

## Fat Duckweed (*Lemna gibba*) might be much more widespread in Hertfordshire than previously thought

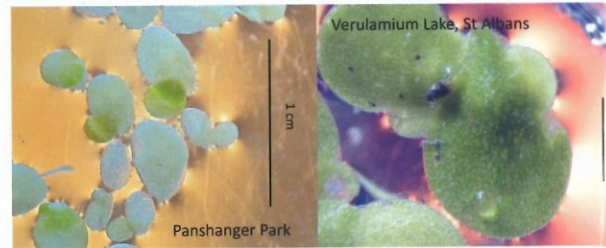
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Fat Duckweed, *Lemna gibba*, is one of three native species of duckweeds occurring in Hertfordshire. It is referred to as 'never very common' by James (2009). According to iRecord, records of duckweeds in Hertfordshire are sparse with most records of duckweeds referring to Common Duckweed, *Lemna minor*. As checked on 8/02/22, from 23 accepted records of *Lemna*, 16 referred to *L. minor*, four to *L. trisulca* (three of them submitted by Alla Mashanova - AM), two to *L. minuta* and one to an undetermined *Lemna*.

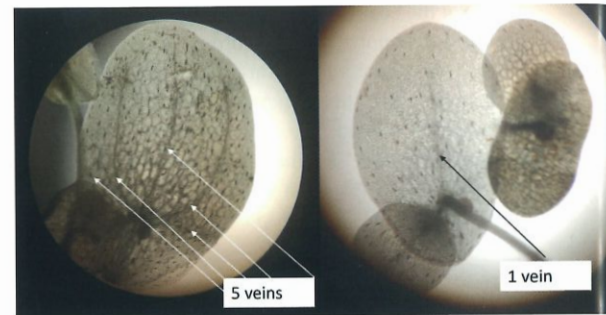
The lack of Fat Duckweed records is likely to be attributed to difficulties in distinguishing it from Common Duckweed. Identifying Fat Duckweed in its 'fat' state, with thalli (leaves) swollen on the underside (Stace, 2019; OPAL, 2014) is straightforward but when it is 'flat' it is not readily distinguishable from Common Duckweed (Lansdown, Rumsey and Crouch, 2019; Lansdown and Rumsey, 2020). According to Poland & Clement (2009), Fat Duckweed is likely to be in its 'fat' state during the flowering season, it is advisable not to record duckweeds outside the growing season to avoid confusion or, alternatively, to grow plants to allow clearer investigation of their morphology.

In our experience, Fat Duckweed would not necessarily become 'fat' even when it is grown under favourable conditions, but there is a set of features distinguishing it from other duckweeds (Crouch and Rumsey 2020; BSBI 2016). Two readily observable features are the asymmetrical shape of the leaves and large air-spaces called lacunae (Figure 1). Another useful feature is the number of veins, but they are only visible after removal of chlorophyll. We used immersion in alcohol to bleach thalli. Fat Duckweed has five veins (Figure 2), Common Duckweed has three and Least Duckweed has one. When thalli start to develop they have only one vein and so, seeing fewer than five veins does not exclude Fat Duckweed (pers. communication R. Lansdown).

As part of a bigger project studying properties of duckweeds as a potential protein supplement, we checked 52 sites (mostly ponds) in Hertfordshire between September 2020 and March 2021. Duckweeds were present at 37 locations where samples were taken (Figure 3). All samples were screened initially and



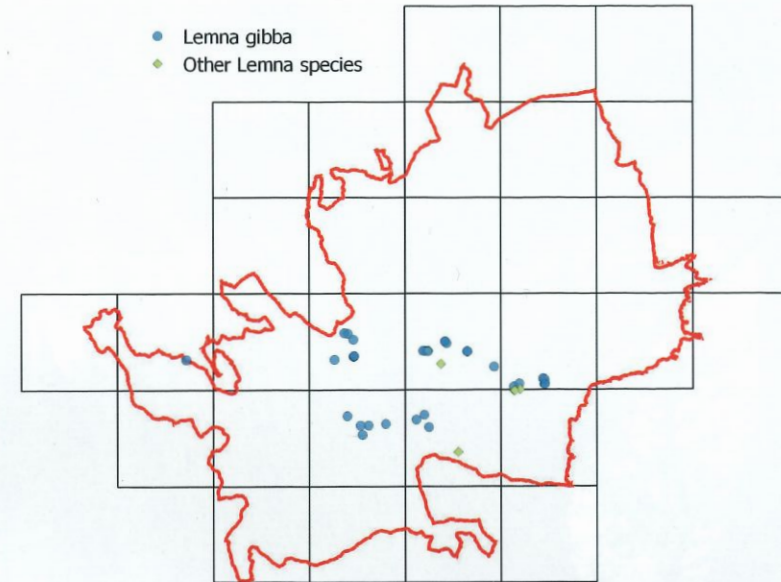
**Figure 1.** Asymmetrical shape of senescing thalli of *Lemna gibba* from Panshanger Park and lacunae visible in a thallus from Verulamium Park (St. Albans). Scale bars were estimated from different images taken at the same magnification.



**Figure 2.** Thalli of *Lemna gibba* with chlorophyll removed showing 5 veins (left) and 1 vein (right). Lacunae, which are visible in both images, help to identify the plant on the right as *Lemna gibba*. Length of the thalli are approximately 3.5 mm in the left image and 2.5 mm in the right image.

then kept, partly at the University of Hertfordshire under controlled environment conditions and partly at AM's residence, to see whether individual plants would develop better to ease identification. In a few cases more samples were taken if the initial samples were lost due to senescing (ageing). Fat Duckweed was convincingly identified in 31 samples suggesting that it is a common and widespread species in Hertfordshire.

We could allocate the name of Fat Duckweed when we saw the features of this species, but we could not identify Common Duckweed on the grounds of not seeing the features of Fat Duckweed. Therefore, we cannot compare distribution of these two species.



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**Figure 3.** Map of sampling locations where any species of duckweeds were found. Locations where *Lemna gibba* was confirmed are marked as circles and other *Lemna* species as diamonds.

In a few cases, when duckweeds were left to grow, Fat Duckweed features became obvious after a few days even when the sample looked like Common Duckweed to begin with. It is very likely that a mixture of both species was present in most samples. Further molecular study is planned at the University of Hertfordshire to improve understanding of differences in distribution between Fat Duckweed and Common Duckweed. In this study, sampling was restricted to Central Hertfordshire. A wider area will be sampled in the future.

### Acknowledgements.

We thank Richard Lansdown for advice on identification of duckweeds, Ian Denholm for helpful discussions, a call for information within Herts Flora Group, arranging access to sites and commenting on the manuscript, and all naturalists who alerted us to duckweed presence in their local water bodies.

### References

BSBI (2016). *Lemna* Crib. Available at: [https://bsbi.org/wp-content/uploads/dlm\\_uploads/Lemna\\_Crib.pdf](https://bsbi.org/wp-content/uploads/dlm_uploads/Lemna_Crib.pdf) [Accessed: 25 January 2022].  
Crouch, H. & Rumsey, F. (2020) Introduction to Duckweeds. Available at: [https://bsbi.org/wp-content/uploads/dlm\\_uploads/Introduction-to-Duckweeds-Helena-Crouch.pdf](https://bsbi.org/wp-content/uploads/dlm_uploads/Introduction-to-Duckweeds-Helena-Crouch.pdf) [Accessed: 25 January 2022].

James, T.J. (2009). *Flora of Hertfordshire*. Welwyn Garden City: Hertfordshire Natural History Society.  
Lansdown, R. and Rumsey, F. (2020). Yes it is *Lemna gibba*, even if it is flat! Available at: <http://paintdrawer.co.uk/nature/lemna-nhm-lansdown-rumsey.jpg> [Accessed: 25 January 2022]  
Lansdown, R., Rumsey, F. & Crouch, H. (2019) ... yes – it is *Lemna gibba*, even if it is flat! Tackling common Duckweed dilemmas. Available at: <http://paintdrawer.co.uk/nature/lemna-2019-bsbi-aem-lansdown-rumsey-crouch.pdf> [Accessed: 25 January 2022]  
OPAL (2014). Guide to duckweeds. Available at: <https://www.imperial.ac.uk/media/imperial-college/research-centres-and-groups/opal/water-survey-duckweed-guide-A5-2014.pdf> [Accessed: 25 January 2022]  
Poland, J. and Clement, E.J. (2009). *The Vegetative Key to the British Flora*. Southampton: J. Poland in association with Botanical Society of the British Isles.  
Rumsey F. Some under-recorded or misidentified taxa [https://bsbi.org/wp-content/uploads/dlm\\_uploads/BSBI\\_RC\\_2015\\_FJR.pdf](https://bsbi.org/wp-content/uploads/dlm_uploads/BSBI_RC_2015_FJR.pdf) [25 January 2022]  
Stace, C.A. (2019). *New Flora of the British Isles* (4th ed.). Middlewood Green, Suffolk: C. and M. Floristics.