

Introduction to Duckweeds



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A presentation for the Scottish Botanists' Conference 2019, updated 2023

Old Lemnaceae : 4 genera (now in Araceae)

Spirodela (3 spp)
(including ***Landoltia***)

Spirodela polyrhiza 7-10 roots
Spirodela punctata 2-5 roots

Lemna (14 spp)

Lemna trisulca 1 root
Lemna gibba 1 root
Lemna minor 1 root
Lemna turionifera 1 root
Lemna minuta 1 root
Lemna valdiviana 1 root
Lemna aequinoctialis 1 root
Lemna perpusilla 1 root

Wolffiella (10 spp)

No roots

Wolffia (11 spp)

***Wolffia arrhiza* ?** No roots
Wolffia columbiana No roots
Wolffia globosa No roots

Spirodela polyrhiza (Greater Duckweed)



- Large fronds
- Red underside
- Many roots (5+) (but they get eaten)
- Turns red in autumn
- Multiple veins

Spirodela polyrhiza (Greater Duckweed)

Distribution in Britain & Ireland

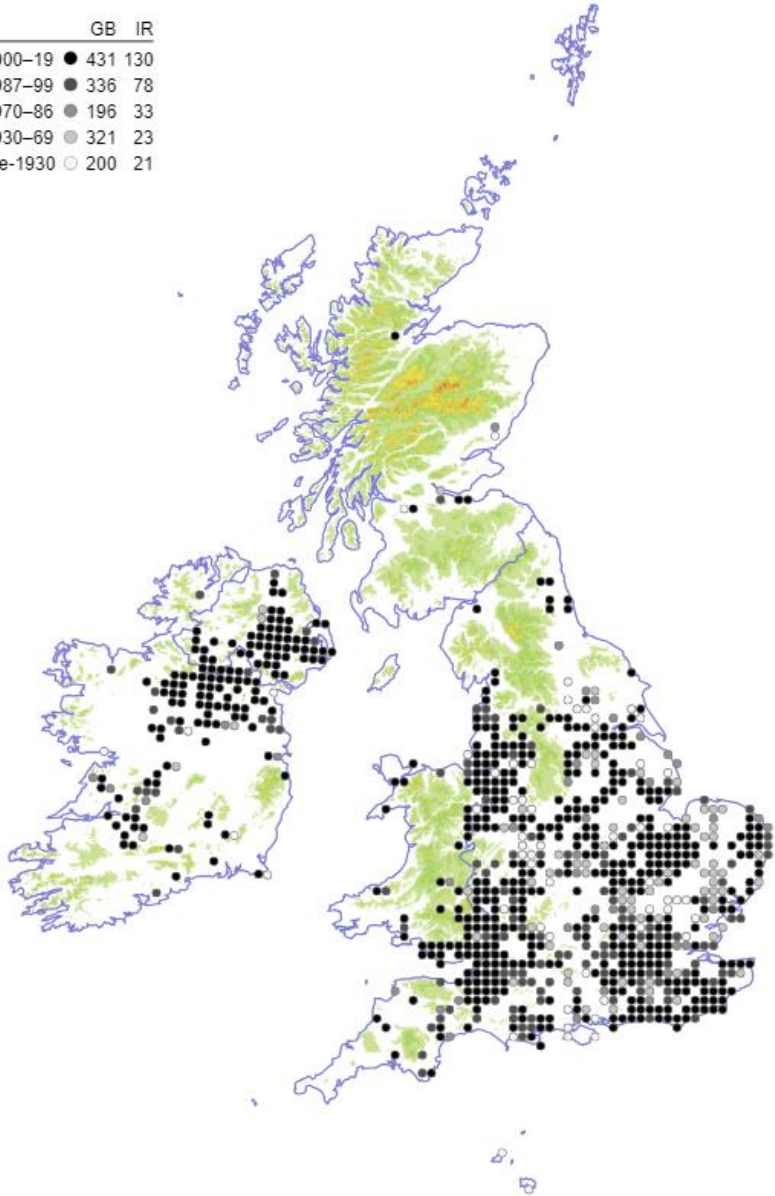
taken from the
BSBI Plant Atlas 2020

Ponds
Canals
Rivers
Ditches

(Base-rich water)

Tolerant of some eutrophication

	GB	IR
2000–19	● 431	130
1987–99	● 336	78
1970–86	● 196	33
1930–69	● 321	23
pre-1930	○ 200	21

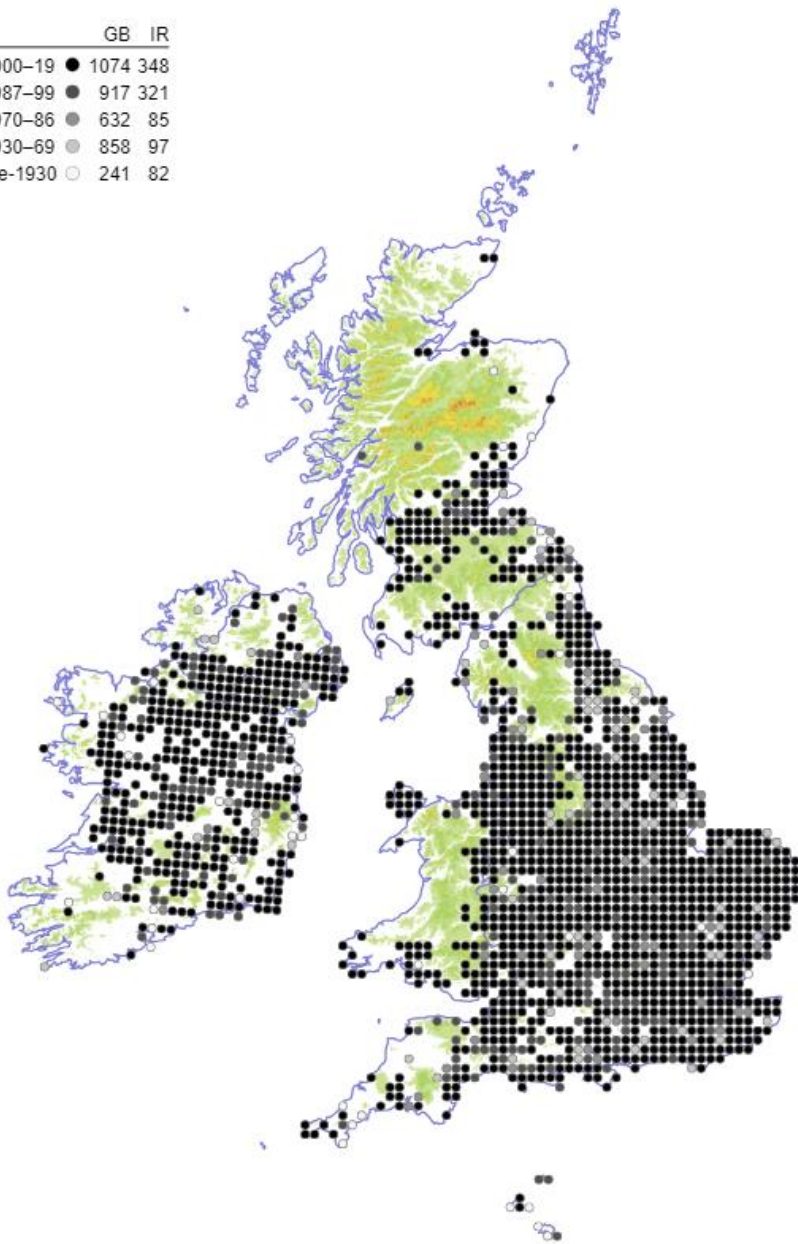


Lemna trisulca (Ivy-leaved Duckweed)



- Stalked fronds form branching chains
- Submerged, just below water surface (it sulks!)
- Flowering fronds float on the water surface

	GB	IR
2000–19	● 1074	348
1987–99	● 917	321
1970–86	● 632	85
1930–69	● 858	97
pre-1930	○ 241	82



Lemna trisulca (Ivy-leaved Duckweed)

Distribution in Britain & Ireland

taken from the
BSBI Plant Atlas 2020

Rivers
Canals
Streams
Ditches
Lakes
Ponds

Mesotrophic to eutrophic water

The Troublesome Ones

- All that is MINUTE is not *minuta*
- Fat Duckweed is not always FAT
- Common Duckweed may not be the most COMMON
- RED is not always RED Duckweed

Frond shape



Photo: © R.V. Lansdown

Lemna minor

Ovate, widest near middle

Length:width ratio 1.2-2.0

Lemna gibba

Rounder, widest near apex

Length:width ratio 1.0-1.5

Enlarged Cells



Lemna gibba

Reticulum on upper surface

Large air cells visible

Swollen cells underneath →

Lemna minor

Upper surface uniform

No large air cells



Photo:
© Fred Giles

Red Coloration



Red Duckweed
L. turionifera

Coloration begins
at the node

Photo: 
© Stefan Lefnaer



Pappules



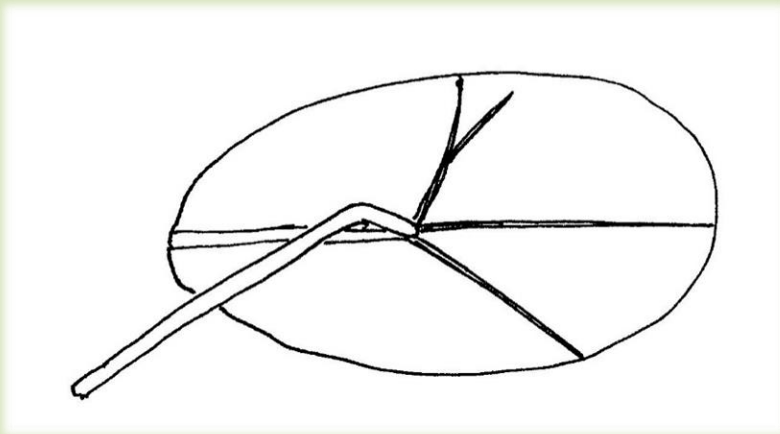
- *L. turionifera* has bumps along the frond. **Note red coloration around big bump at node**
- *L. minor* can have pappules too, but no red coloration



Lemna minor (Common Duckweed)



- Ovate, widest near middle
- Length:width ratio 1.2-2.0
- No red pigmentation
- Upper surface uniform, without large air cells
- 3 or more veins, one primary, two secondary and tertiary veins arising from secondary veins



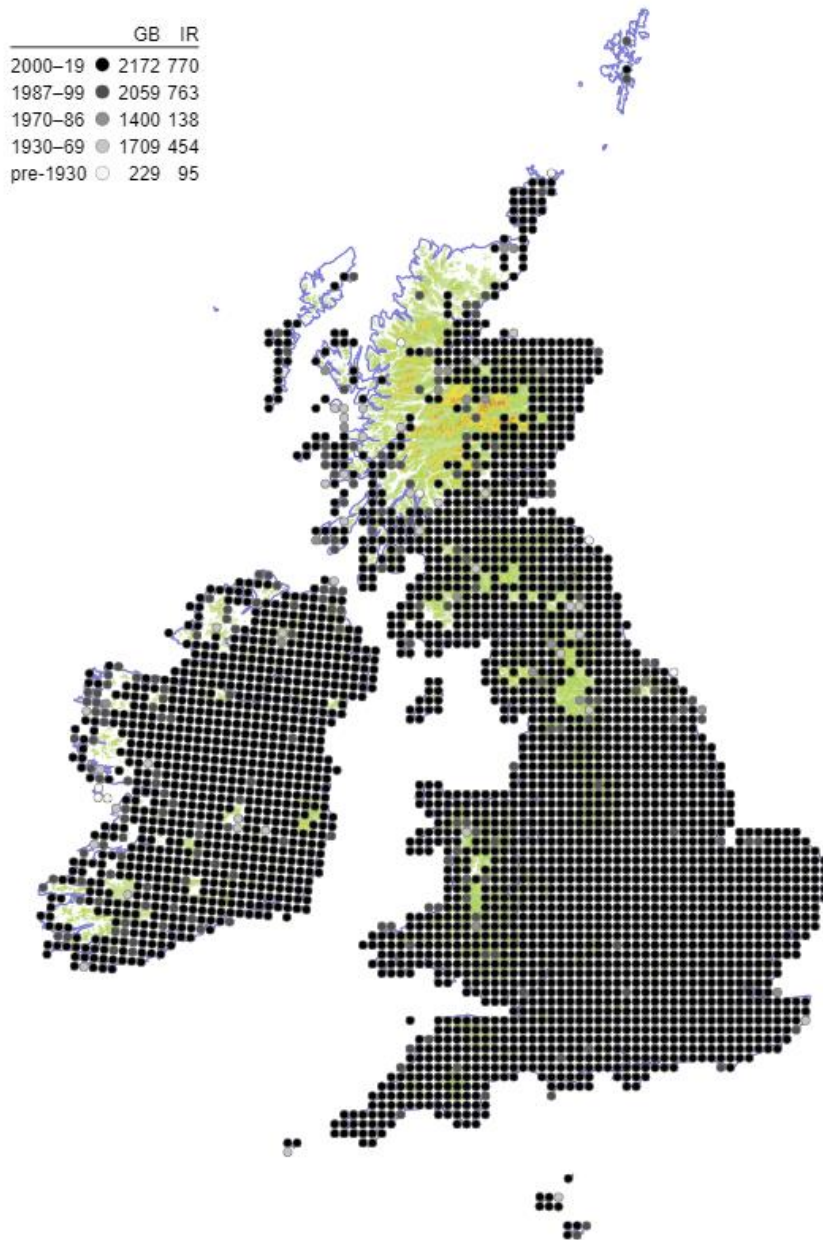
Lemna minor (Common Duckweed)

Distribution in Britain & Ireland

taken from the
BSBI Plant Atlas 2020

Ponds
Lakes
Ditches
Runnels

Widespread ...
... but maybe over-recorded?



Lemna turionifera (Red Duckweed)



- Ovate, widest in apical half
- Length:width ratio 1-1.5
- Strong red pigmentation, beginning around node
- Fronds appear “dirty”
- Row of papules
- Produces small olive-brown rootless turions
- 3 veins

Lemna turionifera (Red Duckweed)

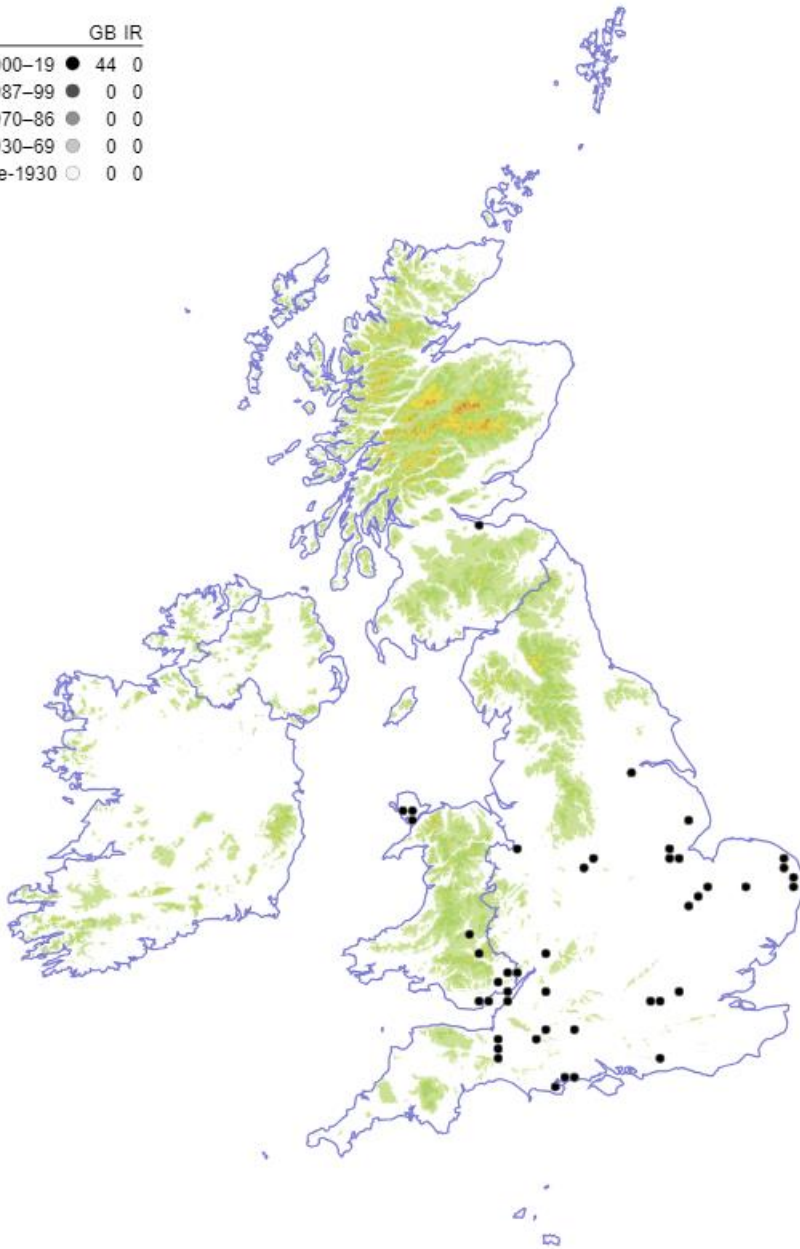
Distribution in Britain

taken from the
BSBI Plant Atlas 2020

First found in 2007

Eutrophic ditches
Ponds
Rivers

	GB	IR
2000–19	● 44	0
1987–99	● 0	0
1970–86	● 0	0
1930–69	● 0	0
pre-1930	○ 0	0



Lemna gibba (Fat Duckweed)



- Frond widest near apex
- Length:width ratio 1-1.5
- Large air cells, may swell
- Red in autumn
- Tertiary veins (where present) arise from node



Lemna gibba (Fat Duckweed)

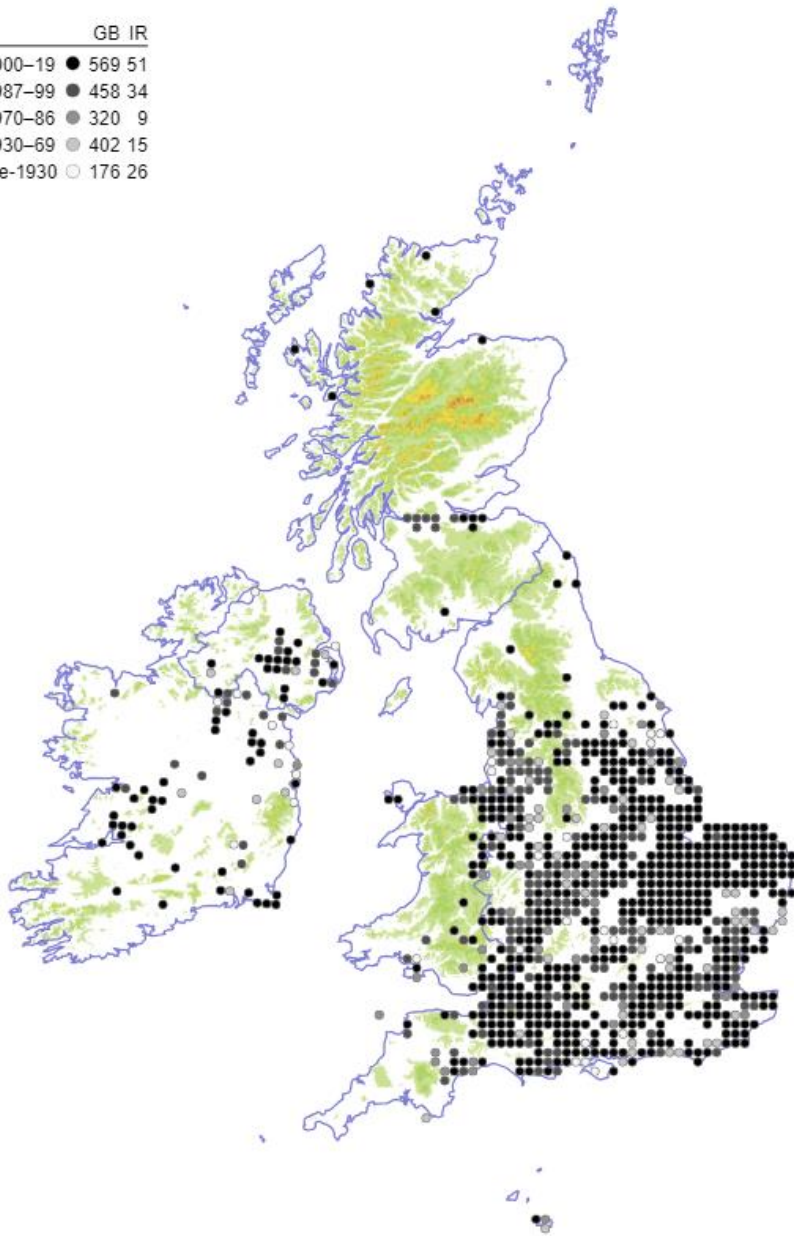
Distribution in Britain & Ireland

taken from the
BSBI Plant Atlas 2020

Rivers
Streams
Canals
Ponds
Lakes
Ditches

Tolerant of more eutrophic water
than *L. minor*

GB IR
2000–19 ● 569 51
1987–99 ● 458 34
1970–86 ● 320 9
1930–69 ● 402 15
pre-1930 ○ 176 26



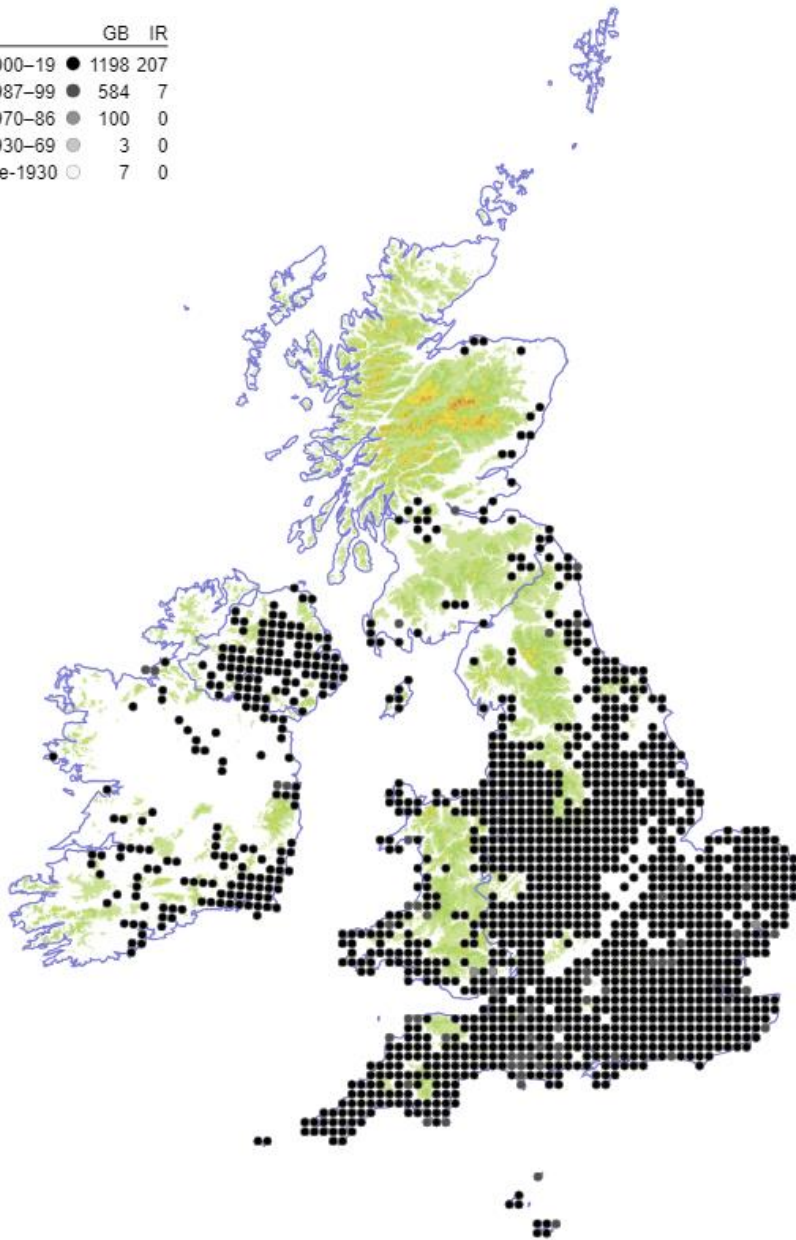
Lemna gibba L. in *BSBI Online Plant Atlas 2020*, eds P.A. Stroh, T. A. Humphrey, R.J. Burckmar, O.L. Pescott, D.B. Roy, & K.J. Walker. <https://plantatlas2020.org/atlas/2cd4p9h.1bx> [Accessed 03/10/2023]

Lemna minuta (Least Duckweed)



- Alien (since 1977)
- Fronds elliptical, widest just above mid-point
- Pale greyish-green
- Translucent
- Single vein to $\frac{2}{3}$ of distance from node to tip
- No red pigmentation

	GB	IR
2000–19	● 1198	207
1987–99	● 584	7
1970–86	● 100	0
1930–69	● 3	0
pre-1930	○ 7	0



Lemna minuta (Least Duckweed)

Distribution in Britain

taken from the
BSBI Plant Atlas 2020

First recorded in Britain in
1977

Eutrophic ditches
Ponds

Shade tolerant

Lemna valdiviana (Valdivia Duckweed)



Differs from *L. minuta* in:

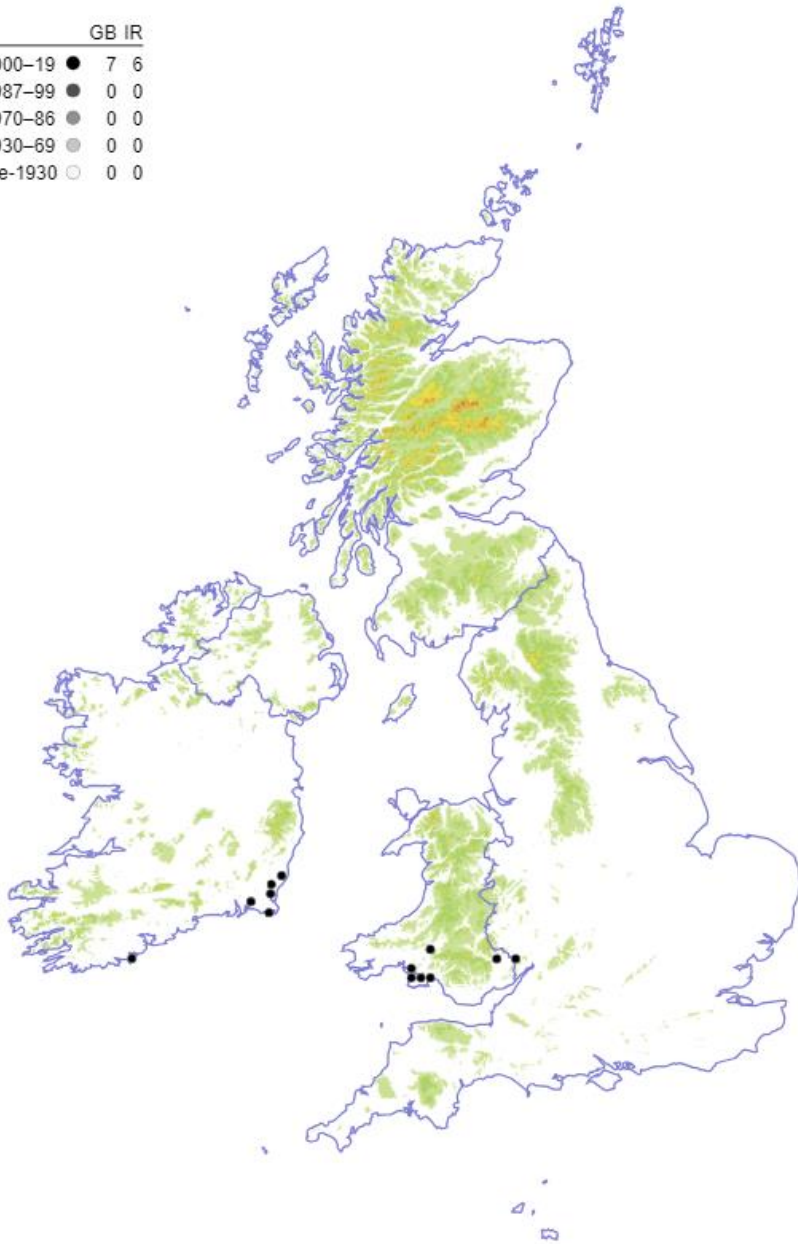
Fronds usually in fours, like butterflies

Vein extends over $\frac{3}{4}$ of way to end of frond

Fronds markedly asymmetrical



	GB	IR
2000–19	● 7	6
1987–99	● 0	0
1970–86	● 0	0
1930–69	● 0	0
pre-1930	○ 0	0



Lemna valdiviana

Valdivia Duckweed

Distribution in Britain

taken from the
BSBI Plant Atlas 2020

First recorded in the wild
in Britain in 2012

In still or slow-moving
mesotrophic water

More thermophilous than *L. minuta*

Wolffia spp. (Rootless Duckweeds)



- Small globose-ovoid fronds
- Bright green
- No roots
- Reproduces by budding
- But how many species do we have?

Wolffia (Rootless Duckweed)

Distribution in England and Wales:

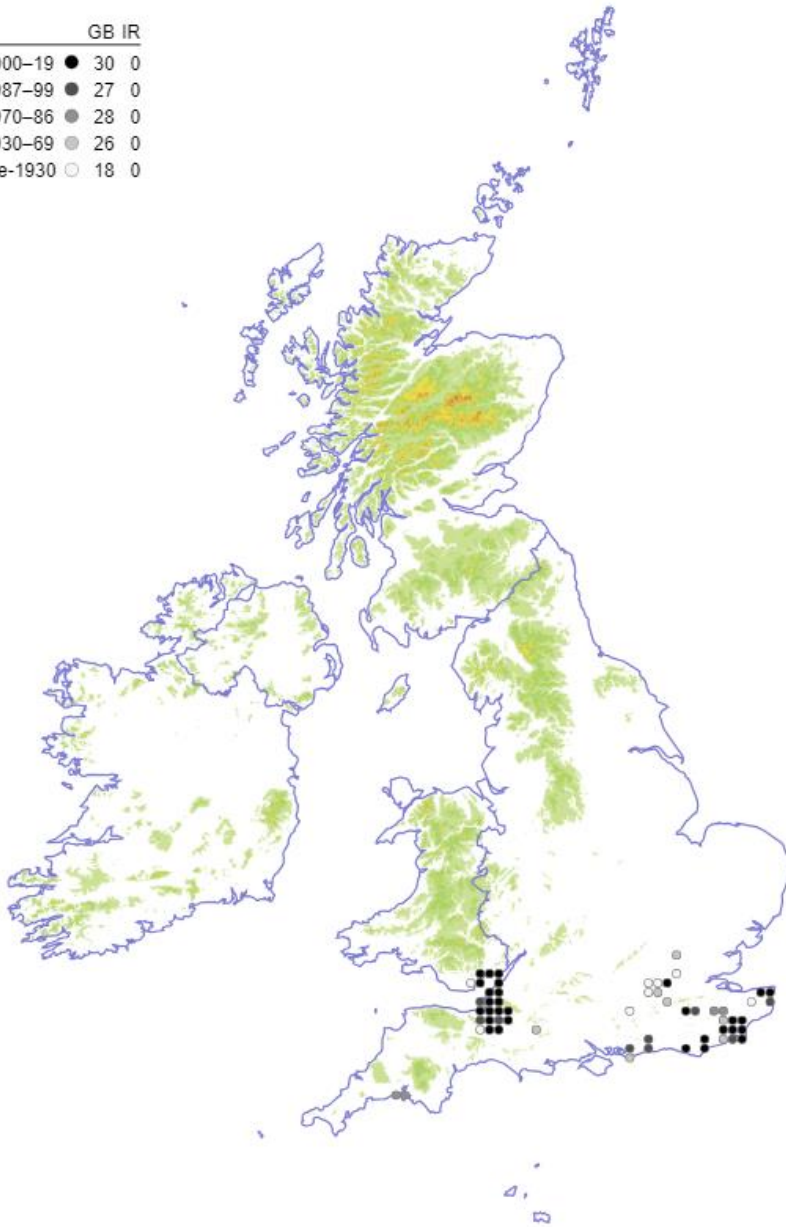
this is the map for
“*Wolffia arriza*” in
BSBI Plant Atlas 2020

But was any of it really that
species?

Or was it *W. columbiana*?

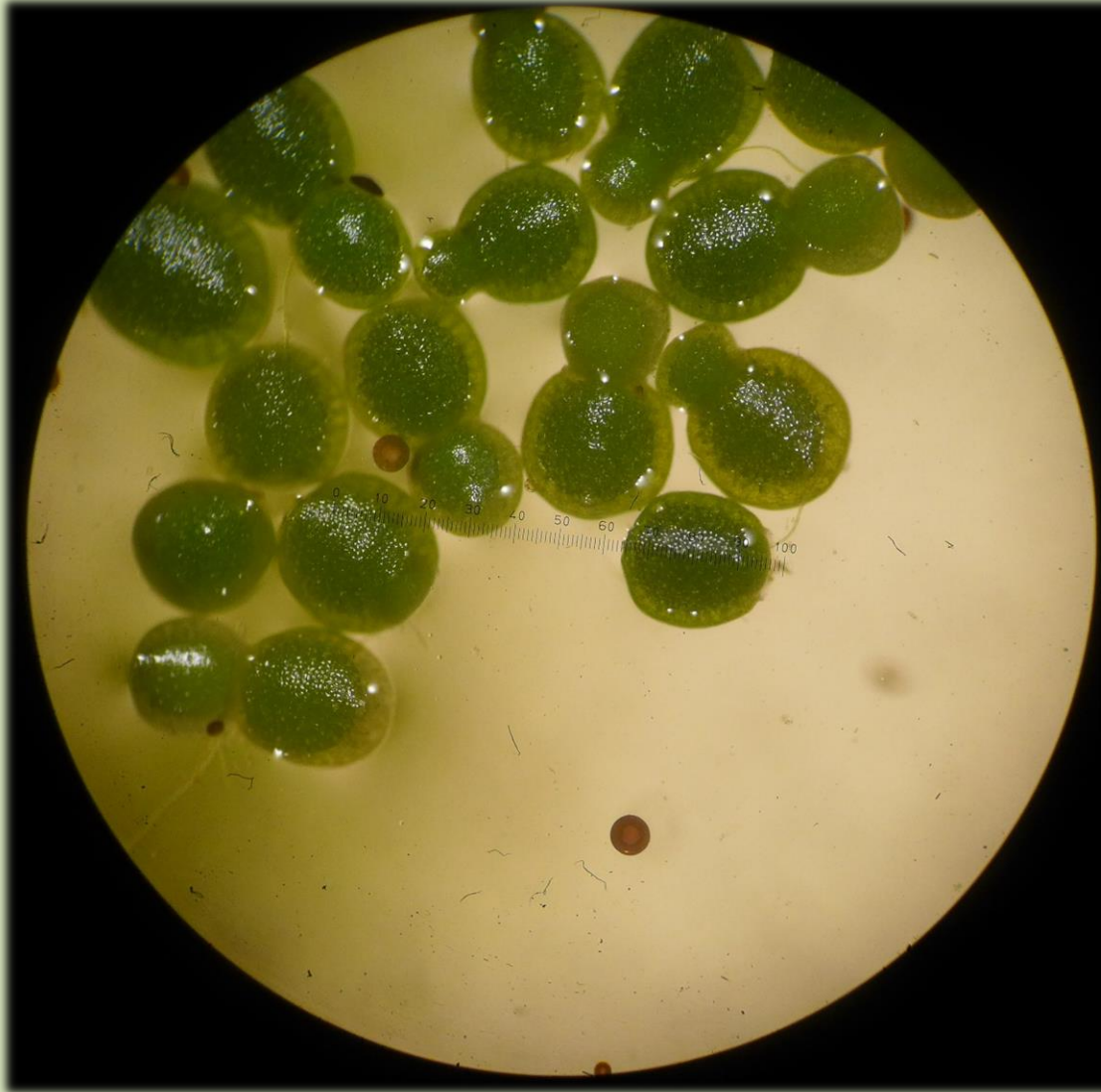
Ditches
Ponds
Base-rich water

GB IR
2000–19 ● 30 0
1987–99 ● 27 0
1970–86 ● 28 0
1930–69 ● 26 0
pre-1930 ○ 18 0



Wolffia arriza (L.) Horkel ex Wimm. in *BSBI Online Plant Atlas 2020*, eds P.A. Stroh, T. A. Humphrey, R.J. Burkmar, O.L. Pescott, D.B. Roy, & K.J. Walker.
<https://plantatlas2020.org/atlas/2cd4p9h.5rw> [Accessed 03/10/2023]

Wolffia columbiana (Columbian Watermeal)



Field Characters

Fronds are pale green, consisting of a darker upper layer and a larger paler lower portion

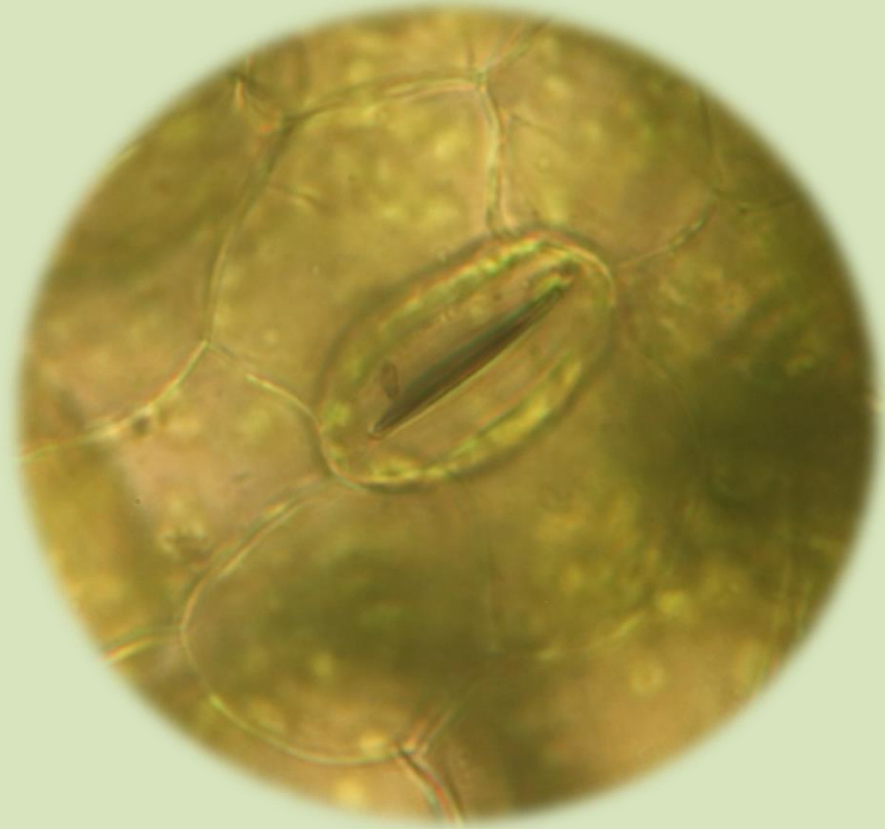
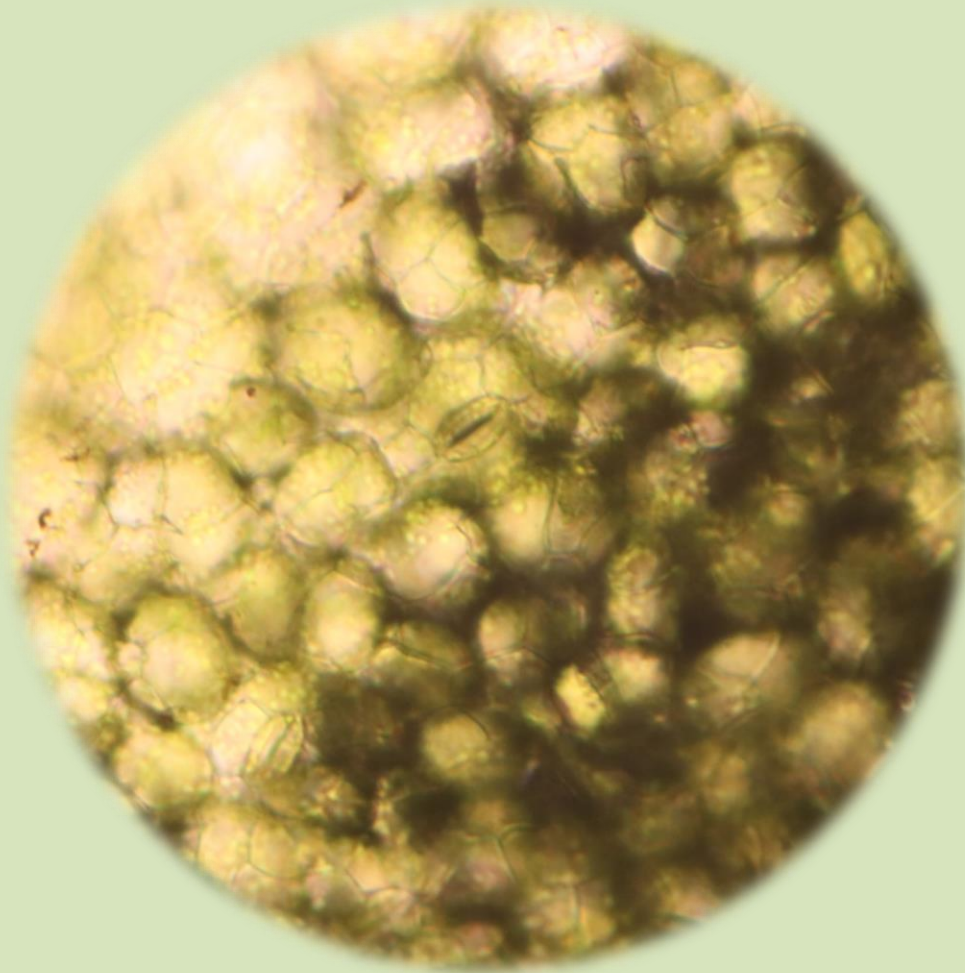
From above, the wider lower portion appears as a paler outer ring

Microscopic Characters

1-15 stomata on upper surface

W. arrhiza has >30 stomata

Wolffia columbiana (Columbian Watermeal)



Photos © Richard Lansdown

**Stomata are difficult to see on a curved surface,
let alone count!**

Spirodela punctata (Dotted Duckweed)



Only Treborth Botanic Garden, Bangor
and a garden pond
not yet in the wild

Other aliens to look for:

Lemna aequinoctialis

Lemna perpusilla

Both have been found amongst aquatics
in a garden centre, not yet in the wild in
Britain or Ireland, but naturalised in
other European countries ...

And we won't even mention hybrids...

A close-up photograph of a dense patch of aquatic plants, likely duckweed, floating on a body of water. The plants consist of small, rounded, green leaves, some of which are tinged with reddish-pink. The leaves are densely packed together, covering most of the water's surface. The water is dark and still, reflecting the light. A semi-transparent text box is overlaid in the center of the image.

How many species?