Notes

UPDATE ON BIRDSEED ALIENS (1985–1998)

In the 13 years since our joint paper (Hanson & Mason 1985), which listed a total of 425 species, of which 318 were actually cultivated by the authors from various birdseed mixtures, I have continued to examine packets purchased in supermarkets, pet shops, garden centres and street markets. The less common seeds have been extracted for cultivation and the remainder mixed with Sunday-roast fat for the garden bird table. Many of the resulting exotic weeds have turned out to be the usual familiar aliens but several new, upgraded and overlooked records can now be added to the list of definite birdseed aliens as the sources of birdseed constantly alter due to changing world commerce.

The number of such additions amounts to a further 44 taxa while the local sewage works has produced another six "probables", i.e. species growing together with known birdseed aliens.

In addition to the above, Clement & Foster (1994) and Ryves *et al.* (1995) include another 34 species as possible birdseed aliens although some of these are much more likely than others thus making a grand total of just over 500 taxa. Continued cultivation experiments will certainly enlarge the proportion of definite birdseed aliens to more than the 70% of this grand total which will itself also certainly marginally increase. Any further additions on a major scale to the total number of taxa now seems most unlikely.

DETAILS OF ADDITIONAL BIRDSEED ALIENS BETWEEN 1985-1997

Cult.	cultivated by
CGH	C. G. Hanson
FH	Mrs F. Houseman
Müller	recorded in Müller (1950)
gardens	recorded in gardens in association with other birdseed aliens
tips	recorded on rubbish tips with other birdseed aliens
occasional	a few plants seen most years
sporadic	single plants appearing irregularly

The following abbreviations are used:
The nomenclature and sequence of families follow *Flora Europaea*. The genera and species are listed alphabetically.

Polygonaceae
Persicaria glabra (Willd.) M. Gómez (*Polygonum glabrum* Willd.): Tips and parks; sporadic.
P. pensylvanica (L.) M. Gómez: Tips; sporadic.

Chenopodiaceae
Atriplex prostrata Boucher ex DC.: Cult. CGH.
A. sagittata Borkh.: Cult. CGH.
Bassia scoparia (L.) Voss (*Kochia scoparia* (L.) Schrader): Sewage works and tips; sporadic.

Amaranthaceae
Amaranthus bouchonii Thell.: Cult. CGH; tips; sporadic, probably overlooked as *A. hybridus*.
A. capensis Thell. subsp. *uncinatus* (Thell.) Brenan: Cult. CGH.

Ranunculaceae
Nigella arvensis L.: Tips; sporadic.
N. sativa L.: Tips; sporadic. Cult. CGH.

Papaveraceae
Papaver dubium subsp. *lecoqii* (Lamotte) Syme: Cult. CGH.

Crucifereae
Brassica rapa L. subsp. *oleifera* (DC.) Metzger: Cult. CGH; tips; sporadic.
B. tournefortii Gouan: Cult FH; also observed as a birdseed alien in Belgium (F. Verloove pers. comm.)
Lepidium campestre (L.) R. Br.: Cult. CGH.
Sisymbrium loeselii L.: Sewage works and tips; sporadic.

Caesalpiniaceae
Senna obtusifolia (L.) Irwin & Barneby: Sewage works; sporadic.

Fabaceae
Glycine soja Siebold & Zucc.: Cult. CGH.
Lotus glaber Miller: Cult CGH.
Lupinus sp.: Cult. CGH from niger seed (*Guizotia*) but not yet identified.
Onobrychis viciifolia Scop.: Cult. CGH.
Sesbania exaltata (Raf.) Cory: Sewage works and tips; sporadic.
Vicia hirsuta (L.) Gray: Cult. CGH.
V. sepium L. var. *eriocalyx* Celak.: Cult. CGH.
Vigna angularis (Willd.) Ohwi & Ohasmi (Adzuki bean): Cult. CGH.
V. radiata (L.) Wilczek: Cult. CGH; tips; sporadic.

Umbelliferae
Apium graveolens L.: Cult. CGH.
Conium maculatum L.: Cult. CGH.

Boraginaceae
Amsinckia micrantha Suksd.: Cult. CGH; tips; sporadic. My own specimen at least is this and not *A. intermedia* as listed in Hanson & Mason (1985).
Borago officinalis L.: Cult. CGH; tips; sporadic.

Verbenaceae
Verbena officinalis L.: Cult. CGH.

Lamiaceae
Ballota nigra L.: Cult. CGH.

Solanaceae
Lycopersicon esculentum Miller: Cult. CGH; very frequent on tips and sewage farms but not as a birdseed alien.
Solanum nigrum L. subsp. *schultesii* (Opiz) Wessely: Cult. CGH; tips; sporadic, probably overlooked in the past.
S. physalifolium Rusby: Cult. CGH; tips; sporadic. My own specimen at least is this and not *S. sarrachoides* as listed in Hanson & Mason (1985).

Polemoniaceae
Navarretia squarrosa (Eschsch.) Hook. & Arn.: Gardens; sporadic. Reported as a birdseed alien in Holland.
Sesamum capense Burm. f.: This is probably the species which occurs sporadically at our local sewage works.

Asteraceae
Anthemis altissima L.: Recorded from a Kentish field with other birdseed aliens after a dressing of sewage sludge.
A. arvensis L.: Cult. CGH.
Cichorium pumilum Jacq.: Sewage works and tips; sporadic.
Tripleurospermum inodorum (L.) Schultz-Bip.: Cult. CGH.
Xanthium strumarium L.: Müller; gardens; tips; sporadic; cult. CGH

Poaceae
Bromus diandrus Roth.: Cult. CGH and FH.
Echinochloa crus-galli (L.) P.Beauv. var. *oryzoides*: Cult. CGH.
Eleusine coracana (L.) Gaertn.: Cult. CGH; recorded also at Ghent (Belgium) as a birdseed alien by F. Verloove (pers. comm.). A cultivated millet in tropical Africa.
Lolium × *boucheanum* Kunth (*L. multiflorum* × *L. perenne*): Cult. CGH.
Oryzopsis miliacea (L.) Benth. & Hook.: Cult. CGH and FH; tips; sporadic.
Panicum subalbidum Kunth: Cult. CGH; tips; sporadic.
Paspalum dilatatum Poir.: Recorded from several urban areas with other birdseed aliens.
Phleum exaratum Griseb.: Müller; reported as a rare birdseed alien at Roeselvare, Belgium 1994 by F. Verloove (pers. comm.).
Rostraria cristata (L.) Tzvelev: Gardens; tips; sporadic; reported as a rare birdseed alien at Ghent, Belgium in 1994.
Triticum durum Desf.: Müller: cult. CGH; tips; sporadic
T. turgidum L.: Müller; tips and waste ground; sporadic.

Note 1 Suggestions are strong that the following species could well be included as birdseed aliens but definite proof is still awaited. Confirmation from readers would be most welcome.

Aegilops neglecta
Amaranthus spinosus
Crepis suberostis
Eleusine multiflora
Galactites tomentosa
Lathyrus inconspicuus
L. ochrus
Leptochloa uninervia
Lolium persicum
Medicago scutellata
M. truncatula
Nigella hispida
Phleum paniculatum
Picris cupuligera
Polygonum bellardii
Silene conoidea

Note 2 The following aliens are claimed as of possible birdseed vector in the references below but I have been unable to corroborate them in my studies to date. E. Clement (pers. comm.) agrees that a significant number appear to be distinctly unlikely and also that several identification errors are suspected. Confirmation is again welcome.

Agrostis gigantea
Anthemis austriaca
Anthoxanthum ovatum
Artemisia annua
Bowlesia incana
Brachiaria eruciformis
Carduus thoermeri
Centaurea diffusa
Chenopodium missouriense
Clarkia quadrivulnera
Convolvulus sabatius
Cucumis myriocarpus
Euphorbia falcata
E. segetalis
Gilia capitata
Hyoscyamus albus
Juncus pallidus
Lathyrus tingitanus
L. tuberosus
Lepidium virginicum
Linum grandiflorum
Malope trifida
Oenothera canovirens
Paspalum distichum
Physalis ixocarpa
Salvia viridis
Schkuhria pinnata
Scolymus maculata
Tetragonolobus purpureus
Triticum monococcum
Verbascum phoenicium
Vulpia geniculata

ACKNOWLEDGMENTS

Once again I am greatly indebted to Eric Clement for checking the identity of most of the taxa and to Filip Verloove who has kept me informed of his birdseed discoveries in Belgium.

REFERENCES

CLEMENT, E. J. & FOSTER, M. C. (1994). *Alien plants of the British Isles*. Botanical Society of the British Isles, London.
HANSON, C. G. & MASON, J. L. (1985). Bird seed aliens in Britain. *Watsonia* **15**: 237–252.
MÜLLER, K. (1950). Die Vogelfutterpflanzen. *Mitt. Ver. Math. Naturw, Ulm* **23**: 3–33.
RYVES, T. B., CLEMENT, E. J. & FOSTER, M. C. (1995). *Alien grasses of the British Isles*. Botanical Society of the British Isles, London.

C. G. HANSON
1 Coltsfoot Road, Ware, Herts.

HIERACIUM KENTII SP. NOV. (ASTERACEAE)

During our long spell of working on the British hawkweeds, Cyril West and I had to lump together some species into groups which we were unable to deal with at the time. The largest of these groups was what we referred to as the *Hieracium exotericum* aggregate. The two botanists who have done the most work on this group are Alex Jordan, whose final account was published by A. Boreau (1857), and N. Hylander (1943). The plant here described as *H. kentii* belongs to this group and is particularly distinct in the stellate hairiness of the underside of the cauline leaves. We could not match it with any of the species in Boreau (1857) or Hylander (1943).

Hieracium kentii P. D. Sell, sp. nov.
HOLOTYPE: Busbridge, Godalming, Surrey, v.c. 17, 28 May 1896, *E. S. Marshall* in Set of British Hieracia by E. F. & W. R. Linton, no. 37, as *H. murorum* var. *pellucidum* (**CGE**).

Ab *H. grandidenti* Dahlst. foliis latioribus, pilis stellatis densis in pagina inferiore foliorum caulinorum, involucri squamis pallidioribus, pilis glanduliferis in involucris pedunculisque luteonigrioribus distinguitur.

Herba perennis phyllopoda, caudice ramoso. *Caulis* 40–70 cm altus, pallide luteoviridis, ad basin saepe purpurascens, stricte erectus, striatus, in parte inferiore pilis simplicibus eglandulosis numerosis, sursum gradatim paucioribus, mediocribus vel longis pallidis et in parte superiore pilis stellatis numerosis pilisque glanduliferis numerosis brevissimis vel brevibus luteonigris vestitus. *Folia* in pagina superiore mediocriter luteoviridia, in pagina inferiore pallidiora neque purpurascentia, in paginis ambabus pilis simplicibus eglandulosis numerosis brevibus vel mediocribus, et in marginibus costaque infra longioribus, subrigidis pallidis vestita, caulina pilis stellatis numerosis vel densis infra vestita; folia basalia pauca vel satis numerosa, exteriora 4–10 cm longa, 2·5–6 cm lata, subrotunda vel late ovata vel late elliptica, ad apicem late rotundata mucronulataque vel obtusa, dentibus magis minusve mammiformibus undulatodentata, ad basin truncata dentium pari basali saepe deflexo, interiora (quando adsunt) 6–10 cm longa, 2·5–5 cm lata, elliptica vel oblongoelliptica, ad apicem subobtusa vel magis minusve acuta, exterioribus similiter dentata, petiolis saepe brevibus, sed interdum ad 8 cm longis et pilis simplicibus eglandulosis numerosis longis pallidis vestitis; folia caulina 0–1(–2), lanceolata vel ovata, ad apicem acuta vel acuminata, plerumque acute sed interdum dentibus mammiformibus dentata, ad basin truncata, sessilia vel breviter petiolata. *Inflorescentia* corymbosa, saepe ramo inferiore longo praedita, acladio breviusculo; pedunculi plerumque aliquantum breves gracilesque, pilis stellatis densis pilisque glanduliferis numerosis brevissimis vel brevibus inaequalibus luteonigris pilisque simplicibus eglandulosis sparsis brevibus pallidis vestiti. *Capitula* 30–35 mm diametro, ad basin rotundata. *Involucri squamae* ante anthesin incumbentes, 4–9 mm longae, 1·0–1·2 mm latae, olivaceae, interiores marginibus pallidis, anguste linearilanceolatae, ad apicem magis minusve acutum gradatim decrescentes, pilis glanduliferis densis brevissimis vel brevibus maxime inaequalibus luteonigris et secus margines adque basin pilis stellatis numerosis vestitae, sine pilis simplicibus eglandulosis. *Ligulae* flavae glabrae. *Styli* paulo obscuri. *Receptaculi alveoli* margine breviter dentati. *Cypselae* 3·0–3·5 mm longae, rubronigrae.

Phyllopodous *perennial herb* with a branched stock. *Stem* 40–70 cm, pale yellowish-green, often purplish towards the base, strictly erect, striate, with numerous, medium to long, pale simple eglandular hairs below, which become gradually fewer up the stem, and numerous stellate and numerous, very short to short, yellowish-black glandular hairs in the upper part. *Leaves* medium yellowish-green on the upper surface, paler beneath and not purplish, with numerous, short to medium, subrigid, pale simple eglandular hairs on both surfaces and longer ones on the margins and midrib beneath, the cauline with numerous to dense stellate hairs beneath; basal few to fairly numerous, the outer 4–10 × 2·5–6 cm, subrotund, broadly ovate or broadly elliptical, broadly rounded and mucronulate to obtuse at apex, undulate-dentate, the teeth more or less mammiform, and truncate at base with the basal pair of teeth often deflexed, the inner, when present, 6–10 × 2·5–5 cm, elliptical to oblong-elliptical, subobtuse to more-or-less acute at apex, toothed like the outer, the petioles often short, but sometimes up to 8 cm and with numerous, long, pale simple eglandular hairs; cauline leaves 0–1(–2), lanceolate to ovate, acute to acuminate at apex, dentate,

usually sharply but sometimes with mammiform teeth, truncate at base, sessile or shortly petiolate. *Inflorescence* corymbose, often with a long lower branch, with the acladium fairly short; peduncles mostly rather short and slender, with dense stellate hairs, numerous, very short to short, unequal, yellowish-black glandular hairs and occasional short pale simple eglandular hairs. *Capitula* 30–35 mm in diameter, rounded at base. *Involucral bracts* incumbent in bud, 4–9 × 1·0–1·2 mm, olive green, the inner with pale margins, narrow linear-lanceolate, gradually narrowed to a more-or-less acute apex, with dense, very short to short, very unequal, yellowish-black glandular hairs and numerous stellate hairs along the margins and at the base, without simple eglandular hairs. *Ligules* yellow, glabrous. *Styles* slightly discoloured. *Receptacle pits* with margin shortly dentate. *Achenes* 3·0–3·5 mm, reddish-black. *Flowering* May and June.

V.C. 13. W. SUSSEX
Shady path near Pitts Hill, August 1918, *W. C. Barton* (**BM**).
Bexley Hill, near Lodsworth, 22 June 1957, *F. R. Browning & C. West* (**CGE**).

V.C. 14. E. SUSSEX
Bexley Heath above Eastbourn, 10 August 1912, *C. C. Lacaita* (**BM**).
Mickleham, 8 June 1938, *H. W. Pugsley* (**BM**).
Roadside east of Holtye Common, near East Grinstead, 30 June 1958, *B. A. Miles* (**CGE**).

V.C. 16. KENT
Tunbridge Wells, 1855, *A. G. More* (**BM**, **CGE**).
Wood near Shoreham, 29 May 1922, *L. B. Hall* (**BM**).
Near Ightham, 11 June 1938, *F. A. Browning* (**BM**).
Ashurst Park, 30 August 1942, *H. W. Pugsley* (**BM**); June 1951, *C. West* (**CGE**).
Shadwell Wood, near Sheldhurst, 6 June 1943, *H. W. Pugsley* (**BM**).

V.C. 17. SURREY
Banks ascending to Hindhead, 4 June 1889, *E. S. Marshall 479* (**BM**, **CGE**).
Church Lane, Whitley, 7 June 1890, *F. J. Hanbury* (**BM**); 28 June 1958, *B. A. Miles* (**CGE**).
Whitley, 23 May 1896, *E. S. Marshall* (**BM**, **CGE**).
Busbridge, Godalming, 28 May 1896, *E. S. Marshall* (**BM**, **CGE**).
Under trees, White Hill, near Caterham, 21 June 1906, *C. E. Salmon* (**BM**).
Wotton, 12 July 1916, *C. E. Britton* (**BM**).
Margery Wood, Colley Hill, 8 June 1919, *C. E. Salmon* (**BM**).
Pilgrims Way, Caterham, 28 June 1932, *C. E. Britton* (**BM**).
Roadside on Gravelly Hill towards White Hill, Caterham, June 1948, *C. D. Pigott* (**CGE**).

I am very pleased to name this plant after Duggie Kent. *Hieracium* was not a genus he was particularly interested in, but he spent a large amount of time searching out original publications for me so that we could get their nomenclature straight. His contribution to British botany was prolific over many years and I am personally particularly indebted to him for meticulously reading the proofs of volume 5 of *Flora of Great Britain and Ireland.* I am indebted to Philip Oswald for supplying the Latin description and diagnosis and to David McCosh and Chris Preston for sorting out and arranging the loan of specimens from the **BM**. A complete revision of the British Hieracia will appear in volume 4 of *Flora of Great Britain and Ireland* and is almost finished.

REFERENCES

BOREAU, A. (1857). *Flore du centre de la France,* 3rd ed. Roret, Paris.
HYLANDER, N. (1943). Die Grassameneinkömmlinge Schwedischer Parke mit Besonderer Berücksichtigung der *Hieracia silvaticiformia*. *Symbolae Botanicae Upsalienses* **7**: 106–274.

P. D. SELL
Dept. of Plant Sciences, University of Cambridge, Downing St, Cambridge CB2 3EA

CHARA BALTICA BRUZ. (CHARACEAE), BALTIC STONEWORT, REDISCOVERED IN HICKLING BROAD, NORFOLK

The stoneworts are a small group of unusually complex aquatic green algae which make up the family Characeae. Baltic Stonewort, *Chara baltica* Bruz., is one of 16 species on the British Red List (Stewart 1996), and was once widely distributed around the coast of Britain, with records from 14 sites in Cornwall, Devon, Kent, Norfolk, Anglesey and the Western and Northern Isles of Scotland. The species has declined in recent years, and there are only six modern records, some of which are doubtful and need confirmation (N. Stewart, pers. comm.). Its sole site in Norfolk is Hickling Broad, which is the richest site for stoneworts in the UK.

The earliest documented record of *C. baltica* at Hickling was in 1898 by G. R. Bullock-Webster, one of the pioneer workers on charophytes of the British Isles. Bullock-Webster recorded the species again in 1899 and 1904 (specimens at **NMW**) and in 1902 (specimen in **BM**), and noted that the plant had "occurred freely for a number of years in company with *Chara hispida* and *Chara aculeolata* (now *Chara pedunculata*) in the northern area of Hickling Broad" (Groves & Bullock-Webster 1924a). Although it was abundant around this time, *C. baltica* was not observed in subsequent visits to Hickling Broad prior to 1924 (Groves & Bullock-Webster 1924b). There are sporadic reports of *C. baltica* for the middle of the century; one is attributed to E. A. Ellis in the mid-1940s (Ellis 1965), and G. H. Rocke recorded it in 1955 and 1956 (Wallace 1956, 1957). A sample of the material collected in 1956 is also in **BM**. The last record of this species at Hickling was made by Rocke in 1965 (Petch & Swann 1968). All historical records are for the variety *rigida* (originally described by Bullock-Webster) of which Hickling is the type and only known locality. The distinctive characters are supposed to be its firm, rigid habit, comparatively long internodes and patent (standing out at right angles) spine cells (N. Stewart, pers. comm.).

Hickling Broad was known to be dominated by stoneworts for the first 60 years of the 20th century, with 15 species being recorded. Water quality subsequently deteriorated due to eutrophication, increasing salinity and accelerating rates of organic sedimentation. The main causes were nutrient input from a large winter roost of Black-headed Gulls in the late 1960s, and deep drainage of the surrounding arable land which breached the saline water table (George 1992). The changes in water quality resulted initially in a periodic explosion in growth of filamentous algae, especially *Cladophora sauteri* (Nees von Eisenbeck ex Kützing) Kützing, and the replacement of the charophyte-dominated communities by waterweeds typical of the more fertile conditions.

The 1965 record of *C. baltica* in Hickling Broad was prior to the near total disappearance of aquatic macrophytes and the shift to turbid, phytoplankton-dominated water which accompanied further nutrient enrichment. Charophytes were rarely recorded from then until the late 1970s, when they were an occasional component of the submerged plant communities (Phillips & Moss 1978). By the 1980s, nutrient levels were decreasing due to the decline in the size of the gull roost and progressive washing-out of the residual gull guano from the Broad's sediment.

It is uncertain whether *C. baltica* continued to survive at very low densities in Hickling after 1965, but the species was not detected by the Broads Authority's annual macrophyte surveys which commenced in 1982. It may, however, have been overlooked, since these surveys sample only selected transects across the Broad.

In 1995 the Broads Authority implemented a weedcutting regime for Hickling to remove Spiked Water-milfoil *Myriophyllum spicatum*, which was impeding movement of boats across the open water. Intensive sub-aquatic monitoring of the aquatic macrophytes (including charophytes) is an integral part of the weedcutting programme and has yielded much detailed information about species distributions, growth characteristics, physical structure and composition of the plant communities. In June 1998, *C. baltica* was rediscovered in the northern arm of the Broad which had not been monitored since 1994. This location is consistent with the historical records which were also for the "northern area" (Groves & Bullock-Webster 1924a, b) and suggests that oospores of this species may have survived in the sediment from the 1960s. *C. baltica* was found to be co-dominant with the Intermediate Stonewort *Chara intermedia*, forming dense, closed lawns up to 0·8 m tall. The species was only associated with soft, organic sediments and was growing at depths of 0·8 to 1·2 m. Oogonia and antheridia were abundant in June and July on branchlet nodes at the surface of the charophyte lawn which experienced the highest light levels. This species is almost certainly perennial, overwintering with *Chara intermedia*. Other occasional associates were *Chara connivens*, *Nitellopsis obtusa*, *Potamogeton pectinatus*, *Najas marina* and *Myriophyllum spicatum*.

C. baltica has been recorded predominantly from standing water bodies up to 7 m deep and is usually associated with sandy substrates (Stewart & Church 1992). It is restricted to sites near the coast, which suggests a requirement for salt, and in the Baltic Sea it is known to tolerate salinities up to 1·8% (approximately 10,000mgCl l^{-1}) (Olsen 1944). Salinity levels in Hickling Broad ranged between 1,000 and 2,400mgCl l^{-1} for the period 1978 to 1998. Total phosphorus concentrations were approximately 0·1mgP l^{-1} from 1980 to 1990, but showed a steady fall to about 0·05mgP l^{-1} by summer 1998 (Schutten & Davy 1998). There has also been a gradual increase in water clarity in Hickling Broad during the 1990s, culminating with a switch to clear water in summer 1998.

Further surveys are needed to determine whether *C. baltica* maintains its current pattern of abundance and distribution in the northern area of Hickling Broad, or whether it appears only sporadically. Experience has shown that it is sometimes difficult to distinguish sterile material of this species from long-spined plants of *C. intermedia*. The two species are, however, readily separated by the larger size of the antheridia of *C. baltica*, which are over 0·5 mm in diameter.

ACKNOWLEDGMENTS

I am most grateful to Nick Stewart for confirmation of *C. baltica*, historical records and much helpful advice. Thanks are also due to Dr Martin George for providing historical information about Hickling Broad.

REFERENCES

ELLIS, E. A. (1965). *The Broads*. Collins, London.

GEORGE, M. (1992). *The land use, ecology and conservation of Broadland*. Packard, Chichester.

GROVES, J. & BULLOCK-WEBSTER, G. R. (1924a). *Notes on the British Charophyta. Journal of botany* **62**: 33–35

GROVES, J. & BULLOCK-WEBSTER, G. R. (1924b). *The British Charophyta*, Vol. **2**. Ray Society, London

OLSEN, S. (1944). *Danish Charophyta. Chorological, ecological and biological investigations. Det Konggelige Danske Videnskabernes Selskab. Biologiske Skrifter* **3**(1): 1–240.

PETCH, C. P. & SWANN, E. L. (1968). *The Flora of Norfolk*. Jarrold, Norwich.

PHILLPS, G. L. & MOSS, B. (1978). *The distribution, biomass and productivity of submerged aquatic macrophytes in the Thurne Broads, Norfolk, 1975–1977*. Report to the Nature Conservancy Council.

SCUTTEN, J. & DAVY, A. J. (1998). *Hickling clear; can we understand why?* Technical Research Report 98/02. University of East Anglia, Norwich.

STEWART, N. F. (1996). *Stoneworts – connoisseurs of clean water. British wildlife* **8**: 93–99.

STEWART, N. F. & CHURCH, J. M. (1992). *Red Data Books of Britain and Ireland: Stoneworts*. J.N.C.C., Peterborough.

WALLACE, E. C. (1956). Plant records. *Proceedings of the Botanical Society of the British Isles* **2**: 26–44.

WALLACE, E. C. (1957). Plant records. *Proceedings of the Botanical Society of the British Isles* **2**: 245–268.

J. E. HARRIS
Kepwick Cottage, Wymondham Road, East Carleton, Norfolk, NR14 8JB

THLASPI PERFOLIATUM L. NEW TO WORCESTERSHIRE (V.C. 37)

On 13 April 1999 whilst recording near the Gloucestershire border for the forthcoming Flora of Worcestershire, KB found a large population of a *Thlaspi* species on the edge of a remote arable field, which was tentatively identified as *T. perfoliatum*. The identification was subsequently confirmed by TCGR and two specimens have been deposited in the National Museum & Gallery of Wales herbarium (**NMW**). This is the first confirmed record for Worcestershire (v.c. 37). The only previous record for Worcestershire *sensu lato* is an undated one from Evenlode (c. SP/22.29) by W. Cheshire (Lees 1867), which at the time appears administratively to have been a detached parish of Worcestershire in East Gloucestershire (v.c. 33).

This is a remarkable discovery of a rare, declining and statutorily protected species, hitherto surviving in only nine native and three introduced sites in Britain (Rich *et al.* 1998). The locality is about 20 km from the nearest sites in the Cotswolds, situated in an otherwise unremarkable area with many arable fields and straight, hawthorn-dominated hedges on a low ridge of Blue Lias. The soil was derived from the Blue Lias bedrock with loss of the upper horizons due to ploughing and soil creep, and formed a shallow, stony, greyish clay soil pH 7·3 (measured in a 50:50 slurry with distilled water using a Hanna pHep2 meter). Rich *et al.* (1989) noted *T. perfoliatum* was generally only persistent for long periods of time on Oolite Limestone soils, though it had persisted on similar formations (including Blue Lias) elsewhere.

The arable habitat is unusual in Britain, the species only having been recorded in arable sites four times previously (Rich *et al.* 1989). The plants were exceptionally tall and robust, probably resulting from fertiliser. They occurred both in the crop and on the adjacent bank, which presumably acts as a refuge when unsuitable crops are grown. The bank was 1–1·5 m tall indicating a long history of ploughing and soil creep at the field margin. Associated species in the arable crop were *Convolvulus arvensis, Polygonum aviculare, Tripleurospermum inodorum* and, on the bank, *Anisantha sterilis, Arrhenatherum elatius, Bromus hordeaceus, Knautia arvensis, Lamium purpureum, Malva moschata* and *Senecio vulgaris*.

The population was estimated to be about 5000 plants, most of which occurred in an area of c. 77 m × 3 m on the edge of the arable field, but significant numbers were also present along an adjacent bank. This is thus the third or fourth largest population in Britain (Rich *et al.* 1998).

The information available to date gives no obvious reason to suspect it is an introduction, and the site is accepted as native. It is close to the known native range on similar geology and soils, and the landscape context suggests it could have survived *in situ* from the Enclosure of this part of Worcestershire. There were no obvious alien species present, and the large population indicated it had been present for some time. The location has been notified to Plantlife, English Nature and the Worcestershire Trust for Nature Conservation, and efforts are being made to conserve the site.

In 1998, a few plants of *T. perfoliatum* were also reported from the Gloucestershire Trust for Nature Conservation Reserve of Cutsdean Quarry. They are rumoured to have been sown (pers. comm. C. Studholme to M. and C. Kitchen 1998), but the person responsible is unknown as is the origin of the seed. Plants were last recorded here in 1967 for certain and possibly in 1971, and were lost when Buckle Street was realigned along the west side of the quarry (S. C. Holland, pers. comm., 1988). No plants were seen in repeated searches in recent years by TCGR and co-workers (1983, 1986, 1992, 1994 and 1996). In 1999, there were six plants scattered in the middle of deliberately created bare open banks.

REFERENCES

LEES, E. (1867). *The botany of Worcestershire*. Worcester Naturalists' Club, Worcester.

RICH, T. C. G., KITCHEN, C. & KITCHEN, M. A. R. (1989). *Thlaspi perfoliatum* L. in the British Isles: distribution. *Watsonia* **17**: 401–407.

RICH, T. C. G., LAMBRICK, C. R., KITCHEN, C. & KITCHEN, M. A. R. (1998). Conserving Britain's biodiversity: *Thlaspi perfoliatum* L. (Brassicaceae), Cotswold Pennycress. *Biodiversity and conservation* **7**: 915–926.

K. BARNETT
49 Hastings Road, Malvern, Worcestershire, WR14 2XE

T. C. G. RICH
Dept. of Biodiversity and Systematic Biology, National Museum & Gallery, Cardiff, CF10 3NP