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## LICHEN FLORA OF THE WEST YORKSHIRE CONURBATION – SUPPLEMENT VII (1999-2004)

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The undoubted improvement in urban air quality over the past few decades is at long last having a major impact on the lichen flora of the West Yorkshire conurbation. The adoption by lichens of the wide variety of man-made and semi-natural habitats has been much more dramatic over the past five years than noted in previous surveys (e.g. Seaward & Henderson 1991, 1999; Seaward *et al.* 1994). It is clear that once the predominating factor, namely air pollution, has been largely eliminated, then the multifarious habitats afforded by urban environments in terms of substrata and microclimates will be highly conducive to lichen colonization. Indeed, there is strong evidence to show that in many European cities, as exemplified by Leeds, the diversity of the lichen flora is richer in suburbia than in rural areas adjacent to the urban boundaries (cf. Seaward 1997). Even suburban trees close to roads with dense traffic frequently support relatively diverse lichen floras with high cover values; however, in such cases, the dominating lichen community is not only indicative of the reduction in sulphur dioxide pollution, but of a pronounced increase in nitrogenous substances derived from gaseous sources (e.g.  $\text{NO}_x$ ,  $\text{NH}_3$ ) and chemically-enriched dusts (e.g. agrochemicals). The effects of these substances are so pronounced that the term 'hypertrophication' is more appropriate than 'eutrophication' to describe the resultant phenomenon (Seaward & Coppins 2004), with nitrophytic epiphytic floras, particularly on twigs, composed mainly of *Xanthoria* and *Physcia* spp., being widespread on a variety of trees (e.g. *Acer*, *Fraxinus*, *Malus*, *Salix*, *Tilia*) throughout the conurbation.

Over the past five years, lichenological surveys of sites within 20 km of the centre of the West Yorkshire conurbation have profited not only from the attention of individuals, but also through important observations made on Yorkshire Naturalists' Union excursions (Henderson 2001, 2004). Of particular note is the work of Dalrymple (2002) on the lichen recolonization of trees in south-western Bradford: twenty-five years prior to this study in 2001, only two species, *Lecanora conizaeoides* and *Lepraria incana*, were to be found growing epiphytically; as a consequence of her detailed investigation of 372 trees, 28 lichen species were identified, including some not seen in Bradford and its environs for a century or more, such as *Flavoparmelia caperata* and *Parmotrema perlatum*. Rather interestingly, although *Lepraria incana* was still common throughout the study area, *Lecanora conizaeoides* had lost its stranglehold, being only occasionally recorded on tree trunks; this is also the case for much of the West Yorkshire conurbation, although the latter is frequently to be found growing on lignum.

Fieldwork has been complemented by literature and herbarium studies in order to gauge the past vs present status of lichen species. Of particular value in this respect has been the detailed on-going investigation of the Manchester Museum (MANCH) Lichen Herbarium (Seaward 2003) which contains a rich source of Yorkshire material, including numerous specimens collected from the West Yorkshire conurbation in the 19th century, particularly those of John Bohler (1797-1872) and William West (1848-1914), several of whose records are enumerated below.

The following list of lichens provides additions to the flora over the five-year period January 1999 – December 2004 based on recording units illustrated in Seaward (1978, Fig. 1 & Table 1); recording units **A** to **S** are within urbanized areas of the conurbation and **T** to **W** are mostly non-urbanized but within 20 km of the centre of the West Yorkshire conurbation (referred to hereafter as WYC). It should be noted that since the delimitation of these units 35 years ago (Seaward 1973), the rural component of **T** to **W** and some inter-urban areas has been significantly reduced by urban development of the adjacent units. This being the case, the area (1257 km<sup>2</sup>) covered within a radius of 20 km of grid reference 44/200.300 has not only a much higher percentage of urbanization, as would be expected, but also a much more integrated urban ecosystem. Collectors are abbreviated as follows: SD = S.Dalrymple, OLG = O.L.Gilbert, AH = A.Henderson, CJBH = C.J.B.Hitch and MRDS = M.R.D.Seaward.

- Acarospora smaragdula* (Wahlenb.) A.Massal. add **J**  
*Agonimia tristicula* (Nyl.) Zahlbr. add **U** on mosses over stonework, Harewood House, 2001, AH (new to WYC)  
*Amandinea punctata* (Hoffm.) Coppins & Scheid. add **K, T, V, W**  
*Anisomeridium polypori* (Ellis & Everh.) M.E.Barr add **M** on *Sambucus*, Meanwood, 2003, CJBH (new to inner urban area of WYC)  
*Aspicilia contorta* (Hoffm.) Kremp. add **K, U**  
*Bacidia rubella* (Hoffm.) A.Massal. add (**J**) Huddersfield, c.1840, J.Bohler (herb.MANCH)  
*Buellia aethalea* (Ach.) Th.Fr. add **U, W** on siliceous stone, Bretton Park, 1999, OLG (new to WYC)  
*Caloplaca crenulatella* (Nyl.) H.Olivier add **M** on calcareous paving, St Chad's graveyard, Leeds, 2003, CJBH & AH (new to WYC)  
*C. decipiens* (Arnold) Blomb. & Forssell add **K**  
*C. flavescens* (Huds.) J.R.Laundon add **J**  
*C. flavocitrina* (Nyl.) H.Olivier add **J** on calcareous paving stone, Castle Hill, Huddersfield, 1998, CJBH *et al.* (new to WYC – but overlooked), **M**  
*C. holocarpa* (Hoffm.) A.E.Wade add **J**  
*C. saxicola* (Hoffm.) Nordin add **J**  
*C. teicholyta* (Ach.) J.Steiner add **U** on calcareous stonework, Harewood House, 2001, AH (new to WYC)  
*Candelariella reflexa* (Nyl.) Lettau add **B, E, U**  
*Catillaria chalybeia* (Borrer) A.Massal. add **B, H, J**  
*C. lenticularis* (Ach.) Th.Fr. add **T, W**  
*Cladonia cornuta* (L.) Hoffm. add **M** on industrial wasteland, Kirkstall Forge, 1994, AH (new to WYC)  
*C. humilis* (With.) J.R.Laundon add **B, J**  
*C. rangiformis* Hoffm. add **M** on industrial wasteland, Kirkstall Forge, 1994, AH (new to inner urban area of WYC)  
*Clauzadea monticola* (Ach.) Hafellner & Bellem. Add **V**  
*Cliostomum griffithii* (Sm.) Coppins add **U**  
*Collema auriforme* (With.) Coppins & J.R.Laundon add **M** on unfashioned limestone gravestone, 1999, CJBH (new to inner urban area of WYC)  
*C. crispum* (Huds.) F.H.Wigg. add **H**  
*C. tenax* var. *ceranoides* (Borrer) Degel. add **T**  
*Dimerella pinetii* (Ach.) Vězda add **V, W**  
*Evernia prunastri* (L.) Ach. add **B, F, W**  
*Fellhaneropsis vezdae* (Coppins & P.James) Sérus. & Coppins add **U** on stone urn, Harewood House, 2001, OLG (new to WYC)  
*Flavoparmelia caperata* (L.) Hale add **B, E, T**  
*Hypogymnia physodes* (L.) Nyl. add **J, N**  
*H. tubulosa* (Schaer.) Hav. add **B, M, U**

- Hypotrachyna revoluta* (Flörke) Hale add **E, U**  
*Lecania cuprea* (A.Massal.) Van den Boom & Coppins add **U** on stone terrace, Harewood House, 2001, OLG (new to WYC)  
*L. cyrtella* (Ach.) Th.Fr. add **U**  
*L. inundata* (Hepp ex Körb.) M.Mayrhofer add **U** on stone terrace, Harewood House, 2001, OLG, CJBH & AH (new to WYC)  
*Lecanora albescens* (Hoffm.) Branth & Rostr. add **J, P**  
*L. chlarotera* Nyl. add (**J**) Huddersfield, c.1840, J.Bohler (herb.MANCH), **U, W**  
*L. crenulata* Hook. add **J**  
*L. expallens* Ach. add **E, K, M, U**  
*L. polytropa* (Hoffm.) Rabenh. add **J**  
*L. saligna* (Schrad.) Zahlbr. add **B, W**  
*Lecidea fuscoatra* (L.) Ach. add **J**  
*Lecidella elaeochroma* (Ach.) M.Choisy add (**J**) Huddersfield, c.1840, J.Bohler (herb.MANCH), **U**  
*Lepraria lobificans* Nyl. add **M** on moss over calcareous stone and base of ornamental shrub, Lawnswood Cemetery, 1999, CJBH (new to inner urban area of WYC), **T** (but predated by collection in herb. Taunton from Wicken Crag, c.1905-9, T.Hebden (new to WYC)  
*Leproloma vouauxii* (Hue) J.R.Laundon add **M**  
*Leproplaca chrysodeta* (Vain. ex Räsänen) J.R.Laundon add **M** on shaded calcareous stone, Lawnswood Cemetery, 1999, CJBH (new to WYC)  
*Leptogium biatorinum* (Nyl.) Leight. add **H** on clay soil of footpath, Cromwell Bottom, 2002, AH (new to inner urban area of WYC)  
*L. gelatinosum* (With.) J.R.Laundon add **T**  
*L. turgidum* (Ach.) Cromb. add **M**  
*Melanelia exasperata* (De Not.) Essl. add **U, W** on bark, Bretton Park, 1999, OLG (new to WYC)  
*M. fuliginosa* ssp. *glabratula* (Lamy) Coppins add **E, W**  
*M. subaurifera* (Nyl.) Essl. add **M, N, W**  
*Micarea denigrata* (Fr.) Hedl. add **H, J, W**  
*M. erratica* (Körb.) Hertel, Rambold & Pietschm. add **M**  
*M. prasina* Fr. add **B**  
*Opegrapha parasitica* (A.Massal.) H.Olivier add **U** on *Verrucaria* sp. on stone urn, Harewood House, 2001, CJBH, AH & OLG (new to WYC)  
*Parmelia sulcata* Taylor add **F, J, N**  
*Parmotrema perlatum* (Eschw.) M.Choisy add **B, E, M** on *Salix*, Adel, 1999, MRDS (new to inner urban area of WYC), **T, U**  
*Peltigera hymenina* (Ach.) Delise ex Duby add **H, K, P, T** (first records for WYC for more than 100 years)  
*Phaeophyscia nigricans* (Flörke) Moberg add **W**  
*Physcia adscendens* (Fr.) H.Olivier add **F, J, K, N**  
*P. aipolia* (Ehrh. ex Humb.) Fűrnr. add **U** on orchard tree, Harewood House, 2001, AH & OLG (new to WYC)  
*P. caesia* (Hoffm.) Fűrnr. add **J**  
*P. tenella* (Scop.) DC. add **F, J, N**  
*Placynthiella dasaea* (Stirt.) Tønsberg add **B**  
*P. icmalea* (Ach.) Coppins & P.James add **B, J, K, P, V**  
*Platismatia glauca* (L.) W.L.Culb. & C.F.Culb. add **W**  
*Porina chlorotica* (Ach.) Müll.Arg. add **M** on granite gravestone, St Chad's churchyard, 2003, CJBH & AH (new to inner urban area of WYC)  
*Porpidia crustulata* (Ach.) Hertel & Knoph add **W**  
*P. soredizodes* (Lamy ex Nyl.) J.R.Laundon add **V**  
*Punctelia subrudecta* (Nyl.) Krog add **U, W**

- P. ulophylla* (Ach.) Herk & Aptroot add **E** on bark, SW Bradford, 2001, SD (new to WYC, although some earlier records of *P. subrudecta* are referable to this species)
- Ramalina farinacea* (L.) Ach. add **N**
- Rhizocarpon distinctum* Th.Fr. add **U, V**
- R. petraeum* (Wulfen) A.Massal. add **T, V**
- R. reductum* Th.Fr. add **M**
- Rinodina gennarii* Bagl. add **J**
- Sarcogyne regularis* Körb. add **J**
- Sarcopyrenia gibba* (Nyl.) Nyl. add **U**
- Scoliciosporum umbrinum* (Ach.) Arnold add **J**
- Stereocaulon pileatum* Ach. add **J**
- Strangospora pinicola* (A.Massal.) Körb. Add **M**
- Tephromela atra* var. *torulosa* (Flot.) Hafellner add (**J**) Huddersfield, c.1840, J.Bohler (herb. MANCH) (new to WYC)
- Theldium decipiens* (Nyl.) Kremp. add **U** on stonework, Harewood House, 2001, AH (new to WYC)
- Trapelia obtegens* (Th.Fr.) Hertel add **J**
- T. placodioides* Coppins & P.James add **H, J, M**
- Trapielopsis flexuosa* (Fr.) Coppins & P.James add **M**
- Usnea subfloridana* Stirt. add **B, M, U**
- Verrucaria elaeina* Borrer add **M** on marble grave edging, St Chad's churchyard, 2003, CJBH & AH (new to WYC)
- V. nigrescens* Pers. add **J, P**
- V. viridula* (Schrad.) Ach. add **K**
- Xanthoria candelaria* (L.) Th.Fr. add **M**
- X. parietina* (L.) Th.Fr. add **F, J, P**
- X. polycarpa* (Hoffm.) Th.Fr.ex Rieber add **B, E, J, P, T, W**
- X. ucrainica* S.Kondratyuk add **M** on *Fraxinus*, beside driveway to St Chad's churchyard, 2003, CJBH & AH (new to WYC)

As a consequence of the above work, the lichen flora of the West Yorkshire conurbation can be summarized as follows: 373 lichen taxa (cf. 845, excluding lichenicolous fungi, for the county as a whole – Seaward 1994 plus recent additions) have been reported from the area within 20 km of the centre of the conurbation, of which 5 are doubtful in the absence of supporting herbarium material and at least 38 are extinct in the area; 260 have been recorded during the present survey (October 1967 – December 2004):

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