

*ELEOCHARIS AUSTRIACA* HAYEK,  
A SPECIES NEW TO THE BRITISH ISLES

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ABSTRACT

*Eleocharis austriaca* Hayek, discovered in 1947 in Yorkshire by N. Y. Sandwith, but not identified until 1960, is described and illustrated. It is an easily recognised species of the *E. palustris* group, and is now known to be widespread mainly in the mountains of Continental Europe from the Pyrenees to the Urals, occurring also in Norway. Six British localities are now known, in vice-counties 64, 67 and 70. Some information is given on the habitat in three of these localities, all of which are by upland rivers.

The group of species to which the common *Eleocharis palustris* belongs presents some difficulties of identification, and the critical taxonomy of the European representatives of the *E. palustris* group needs further elucidation. It is not, therefore, surprising that one of these species has only recently been detected as a member of the British flora. This is *E. austriaca* Hayek, originally described from Central Europe, but now known to be quite widespread in the European mountains.

Material of *Eleocharis austriaca* was first collected in Britain by Mr. N. Y. Sandwith in July 1947 'in a marshy ox-bow of the R. Wharfe below Buckden,' Upper Wharfedale, v.c. 64. Sandwith was obviously impressed by the differences between this plant and normal *E. palustris*, and submitted part of the material to me in 1948. At that time my own work on the European species allied to *E. palustris* was only just beginning, and I did not know *E. austriaca*; it was not until 1953 that I was able to publish a short paper on the species in question (Walters 1953). In 1960 I refound the sheet of Sandwith's original collection, and realised what the plant was. In the following season, Sandwith and others revisited the locality, and found the plant still growing there in some quantity. The detailed account of the plant, and the illustrations accompanying this description, are based upon fresh material from the original locality. I am most grateful to Mr. Sandwith for the material, and for notes on the habitat (Table 1a).

Very recently, during the preparation of this paper, Dr. G. A. Swan has found four new localities for *Eleocharis austriaca* in Northumberland (v.c. 67) and one in Cumberland (v.c. 70), and was good enough to show me one of these in the North Tyne Valley. Dr. Swan and Dr. M. E. Bradshaw have kindly supplied further information about the other North Tyne locality by the Kielder Burn, which they visited on the same day. (See Appendix and Table 1 for details of these localities.)

In habit, *Eleocharis austriaca* resembles the other British *Palustres* (i.e. *E. palustris* and *E. uniglumis*) in the possession of a vigorous rhizome system, from which arise leafless stems terminating in simple flowering spikes (Fig. 1A). The spikes (Fig. 1B) are characteristically compact and bluntly conical, however, contrasting with the typically longer, more cylindrical spikes of *E. palustris* or *E. uniglumis*. (The difference between *E. austriaca* and the rather rarer subsp. *microcarpa* of *E. palustris*, in respect of spike-size and -shape, and glume-size, is rather less than that between it and *E. palustris* subsp. *vulgaris*. As, however, subsp. *microcarpa* is not known in N. England, recognition of *E. austriaca* by general appearance is relatively easy.)\*

\* Strandhede (1960) considers that subsp. *microcarpa*, not subsp. *vulgaris*, must be the type subspecies, i.e., *E. palustris* subsp. *palustris*, according to the current International Code of Botanical Nomenclature. To avoid confusion, I have here used the names as originally published (Walters 1949).

*ELEOCHARIS AUSTRIACA* HAYEK



*Eleocharis austriaca*

Habit

Flowering Spike

Single Flower

Glume

bristle

Section

Watsonia

1963

Two other characters which were rather obvious in the North Tyne population, but which may not apply generally, were the dark brown colour of the spikes, and the extremely high proportion of fertile stems borne rather close together on a relatively short rhizome. When the plant is dug up, another character is obvious – the absence or very poor development of the reddish-purple colour so characteristic of the base of the stem in both *E. palustris* and *E. uniglumis*. This colour character seems reliable on both British and Continental material, and can be used to some extent on dried specimens.

Field recognition of *Eleocharis austriaca* is therefore relatively easy – at least in Britain where, so far as we know, a fourth species, *E. mamillata*, does not occur. Detailed characters of the stem anatomy, and particularly of the ripe fruit, however, provide the precise qualitative differences by which the species can be certainly recognised.

The differences in stem anatomy can be described in several ways, but can perhaps be most easily shown by the epidermal pattern of strips of tissue (readily prepared by scraping off lightly the internal tissues from a strip of stem; Fig. 2A). There is a very obvious difference between *E. austriaca* and *E. palustris* (Fig. 2B) which can be described as follows. The vascular bundles, with which are associated the stomatal rows, are widely-spaced in *E. austriaca*, and much more closely packed in *E. palustris*. Between the stomatal rows can be seen the rows of elongated fibre-cells; in *E. austriaca* there are up to 5 rows of ordinary epidermal cells between these fibre-rows, whereas in *E. palustris* only 1–3 rows are found between the fibre-rows. These differences are clearly seen in Figs. 2A and B. (*E. uniglumis* resembles *E. palustris* in these characters, whilst the Scandinavian *E. mamillata* is closely similar to *E. austriaca* in all vegetative characters). These anatomical differences are responsible for a difference readily observable in fresh material, namely that *E. austriaca* stems (Fig. 1H) are weak and readily cracked, in contrast to the more pliant stems of *E. palustris*. In fresh material, and even more in dried specimens, it is relatively easy to count the number of vascular bundles; stems of *E. austriaca* have 10–16 main bundles, which show as ridges in dried material, whilst those of *E. palustris* have 20 or more, which are far less conspicuous in the dried state.

The ripe fruit of *E. austriaca* differs from that of *E. palustris* in two main features. Firstly, the perianth-bristles are rather well-developed, always exceeding the fruit, and they are often 5 in number, by the bifurcation of the abaxial bristle (Figs. 1C and D, 2C). In contrast, the bristles of *E. palustris* are not infrequently relatively short and always 4 in number (Fig. 2B). In practice, this means that if three or four ripe fruits of the two species are examined, at least one of the *austriaca* fruits will be found to have either a divided bristle or a pair in the abaxial position. Secondly, the style-base is typically long and narrow, with only a small constriction at the junction with the nut. This contrasts with the more broadly triangular style-base, typical of *E. palustris*. There is, however, a good deal of variation in style-base shape, and the character cannot be used reliably on single fruits. Its value is greater in distinguishing *E. austriaca* from *E. mamillata*, which has the low broad style-base indicated by the name. The differences between *E. austriaca* and *E. mamillata* in style-base and in other characters are discussed and illustrated by Walters (1953) and Strandhede (1962).

The European distribution of *E. austriaca* is as yet very incompletely known, but it seems to occur mainly by mountain lakes and streams from the Pyrenees to the Urals; in Scandinavia, where *E. mamillata* is widespread, *E. austriaca* seems to be rare (Strandhede 1962). Its occurrence in N. England therefore fits well with the distribution of species such as *Primula farinosa*, a widespread European mountain plant not occurring in the Arctic. A complete list of localities is given in Appendix B.

There is a general similarity between all the British habitats of *E. austriaca*. All the habitats are relatively impermanent ones by rivers, and the plant seems to form vigorous stands where there is rather open alluvial gravel or sand.

The Wharfedale locality was re-visited by Mr. N. Y. Sandwith on 9 July, 1961, when the species-list (a) in Table 1 was compiled. The plant is growing in an old ox-bow of

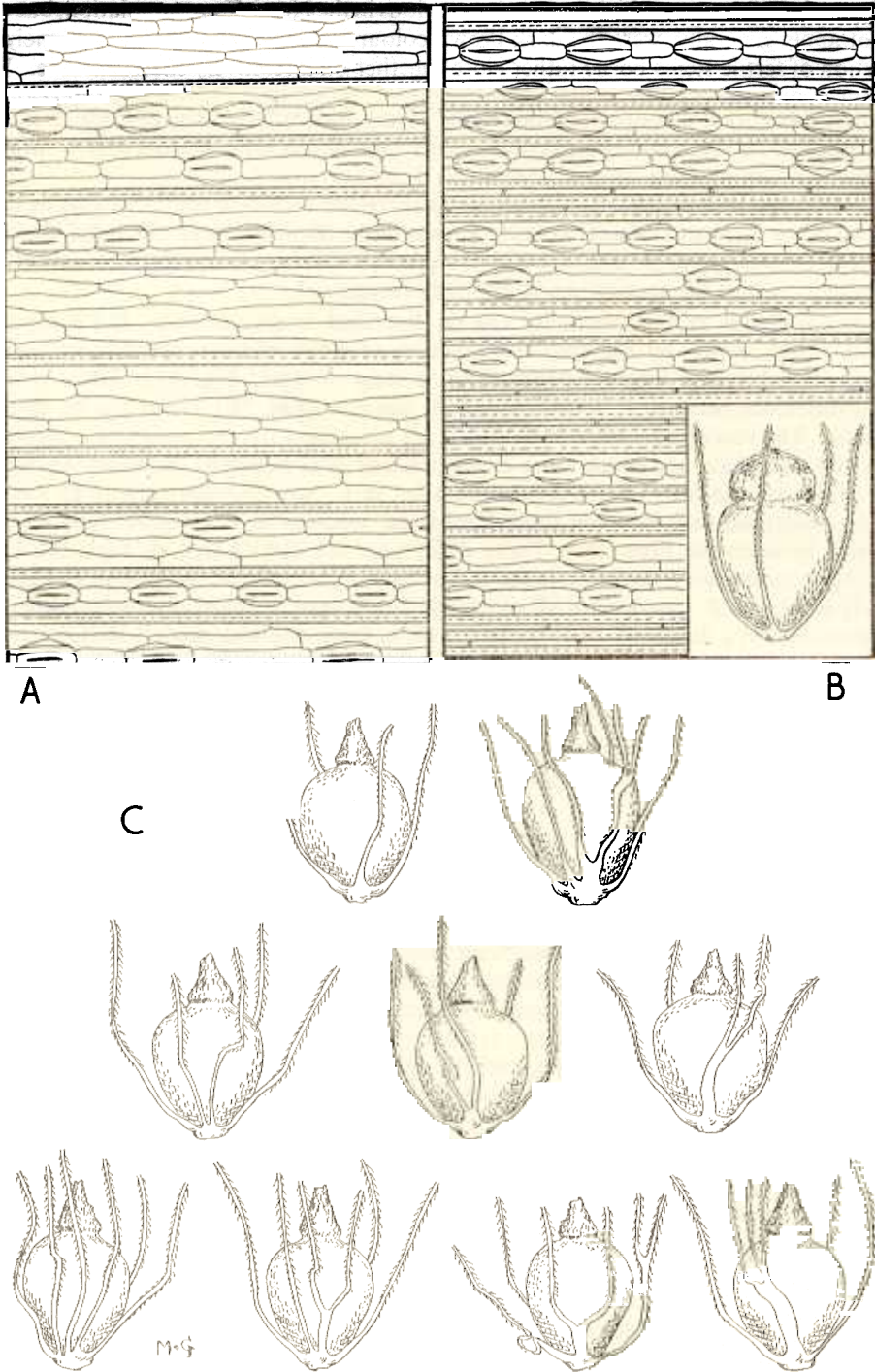


Fig. 2

- A. *Eleocharis austriaca*: Epidermis of stem  $\times 100$   
 B. *Eleocharis palustris* subsp. *microcarpa*: Epidermis of stem  $\times 150$  and (inset) fruit  $\times 12$   
 (Material from Aldenham Reservoir, Herts, v.c. 20, coll. M. A. Grierson, 1961 (K)).  
 C. Fruits of *E. austriaca*, showing range of bristle-number and -form,  $\times 12$

the River Wharfe, rooted in silty mud. A sample of the mud gave on analysis 33.1% of organic matter, and a pH of 6.8.

TABLE 1.  
Localities of *E. austriaca*—lists of associated species

	(a)	(b)	(c)		(a)	(b)	(c)
Achillea millefolium			+	Leontodon autumnalis			
A. ptarmica			+	Linum catharticum			
Agrostis stolonifera			+	Lotus corniculatus			
Alnus glutinosa			+*	Lysimachia nemorum			
Angelica sylvestris				Mentha aquatica			
Anthoxanthum odoratum				Myosotis caespitosa			
Bellis perennis				M. scorpioides			
Callitriche sp.				Parnassia palustris			
Caltha palustris	+		+	Pedicularis palustris			
Cardamine flexuosa				Phalaris arundinacea			
C. pratensis				Plantago lanceolata		+	
Carex demissa				P. major		+	
Centaurea nigra				Poa trivialis			
Cynosurus cristatus				Potamogeton natans			
Deschampsia cespitosa				P. polygonifolius			
Eleocharis palustris				Potentilla anserina			
Epilobium palustre			+	Prunella vulgaris		+	+
E. nenterioides			+	Ranunculus flammula	+	+	+
Equisetum arvense		+	+	R. repens	+	+	+
E. fluviatile			+	Rhinanthus minor <i>sens lat.</i>			+
Euphrasia brevipila				Rumex obtusifolius			
E. nemorosa				Sagina procumbens			+
Festuca arundinacea			+	Salix sp.*			
Filipendula ulmaria			+	S. triandra			
Galium palustre				S. viminalis	+		
Galium uliginosum				Sparganium erectum	+		
Glyceria fluitans	+			Succisa pratensis			
Holcus lanatus				Trifolium pratense			+
Juncus acutiflorus		+	+	T. repens			+
J. articulatus		+	+	Triglochin palustris			+
J. bufonius		+	+	Tussilago farfara		+	+
J. effusus	+		+	Veronica beccabunga	+		+
Lathyrus pratensis			+	V. chamaedrys			+

(a) Original locality in Wharfedale, 9 July, 1961

(b) North Tyne near Otterstone Lee, 23 Aug. 1962

(c) Kielder Burn, 23 Aug. 1962

\* Seedlings.

The locality in the North Tyne Valley near Otterstone Lee, discovered by Dr. G. A. Swan, was shown by him to Dr. M. E. Bradshaw and myself on 23 August, 1962. It is very similar to the Wharfedale habitat; the plant is growing in a silted backwater by the side of the river, in a community containing six species common to both localities (see Table 1b). A sample of the mud from the rhizomes of the plant here showed an organic content of 6% and a pH of 7.1. Dr. Swan and Dr. Bradshaw visited the Kielder Burn locality on the same day, and furnished a description and species list (Table 1c). Here *Eleocharis austriaca* grows in a gravelly and silty backwater by the stream in an open community with much bare gravel. The soil sample gave a very low organic content (2.7%) and a pH of 7.0.

The significant difference in organic content between the Wharfedale locality and the other two emphasises the only obvious difference, namely that the Northumberland habitats were less stable and more obviously subject to flooding. One could, however, reasonably assume that there had been an earlier seral stage in the Wharfedale habitat, before the ox-bow was cut off from the parent river at its upstream end, when the community would have been much more open.

Detailed information on Continental habitats of *E. austriaca* for comparison with these British ones is not yet available, but Strandhede (1962) indicates that the Norwegian

localities by upland rivers, at any rate, are very similar, and also points out that *E. austriaca* differs in its ecological requirements from the closely similar *E. mamillata*, which is characteristic of peaty ground, often of acid reaction. Some Continental habitats are by upland lakes (e.g. the *locus classicus* of *E. benedicta*, cf. Appendix); it would be interesting to have further information about such localities.

I am greatly indebted to Miss M. A. Grierson, of the Herbarium, Royal Botanic Gardens, Kew, for the line-drawings reproduced in Figs. 1 and 2, and to Mr. P. Freeman, of the Botany School, Cambridge, for the soil analyses.

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 ZINSERLING, G. (1935). in V. L. Komarov (ed.) *Flora U.R.S.S.* **3**, 75–6 and 581.

## APPENDIX

## A. Nomenclature and Synonymy

- Eleocharis austriaca* Hayek, *Flora Stiriacae Exsiccata*, Lieferung 19/20 (1910).  
*E. benedicta* Beauverd, *Bull. Soc. Bot. Genève, sér. II* (2) **13**, 245 (1921).  
*E. leptostylopodiata* G. Zinslerling in Komarov (ed.), *Flora U.R.S.S.* **3** (Addenda), 581 (1935).

## B. List of Localities

## (i) Britain

- V.c. 64, Mid-West Yorks: marshy ox-bow of the R. Wharfe below Buckden (Grid ref. 34/945760), N.Y. Sandwith, July 1947 (ref. no. 3185); July 1961 (ref. no. 5906).  
 V.c. 67, S. Northumberland: by R. Rede near Byrness (Grid ref. 36/770022) 22 July 1962; by R. North Tyne near Otterstone Lee (Grid ref. 35/670879) 6 Aug. 1962 (see details on p. 333); by Kielder Burn (Grid ref. 35/651957) 6 Aug. 1962 (see details on p. 333); in silted-up pond by R. North Tyne near Plashetts (Grid ref. 35/664897) 29 Sept. 1962.  
 V.c. 70, Cumberland: by R. Irthing near Gowk Banks (Grid ref. 35/682737) 16 Sept. 1962.  
 (Localities in V.c.'s 67 and 70 were discovered by G. A. and M. Swan).

## (ii) Continental Europe

## AUSTRIA

- Steiermark: 'Stiria media in stagno exsiccato ad pagum St. Peter prope urbem Graz, 370 m. Juni 1906, K. Fritsch,' lectotype in (H); cf. Walters (1953) p. 284).  
 Tirol: 'in paludibus prope Lienz (?) Pichler, Juni 1865' (mixed sheet with *E. palustris*) (BM).

## CZECHOSLOVAKIA

- Beskydy and Tatra (Holub, 1960).

## FRANCE

- Haute-Savoie: Plage du lac Bénit, 1580 m, massif des Vergys, 15 Aug. 1922, G. Beauverd, Ch. Duffour Exsicc. 4277 (*E. benedicta* Beauv., type locality) (G); Servoz, Lac Vert, 3 Sept 1934, M. E. Edmonds No. 9 (K); Chalets de Méri, 1910, de Palézieux (G).  
 Jura: Bords du lac des Rousses 17 July 1869, Herb. Manceau (P).  
 Hautes-Pyrénées: Vallée supérieure du lac de Gaube, 31 Aug. 1836, E. Doassans (as *E. uniglumis*) (K); Cautarets, le Cayan—alt. 1630 m, fin août, Mouillard, Ch. Duffour Exsicc. 1104 (P).

## GERMANY

- Several localities are given for Bavaria by Podlech (1960) (M).

## ITALY

Prov. Belluno: Shore of Lago Alleghe, Caprile, 29 Aug. 1862, Herb. Churchill (K).

## JUGOSLAVIA

Flora Bosnae: 'ad Koran prope Pale,' (near Sarajevo), c. 860 m, 21 July 1929, leg. Maly (K).

## NORWAY

Three localities (2 in Saltdal, Norrland, and one in Sør Trøndelag) are given by Strandhede (1962).

## POLAND

Three localities in the Tatra (W. Carpathians) (KRA) (Walters 1959).

## SWITZERLAND

Apparently widespread; add to the 27 Swiss localities listed in Walters (1953) (mostly in ZT):

Fribourg: Commune de Charmey, rive du lac de Montsalvans, 803 m, 19 July 1849, H. Brunner, Soc. Franc. Éch. Pl. Vasc. Exsicc, B. de Retz, fasc. 3, No. 819 (K),

Engadine: Près Bevers 7. 1867. L. Favrat & W. Barbey (K).

## U.S.S.R.

The distribution given by Zinserling in Komarov (1935) for *Heleocharis leptostylopodiata* is European Russia to Middle Volga region, Ural Mountains and adjacent territories, Siberia (Kusnetskij Alatau), Amur region and the Caucasus. The disjunct nature of the distribution is stressed. The type material (LE) is from 'Baschkiria, Canton Zalaia,' and is in excellent fruiting condition. There can be no doubt as to the identity of Zinserling's species with *E. austriaca*.

In their account of *Heleocharis* in *Flora R.S.S. Ucr.* (1940), Krečetovič & Zoz do not give the species from the Ukraine. It does, however, grow within the present boundaries of the Ukraine, as I have seen the following specimen:

Orelac, near Šniatyn, on R. Prut (Podolia, W. Ukraine)-17 Sept. 1880. A. Sleđiński (KRA).

[The Herbaria in which material is to be seen are indicated by the standard abbreviations as given in ed. 4 of *Index Herbariorum (Regnum Vegetabile 15, 1959)*. I am grateful to the authorities in these institutions for facilities to consult and borrow material.]