Watsonia, **16**, 303–309 (1987)

Typification and status of the mysterious *Festuca guestfalica* Boenn. ex Reichb.

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ABSTRACT

The discovery of the type specimen of *Festuca guestfalica* Boenn. ex Reichb. is described and its diagnostic features are presented. It is closely related to *F. ovina* L. and probably a tetraploid. It is concluded that there is insufficient evidence to identify any plants from the British Isles as this central European taxon.

THE *FESTUCA OVINA* AGGREGATE

In its broadest sense *F. ovina* L. consists of a large number of taxa widely distributed in Eurasia and North America. In *Flora Europaea* (Markgraf-Dannenberg 1980) 92 species (numbers 79–170) belong to this aggregate. Hackel (1882), in his monograph of European fescues, had earlier used almost exactly the same scope for his '*F. ovina* Linn. sens. ampliss.'; in fact only one of the 92 species recognized in the aggregate by Markgraf-Dannenberg (*F. hystrix* Boiss.) was excluded from it by Hackel.

In British Floras a range of circumscription has been adopted (Table 1). Howarth (1925) described the aggregate as '*F. ovina* L. sensu ampliss.' and Tutin (1952) as '*F. ovina* agg.' However, both these authors divided the group into separate species (five and four respectively). Howarth (1948) reduced the number of species he recognized from five to four, *F. supina* Schur having previously been recorded in error. Hubbard (1954) recognized five species. The later editions of Tutin and Hubbard do not differ from the first, apart from the use of the name *F. longifolia* Thuill. instead of *F. trachyphylla* (Hack.) Krajina by Tutin (1962).

Markgraf-Dannenberg (1980) recorded seven of her 92 species for Britain, and these were all briefly treated by Tutin (1981). In addition *F. armoricana* Kerguélen and *F. huonii* Auquier are known from the Channel Isles, but Markgraf-Dannenberg's record of *F. indigesta* Boiss. from Ireland is probably an error of identification. Since 1980 an eighth species, *F. ophioliticola* Kerguélen, has been recorded from Britain (Wilkinson & Stace 1985); all eight are listed in Table 1.

TABLE 1. TAXONOMIC TREATMENTS OF *F. OVINA* AGG. IN FIVE DIFFERENT WORKS

Howarth 1925	Howarth 1948	Tutin 1952	Hubbard 1954	Markgraf-Dannenberg 1980
F. capillata	F. tenuifolia	F. ovina ssp. tenuifolia	F. tenuifolia	F. tenuifolia
F. ovina	F. ovina	F. vivipara	F. vivipara	F. vivipara
		F. ovina ssp. ovina	F. ovina	F. ovina
				F. guestfalica
				F. ophioliticola
F. glauca	F. glauca	F. glauca	F. glauca	F. longifolia
F. longifolia	F. longifolia	F. trachyphylla	F. longifolia	F. trachyphylla
				F. lemanii

Our concept of *F. ovina* in Britain is covered by the descriptions of *F. ovina*, *F. guestfalica* and *F. ophioliticola* given in *Flora Europaea*, but it excludes the other five species. It is possible to subdivide taxonomically this concept of *F. ovina* (which may be called *F. ovina* sensu stricto), as Markgraf-Dannenberg has done, but we prefer to recognize such segregates at infraspecific levels rather than as species (Wilkinson & Stace 1985).

Festuca ovina has been typified (Jarvis, Stace & Wilkinson 1987) by a specimen in **LINN** which represents a northern diploid plant (*Festuca ovina* sensu strictissimo) which is common in Scandinavia and northern Britain but rare in southern England and apparently absent from Belgium and France. In these more southern areas it is replaced by various tetraploid taxa. Apparently the earliest name at specific level that could be used for any of these tetraploids is *F. guestfalica* Boenn. ex Reichb., and it is the application of this name that is the subject of the present paper.

TYPIFICATION OF *FESTUCA GUESTFALICA*

FESTUCA GUESTFALICA Boenn. ex Reichb., *Flora Germanica Excursoria*, p. 140 (3) (1831). *F. ovina* ssp. *eu-ovina* var. *vulgaris* subvar. *guestphalica* (Boenn. ex Reichb.) Hackel, *Monogr. Fest. Europ.*, 87 (1882).

The name *F. guestfalica* has never been typified and was ignored by twentieth-century botanists until Markgraf-Dannenberg (1980) adopted the name in *Flora Europaea* for a plant that she claimed was distributed from Britain and France to Poland and Czechoslovakia. Reichenbach's description is too vague to give a good impression of the identity of the taxon, except that it belongs to the *F. ovina* aggregate. If it is part of *Festuca ovina* sensu stricto it is, from its distribution, probably a tetraploid. Markgraf-Dannenberg's (1980) concept was apparently intuitive, based upon her wide and long experience of the genus in central Europe. Although she gave "Br" in the distribution, we have seen no British material so labelled by her. The few records of *F. guestfalica* for Britain that have appeared in the literature recently are all errors, based on a misinterpretation of Markgraf-Dannenberg's concept of the species (e.g. Ellis 1983, p. 172). Kerguélen (1982, 1983) has considered this problem, and gave a brief description of a *Festuca* occurring in the Paris region that he thought came under Markgraf-Dannenberg's concept of *F. guestfalica*. However, he considered that this latter concept embraced several taxa, and he surmised that the typical species of Reichenbach, the Parisian plant, another related taxon from Le Mans, *F. ophioliticola* ssp. *calaminaria* Auquier, and at least three populations studied by Huon (1970) in western France probably came under this name. However, he had no information on the nature of the type material, identification of which he justifiably considered "indispensable".

Reichenbach's "*F. guestfalica* a Bnngh." (implying the name was supplied by Boenninghausen) was based on "*F. valesiaca* var. β Weihe D. Gräs. XI. no. 264.", said to come from "An Kalkfelsen im Sauerlande in Westfahlen" (Westphalia, W. Germany, hence the epithet *guestfalica*). W. Lippert (München) kindly informed us (in litt. 1983) that "D. Gräs. XI" refers to Weihe's exsiccatum set *Deutsche Gräser für Botaniker und Oeconomen*, XIte Sammlung, a set of which he and other central European grass taxonomists had been seeking unsuccessfully for some time.

In January 1984 we distributed with the University of Leicester Botanic Garden annual Seedlist an open request for information about Weihe's exsiccatum. This resulted in the location of at least two syntypes of *F. guestfalica*.

At Helsinki there is a set of fifteen bound volumes of Weihe's *Deutsche Gräser*, volume XI of which contains no. 264, which is indeed labelled "264. *Festuca valesiaca* var. β Am Felsen im Sauerlande" (Plate 3A), with no other data. Volume XI was kindly lent to us by I. Kukkonen. It contains 25 sheets (nos 251–275), as presumably do all the other volumes, but is undated (Fig. 1). Dr Kukkonen tells us that Volume I is dated 1st October 1817, and Volume XII October 1824, and that, since it contains a reference to Mertens & Koch's third edition of Röhling's *Deutschlands Flora* (1823), Volume XI must have appeared in 1823 or 1824. Sheet no. 264 is clearly the plant upon which Reichenbach's *F. guestfalica* was based.

From Leningrad also we received anonymously on loan a single sheet of no. 264 from the same volume. This has the same small printed label as that at Helsinki, under which someone has written 'Weihe'. This sheet is obviously another syntype. Presumably the set of exsiccata at Leningrad has

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FIGURE 1. Reproductions of title-page and contents-page of Weihe's rare *Deutsche Gräser*, Volume XI, at Helsinki.

been cut up and disposed into the herbarium in systematic sequence. No other examples of this rare set of exsiccata have come to light.

We also received on loan from Edinburgh a sheet ex "Herb. Dörfler. Purchased 1912." that bears no other printed labels but two handwritten ones (Plate 3B). The upper was written by Weihe (handwriting identified for us by B. Gries of Münster, H. E. Weber of Osnabrück and G. Wagenitz of Göttingen) and reads: "*Festuca valesiaca β hirsuta* . . . Weihe". The lower label starts "543 b *Festuca guestfalica* . . .", followed by a description and ends "(Weihe D Gräser 11 Heft) . . . guestfalia montibus calcareis." The handwriting has been identified for us by F. Kottwitz of Nortrup as that of Boenninghausen. The absence of the number 264 on this sheet indicates that this specimen cannot be considered a syntype, but in fact it might well be one. The description written by Boenninghausen agrees with that in Reichenbach's *Flora*, and the number 543 b might be an error for 243 b, which is the number of *F. guestfalica* in the *Flora*. Moreover the reference to Weihe's exsiccata, Volume 11, by Boenninghausen, and use of the name *F. valesiaca β* by Weihe, tie the specimen in with no. 264 in the exsiccata volumes. There remains the possibility that Weihe's and Boenninghausen's labels were referring to the fact that the Edinburgh specimen was taxonomically the same as *F. guestfalica*, rather than it being a type, even though the specimens appear so similar that they might have come from the same gathering. The most important aspect of the Edinburgh specimen, however, is that it bears a label by Boenninghausen with the name *F. guestfalica*, which (uniquely) confirms Reichenbach's attribution of the origin of the name.

Accordingly, we designate the Helsinki exsiccatum as lectotype, the Leningrad specimen as isolectotype, and the Edinburgh specimen as a possible isolectotype.

DESCRIPTION AND DISTRIBUTION OF *FESTUCA GUESTFALICA*

Our concept of *F. guestfalica* is based upon the three specimens mentioned above and upon a number of other herbarium specimens in **HAL**, **W** and **Z**, from Germany and Switzerland, that resemble the former closely and are obviously conspecific with it. Diagnostic measurements of the type material are as follows: plant height 45–60 cm; leaf-blades Y-shaped to V-shaped in section, with 2 grooves, 1 ridge, 6–7 veins and continuous or slightly broken, rather thin sclerenchyma; panicles (6)8–12 cm; spikelets (to tip of 4th floret excl. awn) (6.1)6.5–7 mm; lower glume (2.6)2.8–3.6(4.4) mm; upper glume (3.2)3.5–4.4(4.6) mm; lemmas 4–4.5 mm; lemma awns (0.3)0.5–1(1.2) mm. The most notable feature of the types is the very lax panicle, setting the plants well apart from most others in the *Festuca ovina* aggregate.

A more extended description based upon all the above material follows (Fig. 2) (measurements are means of specimens):

Plants laxly tufted, with only intravaginal shoots, without rhizomes, retaining or shedding old leaves. Culms (30)36–58(68) cm, with 2–3 nodes (excl. inflorescence), the uppermost not pruinose, usually visible beyond subtending sheath and reaching 11–26% up culm; stem below inflorescence 0.4–0.7 (0.8) mm wide, scabrid or occasionally smooth, strongly grooved when dry. Leaves green, subpruinose or not; sheaths 2.9–7 cm, fused for 0–39% of length, smooth or occasionally scabridulous in upper half, hairy or glabrous; auricles short, minutely ciliated or occasionally glabrous; ligules <0.5 mm, minutely ciliated; blades 6.8–19.7 cm, very lank, not acutely pointed, 0–40(50)% on each plant curved at tip, scabrid at least in upper third, glabrous or hairy at base.

Inflorescences nodding or slightly so, 6–12.4 cm, very lax, with (8)10–14 nodes and 20–36(41) spikelets; branches not pruinose or occasionally subpruinose, not narrowing below spikelets, scabrid or scabridulous, the lowest two 1.7–3.6 cm apart. Spikelets (6.6)6.7–7(7.1) mm, with 3–8 florets (the most apical one reduced and sterile), not pruinose or occasionally subpruinose; pedicel 1.4–2.3(2.7) mm, scabrid or scabridulous; lower glume narrowly triangular to narrowly lanceolate, 2.5–3.3×0.6–0.8 mm, scabrid at tip, ciliate at margin, with 1 vein; upper glume lanceolate to narrowly so, 3.45–4.3×0.9–1.15 mm, scabrid or hairy at tip, ciliate at margin, with 3 veins; lemmas 3.8–4.4 (excl. awn)×1.6–1.9 mm, lanceolate, hairy or scabrid in distal half, with 5 veins, with awn 0.6–1.1(1.9) mm; paleas linear-lanceolate, 4–4.8×0.65–0.85 mm; anthers yellow or purple, (2.2)2.4–3.1 mm.

Leaf-blade in section: laterally compressed to oval, with margins not or slightly infolded, (0.46)0.57–0.69(0.75) mm diameter/thickness ratio 1.9–2.5(2.7), with (5)7 veins, 2(4) grooves

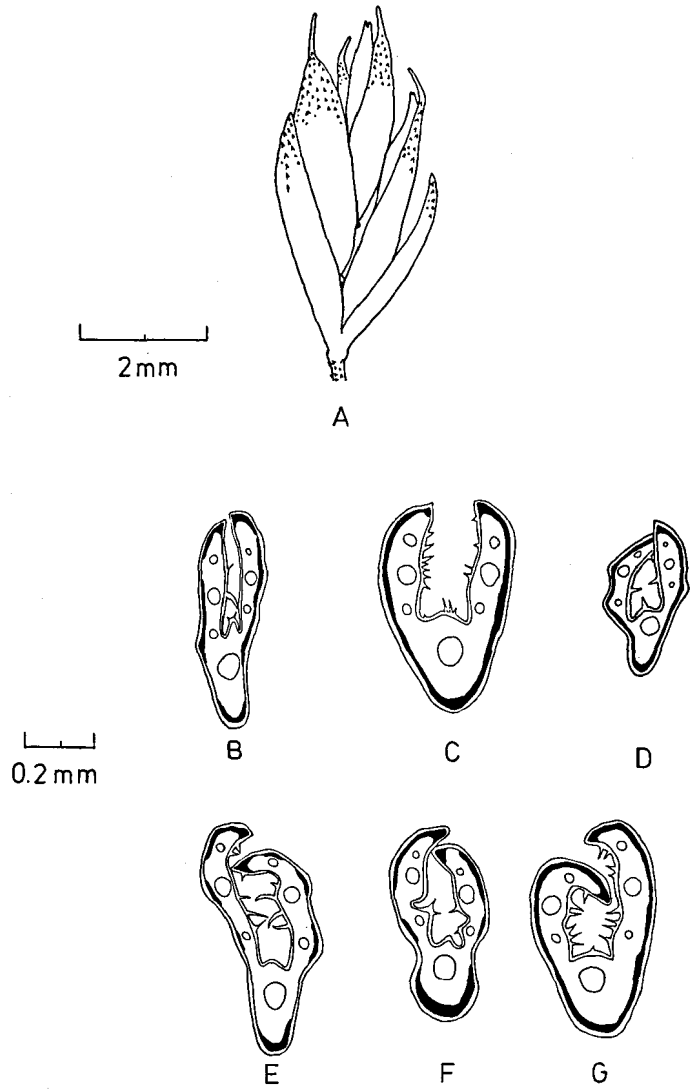

FIGURE 2. Spikelet (A) and transverse sections of leaf-blades of sterile shoots (B–G) of *F. guestfalica*. (A) lectotype; (B) lectotype; (C) Edinburgh possible isolectotype; (D) Leningrad isolectotype; (E, F, G) unlocalized German and Swiss specimens in Zürich.

and 1(3) ridges on adaxial surface; sclerenchyma forming thin broken ring or sometimes unbroken ring 1–2 cells thick; adaxial midrib 0.07–0.1(0.17) mm wide and 0.02–0.06 mm deep; adaxial epidermal cells ±uniform in size, lacking bulliform cells, with prickles (12.5)20–40(46.5) μm long.

Leaf-blade adaxial epidermis: stomata (33.5)35.5–39.75(44.5) μm long, (20)40–80(85)% solitary, 8–56(76)% with accompanying prickle-cell, 3–24% with accompanying silica-cell; prickles 63–93% solitary, 7–14(34)% forming rows of 2-few cells, 2–9(18)% with accompanying silica-cell. Leaf-blade abaxial epidermis: stomata absent; long-cells with highly sinuous walls, (105)140–185(250) μm long; silica-cells and cork-cells present; prickles usually present.

We have encountered two British specimens that agree well with the lectotype in all critical characters. One is a voucher (now in **K**) of a plant used by T. J. Jenkin in the hybridization

experiments carried out at Aberystwyth in the 1930s, 1940s and 1950s. The plant is that described by him as *F. ovina* (Sheet 28, Experiment B143) (Jenkin 1955). He found it to be a tetraploid (2n=28), and he obtained hybrids between it and *F. rubra* L. It originally came from an acid heath in Pembrokeshire, Wales. The other is a plant collected fresh by T. C. G. Rich at Gaitbarrows, W. Lancashire, England and cultivated at Leicester. Like the type of *F. guestfalica*, it came from a limestone area. It is also a tetraploid (2n=28), with all the chromosomes metacentrics or submetacentrics and the ratio of largest to smallest chromosomes 1.7.

We cannot confirm or deny the more extensive distribution of the species given by Markgraf-Dannenberg (1980). We have seen only three specimens determined by her, and these do agree with our concept of the species, but it must be remembered that her circumscription of the species was drawn without having seen the type specimens. The plants from France thought of as possible *F. guestfalica* by Kerguélen (1982, 1983) are not good matches for the type material, and we have seen no material of *F. guestfalica* from France, Belgium or Holland.

TAXONOMIC STATUS OF *F. GUESTFALICA*

At first glance the type and similar specimens from Germany and Switzerland appear to represent a very distinct taxon. By far the most distinctive character is the widely spreading, lax panicle, quite unlike that usually found in *F. ovina* sensu stricto or indeed within the *F. ovina* aggregate. The most similar western European taxa appear to be *F. ovina* ssp. *ophioliticola* (Kerguélen) M. Wilkinson and *F. lemanii* Bastard, both of which normally possess much more contracted inflorescences, shorter, stiffer leaf-blades and shorter leaf-sheaths than *F. guestfalica*. Apart from this *F. lemanii* differs mainly in its shorter pedicels, shorter lemma-awns, shorter anthers, 2–4 (rather than usually 2) grooves on the leaf-blades, and longer stomata (Table 2). These differences seem consistent and within the *F. ovina* aggregate are of the order normally representative of different species.

F. ovina ssp. *ophioliticola* differs additionally from *F. guestfalica* mainly in its shorter anthers (more or less as in *F. lemanii*) and shorter upper glumes (Table 2). These differences are less convincing.

It is possible that *F. guestfalica* is a distinct species, but equally possible that it is an extreme variant of *F. ovina* ssp. *ophioliticola*. The two British plants closely resembling *F. guestfalica* throw some light on this point. Both Jenkins (1955) and T. C. G. Rich (pers. comm. 1985) collected the plants in the belief that they were representative of the segregate of *F. ovina* common in each of the areas concerned. Yet no herbarium material of wild-collected *F. ovina* that we have seen from those areas (or indeed from anywhere in Britain) closely resembles *F. guestfalica*. The two British specimens that do seem identifiable with that taxon represent cultivated material, and it is likely that they do not represent phenotypes normally encountered in the wild. Bidault (1968, p. 242) listed panicle length and innovation leaf-length as two of the more plastic characters in *Festuca*. The wide disjunction between the two British sites, and between those and the type locality of *F. guestfalica*, suggest that it is unlikely that the former are outposts of a central European taxon.

We conclude that more investigations in Westfalia are needed to investigate the status of *F.*

TABLE 2. DIAGNOSTIC CHARACTERS OF *FESTUCA LEMANII, F. GUESTFALICA* AND *F. OVINA* SSP. *OPHIOLITICOLA*

Character	*F. lemanii*	*F. guestfalica*	*F. ovina* ssp. *ophioliticola*
Pedicel length (mm)	0.6–2(2.4)	1.4–2.9	(1.3)1.4–2.8(3.6)
Spikelet length (mm)	(6.1)6.5–7.5(8.5)	(6.6)6.7–7(7.1)	(5.5)5.9–7(7.5)
Upper glume length (mm)	(3.4)3.5–4.6(4.8)	3.45–4.3	3–3.9(4.9)
Lemma awn length (mm)	(0.34)0.6–1.6(1.9)	0.6–1.1	(0.3)0.5–1(1.6)
Anther length (mm)	1.8–2.5	(2.2)2.4–3.1	(1.65)1.85–2.2(2.85)
No. leaf-blade grooves	2–4	2(–4)	2(–4)
Stomatal length (μm)	(31)38–45.8	(33.5)35.5–39.75(44.5)	31–39.5
Chromosome number	42	?28	28

guestfalica, but that, whatever the results of such studies, it is probable that the British plants are extreme ecophenes of *F. ovina* ssp. *ophioliticola*. If these two taxa are the same, it should be noted that *F. guestfalica* is the correct name at the species level, but ssp. *ophioliticola* is correct at the subspecies level.

ACKNOWLEDGMENTS

We are most grateful to the many herbarium curators who searched (mostly unsuccessfully) for specimens on our behalf, especially to Dr I. Kukkonen (Helsinki) for loaning us Volume XI of the Weihe set of exsiccata. We are also indebted to the following for much helpful advice on Weihe and Boenninghausen and on the taxonomy of *Festuca*: B. Gries, M. Kerguélen, F. Kottwitz, W. Lippert, F. Runge, G. Wagenitz and H. E. Weber; and to T. C. G. Rich for providing living material of *Festuca*.

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(*Accepted July 1986*)