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THE KNOPPER GALL, by M.R. Jukes

Summary

The Knopper gall is described and the life cycle of the gall wasp *Andricus quercuscalicis* (Burgs.) is detailed. Brief mention is made of the gall's spread and current status in Britain.

1. The 'Knopper' is a large conspicuous gall on the acorns of Pedunculate oak (*Quercus robur*). It results from development of the agamic (parthenogenetic) generation of a cynipid wasp *Andricus quercuscalicis* Burgs. Although well known in Europe, the species is relatively new to Britain, and was first recorded in Northamptonshire during the early sixties (Claridge, 1962). Since then it has spread rapidly throughout southern and midland England, becoming abundant in many localities.
2. The gall consists of an irregular, ridged cone, firmly attached to the acorn by a short, concealed stalk (Fig. 1). An apical aperture leads to an inner chamber where a thin-walled woody capsule contains a single larva (Fig. 2). During development, the galls are soft, green, and covered with a sticky film, giving a glossy appearance. One or two galls normally develop on a single acorn although several more may be found occasionally. In September the galls become brown and woody and fall to the ground where they overwinter buried in the surface litter. Gall wasps destined to emerge the following spring overwinter in these galls as fully formed adults; a proportion, however, remain in the galls as mature larvae for one or two years. This extended diapause is also found in other seed-feeding insects and is probably an adaptation ensuring the survival of populations through poor seed years.

Figure 1. External appearance of a knopper gall

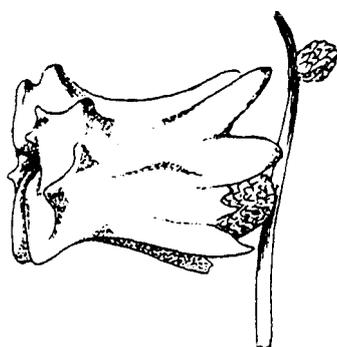
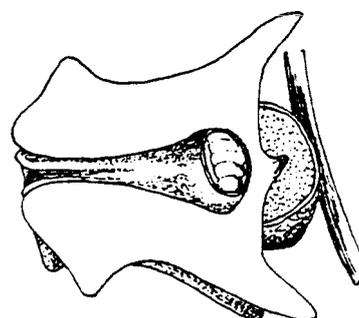


Figure 2. Section of a knopper gall



3. During early spring agamic female wasps emerge from the Knopper galls and fly in search of Turkey oak (*Quercus cerris*). Eggs are inserted into the swelling male flower buds and give rise to an inconspicuous alternate generation of galls on the catkins. These catkin galls are little over one millimetre in length, swelling to this size only a few days before development is complete. Each gall contains a single insect; more than one of these minute galls may grow on an individual catkin. The sexual generation on Turkey oak lasts only nine weeks, culminating in the emergence of male and female gall wasps. Fertilised females migrate to Pedunculate oak where they lay eggs on developing acorns, thus initiating the next generation of Knopper galls.
4. A number of different parasitoids are known to attack the agamic generation in Europe (Collins *et al*, 1983) and although most of these species are common in Britain, the Knopper gall is at present virtually free from

parasitism. It is expected that in time, parasitoids will adapt to the gall and exert some degree of natural control. Variable parasitism levels have been achieved on the Turkey oak galls by chalcids of the genus *Mesopolobus*, however, these appear to have little controlling influence.

5. Knopper galls have been known to occur on oaks in continental Europe for over 200 years, and on the Channel Islands since about the turn of the century. It was not until the sixties that a number of independent records demonstrated that *Andricus quercuscalicis* was firmly established on mainland Britain. Until 1973, the Forestry Commission had received enquiries concerning this gall only from Devon; by 1983 it had been reported from most of the English counties south of Yorkshire.
6. The Pedunculate oak and some of its named hybrids are the only oaks to suffer from the agamic generation of this gall; the Sessile oak (*Quercus petraea*) appears to be immune. The galls are more noticeable during poor mast years such as 1983 when, in some areas, most of the available acorns are attacked. The viability of galled acorns is greatly reduced (Martin, 1982) but only in years where Knopper populations are high, and the mast poor, will natural regeneration be affected. The health of the trees themselves is in no way affected by the gall's presence; trees which have recently commenced fruiting will happily continue to produce acorns (galled or otherwise) for well over 100 years.
7. Nursery grown oak trees are being extensively planted for both commercial forestry and amenity. *Andricus quercuscalicis* may from time to time affect the local supply of acorns for nursery use but it seems unlikely that seed crops will be severely affected throughout Britain in the same year. When shortages of acorns do occur imports from the Continent should continue to be available to fulfil the need of the nursery trade.

References

- Claridge, M.F. (1962). *Andricus quercuscalicis* (Burgsdorf) in Britain (Hymenoptera : Cynipidae). *Entomologist* **95**, 60-61.
- Collins, M., Crawley, M.J. and McGavin, G.C. (1983). Survivorship of the sexual and agamic generations of *Andricus quercuscalicis* on *Quercus cerris* and *Q. robur*. *Ecological Entomology*, **8**, 133-138.
- Martin, M.H. (1982). Notes on the biology of *Andricus quercuscalicis* (Burgsdorf) (Hymenoptera : Cynipidae), the inducer of Knopper galls on the acorns of *Quercus robur* L. *Entomologists Monthly Magazine*, **118**, 121-123.
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