

19th March 2011 Time Allowed 1½ hours
SECTION A (10 marks, 1 for each question)
 Answer ALL the questions in this section. Use one or two word or short phrase answers.
 Q1 What is the maximum permitted percentage of water in heather (ling) honey for retail sale in the UK?
 Q2 What is the recommended temperature for long term storage of honey?
 Q3 What is the maximum legally permitted level of HMF in floral honey for retail sale in the UK?
 Q4 Name the enzyme which bees introduce into nectar to change complex sugars into simple sugars.
 Q5 Give one disadvantage of using a tangential honey extractor.
 Q6 Which component of ling honey causes the honey to get?
 Q7 What is the melting point of beeswax?
 Q8 What is the term used to describe the tendency of honey to absorb water?
 Q9 Where are the extra floral nectaries found on a field bean?
 Q10 What is metheglin?

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1. What are the features and structures by which pollen grains may be identified?
 2. What is the value of pollen to a colony of honey bees?

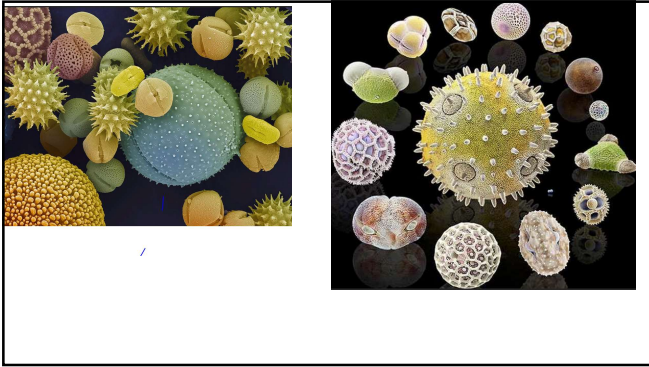
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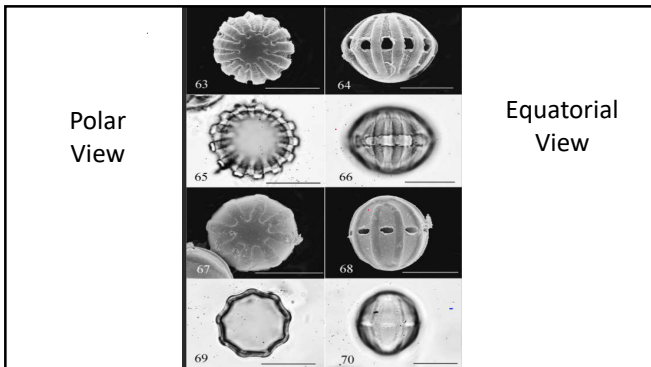
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Features of Pollen Grains

1. SIZE
2. SHAPE
 - round, irregular
3. APERTURE NUMBERS oval flattened, oval elongated, long, triangular/trilobed, semi-circular
4. APERTURE TYPES
 - furrows, pores
5. SURFACE
 - Smooth or indefinite, granular, striate, net or pitted, isolated dots due to spines or projections
6. EXINE SECTION
 - Thin, medium no rods, medium rods or beaded, thick coarse external rods, close rods, long thin spines, broad based spines, small spines/warts
7. OTHER STRUCTURAL FEATURES

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A **B** **C**

- 1. Pollen grain wall- exine and intine
- 2. Exine - thick hard ornamental, made up of sporopollenin (most resistant organic material high temperature, acid, alkalis)
- 3. Germ pore- circular aperture in exine- sporopollenin absent. Pollen tube emerges from germ pore
- 4. The inner wall of the pollen grain intine- a thin and continuous layer made up of cellulose and pectin.

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The Oil Seed Rape pollen measured 38um under the microscope and is oblong in shape. The pores are not prominent. The two pictures below show the photos taken through the eyepiece. The one on the left shows the netted and beaded surface of the pollen grain. The one on the right shows the section at the equator and the medium thick exine (shell).

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Forget Me Not pollen is tiny, at about 6um. It is a very distinctive dumbbell shape. Rex Sawyers pollen identification guide shows that Forget Me Not pollen is a yellow colour. There were different shades of yellow pollen going into the hive and the bees were working this flower, but it looked like they were taking nectar and none of the honey bees had pollen in their baskets.

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a **20 μm**

b **20 μm**

c **10 μm**

d **10 μm**

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Analysing Pollen in Honey

CENTRIFUGING METHOD

- 10g honey
- Make up to 30ml with water, mix
- Divide 2x15ml test tubes
- Centrifuge 2,000 rpm
- Decant supernatant leave sediment
- ½ fill one tube water add to other tube
- Fill empty tube to same level
- Centrifuge 5 mins
- Decant liquid
- Pipette sediment on to slide
- Dry on hot plate
- Add glycerine jelly
- Add cover slip
- X400 under microscope

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Analysing Pollen in Honey

SEDIMENTATION METHOD

- 10g honey
- Make up to 30ml with water
- Stir well
- Leave 24hrs
- Decant supernatant leaving 10ml + sediment
- Leave 24 hrs
- Decant supernatant
- Make slide with pollen sediment

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