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New species of *Festuca* L. section *Festuca* (*Poaceae*) in the Iberian Peninsula

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Resumen: Fuente, V. de la, Ortúñez, E. & Ferrero, L. M. *Nueva especie de Festuca L. sección Festuca (Poaceae) en la Península Ibérica. Lazaroa 20: 3-9 (1999).*

Se describe una nueva especie diploide de *Festuca* L., *F. vettonica*, perteneciente a la serie *Intravaginales* Hackel (sección *Festuca*) en el macizo de 'La Serrota' (Sistema Central, España). Se aportan caracteres morfológicos, anatómicos y citológicos de este taxón.

Abstract: Fuente, V. de la, Ortúñez, E. & Ferrero, L. M. *New species of Festuca L. section Festuca (Poaceae) in the Iberian Peninsula. Lazaroa 20: 3-9 (1999).*

A new diploid species of *Festuca* L. belonging to the series *Intravaginales* Hackel (sect. *Festuca*), *Festuca vettonica*, is described from 'La Serrota' massif (Central Mountain System, Central Spain). Morphological, anatomical and cytological characters of the taxon are presented.

INTRODUCTION

Festuca L. sect. *Festuca* [series *Intravaginales* HACKEL (1882)] comprising the intravaginally tillering species and is represented in the Iberian Peninsula by some 24 species (MARKGRAF-DANNENBERG, 1980) and by some 29 species (FUENTE & ORTÚÑEZ, 1998). During our research on this genus in the Iberian Peninsula, we collected in 'La Serrota' massif (Central Mountain System, Central Spain) one diploid fescue belonging to the section *Festuca* which can not be atributed to any of the known species. Investigations based on some herbarium specimens, personal collections and living material from this massif convinced us that this fescue is to be ascribed to a new species, for which we propose the name *Festuca vettonica*.

As the result of our study the morphological, anatomical, citologycal, ecological and chorological characters of *F. vettonica* are given. A key of identification with the close taxa is presented and the principal microepidermal characters has been incorporated with the aim to emphasize the importance taxonomic of these characters.

MATERIAL AND METHODS

The material studied came from our own and collections of others. During our field investigations, specimens of different populations have been collected in 'La Serrota' massif (Central Mountain System, Spain), which have been deposited in our personal herbarium and cultivated in the greenhouse at the Universidad Autónoma de Madrid. The methods and terminology adopted for the morphological and anatomical analyses are the same as described by HACKEL (1882), SAINT-YVES (1913), AUQUIER (1974), ELLIS (1976) and WILKINSON & STACE (1991).

Epidermal characters have been studied by scanning electron microscopes, Philips XL30. The terminology and methods adopted are those of METCALFE (1960), ELLIS (1979) and PALMER & TUCKER (1981).

Chromosome numbers were made in root meristems from mature plants. Chromosome numbers were counted from the following locality: **Avila**, Cepeda la Mora, La Serrota, Canto de la Oración, 30TUK2483, 1950 m, *V. de la Fuente & L. M. Ferrero*, 22-VI-1995.

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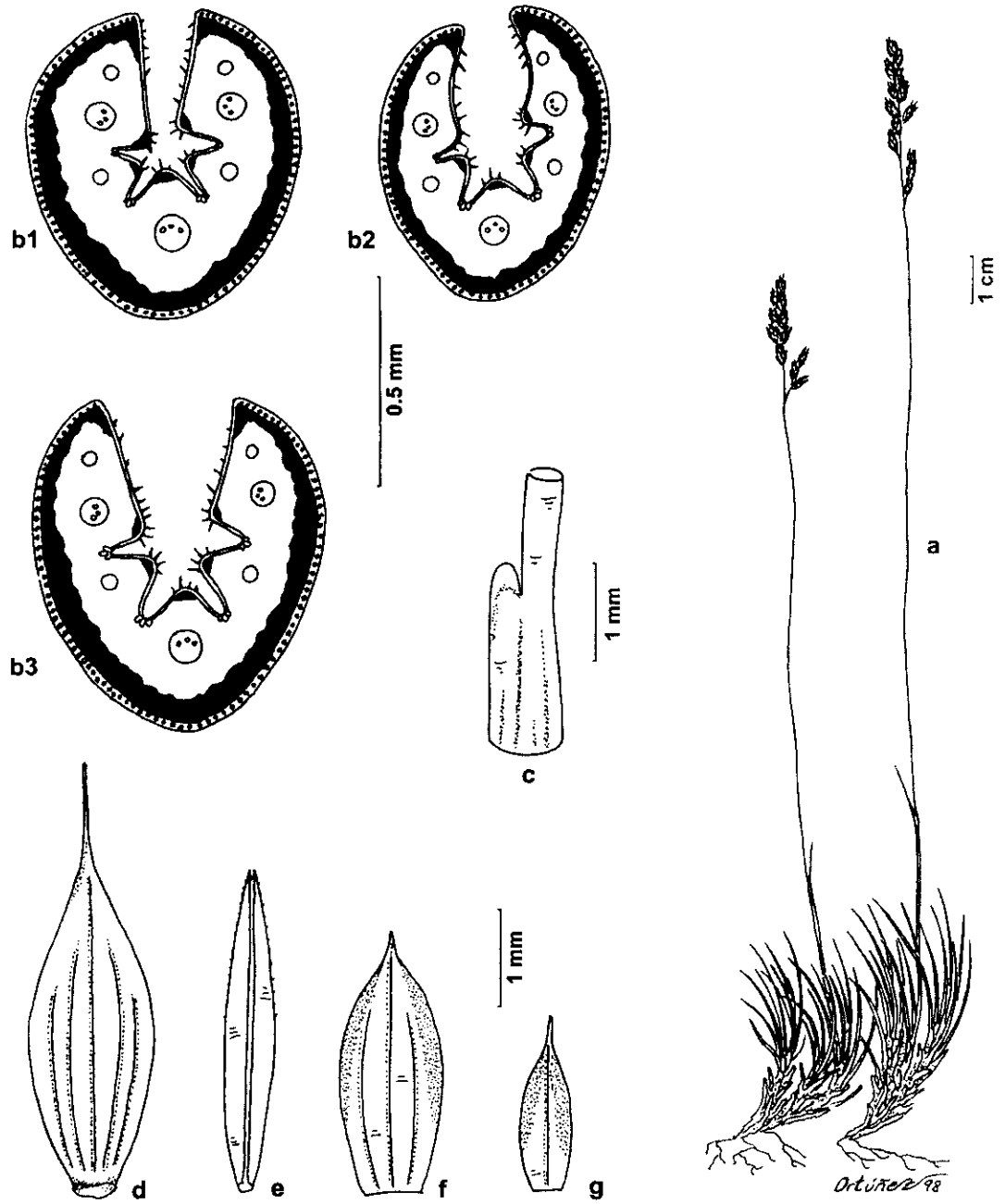

Figure 1.—*F. vettonica* (Avila, Cepeda la Mora, La Serrota, Canto de la Oración): a, habit; b, leaf-blade sections (b2: Avila, La Serrota, Alto de Serradillas, Riscos de Ulaca); c, sheath and ligule; d, lower glume; e, upper glume; f, palea; g, lemma.

RESULTS

Festuca vettonica Fuente, Ortúñez & Ferrero, ***sp. nov.***

Typus: «Spain, Avila, Cepeda la Mora, La Serrota, Canto de la Oración, 30TUK2883, 1950 m, 22-VI-1995, *V. de la Fuente & L. M. Ferrero*» (*Holotypus* MAF 157258).

Iconography: Figure 1.

Eponymy: *F. vettonica* is named for de Vetones, ancient people who lived in this area.

Gramen dense caespitosum, innovationibus intravaginalibus. Culmi (11,5)13-26 cm, erecti, glabri, gracilis. Foliorum vaginae 2/3-3/4 longitudine conjunctae, glabrae. Ligulae truncatae, ciliatae; auriculis 0,2-0,4(0,6) mm longae ex obtusae. Laminae (3,2) 4,5-7,5 cm longae, curvatae v. erecto-curvatae, pruinosae, plerumque glabrae; apice acute attenuato, pungenti; sectione transversa ovata v. ovata-orbiculare, (0,5) 0,65-0,8 mm diametrom, septemnervatae raro novennervatae, continuo sclerenchymate, 5 costis plerumque cum sclerenchymate. Panicula 2,4-3,9 (4,6) cm longa, densa, (9)11-20 (25) spiculis; ramos (1)2-4(5). Spiculae 4,8-5,7(6) mm longa, 3-4 floribus. Glumae inaequales, margine late scarioso; infera ovata-lanceolatum, (1,8)2,1-2,4 mm longa, uninervata; supera ovata, (2,5)2,8-3,5 mm longa, trinervata. Lemma ovata-lanceolatum, 3,5-4,5(5,5) mm longa, quinquenervatum, margines confertim scariosi et aculiati minime in 1/4 longitudine superiore; arista (0,6)0,8-1,2 mm longa. Palea oblonga, 3,4-4,5 mm longa. Ovarium glabrum. Chromosomatum numerus, 2n = 2x = 14.

Densely tufted grass, vegetative shoots intravaginal. Culms (11.5)13-26 cm, erect, glabrous, slender. Sheaths of the leaves fused for 2/3-3/4 of their length, glabrous. Ligules truncated, ciliate; obtuse auricles 0.2-0.4(0.6) mm. Blades (3.2) 4.5-7.5 cm long, curved to erect-curved, pruinose, usually glabrous; apex of the leaves acute, sharp. Leaf blade cross section in outline ovate to ovate-rounded, (0.5)0.65-0.8 in vertical diameter, with 7 veins (rarely with 9); sclerenchyma forming a complete ring; adaxial grooves 4; adaxial ridges 5 frecuently with sclerenchyma. Panicle 2.4-3.9(4.6) cm long, dense, with (9)11-20(25) spikelets and with (1)2-4(5) branches. Spikelets 4.8-5.7(6) mm long (to the tip of the fourth lemma, excl. awn), with 3-4 florets. Glumes unequal, widely scarious margins; lower glume (1.8)2.1-2.4 mm long, 1-veined, ovate-lanceolate; upper glume (2.5)2.8-3.5 mm long, 3-veined, ovate. Lemma 3.5-4.5(5.5) mm long (excl. awn), ovate-lanceolate, 5-veined, scarious margins and shortly aculeate in 1/4 upper of their length; awns (0.6)0.8-1.2 mm long. Palea 3.4-4.5 mm long, oblong, scabrid on the keels. Ovary glabrous. Chromosome number. 2n = 2x = 14 (Figure 2).

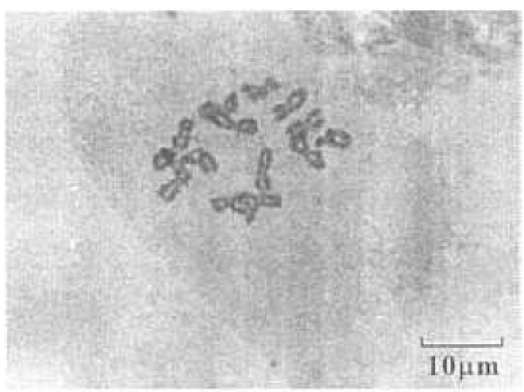

Figure 2.—*F. vettonica* 2n = 14 (Avila, Cepeda la Mora, La Serrota, Canto de la Oración).

Table 1
The principal characters distinguishing *F. vettonica*, *F. longiauriculata* Fuente, Ortúñez & Ferrero, *F. curvifolia* Lag. ex Lange and *F. aragonensis* (Willk.) Fuente & Ortúñez.

	F. vettonica	*F. longiauriculata*	*F. curvifolia*	*F. aragonensis*
Chromosome number (2n)	14	14	42	28
Auricles length (mm)	0.2-0.4(0.6)	0.4-0.9(1)	(0.15)0.2-0.25	0.15-0.2
Adaxial ridges	5	3-5 very prominent	1-3	1
Leaf blade cross section in outline	ovate to ovate-rounded	ovate-rounded	obovate	elliptical
Sheaths of the leaves fused for	2/3-3/4	2/3-3/4	1/2(3/4)	1/2
Spikelets length (mm)	4.8-5.7(6)	5-6.8(10)	(4.7)5-7.5(8.8)	(3.8)4-6.6(7)
Fertil florets	3-4	4-6	(3)4-6(7)	(3)4-5
Upper glume length (mm)	(2.5)2.8-3.5	2.9-3.9	(2.3)2.5-4(4.7)	(2.3)2.6-4.5
Lemma length (mm)	3.5-4.5(5.5)	3.9-5.1	(2.8)3.3-5(5.2)	(3)3.5-4.5(4.9)
Awns (mm)	(0.6)0.8-1.2	(0.9)1-1.5	0.9-2(2.5)	0.9-1.5(1.9)

Table 2
The principal characters of epidermal micromorphology distinguishing *F. vettonica, F. longiauriculata* Fuente, Ortúñez & Ferrero (Fuente & al. 1999), *F. curvifolia* Lag. ex Lange and *F. aragonensis* (Willk.) Fuente & Ortúñez.

	F. vettonica	*F. longiauriculata*	*F. curvifolia*	*F. aragonensis*
Leaf-blade adaxial surface:				
Stomata length (µm)	25-28	28-31(34)	35-42(45)	25-36(38)
Long-cells wide (µm)	20-23	12-18	(15)18-23(25)	(8)10-18(20)
Long-cells 'stomata' length (µm)	(20)25-70	33-50	(30)55-100(125)	(55)60-100
Long-cells 'non stomata' length (µm)	50-90	(31)40-81	(60)68-120(125)	(70)78-120
Epicuticular wax	filaments	reticular tissue	filaments	filaments
Leaf-blade abaxial surface:				
Long-cells length (µm)	30-90(100)	(45)56-81(100)	(44)65-120(160)	90-115(128)
Long-cells walls wide (µm)	9-13	9-13	(10)12-15(17)	16-18(20)
Lemma abaxial surface:				
Long-cells length (µm)	(15)20-40	(15)25-44	(38)55-68(89)	(45)50-75

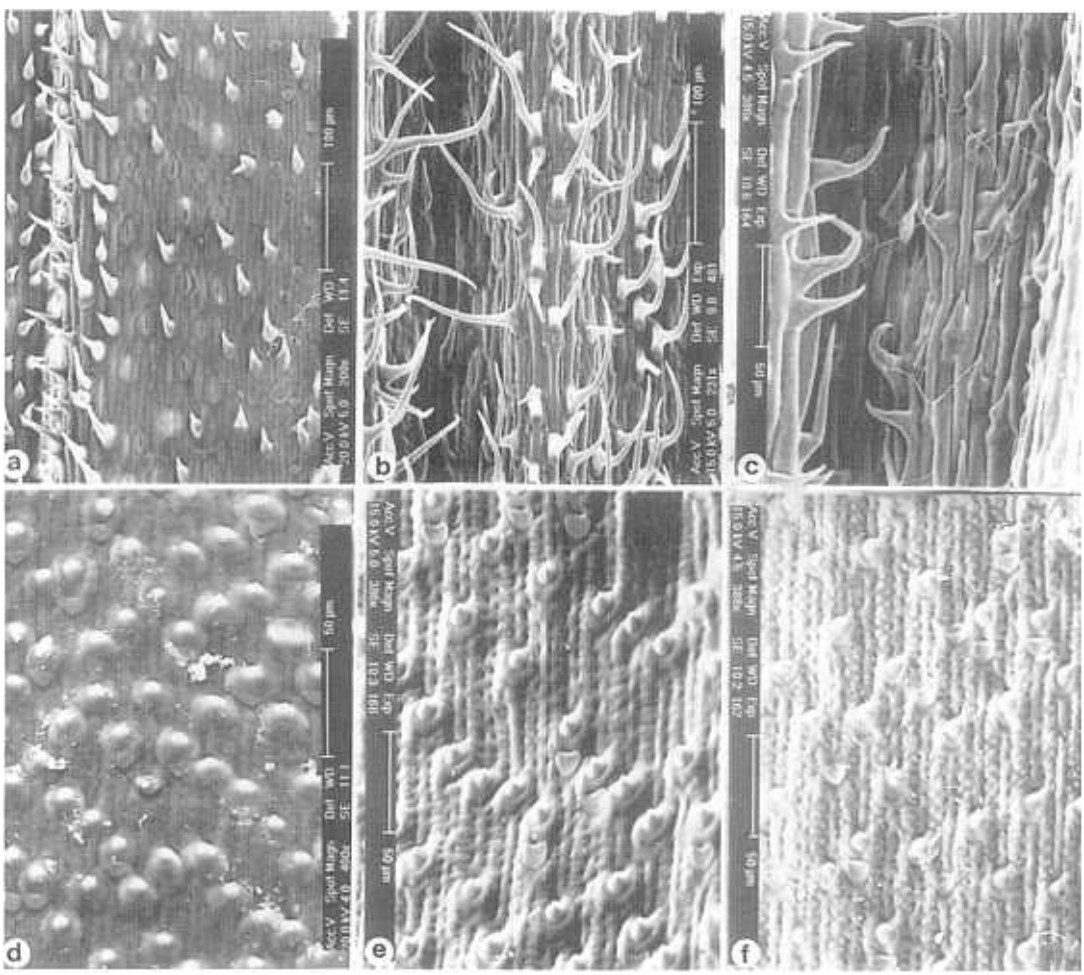

Figure 3.—*F. vettonica* (Avila, Cepeda la Mora, La Serrota, Canto de la Oración): a, leaf-blade adaxial surface; d, lemma abaxial surface. *F. curvifolia* (Madrid, Sierra de Guadarrama, Peñalara): b, leaf-blade adaxial surface; e, lemma abaxial surface. *F. aragonensis* (Soria, Moncayo): c, leaf-blade adaxial surface; f, lemma abaxial surface.

Leaf-blade abaxial surface: covering of dense epicuticular wax; stomata absent; long-cells rectangular, ca. 30-90(100) × 35-45 µm, convex surface and with markedly sinuous wall outlines, prominent, raised, 9-13 (m wide; silica bodies rounded.

Leaf-blade adaxial surface (Figure 3a): dense epicuticular wax forming filaments; stomata 25-28 (m, usually solitary or acompanying cork cell; long-cells rectangular, 20-23 µm wide, long-cells 'stomata' (20)25-70 µm long and 'non stomata' 50-90 (m long, with visible and markedly sinuous wall outlines, 5-8 µm wide; silica bodies rounded; prickles and scarce macrohairs principally to the margins and on the ridges.

Lemma abaxial surface (Figure 3d): epicuticular wax; stomata absent; long-cells rectangular (15)20-40 (m long, flat surface, with wide and markedly sinuous wall outline; hooks present in all surface, 7-12 (m in vertical diameter of the base; rounded or kidney-shaped silica bodies.

The principal characters distinguishing of epidermal micromorphology of *F. vettonica, F. longiauriculata, F. curvifolia* and *F. aragonensis* are given in the Table 2. The different epidermal surfaces of *F. longiauriculata* can see in FUENTE & al. (1999) and of *F. curvifolia* and *F. aragonensis* can see in the Figure 4.

Studied material: **Avila:** La Serrota, Alto de Serradillas, Riscos de Ulaca, 30TUK28, 2000 m, 31-VII-1985, *D. Sánchez-Mata* (herb. Fuente & Ortúñez). Cepeda la Mora, La Serrota, Canto de la Oración, 30TUK2883, 1950 m, 22-VI-1995, *V. de la Fuente & L. M. Ferrero, typus,* MAF 157258, (herb. Fuente & Ortúñez). La Serrota, Alto de Serradillas, 30TUK28, 2000 m, 24-VIII-1999, *V. de la Fuente* (herb. Fuente & Ortúñez).

Chorology: Endemic of Iberian Peninsula. *F. vettonica* is known from 'La Serrota' massif (Central Mountain System, Central Spain) (Figure 4).

Ecology: *F. vettonica* occurs in psicroxerophilous grazing land on acid soils, over 1900-2000 m.s.n.m. The lithology is particularly interesting in this massif because there are numerous outcrops of rocks with elevate content of heavy metals, where other endemic taxon has been described before (SÁNCHEZ-MATA, 1988).

DISCUSSION

F. vettonica appears to be close to another orophile species, *F. longiauriculata* Fuente, Ortúñez & Ferrero, diploid taxon described recently from south-eastern Spain (FUENTE & al., 1999) and clearly distinct by longer auricles, soft leaf blade with apex ligthly sharp or not sharp and with very prominent adaxial ridges 3-5. F. *curvifolia* Lag. ex Lange, an hexaploid spanish taxon distributed in 'Sierra de Guadarrama', 'Sierra de Ayllón' and north of 'Sistema Ibérico (ORTÚÑEZ & FUENTE, 1997) and *F. aragonensis* (Willk.) Fuente & Ortúñez, a tetraploid endemic from Moncayo Mountains (Spain) (FUENTE & al., 1997) are too close species to *F. vettonica*, although show distinct characters easily to differ. Further diagnostic differences between these four taxa are shown in the Table 1. The different leaf blade sections can see in the Figure 5.

The principal characters distinguishing of epidermal micromorphology of *F. vettonica, F. longiauriculata, F. curvifolia* and *F. aragonensis* are given in the Table 2. The different epidermal surfaces of *F. longiauriculata* can see in FUENTE & al. (1999) and of *F. curvifolia* and *F. aragonensis* can see in the Figure 3.

KEY

1. Ligules with auricles 0.2-0.9 (1) mm long. Leaf blade cross section in outline ovate to ovate-rounded, with 3-5 adaxial ridges. Sheaths of the leaves fused for 2/3-3/4 of their length. Lemma abaxial surface with long-cells (15)20-44 µm long 2
1. Ligules with auricles 0.15-0.25 mm long. Leaf blade cross section elliptical or obovate, with 1-3 adaxial ridges. Sheaths of the leaves fused for 1/2 (rarely 3/4). Lemma abaxial surface with long-cells (38)50-75(89) µm long 3

2. Leaf blade with 3-5 adaxial ridges very prominents (Figure 1a). Spikelets 5-6.8(10) mm, with 4-6 florets. Leaf-blade adaxial surface with stomata 28-31(34) µm long and long-cells 12-18 µm wide ..... **F. longiauriculata**
2. Leaf blade with 5 adaxial ridges not prominents (Figure 2b). Spikelets 4.8-5.7(6), with 3-4 florets. Leaf-blade adaxial surface with stomata 25-28 µm long and long-cells 20-23 µm wide ..... **F. vettonica**

3. Leaf blade cross section in vertical diameter usually lower than 0.65 mm, with 5-7 veins and 1 adaxial ridge (Figure 1c). Leaf-blade adaxial surface with stomata 25-36 (38) µm long and long-cells (8)10-18(20) µm wide ..... **F. aragonensis**
3 Leaf blade cross section 0.65-1 mm in vertical diameter, with 7 veins and 1-3 adaxial ridges (Figure 1b). Leaf-blade adaxial surface with stomata 35-42(45) µm long and long-cells (15)18-23(25) µm wide ..... **F. curvifolia**

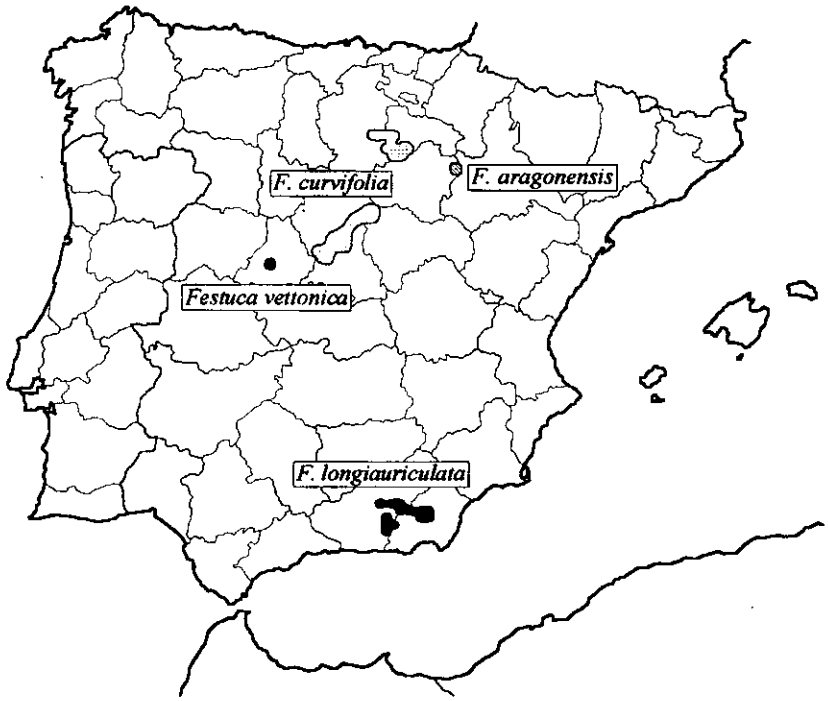

Figure 4.—Distribution areas of *F. vettonica*, *F. curvifolia*, *F. aragonensis* and *F longiauriculata*

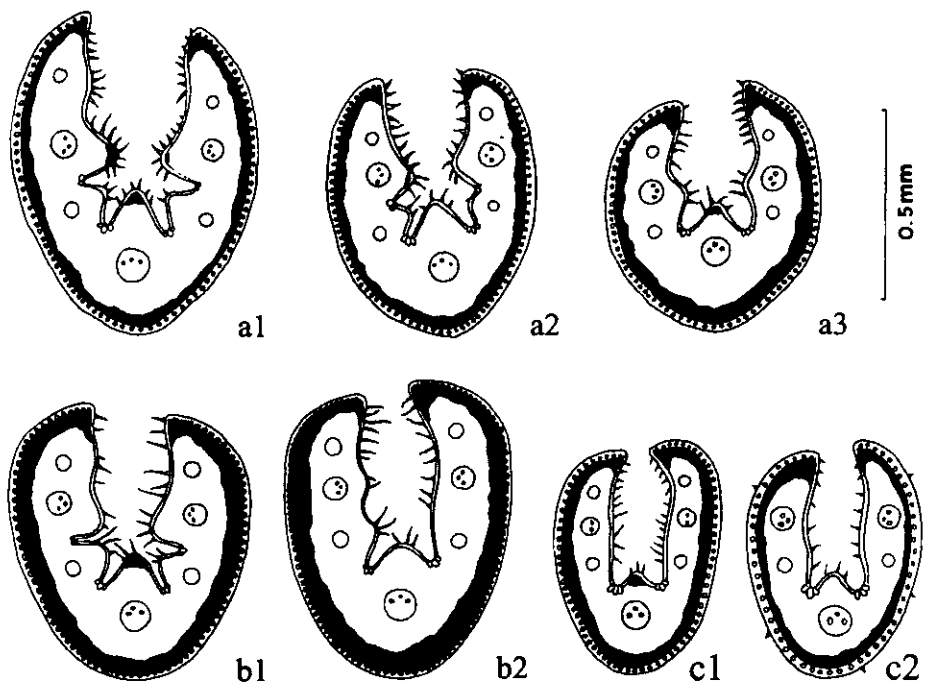

Figure 5.—Leaf-blade sections: a, *F. longiauriculata* (a1, Almeria, Fiñana, MAF 155112; a2, Granada, Sierra de Baza, La Benajara, GDAC 26304; a3, Almeria, Sierra de los Filabres, Calar Alto –cultivated specimens-); b, *F. curvifolia* (Madrid, Sierra de Guadarrama, Peñalara, herb. Fuente & Ortúñez) and c, *F. aragonensis* (Soria, Moncayo, herb. Fuente & Ortúñez).

REFERENCES

Auquier, P. —1974— Biosystématique, taxonomie et nomenclature du groupe de Festuca ovina L. s.l. (Poaceae) en Belgique et dans quelques régions voisines — D. Sc. thesis, University of Liège.

Ellis, R. P. —1976— A procedure for standardizing comparative leaf anatomy in the Poaceae. I. The leaf-blade as viewed in transversal section — Bothalia 12(1): 65-109.

Ellis, R. P. —1979—. A procedure for standardizing comparative leaf anatomy in the Poaceae. II. The epidermis as seen in surface view — Bothalia 12(4): 641-671.

Fuente, V. de la & Ortúñez, E. —1998–. Biosistemática de la sección Festuca del género Festuca L. (Poaceae) en la Península Ibérica — Colección de Estudios 59. Ed. Universidad Autónoma de Madrid.

Fuente, V. de la, Ortúñez, E. & Ferrero, L. M. —1997— Contribución al conocimiento del género Festuca L. (Poaceae) en el País Vasco y Sistema Ibérico septentrional (Península Ibérica) — Itinera Geobot. 10: 317-351.

Fuente, V. de la, Ortúñez, E. & Ferrero, L. M. —1999— New species of Festuca L. (Poaceae) in the Iberian Peninsula — Parlatorea 3.

Hackel, E. —1882— Monographia Festucarum Europearum — Kassel & Berlin.

Markgraf-Dannenberg, I. von. —1980— Festuca L. In: Tutin, T. G., Heywood, V. H., Burges, N. A., Moore, D. M., Valentine, D. H., Walters, S. M. & Webb, D. A. (eds.), Flora europaea 5: 125-153 — Cambridge.

Metcalfe, C. R —1960— Anatomy of the Monocotyledons 1. Gramineae — Oxford.

Ortúñez, E. & Fuente, V. de la —1997— On three species of Festuca L. (Poaceae) from the Central Mountain System, Spain — Willdenowia 27: 57-67.

Palmer, P. G. & Tucker, A. E. —1981— A scanning electron microscope survey of the epidermis of East African grasses. 1 — Smithsonian Contr. Bot. 49: 1-84.

Saint-Yves, A. —1913— Les Festuca de la section Eu-Festuca et leurs variations dans les Alpes Maritimes — Annuaire Conserv. Jard. Bot. Genève 17: 1-218.

Sánchez-Mata, D. —1988—. Misopates rivas-martinezii (Scrophulariaceae), nueva especie del Sistema Central (España) — Candollea 43: 261-272

Wilkinson, M. J. & Stace, C. —1991— A new taxonomic treatment of the Festuca ovina L. aggregate (Poaceae) in the British Isles — Bot. J. Linn. Soc. 106: 347-397.