

Setting up and running an Association Microscopy Group

Sean Stephenson

In recent years there has been an increase in beekeeper interest in microscopy as an aid for module studies as well as investigating such things what plants the bees are foraging on. This seminar covers the considerations and objectives for setting up a microscopy group, presents an outline programme, the equipment and skills necessary to run a group in addition to discussing how to maintain the interest of the participants.

My microscopy journey

- Studying for my Advanced Husbandry Assessment
 - Needed to carry out a disease analysis task
- Attended a weekend course run in Devon
- Bought medium range microscopes from Brunel
- Attended NDB courses where Bob Smith led microscopy sessions
- Studied for BBKA Microscopy Certificate with other interested members of Bucks BKA
- Expanded to a county group meeting 10 months a year



Topics

- Why microscopy
- Starting from scratch
- Building a core
- Keeping it going

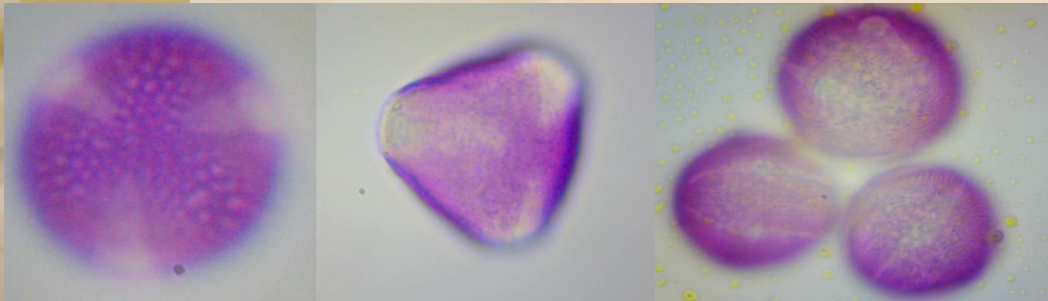
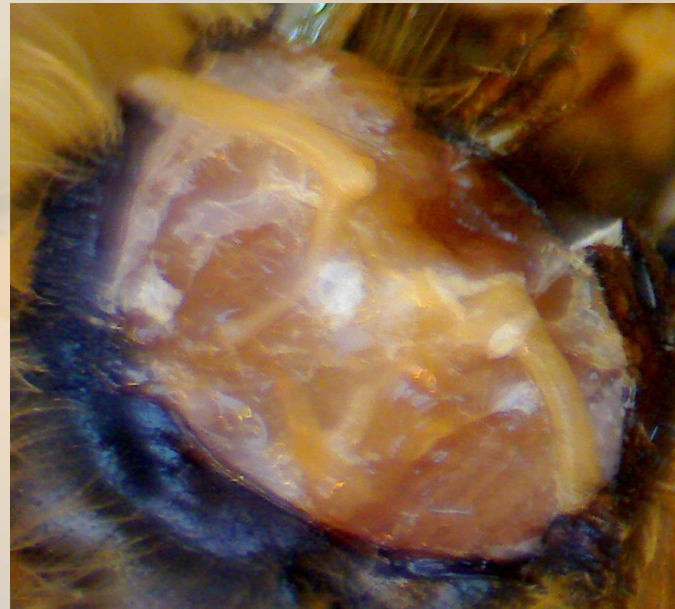


It all starts with the wonder of bees



Microscopy and Beekeeping

- Fascination of understanding what makes a honey bee a honey bee
- Verifying disease
- Learning about our honey



Starting from scratch


- Assuming no previous microscopy experience
- Small group, attend microscopy courses
 - Beginners; anatomy, disease inspection, slide preparation
 - BBKA, NHS, County Associations
 - Meet regularly
- Build some expertise
 - BBKA Microscopy Certificate
 - Do not over complicate it
 - Start with simple workable procedures
 - Do not try and re-invent the wheel



Beekeepingstuff.org/microscopy



Sean Stephenson
Introduction to
Microscopes



**Honey Sources
via Microscopy**

Sean Stephenson and Jonny Morgan

<https://tinyurl.com/MicroscopyHA25>

1




**Nosema Testing and
Preparing Pollen Slides**

Sean Stephenson

1

Honey Bee Acarine examination
followed by
Abdominal Dissection

Sean Stephenson



**Preparing Anatomy
Slides**

Sean Stephenson
NHS 2024

Beg, steal and borrow or use eBay!

- Most BKA have some microscopy equipment
- Generally, it worked once
- A group needs equipment beyond that of the core members
- Members will want to try before they buy their own equipment



Use good value quality equipment

Brunel SP30 Monocular (3354)

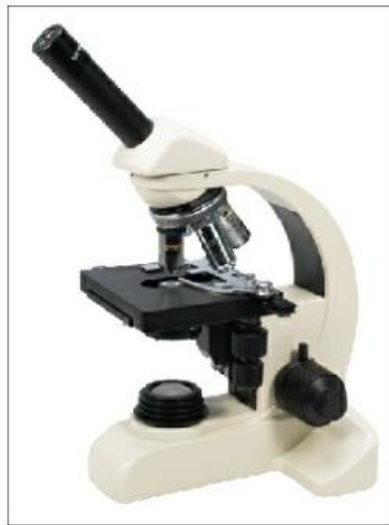
The SP30 is without doubt our best value for money microscope. This model has been used only by ourselves for customer demonstrations and is in pristine as new condition. Achromatic 160mm tube length objectives x4, x10, x40 and x100 objectives with a x10 wide field eyepiece giving an overall magnification range of x40 to x1000.

Full mechanical stage with drop down coaxial movement controls and double vernier scales. Focusing Abbe condenser with iris diaphragm. Coaxial coarse and fine focus controls with tension adjustment and focus stop for slide security.

LED lighting with on/off switch and brightness control. A massive saving for in effect a new microscope.

Price £180.00 + vat

[Online Shop ▶](#)



<https://www.usedmicroscopes.co.uk/bargains.html>

Now available at the sale price of £145 saving £35 (19%) but only while current stock lasts in our [Amazon Shop](#) or through our own secure shop on this web site - [click here for details](#)

A microscope for looking at whole objects in 3D without the need to prepare slides. Look at any object immediately at x20 or x40 magnifications. Take a new look at the world around you. The Apex Discovery produces crisp, sharp, high contrast images that are enhanced by the inbuilt lighting system that allows top light and bottom light to be used together or separately to suit the type of specimen.

A pair of wide field eyepieces x10. The raised base has the option of a black/white reversible dissection plate or frosted glass plate when using the bottom lighting. Stage clips, on/off rocker and lighting control switches. Also included two rubber eyecups and a dust cover. Can be used with the Apex Minigrab digital camera. No need for the use of prepared slides therefore the Apex slide sets and slide making kits are not suitable for use with this product. An aluminium attache case available as an accessory.

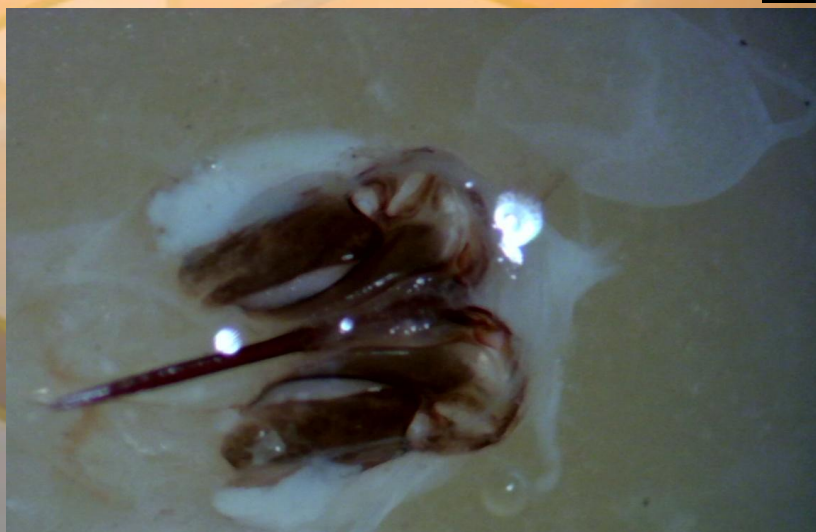


<https://www.apexmicroscopes.co.uk/apexdiscoverymicroscope.html>

Typical annual cycle

Task	Beginners	Existing members
January		Nosema and investigating some of my bees for cysts
February	Preparing pollen slides from stored pollen, anther and pollen load	Hazel, Hellebore, Snowdrop and Aconite, different mount options
March	Acarine and abdominal dissection	Soft tissue anatomy slides of honey bee glands and mounting abdominal ganglia
April	Honey analysis using prepared samples	Honey analysis from 1 st principles
May	Nosema analysis, gram staining and oil immersion	Preparing bacteria slides from live yogurt using gram staining
June	Anatomical slides, hard tissue	Anatomical Slides, sting, proboscis, foot
September	Perfecting a pollen slide	Honey Show slide preparation
October	BBKA anatomical slides	Mount the heart and aorta
November		Three labial glands on one slide
December		Interesting slide design

First time microscopists



Encourage work towards BBKA Microscopy Certificate in year 2

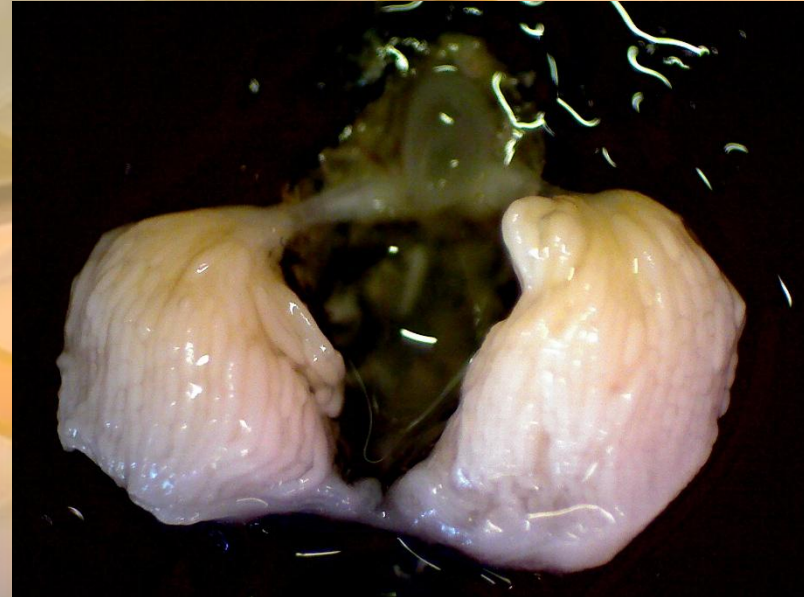
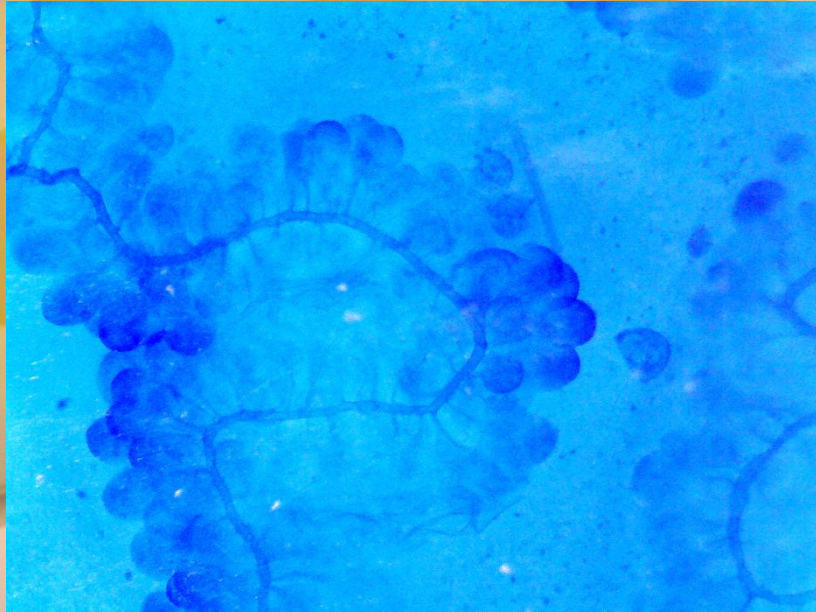
- Hone slide production techniques
- Collect pollen throughout the season
 - Build a library
- Anatomy slides can start in the Spring
- Practice dissections and pollen load preparation



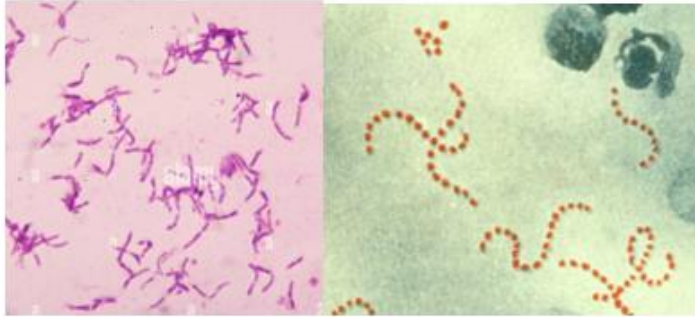
What keeps the interest going

- Beyond the BBKA syllabus
- Comparing techniques
- Oil immersion
- Arranging body parts
- Hunt for honeydew
- Look beyond the honey bee
 - Compare the mandibles of bee/wasp/hornet
- Hunt the organ



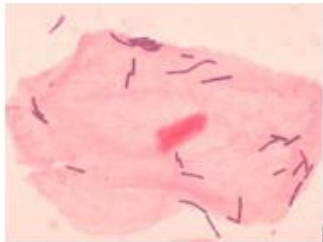


Slides that mimic reality



Bifidobacterium

Streptococcus

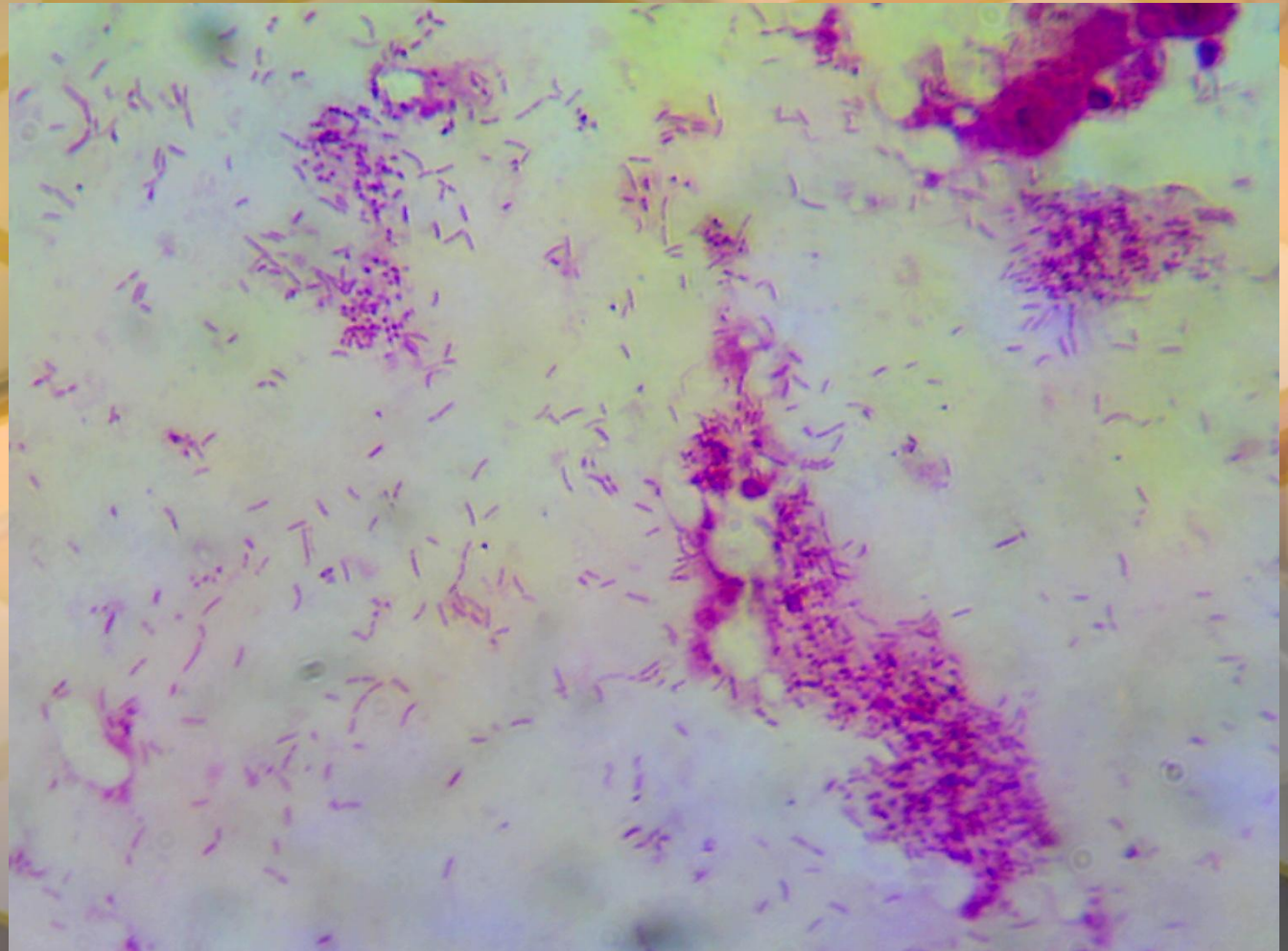


Lactobacillus






Procedure:

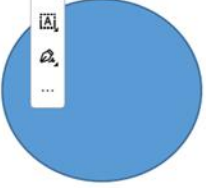



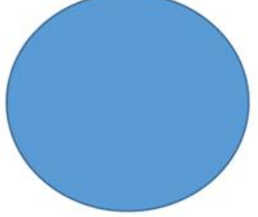




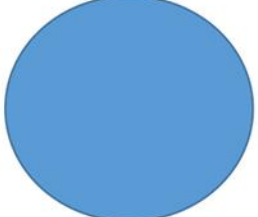


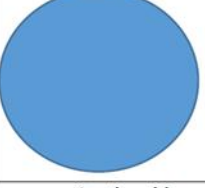

1. Heat fix thin film sample on to slide
2. Apply carbol fuchsin
3. Dry on hot plate
4. Wash with alcohol fix
5. Dry
6. Apply mountant
7. View under microscope at x1,000 with oil

Try three yoghurts.

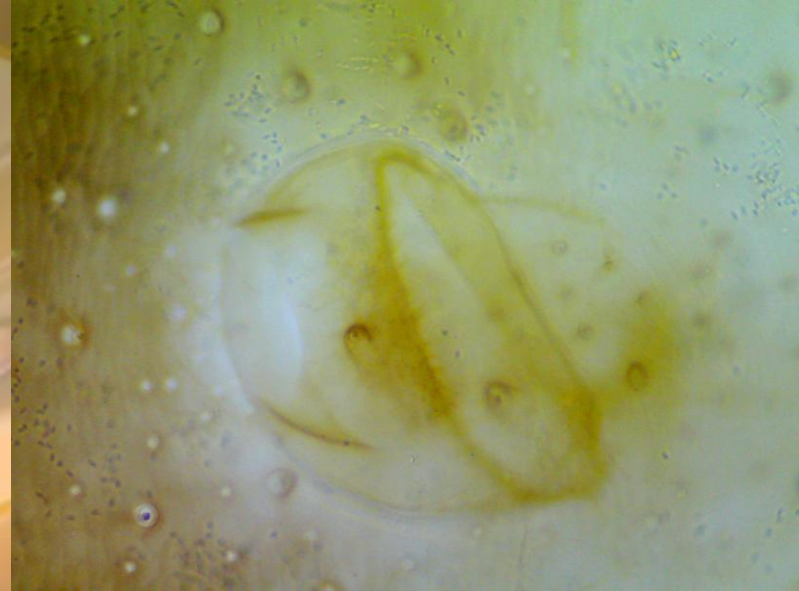
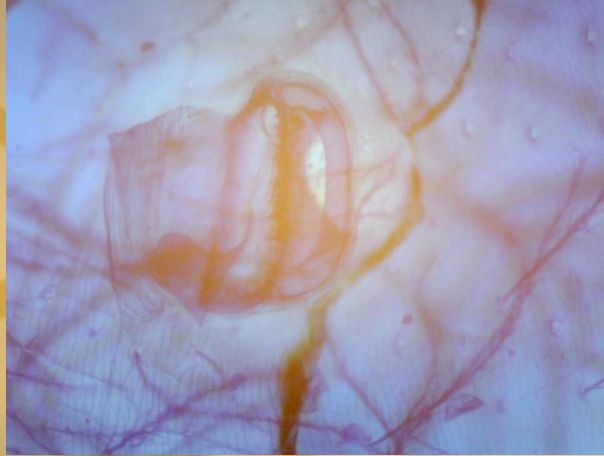


Create aide memoirs

Sycamore	Acer pseudoplatanus		
Poached egg plant	Limnanthes douglasii		
Crocus	Crocus aureus		
Willow	Salix caprea		
Heather	Calluna vulgaris		

Preparing legs for mounting						
Iso	Sodium Hydroxide 3days bleach/soften	Water 12 hours (wash)	Acetic acid 12 hours (decalcify)	Water 1 hour (wash)		
Back leg					F L A	ISO Min 24hrs (Dehydrate) 
Mid leg					T T E	Toluene 24 hours min (clear) 
Front leg					N	
Iso	Sodium Hydroxide 1-3days (Bleach/soften)	Water 12 hours (wash)	Acetic acid 12 hours (decalcify)	Water 1 hour (wash)		

Find a spiracle and stain/magnify it



Build your group search tools

Key #	Common Name	Scientific name	Plant Family	1. Si	2. Sha	3. Aperture Number	4. Aperture Type	5. Surfa	6. Exine Sctia	7. Other Structural Featur	8. Pollen Colou
3	English Yew	<i>Taxus baccata</i>	Taxaceae	2	1	1					
12	Cuckoo Flower	<i>Cardamine pratensis</i>	Cruciferae	2	1	3	2				
19	Good King Henry or Fat Hen	<i>Chenopodium album</i>	Chenopodiaceae	2	1	6					
48	Sea Buckthorn	<i>Hippophae rhamnoides</i>	Elaeagnaceae	2	1	3					
97	Figwort	<i>Scrophularia nodosa</i>	Scrophulariaceae	2	1	3					
103	Ribwort Plantain	<i>Plantago lanceolata</i>	Plantaginaceae	2	1	5/6					



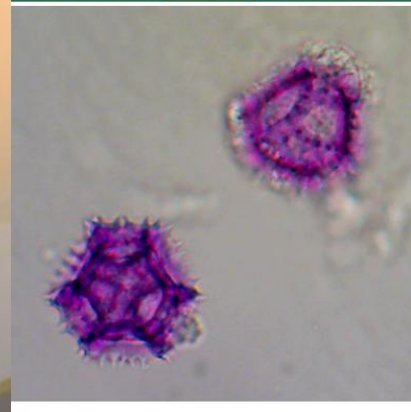
Cherry x 600



Cornflower



Chives x 600



Dandelion x 600



Danish Scurveygrass x 600



Danish Scurveygrass x 600

Training videos



Bits and pieces

- Clarke's fluid
 - 70% ISO (99%): 30% Acetic Acid(80%)
 - Fixes soft tissue
- Fuchsin stain with or without glycerine
 - Non-glycerine pollen appears distorted
- LOCA
 - Great for anatomy slides, good results for pollen but caution required for depth of mountant
- Back of scalpel for removing bee head
 - Rock the head away



Any Questions