

**Evidence for the entomopathogenic fungus *Erynia nebriae* (Raunkiaer, 1893) (Entomophthoromycotina, Entomophthoraceae) on the Cotswold Hills at Stanway, Gloucestershire.**

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Photograph © Paul Whitehead.

### Introduction

An earlier contribution (Whitehead, 2014) attempted to highlight the taxonomic difficulties enshrined in the study of entomopathogenic fungi. Evidently it succeeded because on 11 February 2018 I was contacted by the German mycologist Dr Thorben Hülsewig who had read the account. The ensuing discussion improved my somewhat limited comprehension and this new information is provided here.

### Discussion

Figure 02 in Whitehead (2014) depicted a recently dead *Nebria brevicollis* (F., 1792) (Coleoptera, Carabidae) from the Stanway Woods complex of Gloucestershire densely invested with fungal mycelia and bore the following caption: “*Cordyceps bassiana* Li, Li, Huang & Fan, 2001 in its anamorphic state ‘*Beauveria bassiana* (Bals.-Criv.) Vuill.’ (Hypocreales: Cordycipitaceae) on *Nebria brevicollis* (F., 1792) (Coleoptera:Carabidae), Stanway woods complex, Gloucestershire VC33 SP03 184 m a.s.l., 15 November 2014. Further molecular studies are likely to require that this determination be revised. © P.F. Whitehead.”

Recently Keller & Hülsewig (2018) brought forward the first findings of the entomopathogenic fungus *Erynia nebriae* (Raunkiaer, 1893) (Entomophthoromycotina, Entomophthoraceae) since its original description. Eighteen beetles with recently sporulating fungi were collected between 19 November 2016 and 16 December 2016 from a forest path in a deciduous forest dominated by beech *Fagus sylvatica* L. and oak *Quercus robur* L.). The forest is part of a recreation area Hohenstein near Witten, Nordrhein-Westfalen, Germany, at an altitude of about 130 m at 51°43'N 7°35'E. This site is therefore not unlike that at Stanway in terms of habitat, altitude and seasonality.



01. *Nebria brevicollis* (F., 1792), Stanway woods complex, Gloucestershire VC33 SP03 184 m a.s.l., 15 November 2014. The features of the pathogenic fungus which had very recently killed the beetle are evident and compare well with similar illustrations in Keller & Hülsewig (2018). © P.F. Whitehead

The Stanway *Nebria brevicollis* is reproduced here in 01 showing the mycopathogen clearly. One cannot determine an entomopathogenic fungus from an image; Keller & Hülsewig (2018) demonstrate the specialised equipment required to produce microimages of conidia, spores and nuclei so that taxonomy may be confirmed.

However, the Stanway specimen shows the beetle invested in dense mycelia with laterally disposed cystidia clearly visible. Dr Hülsewig suggests (*in litt.*, 8 February 2018) that there are reasonable grounds to accept this evidence as the first British record of the very rare entomopathogenic fungus *E. nebriae*.

Accessible background information concerning entomopathogenic fungi and their hosts can be found in Samson, Evans & Latgé (1988).

### Conclusion

An example of the carabid beetle *Nebria brevicollis* from Stanway Gloucestershire almost certainly provides the first British and third world record (Dr T. Hülsewig, *in litt.*, 8 February 2018) of the fungus *Erynia nebriae*. This is a winter-active fungus with strongly focussed populations occurring between 15 November (Stanway, England) and 15 January (Germany). If this fungus coevolved with *Nebria brevicollis* as one is tempted to infer, and it is limited to upland woodlands, it might throw light on the ecological history of *Nebria brevicollis* prior to recent human-culture impacts. Other species of *Nebria* occur as forest fringe species in continental Europe.

### References

- Keller, S. & Hülsewig, T., 2018. Amended description and new combination for *Entomophthora nebriae* Raunkiaer, (1893), a little known entomopathogenic fungus attacking the ground beetle *Nebria brevicollis* (Fabricius, 1792). *Alpine Entomology* 2:1–5.  
Samson, R.A., Evans, H.C. & Latgé, J.-P., 1988. *Atlas of entomopathogenic fungi*. 187 pp. Springer-Verlag.  
Whitehead, P.F. 2014. Taxonomy, clavicipitaceous fungi and the juggler of molecules. *Worcestershire Record* 37:46-47.

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