

SCALE INSECTS OF BRITAIN

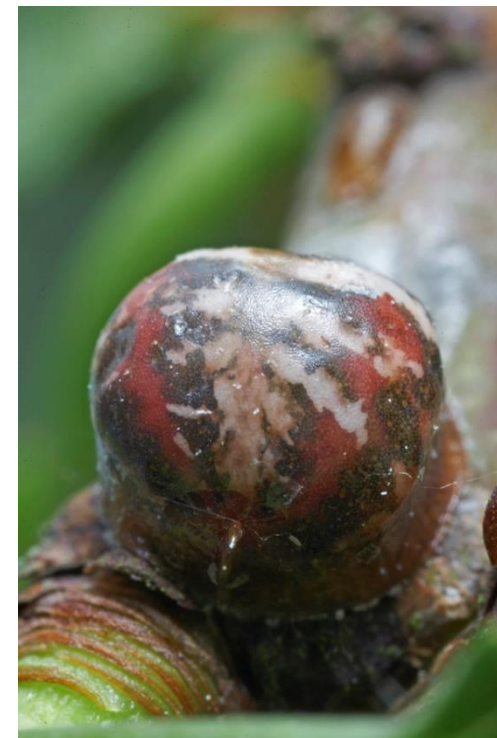


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Outline of talk

- What are Scale insects?
- Biology
- Beneficial scales
- Scale insect plant pests
- Scale insects in Britain
- Detection in different habitats
- How to identify scales
- Why study scale insects in Britain?



Animal or vegetable? One species was only determined to be an insect and not a seed, following a lawsuit (Imms, 1990)

What are scale insects?

- Plant-sap feeding insects
- Related to aphids, whitefly & psyllids
- Feed on all parts of the plant
- 8000 species
- 1050 genera
- Between 20-31 families
- Higher classification is evolving





Top left: - Adult male

Top Right:- Dead adult females & "Crawlers"

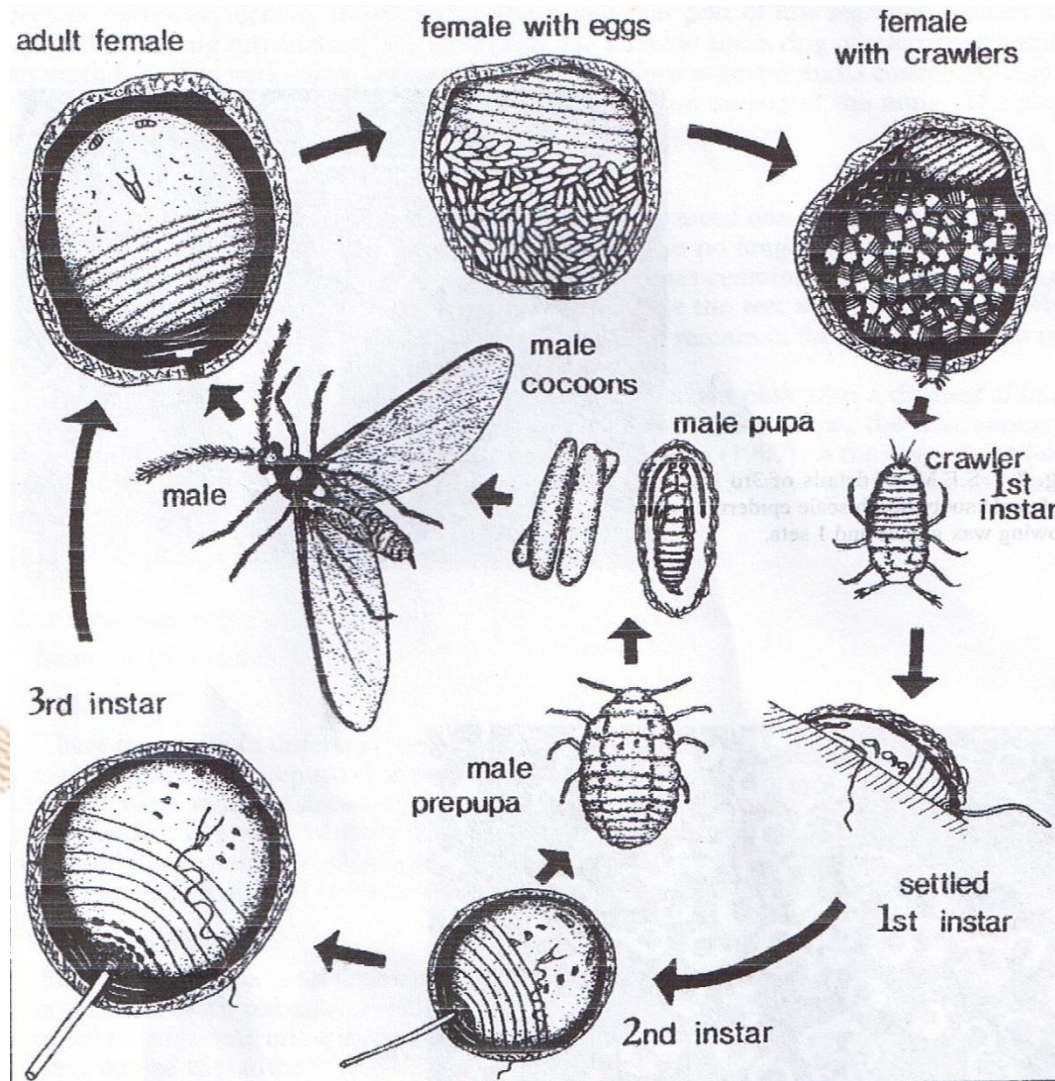
Bottom Left:- Live Female (Ventral) with eggs
(Photos via Bugwood.org)

Biology and Dispersal

- Sexually dimorphic; neotenic females; non-feeding winged adult males
- Females 3-4 instars; Males 5 instars
- Reproduce sexually, parthenogenetically and hermaphrodites
- Most lay eggs, protected by an ovisac, female's body, separate scale-like cover, between wax plates or inside a ventral abdominal pouch
- First instars (crawlers) actively disperse and carried by wind
- Commonly transported in trade. One of the most successful colonising groups of insects in warmer parts of the world



Scale insect life cycle



- Beech felt scale
Cryptococcus fagisuga
- Females 4 instars;
males 5 instars
- Univoltine



Beneficial scale insects

- Used for centuries for production of dyes (*Dactylopius*, *Kermes*, *Porphyrophora*)
- Lacquers (Shellac - *Laccifer lacca*)
- Chinese Wax (*Ceroplastes ceriferus*, *Ericerus pela*) – candles, polish, medicine
- Food (Biblical 'manna', *Trabutina mannipara*)
- Jewellery (ground pearls)
- Medicines
- Honey (Greece – honeydew from *Marchalna hellenica*)
- Biological control of weeds



Chinese Wax



Shellac – furniture polish

Dactylopius coccus – Cochineal E120



INGREDIENTS:

Wheat Flour, Wheat Starch, Palm Oil, Potato Powder, Onion Powder, Sugar, Salt, Monosodium Glutamate, Cochineal.

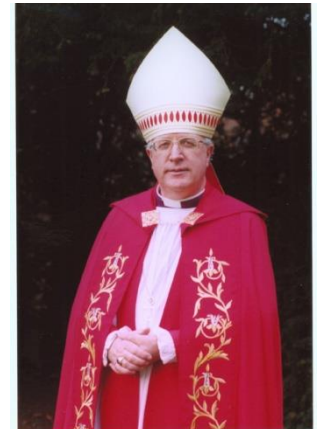


Scale insects – Historical Impact



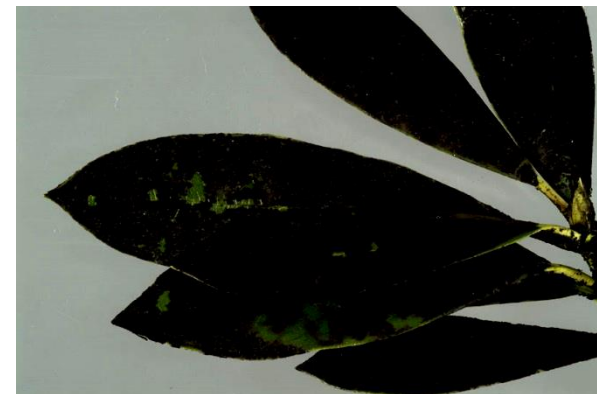
Trabutina mannipura
Tamarisk – manna from
Heaven

Kermes vermilio
– vermilion dye



Scale insects as plant pests

- Most important pests of many tropical and subtropical fruit crops such as Citrus
- Removal of plant sap reduces host vigour
- Chlorosis, discolouration
- Distortion, galling, pitting
- Drying out and dieback
- Premature leaf drop
- Necrosis due to toxic saliva
- Kill susceptible plants
- Vectors of plant pathogenic diseases
- Honeydew and moulds



Pine tortoise scale in Turks & Caicos Islands (TCI)



- *Toumeyella paricornis*, native to N. America
- Introduced to TCI (UK Overseas Territory) on Christmas trees from USA
- First identified in 2005 by Fera
- Catastrophic decline (95%) of endemic *Pinus caribaea bahamensis*
- IUCN red listed and National tree for TCI
- Pineyards (climax vegetation) extirpated in most of TCI – ecological change
- Caicos Pine Recovery Project - emergency restoration protocols – by Kew & TCI Department of Environment and Maritime Affairs, supported by Fera
- **Pine Tortoise scale in Italy 2015**



Impact in the UK



- Most abundant scale insects in urban areas are all exotic introductions
- Cottony cushion scale, *Icerya purchasi*, caused severe dieback to pittosporum hedging at Heathrow Airport in 2016
- Euonymus scale, *Unaspis euonymi*, caused severe dieback to spindle hedges in North Yorkshire in 2018
- New Zealand Flax mealybug, *Balanococcus diminutus* killed large numbers of *Phormium* plants in Leeds



Scale insects of Britain

- Approximately 90 native and 26 introduced naturalized scale insect species present in Britain (Continental fauna is much larger)
- They are among the most poorly recorded and studied of all British insects
- Four main families: Pseudococcidae, Coccidae, Eriococcidae and Diaspididae
- Many species are only known from a couple of records



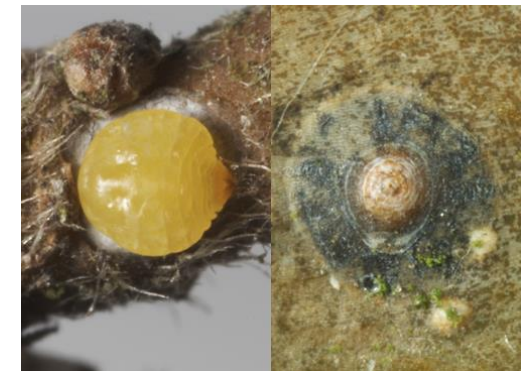
Pseudococcidae



Coccidae



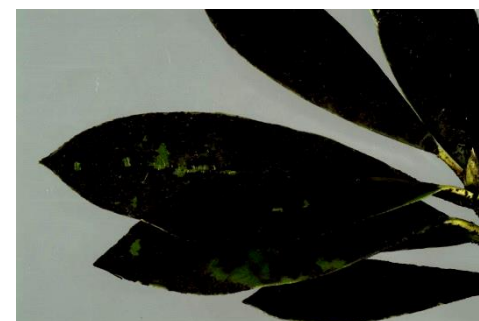
Eriococcidae



Diaspididae

Detection

- Many scale insects can be found throughout the year as the dead females remain attached to the host plant
- Most are conspicuous when they produce their waxy ovisacs during spring and summer
- Honeydew and sooty moulds
- Scale insect populations are often larger in urban areas making them easier to spot
- Many species feed on the roots and stem bases of grasses and herbaceous plants



Scale insects in urban gardens and parks



New Zealand flax –
Balanococcus diminutus
Phormium tenax



Brown soft scale –
Coccus hesperidum
Numerous plants



Wisteria scale –
Eulecanium excrescens
Wisteria, woody plants



Viburnum scale –
Lichtensia viburni
Ivy, Viburnum



Brown scale –
Parthenolecanium corni
Numerous woody plants



Yew scale –
Parthenolecanium pomericum
Yew

Scale insects in urban gardens and parks



Cottony camellia scale –
Pulvinaria floccifera
camellia, holly, rhododendron



Hydrangea scale –
Pulvinaria hydrangeae
Hydrangea, Acer



Horse-chestnut scale –
Pulvinaria regalis
Trees



Rose scale –
Aulacaspis rosae
Rose



Minute cypress scale –
Carulaspis minima
Cupressaceae



Euonymus scale –
Unaspis euonymi
Euonymus

Scale insects in woodlands



Birch bark scale –
Steingelia gorodetskia
Birch roots



Boreal ensign scale –
Newsteadia floccosa
Moss and roots



Polyphagous tree mealybug
– *Phenacoccus aceris*
Trees



Beech mealybug –
Trionymus newsteadi
Beech



Bituberculate scale –
Palaeolecanium
bituberculatum

Rosaceae



Oak soft scale –
Parthenolecanium rufulum
Oak

Scale insects in woodlands



Small spruce bud scale –
Physokermes hemicryphus
Spruce



Striped kermes –
Kermes quercus
Oak



Beech scale –
Cryptococcus fagisuga
Beech



Ash bark scale -
Pseudochermes fraxini
Ash



Pit-making oak scale –
Asterodiaspis variolosa
Oak



Willow scale –
Chionaspis salicis
Willow, Ash, Currant

Scale insects in grass & heathland



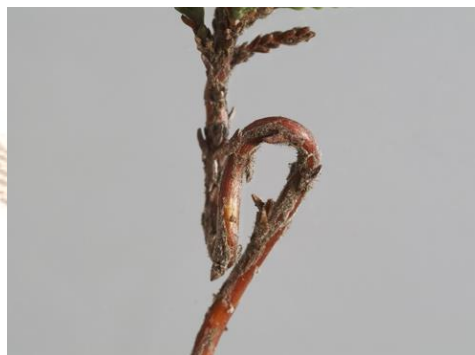
Cottony grass scale –
Eriopeltis festucae
(4 spp.) Grasses



Wood rush soft scale –
Luzulaspis luzulae
(4 spp.) Sedges



White root mealybug –
Rhizoecus albus
Roots herbs & grasses



Heather felt scale –
Eriococcus devoniensis
Galls *Erica tetralix*



Harmless felt scale –
Eriococcus inermis
Grasses, sedges



Blueberry armoured scale –
Diaspidiotus bavaricus
Heather, Blueberry

Scale insects in orchards and vineyards



Nut scale –
Eulecanium tiliae
Malus, Prunus



Nut scale –
Eulecanium tiliae
Teneral female



Woolly vine scale –
Pulvinaria vitis
Vine, plum, currants



Woolly vine scale –
Pulvinaria vitis
Male tests



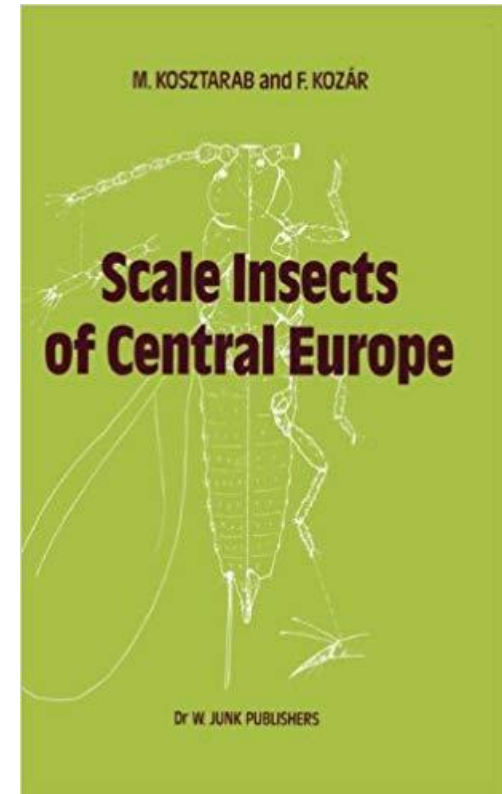
Yellow plum scale –
Diaspidiotus ostreaeformis
Malus, Prunus



Mussel scale –
Lepidosaphes ulmi
Malus, Prunus

How to identify scale insects?

- Scale insect taxonomy is based on the adult female morphology
- Scale insects usually need to be slide mounted and identified by an expert
- The limited number of species in Britain means that with experience field identification of some common species is reliable
- Most species are relatively host specific
- Main references are is by Kosztarab & Kozar *Scale insects of Central Europe*; and keys to the British Pseudococcidae and Eriococcidae by Doug Williams





Useful Links provided by BNHS

- <https://www.bnhs.co.uk/focuson/scales/html/>
- SCALE INSECTS AND WHITEFLIES
(HEMIPTERA:COCCOIDEA AND ALEYRODOIDEA) OF
BEDFORDSHIRE (2010) BR. J. ENT. NAT. HIST., 23: 2010
- [https://www.bnhs.co.uk/focuson/scales/docs/
Malumphy%202010%20Scales%20&%20whit
eflies%20of%20Bedfordshire%20BJENH.pdf](https://www.bnhs.co.uk/focuson/scales/docs/Malumphy%202010%20Scales%20&%20whit%20eflies%20of%20Bedfordshire%20BJENH.pdf)

Why study scale insects in Britain?

- Opportunity to discover something new
- Fauna continually changing – non-native species regularly introduced
- Climate change enables species to expand geographical range
- Mediterranean species are moving northwards
- Glasshouse species moving outdoors
- Tropical species establishing in London
- Native species under-recorded so plenty of scope for new county records



Greedy scale
Hemiberlesia rapax,
recently found
outdoors in London
– Thanks to RHS

Golden root mealybug – *Chryseococcus arecae*

- Native to New Zealand
- Polyphagous, root feeding, pest of ornamental plants
- First recorded in Scotland in 2012 and England in 2015
- Spreading in plant collections
- Feeds on numerous ornamentals, crops and natural plants
- Distinctive gold colour
- Please report it to the RHS



What to do now?

- Look in your garden and city centre to become familiar with their appearance
- If you find some suspect scale insects, take a photo and collect a sample in 70% ethanol
- Submit a picture to Chris Malumphy who can offer advice
chris.malumphy@fera.co.uk
- The natural enemies of the native scale insects are also worth studying (?impact of harlequin ladybird)



Thank you for your attention



Stellate scale
*Ceroplastes
stelifer* found on
orchids grown
indoors