Red Duckweed (*Lemna turionifera* Landolt) new to Britain

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ABSTRACT

In May 2007, red duckweed (*Lemna turionifera*) was found in a ditch at Stoborough in Dorset. In July 2007, a second population was found in the South Forty-Foot Drain in Lincolnshire. *L. turionifera* is native in North America and northern Asia. It has also been recorded from Austria, Belgium, the Czech Republic, France, Germany, the Netherlands, Norway, Poland and Sweden where it has usually been considered to be an alien. Its occurrence in two very widely separated sites suggests that it may have been in Britain for some time but has been overlooked. Notes are provided to aid identification of *L. turionifera*, particularly in relation to *L. minor* and *L. gibba* and some information is provided on the habitats and species associated with it at its two British sites.

KEYWORDS: Lemnaceae, distribution.

INTRODUCTION

In May 2007, John Bruinsma, Klaus van de Weyer and I visited a number of sites in southern England to enable Klaus to prepare guidance on the identification of some aquatic plant taxa which occur or have occurred in Germany with which he was not familiar. One of these was *Potamogeton* × *sudermanicus* Hagstr. at its only British location near Stoborough in Dorset (vc. 9). Whilst searching for the pondweed, *L. turionifera* Landolt was found growing with *L. gibba* L. in populations embayed by a plank bridge and among marginal vegetation. On 19 July 2007 another population of *L. turionifera* was found in the course of a survey of aquatic vegetation in the South Forty-Foot Drain, between Billingborough Fen and Quadring Low Fen, Lincolnshire (vc. 53).

Material from both populations was sent for determination by Professor Dr. E. Landolt at the Institut für Integrative Biologie, Zürich. The material from Stoborough was too degraded for determination by the time it arrived but Prof. Landolt has been able to confirm that the material from the South Forty-Foot Drain was *L. turionifera*. The two populations were sufficiently similar that I am convinced that they are both of the same species and therefore the collection from Stoborough represents the first record of this species in Britain. Material from this collection has been deposited at **BM**.

DISTRIBUTION

L. turionifera is native in North America and northern Asia. In North America it occurs from Mexico north to Alaska and through much of Canada and the United States east to Nova Scotia, it is largely absent from the south-eastern United States. In Asia it occurs in a broad band from Turkey, north and east across Russia to Kamchatka and Sakhalin Island (Landolt 1986). In Eurasia, the western limits of its distribution have been obscured by apparently non-native populations (Muller 2004), where it has been recorded from Austria, Belgium (Hoste & Bruinsma 2007; van Landuyt 2007), the Czech Republic, France (Muller 2004), Germany (Landolt 1986, Wolff and Ortschiedt 1993), Poland (Muller 2004), the Netherlands (Wolff & Bruinsma 2005), Sweden and Norway (GBIF 2007). Its occurrence in Britain may be part of a westward range expansion.

IDENTIFICATION

A total of seven species of Lemnaceae are known to occur in the wild in Britain. In addition to species of *Lemna*, these include *Spirodela polyrhiza* (L.) Schleiden and *Wolffia arrhiza* (L.) Horkel & Wimmer. Another species *Landoltia* (formerly *Spirodela*) *punctata* (G. Mey) Les & D. J. Crawford has been recorded as a contaminant in garden centres (Rumsey 2006), but not yet in the wild. The species of *Lemna* known to occur in the wild in Britain fall into three sections: Section Hydrophylla most clearly distinguished by submerged growth and the fronds tapering to a stalk at the base, represented by *L. trisulca* L.;

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Section Uninerves, best distinguished by having only one nerve, represented by *L. minuta* Kunth.; and Section *Lemna* best distinguished by having floating growth and more than one nerve, represented by *L. gibba*, *L. minor* and *L. turionifera* (Landolt 1986). *L. gibba* can sometimes be identified by its growth form, where the cells of the aerenchyma expand so that the whole frond becomes swollen and can be up to 4 mm thick. However, not only can *L. gibba* occur in populations where no fronds are swollen, but *L. minor* can show some expansion, although never as much as *L. gibba* (Landolt 1986). When not expanded, *L. gibba* and *L. minor* can usually be separated by the shape of fronds, although this is not always clear and some populations may need to be grown in cultivation until characteristic features are sufficiently well developed (E. Landolt, pers. comm. 2007).

L. turionifera can usually be identified by the presence of papules along the median line, of which the apical is not significantly larger than the others and by reddish coloration commencing around the point at which the root is attached on the underside and developing as brownish-red discoloration of the bases of fronds on the upper side, making fronds look "dirty". This latter feature is the best method of recognising plants of *L. turionifera* among mixed floating *Lemna* populations. Papules are small raised bumps which occur on the upper surface of fronds and are the same colour as the surrounding tissue. The following key provides guidance on identification of those species of *Lemna* known to occur in the wild in Britain.

KEY

1. Fronds denticulate at the apex; narrowed to a stalk-like portion at the base..... *L. trisulca*
   Fronds entire and with at most only a minute stalk-like portion.....2

2(1) At least some fronds greatly swollen to more than 2 mm, with a firm, whitish or translucent swelling below the green upper cells.....*L. gibba*
   Fronds ± flat, clearly bifacial and not or at most only slightly swollen.....3

3(2) Fronds with reddish coloration.....4
   Fronds lacking reddish coloration, entirely green or glaucous.....6

4(3) Reddish coloration developing initially at the margins then spreading inwards on both surfaces or as scattered dots over the upper surface.....*L. gibba*
   Reddish coloration either mainly on the upper surface or developing initially at point of root attachment (node) underneath and spreading outward.....5

5(4) Reddish coloration ± restricted to the upper side of fronds or markedly less intense on the underside; papules near the tip and at the node larger than the ones in between.....*L. minor*
   Reddish coloration either restricted to or more intense on the underside; papules of uniform size.....*L. turionifera*

6(5) Fronds evidently glaucous (although this is very difficult to confirm in small or sparse populations); fronds small (<4 mm × 2·5 mm); vein solitary and indistinct.....*L. minuta*
   Fronds green, not glaucous; fronds small to large (<10 × 7 mm); veins usually more than one and usually evident as ridges along the frond.....7

7(6) Fronds with distinct papules along the median line of the upper surface, the papule at the tip not distinctly larger than the proximal papules.....*L. turionifera*
   Fronds without distinct papules or with papules near the tip distinctly larger than proximal ones.....8

8(7) Fronds widest toward the often broad apex; largest fronds with five veins all arising from the same point.....*L. gibba*
   Fronds widest at the middle or toward the base, apex usually fairly narrow; largest fronds with 4–5 veins with the outer veins arising from the inner.....*L. minor*

DISTRIBUTION AND HABITAT IN BRITAIN

DORSET (V.C. 9)

The population at Stoborough was found in a broad ditch, approximately 10 m wide, with a width of about 7m of open water. The margins were densely vegetated mainly with *Glyceria maxima* (Hartmann) O. Holumb. *L. turionifera* was mainly found in a mixed population with *L. gibba* embayed by railway sleeper crossing the ditch near its mid-point. Scattered plants were also found in areas of open water on the landward side of stands of *G. maxima*. Other plants recorded in the ditch included, *Potamogeton* × *sudermanicus* Hagst., *P. acutifolius* Link and *Lemna gibba*; *Lemna minuta* occurs in a very well-developed population in a nearby ditch. The ditch where the *L. turionifera* was found is shown running just north of due west of Redcliffe Farm on a map published by Preston & Pearman (1998).

LINCOLNSHIRE (V.C. 53)

At the point where *L. turionifera* was found, the South Forty-Foot Drain is a wide, deep channel with very slow-flowing or still water running between high, steep embankments through fenland. The population in the South Forty-Foot Drain occurred with a very rich fenland aquatic plant community including *Ceratophyllum demersum* L., *Chara vulgaris* L., *C. virgata* Kütz., *Hottonia palustris* L., *Lemna gibba*, *L. minor*, *L. trisulca*, *Myriophyllum verticillatum* L., *Nymphoides peltata* Kuntze, *Potamogeton lucens* L., *P. natans* L., *P. pectinatus* L., *P. trichoides* Cham. & Schltdl., *Ranunculus circinatus* Sibth., *Riccia fluitans* L., *Sagittaria sagittifolia* L. and *Tolypella prolifera* (Desv.) Leonh.

Landolt (1986) recognises only five phytosociological associations characterised by *L. turionifera*. One of these, referred to as "Association of *L. turionifera* and *Riccia fluitans*" is reported to include *L. turionifera*, *L. trisulca*, *Spirodella polyrhiza* and *Wolffia columbiana* Karsten with occasional *Lemna valdiviana* Phil., *Wolffia borealis* (Engelm.) Landolt and *Ceratophyllum demersum*. Clearly many of these species are unlikely to occur in Britain however it would seem reasonable to attribute the population in the South Forty-Foot Drain to this association, because it shares *Riccia fluitans*, *Lemna trisulca* and *Ceratophyllum demersum*. Muller (2004) suggests that in Europe *L. turionifera* is associated with still, eutrophic water with a pH of 7–9 and this is likely to agree with the conditions in both the British sites.

The discovery of this species at two widely separated sites in Britain suggests that it may well be widely established and has simply been overlooked. *Lemna* species are not necessarily well recorded in Britain and it is hoped that information presented here will help to improve recording.

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