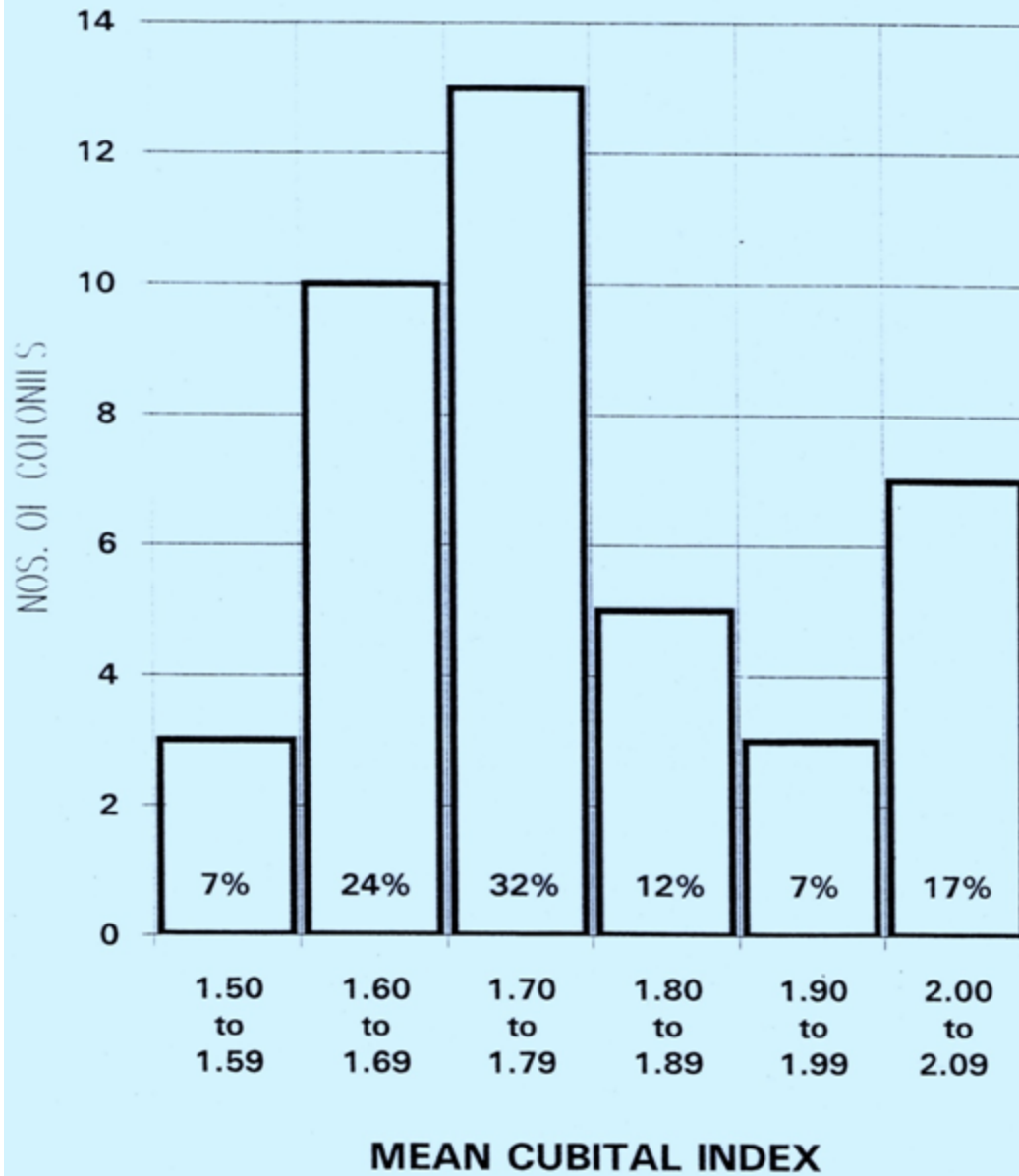
TONGUE

| | | | | |
|-----------|------|------|------|------|
| Hive no. | 3 | D1 | H2 | 1 |
| Hive mean | 1.54 | 1.57 | 1.66 | 1.68 |

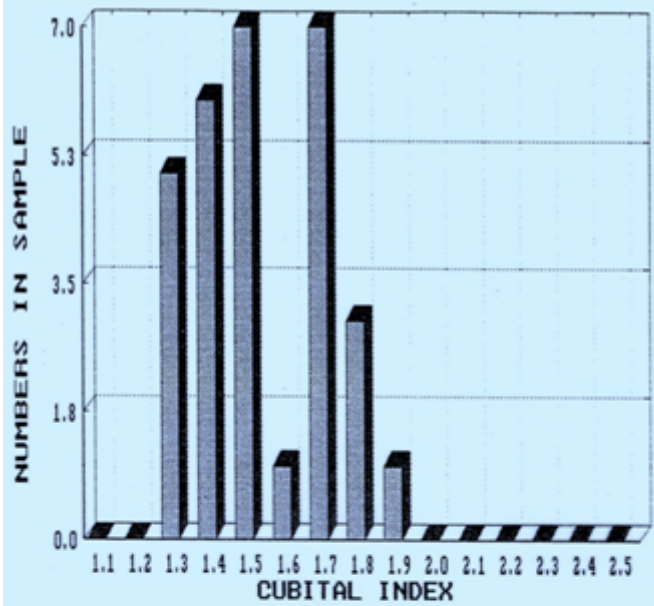
CUPAR (FIFE)

| | | | | | |
|-----------|------|------|------|------|------|
| Hive no. | 5 | 1 | 10 | 6 | 7 |
| Hive mean | 1.64 | 1.65 | 1.66 | 1.81 | 2.00 |

SCOTBEE PROJECT



CUBITAL INDEX OF SAMPLE



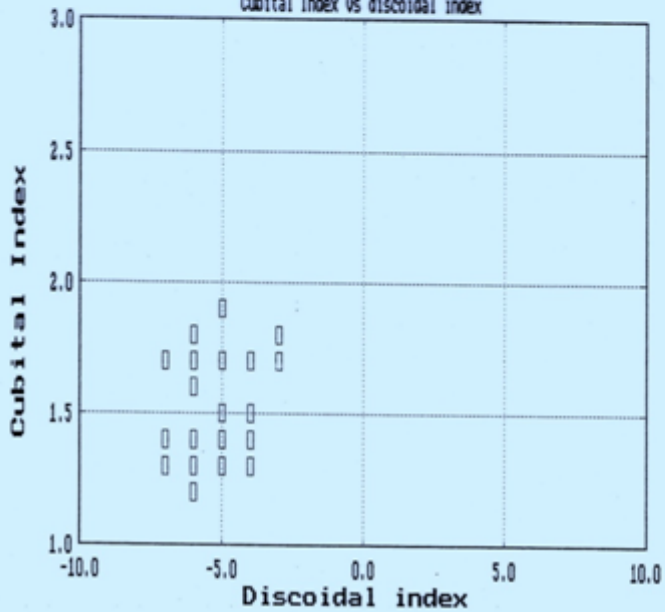
"BEST BUY"

from TONGUE

MEAN C.I. 1.54

MEAN D.S. -4.97

Scatter Diagram
Cubital Index vs discoidal index



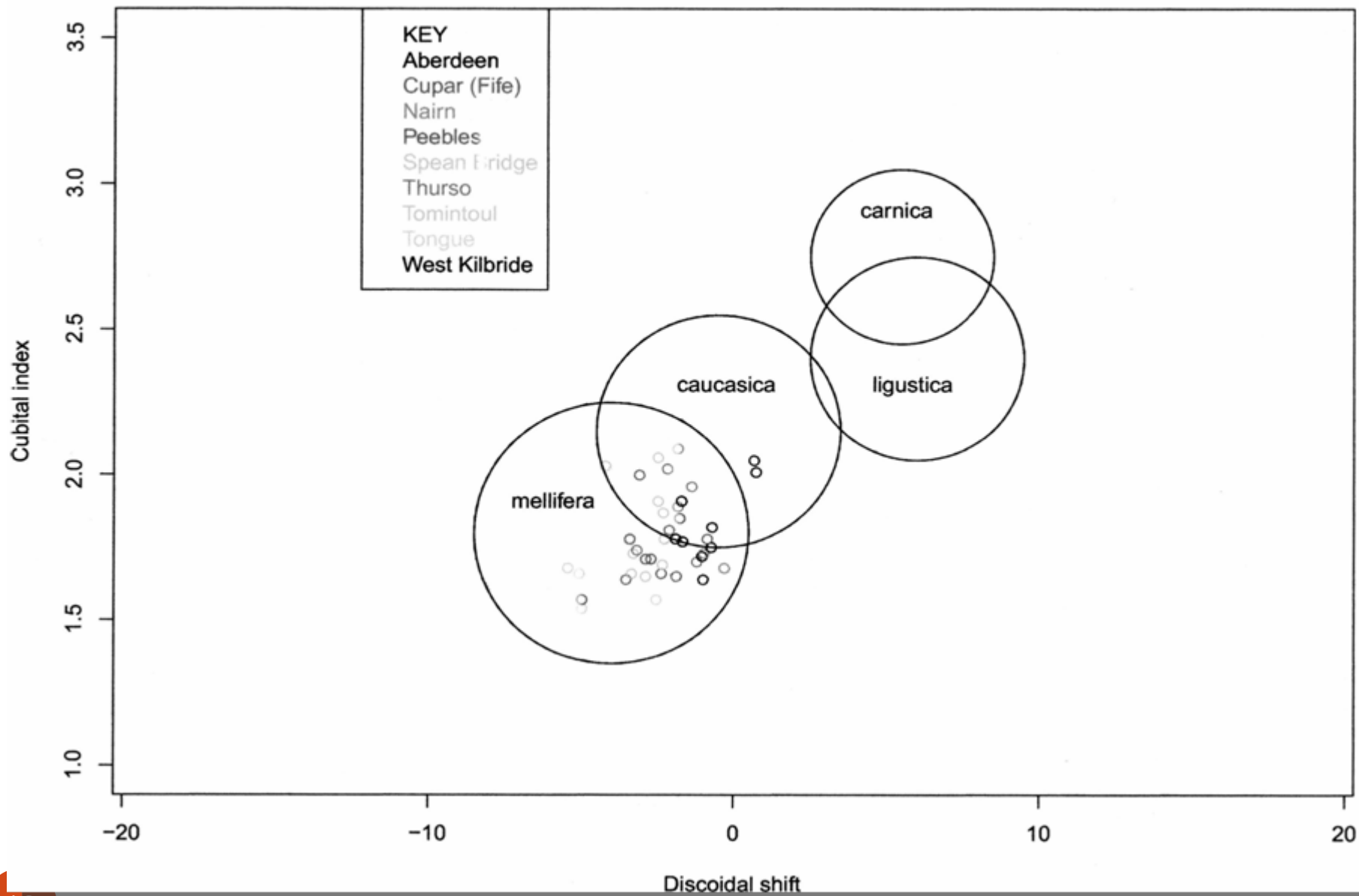
Summary of the Results

- $\frac{1}{3}$ of colonies *Apis mellifera mellifera*
- $\frac{1}{3}$ were “near blacks”
- $\frac{1}{3}$ appeared to be hybrids

Data for first 2 groups showed a continuous distribution

No evidence of regional differences

SCOTBEE data - Mean colony value pairs



Future Plans

- Scientifically there is no value in mere masses of data
- John planned a new survey
- And suggested how this might be done
- By further statistical analysis and keeping samples manageable

Postscript

- Corresponded with 6 beekeepers from original survey
- What happened to my bees?
- Best buy from 'Tongue'

So where did Bernhard get his bees from?

And where did they go?

