

A STUDY IN THE GENUS VULPIA

by

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(Issued April 20th. 1937).

In recent times, agrostologists have gradually found that the old system of the family of the grasses can no longer be accepted as a natural one and many changements are proposed by various authors. Not being satisfied with the thirteen tribes, accepted by BENTHAM and HOOKER and by HACKEL, many authors preferred to give a new arrangement because it is unpractical to divide so large a family in but thirteen tribes; consequently they introduced a greater number of tribes or groups. Especially the tribe of the *Chlorideae* is a very unnatural one, as there are brought together a great many very different and certainly not allied genera. The tribe of the *Festuceae* is another example of such a *mixtum compositum* and the subdivisions accepted in this tribe are once more very unnatural. Especially the reduction of the uppermost florets in the spikelet is not such an important character, as it is running through the whole family of the grasses. In applying this character such genera as *Melica* and *Glyceria* are widely separated, although they are in my opinion closely allied. ASCHERSON and GRAEBNER indicated already in their well-known Synopsis that it is striking that the genus *Glyceria* agrees with *Melica* as to the closed sheaths and the form of the stigmas. I found the hyaline margins and the summit of the lemmas always much agreeing in both genera. I saw recently to my surprise that this old idea was strongly propagated by the russian botanist NEVSKY, who placed *Glyceria* and a few other genera in the separate tribe of the *Meliceae*. This author proposed a quite different arrangement of other groups of the *Festuceae* and his expositions are in my opinion an important move in the right direction. His tribe of the *Bromeae* with a new classification of the genera is at the moment more natural, as the old genus *Bromus* is

purified by elimination of aberrant genera, although the author proposes perhaps far too much genera. I will deal with this question in a separate paper on *Bromus* before long. Since very large genera as *Andropogon* and *Panicum* are gradually divided into more natural ones by excluding very different groups, it is quite rational to give also a new grouping of the plants belonging to the genus *Festuca* as it was accepted by HOOKER, BENTHAM and HACKEL. On studying the genus *Festuca* as treated by ASCHERSON and GRAEBNER in their Synopsis, we find that *Festuca* is a mixtum of very different genera; these genera are so different, that it is impossible to place all of them, even as sections of the large genus *Festuca* in a natural system.

It is therefore necessary to limit the genus *Festuca* and to accept for this genus the treatment as it is given in HACKEL's admirable monograph of the genus *Festuca*. We all agree that the section *Atropis* in ASCHERSON's Synopsis represents a very good and distinct genus, but at the same time we must go on and accept definitively such genera as *Nardurus* REICHB., *Catapodium* LINK, *Scleropoa* GRISEB., *Desmazeria* DUMORT., *Cutandia* WILLK., *Sphenopus* TRIN. and *Vulpia* GMELIN. Although I am convinced that these genera and some other ones, not mentioned here, are very natural, it is not yet possible to give a sharp definition of them, because it is very probable that some species now accepted as a member of one of those genera, may belong to one of the others, as there are some species which are at the moment not yet fully known in all their characters. In HACKEL's monograph, cited above, many of the genera enumerated by me, were excluded by him and in modern time, the late SAINT YVES who treated the genus *Festuca* so extensively, accepted *Festuca* quite in the same sense of HACKEL's monograph. The genus *Atropis* (*Puccinellia*) is now universally recognized as distinct and taken up already in HACKEL's treatment in ENGLER and PRANTL's Pflanzenreich, but the genus *Festuca* was accepted there with *Vulpia* and *Nardurus* as subgenera. The true genus *Festuca* comprises no annual plants; with some rare exceptions in *Vulpia*, all the other genera mentioned above contain but annual species.

A much advanced treatment of the *Festuceae* was already given by BATTANDIER and TRABUT in their „Flore de l'Algérie”, Monocotyledones (1895) p. 120—122. In that work the following genera are recognized: *Sphenopus*, *Vulpia*, *Ctenopsis*, *Desmazeria*, *Catapodium*, *Nardurus*, *Scleropoa*, *Cutandia* and *Vulpiella*. *Festuca* is accepted in the sense of HACKEL. *Catapodium* is a mixture of *Eucatapodium*, *Castellia* and *Agropyropsis*. The latter was recently published as a new genus by

MISS CAMUS and placed in the *Hordeae*. *Nardurus* contains the *Vulpia cynosuroides* PARL., which is better to retain in the genus *Vulpia* and *Cutandia* of BATTANDIER and TRABUT is a mixtum of the true *Cutandias* and the *Vulpia incrassata* SALZM., for which is proposed a new subgenus *Vulpiella*. The species is, however, better retained in the genus *Vulpia*. In their „Flore analytique et synoptique de l'Algérie et de la Tunisie”, the authors BATTANDIER and TRABUT gave in the year 1902 the same arrangement.

It is not my intention to give here the grouping of the different genera of the tribe of the *Festuceae*, subtribe *Festucineae* ASCHERS. et GRAEBN. (Synopsis II p. 437), as I wish to treat in this paper the genus *Vulpia* more extensively.

GMELIN established the genus *Vulpia* in the year 1805 and based it on the *Festuca Myurus* of LINNÉ as described in the first edition of the Species Plantarum in 1753. This species is well-known to all agrostologists of Central Europe and represented by the type in the herbarium of LINNÉ. All the botanists who have seen it, especially MUNRO and PARLATORE, agree as to the identity with the plant commonly so called. That LINNÉ himself, in the second edition of the Species Plantarum, gave some different characters, which were taken from another South European species, received from LOEFLING, a species with hairy lemmas, is no reason to give to the species, first described by LINNÉ, the name of *Festuca pseudo-myurus* as did SOYER-WILLEMET, who accepted the species with hairy lemmas as the true *Festuca Myurus*. This question is clearly explained by DUVAL-JOUVE and by ASCHERSON. Although DUVAL-JOUVE was a very accurate observer and very familiar with the *Vulpias*, studied so intensively by him, his conclusions are in some cases wrong, as the complete literature was probably not at his disposal or some publications were overlooked by him. His observations of the plants are, however, of great importance and his conclusions are, as I will show, easy to correct.

GMELIN's genus *Vulpia* was published in his Flora Badensis (1805). We find there on p. 1 under the CLASSIS MONANDRIA, DIGYNIA, *Gramineae* sub V. VULPIA: *Cal.* Gluma 5-flora. *Cor.* Gluma 2-valvis. On p. 8 of his work, the genus was described as a new one with the following description: „*Calyx* Gluma subquinqueflora, bivalvis, inaequalis: exterior minima lanceolata: interior major lineari-lanceolata, mucrone membranaceo terminata. *Corolla* Gluma bivalvis inaequalis, diaphana: *Valvula* exterior major, apice longe aristata. *Stamen* unicum. *Styli* duo. *Semen* tenue teretiusculum utrinque acutum, longitudinaliter sulco exaratum,

corolla tectum." This description of the genus is followed by a diagnosis, reading: „7 *VULPIA Myurus panicula spicata, subsecunda, flosculis longe aristatis, scabris,*” and the different references to LINNÉ, POLLICH, HALLER, HUDSON and SCHEUCHZER. *Icon. Leers fl. Herborn. t. 3 f. 5. p. 34.* GMELIN gives further an important observation: „a *Festuca* genere maxime recedunt *Festuca Myurus, F. pilosa* et *F. sciuroides* ob calycis et corollae structuram et Stamen semper unicum. Stamen semper unicum in *F. pilosa* et *Sciuroide* in Castilia copiose obvenientibus vidi; in *F. Myuro* et *Sciuroide* idem observavit Ill. Roth. *Fl. Germ. 2. p. 128—130.*”

Although GMELIN mentioned two other plants as belonging to this genus, he did not describe them. His *Festuca pilosa* which is the *Festuca ciliata* of DANTHOINE, is a nomen nudum, which is regrettable, since DANTHOINE's name is not valid and ASCHERSON's new name *Festuca Danthonii* disputable on account of the intricating synonymy. GMELIN correctly understood the *Festuca sciuroides*, described by ROTH in the year 1789, but he did not make the combination *Vulpia sciuroides* GMELIN in the year 1805 as is given in ASCHERSON's Synopsis. We find this new combination much later in GMELIN's Supplement to his *Flora Badensis* (1826) p. 66. In KUNTH's *Enumeratio Plantarum (Agrostographia Synoptica sive Enumeratio Graminearum)* Vol. I. (1833) p. 396—397, the references to GMELIN are wrongly given as to the page 215 of GMELIN's work and in NEES's *Agrostographia Capensis* (1841) p. 440 under *Vulpia*, the citation pag. 215 is copied from KUNTH's work without verifying GMELIN's work, where on p. 215 *Festuca bromoides* is treated and not *Vulpia bromoides* as KUNTH and NEES indicate. *Vulpia Myurus* is easy to recognize when found growing in the fields of Central Europe; the difficulties to distinguish this species arise when we study the whole area of its dispersion. We now come to another *Vulpia*, described by LINNÉ as *Festuca bromoides* in the first edition of his *Species Plantarum* (1753) p. 75 under number 7. In the literature after LINNÉ we find many different opinions as to what species was so named by him. We know that MUNRO, in a paper on the identification of the Grasses of Linnaeus's Herbarium, published in the *Journal of the proceedings of the Linnean Society of London* in the year 1862, Vol. VI. p. 45, said under number 7, that the specimen in the herbarium was in his opinion, the same as number 5, the latter being *Festuca Myurus*. PARLATORE had already given the same opinion that *Festuca bromoides* was simply a synonym to *Festuca Myurus* L.. The species in question was thus, according to those authors, described twice by LINNÉ. When

ASCHERSON and GRAEBNER in their well-known Synopsis treated the genus *Vulpia* as published by GMELIN, accepting this genus as a section of the genus *Festuca*, they named the plant *Festuca dertonensis* and based this name on the *Bromus dertonensis* ALLIONI (Flora Pedemontana II. (1785) p. 249) noting, that *Festuca bromoides* belonged partly to this species, although they indicated at the same time: „L. in Herb.” Now this *Festuca dertonensis* is much allied to *Festuca Myurus* L. but generally to distinguish at first sight by the habit, being a strictly erect plant with a stiff panicle, with erect, not drooping branches. Those botanists who could study both species in the field will agree with me that they cannot be confounded. Thus it is a fact that ASCHERSON and GRAEBNER accept the species *Festuca bromoides* of LINNÉ as a mixtum because they place it under the synonyms of *Festuca dertonensis* with the addition: „L. pro parte.”

We should like to know what are the reasons why they excluded the name of LINNÉ and therefore we go to the authentic description, which prevails, according to our rules of nomenclature. This description consists of a short diagnosis followed by some references to the pre-linnean literature. LINNÉ cited Royen lugdb. 68. Raj. Pluk. and Scheuchz., Anglia and Gallia are given as the habitat. The diagnosis: „panicula secunda, spiculis erectis: calycis altera valvula integra: altera acuminata”, perfectly applies to *Festuca dertonensis*, which is the same as *Festuca sciuroides* ROTH. It was this species of ROTH that was transferred to *Vulpia* as *Vulpia sciuroides* by GMELIN in his Supplement (1826), overlooking the earlier *Bromus dertonensis* of ALLIONI from the year 1785.

Now it is very curious, that GMELIN treated the *Festuca bromoides* of LINNÉ, on p. 215 of his Flora Badensis, as a true *Festuca*, indicating it as an annual plant, allied to *Vulpia Myurus* or *Festuca Myurus* L. and giving the differences rather extensively, noting however that *Festuca bromoides* has 3 anthers, which cannot be true because *Festuca bromoides* L. has always but one stamen. From GMELIN's exact locality there is no other annual *Festuca* known and it is in my opinion certain that *Festuca bromoides*, as described by GMELIN, is quite the same plant as ROTH's *Festuca sciuroides* or ALLIONI's *Bromus dertonensis*. Important is GMELIN's observation under *Festuca bromoides*: „Ill. L i n n a e u s l. c. optime post F. m y u r o s posuit, nostrates bene multi minus recte ante F. o v i n a m, cum qua certe nullam habet similitudinem.” Of course the *Festuca ovina* L., which is moreover a perennial species, widely differs in its very different leaves and in the characters of the spikelets. The observation proves once more that GMELIN had the annual *Festuca*

dertonensis before him, notwithstanding his wrong indication of the 3 stamens.

In GMELIN'S Supplement to his Flora Badensis (1826) he gives on p. 65 additional notes to his *Festuca bromoides*, indicating a variety β . „Culmis longioribus tenerioribus, flosculis saepissime monandris. Haec varietas mere differt a Festuca bromoide nostra seu Linnaeana: Culmis longioribus gracilioribus. Flosculis saepissime monamdris, nec triandris.” GMELIN thus found, that his *Festuca bromoides*, not treated by him as a member of his genus *Vulpia*, could have but one stamen, but in saying „saepissime”, he is still convinced that the species occurs with 3 stamens too. This follows from a further note by him, reading: „Individua numerosa, circa Karlsruhe examinata, persaepe flosculis triandris, praedita sunt. Individuum a Cl. Vahllo in Fl. Danica et a Cl. Sowerby in Engl. Botany flosculis triandris depictum est.” If indeed there are among his numerous specimens from Karlsruhe, plants with three stamens, it is certain that these belonged to a true *Festuca* and not to *Festuca bromoides*. That the cited plates, show flowers which are triandrous, is not so strange; artists who prepared such drawings have often taken all sorts of liberties. At the end of the treatment of *Festuca bromoides*, GMELIN mentions his spanish plant, „*Vulpia sciuroides* mea, in Castilia lecta, semper monandra, longe differt a Festuca bromoide var. seu F. sciuroide Wibellii, Rothii et Willdenovii”.

It may be that GMELIN had the true *Vulpia bromoides (sciuroides)* from Spain. This species is not so very common there, I saw it from Castilia nova, in pratis ad Guadarrama, collected by LANGE. This locality is mentioned by WILLKOMM and LANGE in their Prodrromus Florae Hispanicae, Vol. I (1870) p. 91. Many other localities under *Vulpia sciuroides* are doubtfully cited and the different species *Vulpia Broteri* BOISS. et REUT. is taken up there as a variety *longearistata* Wk.. It is also possible that GMELIN had from Spain the glabrous state of *Festuca ciliata* DANTHOINE, a species much more common there. This glabrous variety of *Festuca ciliata* DANTH. is not so easy to recognize from small forms of *Festuca bromoides* and its relation to *Festuca ciliata* was at the time of GMELIN not yet recognized. I have given here a rather long explanation to demonstrate how intricate the different ideas of a rather common plant were, during a long time, after being described by LINNÉ. Wrong observations by some authors were often accepted and have found their way through the literature up to the present.

DUVAL-JOUVE, who studied the *Vulpias* very extensively, wrote a

very interesting paper: Sur les *Vulpia* de France, published in *Revue des sciences naturelles*, in the year 1880. In this paper the name *Vulpia sciuroides* (ROTH) GMELIN is accepted although DUVAL-JOUVE was acquainted with the fact that the species was earlier described as *Bromus dertonensis* ALLIONI (Duv.-Jouve, loc. cit. p. 48). This author says further on p. 31: „quand LINNÉ, dans la première édition du *Species*, établit son *F. bromoides*, il lui attribua aussi deux glumes (calycis válvula integra, altera *acuminata*, p. 75), ce qui convenait très-bien au *V. sciuroides* des modernes. Mais au même lieu, il réfèrait sa plante au *Gramen paniculatum bromoides, minus, paniculis aristatis unam partem spectantibus* de Raius et de Scheuchzer, pag. 297, tab. VI, fig. 14, qui est sans conteste le *V. uniglumis* des modernes et s'éloigne du *F. sciuroides* Roth, en ce qu'il a une de ses glumes *rudimentaire*, — minima vixque observabili —, et l'autre longuement subulée, — altera apice suo in aristam desinente —, Scheuchz., pag. 297." DUVAL-JOUVE now exclaims that there is a contradiction between the diagnosis of LINNÉ and the reference.

Although LINNÉ himself changed in the second edition of the *Species Plantarum* the word „*acuminata*” into „*aristata*”, the first description given by him is the valid one and agrees with the *Festuca dertonensis*. Even HACKEL and BRIQUET in their *Revision des Graminées de l'herbier d'Albr. de Haller filius*, published in the year 1906 in *Annuaire du Conservatoire et du Jardin botaniques de Genève*, say under *Festuca dertonensis* (loc. cit. p. 83): „Il vaut mieux, à la suite d'Ascherson et Graebner, abandonner le nom linnéen *Festuca bromoides* (1753) qui paraît s'appliquer à des plantes différentes et restera toujours inextricable.”

Unless we proceed in the study of this question, we cannot come to a decision. Because LINNÉ mentioned under the references at first VAN ROYEN's *Flora Leidensis*, we have to look what ADRIAAN VAN ROYEN has said there on pag. 68 of his *Festuca* no. 5. I think that few botanists and certainly not DUVAL-JOUVE, have verified this citation of LINNÉ. For it is extremely astonishing to see, in VAN ROYEN's *Flora* on pag. 68, that LINNÉ copied the description, given by VAN ROYEN in the year 1740, verbatim, using exactly the same diagnosis of VAN ROYEN and copying the phrase name too, citing quite as VAN ROYEN did: *Raj. hist.* 1287. *Syn.* 415. *Pluk. alm.* 174. t. 33. f. 10. *Scheuchz. hist.* 297. Fortunately ROYEN's herbarium contains the sheet, upon which are written by himself in his fine handwriting, exactly the same data as published by him in the year 1740. The annual plants on the sheet are rather small specimens but they belong undoubtedly to the *Festuca sciuroides* of ROTH.

I have seen an authentic specimen of ROTH's species, given by ROTH to PERSOON, in the herbarium of the latter. On VAN ROYEN's authentic sheet we find after the diagnosis Roy. prodr. 68, inter parenthesis the word „*bromoides*” in another handwriting and written with a different kind of ink. This was done afterwards by his son DAVID VAN ROYEN.

It was a mistake of VAN ROYEN to place a wrong reference under his *Festuca* no. 5 and LINNÉ copied it without control, as is the case with so many references in LINNÉ's works. He quoted also often wrong plates and wrong citations of old authors and I will give here an example, which was interesting in the course of my investigations for a monograph of the genus *Digitaria*.

LINNÉ cites often phrase names of the work of SLOANE, as he did under *Panicum sanguinale* (spec. plant. p. 57). Now one of the specimens of SLOANE is the well-known *Leptochloa virgata*, so totally different from the crab-grass, as is the name of *Panicum sanguinale*, used by GRONOVIVS. The plate t. 70. f. 2 in SLOANE's work represents this *Leptochloa virgata* too. Now this wrong citation is given once more by LINNÉ in the second edition of the Species Plantarum in the year 1762, but in the same work it is also given under *Cynosurus virgatus* (p. 106), which is *Leptochloa virgata* (L.) P. B. This is correct but LINNÉ probably forgot to remove the wrong synonym under *Panicum sanguinale*. There is no reason to reject the well-known name *Panicum sanguinale*, because this name is based upon LINNÉ's own description and his specimen. In such cases we consider the wrong citations as misinterpretations of the old literature, which are of no influence to the nomenclature of the species.

VAN ROYEN, applying the phrase name „*Gramen paniculatum bromoides, minus*”, was certainly struck by the very small specimens he had at hand, the eight plants are indeed scarcely 10 cm high and the panicles have but 2—4 spikelets. In ROYEN's herbarium there is a second sheet with a small label only, reading in VAN ROYEN's hand „5 Festucae variet.” and once more in a darker ink in his son's hand the word „*bromoides*”. The three specimens are about 25 cm long, the exerted panicles are 5 cm long and all the plants belong to the same species, the *Festuca dertonensis*. They represent the better developed plants.

Now that we know the reasons why there is no accordance between the description of LINNÉ and the references, there are in my opinion no objections to accept for our *Festuca dertonensis* (*sciuroides*) the first epithet *bromoides*, because *Festuca bromoides* L. is cleared up and identified. Belonging to the genus *Vulpia* as accepted in modern time, the species has to bear the name of *Vulpia bromoides* (L.) GRAY in „Natural

Arrangement of British Plants" (1821) p. 124. The same combination was published by DUMORTIER two years later in an often neglected little book „Observations sur les Graminées de la Flore Belgique" by B. C. Dumortier, Tournay (1823) p. 101. DUMORTIER maintains also *Vulpia sciuroides* as a variety, indicating it as *v. sciuroides* DUM. with the characters: Paniculâ basi ramosâ, locustis numerosis. He cites *Festuca sciuroides* ROTH, caracteres precedentis, habitus sequentis (that is *V. Myurus* GMEL.), pedunculi adpressi. Field study proves that such more robust forms with branched panicles and more numerous spikelets occur together with depauperate lower plants with few spikelets in each panicle, so that the variety is not to maintain. I have cultivated *Festuca dertonensis* often in my garden and noted that it is easy to find in the cultures small specimens with reduced panicles and luxuriant ones with longer panicles and numerous spikelets. LANGE's variety *gracilis* of *Vulpia sciuroides*, mentioned by ASCHERSON and GRAEBNER is such a depauperate form and of no value. The var. *Broteri* is the *Vulpia Broteri* BOISS. et REUTER, which is treated by HACKEL in his Catalogue raisonné des graminées du Portugal (1880), as a distinct species.

It is important to note that the name *Festuca bromoides* L. was used for our species by various American agrostologists. PIPER accepted it in his „North American Species of Festuca" (Contrib. U. S. National Herbarium, Vol. X [1906]) under his subgenus *Vulpia* (GMEL.) HACK. on p. 18 and HITCHCOCK used the name in his different works on grasses. Recently, however, in his „Manual of the Grasses of the United States", published in the year 1935, he took up the name *Festuca dertonensis* (ALL.) A. et G., saying that the species has been referred to *Festuca bromoides* L. by American authors (l. c. p. 63). In his list of the synonyms on p. 857 no. 4, he gives the observation that this is the species referred to *Festuca bromoides* L., but that seems to be a mixture; the name being referred to *Festuca Myurus* by European authors. This is not correct. *Festuca bromoides* L. is not a mixture, although European authors, such as ASCHERSON and GRAEBNER refer *Festuca bromoides* partly to *F. dertonensis* and partly to *F. uniglumis*. It is quite impossible to place the name *Festuca bromoides* as a synonym under the very different species, commonly called *Festuca uniglumis* SOLANDER in AITON Hort. Kew. ed. I. 1. (1789) p. 108. The authors of the Synopsis give LINNÉ's name under SOLANDER's species as „pro parte", but „not Herb. Linné". For *Festuca uniglumis* SOL. there is an earlier name, the *Festuca fasciculata* FORSK. Fl. Aeg. (1775) p. 22, a name already used by HACKEL and BRIQUET in their revision of the grasses from the Haller Herbarium

(l. c. p. 81), a name, being, according to those authors „le plus ancien nom, qui doit être rétabli”. The same authors express their doubt as to the name of *Stipa membranacea* L., described in the year 1753 in the *Species Plantarum* p. 560. They affirm that the specimen in the herbarium of LINNÉ belongs to *Festuca fasciculata* and that the type locality is correctly indicated by LINNÉ. If we control the description of *Stipa membranacea* L., we find that it is applicable to *Festuca fasciculata* with exception of the words „panicula laxa”.

We have here once more one of those curious questions; how is it possible that LINNÉ, the founder of the genus *Stipa*, could place in that genus so different a plant of the *Festuceae*. Before we explain this, we must first say something about DUVAL-JOUVE's ideas.

DUVAL-JOUVE, very interested in the family of the grasses, wrote in the year 1866 an article „L'Herbier de Linné et les graminées françaises d'après les travaux de Parlatores, Hartman et Munro”. This paper was published in the „Bulletin de la Société botanique de France”. DUVAL-JOUVE adopted *Stipa membranacea* L., saying that LINK was correct when he conserved this name as *Vulpia membranacea* (L.) LINK. He observed however that PARLATORE pointed out that *Festuca uniglumis* SOL. has a nearly wanting lower glume, whereas *Stipa membranacea* has a more developed one. PARLATORE therefore renamed *Stipa membranacea* and called it *Vulpia Linneana*. In PARLATORE's later works this *Vulpia Linneana* disappears. Indeed the differences are of minor importance. DUVAL-JOUVE had already stated such very small differences and concluded that there are in this case not two different species and that *Stipa membranacea* is identical with our *Vulpia uniglumis*, but 14 years later in his already mentioned work on the *Vulpias* of France, he changed his mind and accepted the name *Vulpia uniglumis* (l. c. p. 32). We find there a very critical study of the various data and all the doubts that are put forward by him. Giving LINNÉ's description in extenso, he says that it is impossible for him to believe that LINNÉ, who described the genus *Stipa* which is strictly one-flowered, could have placed into it a grass, where each spikelet contains 4—6 flowers, each flower without an articulation between the lemma and the awn and with pedicels of the spikelets not being margined nor membranaceous. DUVAL-JOUVE finishes his treatment of this species saying that one may find in the herbarium of Linné on the sheet of *Stipa membranacea* the *Vulpia uniglumis*, as indicated by SMITH, PARLATORE and MUNRO, there is no doubt, but this is in his opinion a transfer, or LINNÉ had been: „le jouet d'une illusion incompréhensible”.

Stipa membranacea is a valid name, although given without generic description. This is against our modern rules of nomenclature, compare the case of *Eragrostis minor* Host, published without description of the genus, the latter being described afterwards in the year 1812 by Beauvois. The name *Eragrostis minor* is therefore rejected and this well-known species has to bear the name *Eragrostis poaeoides* Beauv.. To avoid many difficulties we have, however, accepted in the rules of nomenclature that in the case of the species of Linné, the names are valid even without generic descriptions. *Stipa*, *Apluda*, *Aristida*, *Andropogon* and so many other genera proposed for the first time in the year 1753 are thus valid, although they are described as genera in the *Genera Plantarum* ed. V in the year 1754.

Stipa membranacea L., being a *Vulpia*, has therefore to bear the name given by Link. If we study *Vulpia uniglumis* exactly we can better understand some of Linné's puzzling characters. The pedicels, given as dilatated and membranaceous, are in our species very acute and narrowed towards the base, they are enlarged upwards and broadest at the summit, they look like the long callus of the genus *Stipa*; being more or less compressed, Linné could describe them as ancipitate and somewhat obtuse. In transmitted light the pedicels are thicker and darker at the middle, thinner and somewhat transparent at the sides. With spikelets before us we can understand these characters although they are not extraordinarily striking; it may be that Linné also observed the branches of the panicle and the axis, which are more distinctly compressed and evidently membranaceous. Since the first glume is often but a rudiment, it may be that Linné overlooked it, taking the second glume for the first one and the first lemma for the second glume. *Vulpia uniglumis* has often but two developed flowers and it is thus evident that in such a case Linné saw but one flower. This agrees with our own observations, if we study a detached spikelet superficially and if we neglect the few short sterile lemmas which moreover easily fall off. If we look at the fertile flowers of the spikelet, we find that among all the *Vulpias* they agree the best with the lemma of a *Stipa*, having a very long awn, as long as the body of the lemma. Now Linné says in his description: „calycis arista longitudinae aristae corollinae”, which agrees with the characters of *Vulpia uniglumis*. I observed that the second glume has a total length of 3 cm, the body being as long as the awn, which is about 1,5 cm long; the first lemma was 38—40 mm long and the body of the lemma about 2 cm long. These data are quite in accordance with those given by Linné and cited by me above. Other characters given by

LINNÉ are of minor importance, but they correspond also to *Vulpia uniglumis*. The grass is scarcely a feet high, often less so, the panicle is simple and scarcely divided, quite as in *Vulpia uniglumis*, often not very long and „debilis”, and sometimes more or less interrupted (interpreted by LINNÉ as „laxa”). The locality given by LINNÉ is correct as the species is known from Spain. „Habitū Avenae”, says LINNÉ, which applies to a more than one-flowered plant with long awns.

If we take all these data into consideration, there is in my opinion no objection to accept the specimen in the herbarium of LINNÉ as representing *Stipa membranacea* and although the name is not well-chosen and the plant placed in a wrong genus, it is not allowed to neglect the name and therefore we have to use the name *Vulpia membranacea* (L.) LINK for the plant commonly named as *Festuca uniglumis* SOLAND. or *Vulpia uniglumis* DUMORT..

There is in LINNÉ's Species Plantarum another *Vulpia*, which was described by him as *Festuca incrassata* L., a name not mentioned in the Index Kewensis. Because this name was published in the first authentic edition, on p. 75 no. 6, it is valid and ought to be accepted by every botanist. Now it is known that in different specimens of the Species Plantarum page 75 is taken away and replaced by another one, where we find under no. 6: *Festuca maritima* L. with a quite different diagnosis and with different references. See for this question WILHELM JUNK's interesting article „Linné's Species Plantarum editio princeps und ihre Varianten mit Beschreibung einer neuen. Mit 12 Facsimile-Tafeln. Berlin 1907.” Very worth reading is his page 12, where the various data are mentioned. The new *Festuca maritima*, received by LINNÉ from LOEFLING, was once more published in the second edition of the Species Plantarum. We do not know why LINNÉ ordered, during the printing of his work, to replace page 75 by another one. He probably tried to withdraw his *Festuca incrassata*, because it was based by him partly upon a reference to BARRELLIER and SCHEUCHZER, which had become suspect to him.

Going over the diagnosis of *Festuca incrassata*, over the references, the locality and the rather long note, it is interesting to see that *Festuca incrassata* is certainly a *Festuca* from the subgenus *Vulpia* HACK.; being the first name and validly published, it must be applied to a species of *Vulpia*. There is however another *Vulpia* described as *Festuca incrassata* SALZMAN, which was published without any other reference by LOISELEUR in the second edition of his Flora Gallica in the year 1828 (p. 85). The name given by SALZMAN is therefore a homonym. If we

treat this *Vulpia* as a *Festuca*, the nomenclature is easy enough for we have then to look only for a new name to give to the species of SALZMAN, whatever the *Festuca incrassata* further may be. *Festuca incrassata* L., being a *Vulpia*, as I shall explain afterwards, cannot be named *Vulpia incrassata* as there is already a *Vulpia incrassata* PARLATORE (1841), which is based upon *Bromus incrassatus* LAMARCK, Enc. I. (1783) p. 469. In the genus *Vulpia* the combination *Vulpia incrassata* (LAMCK.) PARL. is thus valid and to be used for the same species as described in LOISELEUR's Flora. By a curious coincidence both names given by SALZMAN and by LAMARCK belong to the same species although described under two different genera *Bromus* and *Festuca* but with the same specific name. In LOISELEUR's Flora there is no reference to the *Bromus incrassatus* LAMCK.. PARLATORE's combination is to be accepted unless there is an earlier name, given before 1783.

Let us first treat LINNÉ's *Festuca incrassata*. His diagnosis: „panicula subnutante secunda, pedunculis incrassatis, aristis calycinis longitudine flosculorum”, points to the species which is generally named *Vulpia ligustica* LINK, which is based upon *Bromus ligusticus* ALLIONT (1785). This species has a secund, lax panicle with nodding branches and the pedicels of the spikelets are compressed, enlarged upwards and obovate, moreover the upper glume is as long as the spikelet, the awn as long as its lemma. In a note LINNÉ says: „singulare quod pedunculi membranacei floribus fere crassiores. Calycinae aristae non breviores aristis flosculorum”. He finds it thus very striking that the pedicels of the spikelets (named pedunculi by him) are nearly thicker than the spikelet and membranaceous, which is however exactly the case in *Vulpia ligustica*. The habitat, given as Spain, is not correct, as *Vulpia ligustica* LINK, although common in Southern Europe, is not known from Spain.

Finally there is LINNÉ's reference: „Gramen festuceum myurum elatius, spica heteromalla, gracili. Barr. ic. t. 99. f. 2. Scheuch. gram. 293?”. SCHEUCHZER's plant does not belong to *Vulpia ligustica*. The latter is SCHEUCHZER's Gramen bromoides festucea tenuique panicula minus p. 296 and was placed by LINNÉ himself in the second edition of the Species Plantarum wrongly under *Bromus distachyos* (p. 1677) which was published already in Amoen. Acad. IV. (1759) p. 304. This plant is our well-known *Brachypodium distachyon* (L.) ROEM. ET SCH. (1817). SCHEUCHZER's plant under *Festuca incrassata* L. is the well-known *Vulpia Myurus* GMEL..

THELLUNG placed the *Festuca incrassata* L. under *Festuca ligustica* in his Flore adventice de Montpellier. (1912) p. 129 with a query, citing:

„L. Spec. pl., 1753, ed. pristina, p. 75, excl. syn. Barr. — non alior.” He had no difficulties with *Vulpia incrassata* PARL., because he placed that plant in another genus on p. 121 of his flora. We find there both *Bromus incrassatus* and *Vulpia incrassata* as *Cutandia incrassata* (LAM.) JACKSON Ind. Kew. (1893) p. 675. This was probably done because BENTHAM, taking up the genus *Cutandia*, described by WILLKOMM in the year 1860, indicated that *Festuca incrassata* SALZMAN belonged to *Cutandia* although BENTHAM did not make new combinations in the genus *Cutandia*. See BENTHAM, Notes on Gramineae, in Journ. Linn. Soc. Botany, Vol. XIX (1881) p. 118 (under *Cutanda*) and further BENTHAM et HOOKER, Genera Plantarum, Vol. III. (1883) p. 1188 (under the correct name *Cutandia*).

Festuca incrassata SALZM. is treated by ASCHERSON and GRAEBNER in their Synopsis as a member of the section *Vulpia*. HACKEL discussed the genus *Cutandia* in the „Moniteur du Jardin Botanique de Tiflis”, livr. XXIV (1912). He limited this genus to those species where the axis of the panicle is articulated, such as *Cutandia memphitica* (SPRENG.) RICHTER, *Cutandia dichotoma* (FORSK.) BATT. ET TRAB. and *Cutandia divaricata* (DESF.) RICHTER. He says: „Cutandia incrassata returns to Festuca, the other ones, placed by Bentham in Cutandia go to Scleropoa.” The type of WILLKOMM’s genus *Cutandia* is *C. scleropoides* WILLK., which is the same as *Cutandia memphitica* (SPRENG.) RICHTER. Only those species which group themselves round this *C. memphitica* are to accept as members of this genus. I have to remark only that the valid combinations in *Cutandia* are those of RICHTER in the year 1890.

Since so many references of LINNÉ proved to be wrong, as is already explained by me above, the one under his *Festuca incrassata* must be accepted as a misinterpretation and our conclusion is therefore that the diagnosis of LINNÉ and his description belong very probably to *Vulpia ligustica*. But even if there are objections to place LINNÉ’s species there, we are happy to find that this is not important because a combination with LINNÉ’s species as basis cannot be accepted on account of the existing *Vulpia incrassata* (LAMK.) PARL.. If perhaps the latter has to bear an earlier name, we never can take it up for LINNÉ’s species. Therefore the well-known name *Vulpia ligustica* (ALL.) LINK is safe.

This we cannot say as to the name *Vulpia incrassata* (LAMK.) PARL., for which the date of priority is the year 1783. It is not possible that this species was described between 1753 and 1783? To find it out we must know if there are more species, belonging to *Vulpia*, described by LINNÉ. Indeed there are still two species, one of them is *Bromus genicu-*

latus L. described in Mantissa, I. (1767) p. 33., the other is *Bromus stipoides* L., described in Mantissa, II. (1771) p. 557. Both species are placed by ASCHERSON and GRAEBNER under *Festuca geniculata* WILLD., which is the plant generally called *Vulpia geniculata* (L.) LINK.

In this case we could presume that LINNÉ described under *Bromus* the same species twice, which, however, appears to be not true on studying the descriptions. Let us first take LINNÉ's *Bromus geniculatus*. This species is accepted by all authors who treated it, as the *Vulpia geniculata* of LINK and the specimen in LINNÉ's herbarium is the plant going under LINK's name. Fortunately, LINNÉ did not give references but a rather long description of his own. All the characters given by him agree with the type in his herbarium and with the well-known plant, so common in the mediterranean region. This question is quite settled as *Bromus geniculatus* has priority above *Bromus stipoides*. DUVAL-JOUVE accepted both species of *Bromus* of LINNÉ as being the same, an incorrect opinion, copied by ASCHERSON. He treated the species under *Loretia geniculata* in his *Vulpias* of France (l. c. p. 36) saying that the name *geniculatus* is wrong because the species is far from being always geniculate; he says further: „C'est là ce qui fit que, en 1771, le même auteur, recevant la même plante, — culmis plurimis erectis, — la crut différente et la publia sous le nom de *Bromus stipoides*, Mant. alt., pag. 557, lui donnant ce nom parce qu'il lui trouvait certains rapports avec son *Stipa membranacea*, „Diversus a *Stipa membranacea* et genere et habitu, pedunculis licet conveniat” (l. c. p. 558)”. Here the famous French agrostologist was wrong. It is not very probable that LINNÉ afterwards in the second edition of his Mantissa, described the species he had in his herbarium already as *Bromus geniculatus*, once more as *Bromus stipoides*. This *Bromus stipoides* is a *Vulpia* too and indicated as growing in Majorea. From the description which is very different from that of *Bromus geniculatus*, we learn various things for the identification, especially that the leaves are shorter than the culms, the oblong panicle is brownish (which is never the case in *Bromus geniculatus*), the spikelets are placed in clusters of three, the middle one being unispiculate, the lateral ones 2—3-spiculate. LINNÉ says intermedio 1-floro, lateralibus 2—3-floris. He certainly means „spikelets” when saying „flores”, because after the character of the compressed, obtuse, upwards broadest pedicels, the „flores” are given as 4-flowered. The calyx is subulate and glabrous and the „corolla petalo exteriore arista recta, longit. floris”, which means that the lemma bears an erect awn as long as its body. The linear anthers are yellow, from which we conclude that the flowers are chasmogamic,

in the cleistogamic *Vulpias* the anthers are not linear. Chasmogamic are among the *Vulpias* only *Vulpia Alopecurus* (SCHOUSB.) LINK (which does not come into consideration), further *Vulpia ligustica* (ALL.) LINK (with a very different panicle), *Vulpia sicula* (PRESL) LINK (a quite different perennial species), *Vulpia geniculata* (L.) LINK (described by LINNÉ himself), *Vulpia incrassata* (LAMK.) PARL. and *Vulpia tenuis* (TINEO) PARLATORE. Only the last two species come into consideration to be compared with LINNÉ's *Bromus stipoides*. Both species are, moreover, known from the Baleares, the type locality of *Bromus stipoides*. It is especially the *Vulpia incrassata* PARL. which has the construction of the panicle branches in groups of three as indicated so exactly by LINNÉ. We find further under *Bromus stipoides* more important characters. Differing from *Stipa membranacea* (qui similis in Systema XIII), „et genere et habitu”, indeed the habit is very different, „pedunculis licet conveniat”, *Stipa membranacea* is thus indeed a *Vulpia*, as already pointed out by me above, „cum stipae aristae semine 4-plo longiores, huic vix seminis longitudine”. This agrees too, as *Vulpia membranacea* (*uniglumis*) has often a very long awn, whereas in *Vulpia incrassata* PARL. the awn is scarcely as long as the body of the lemma and mostly much shorter. From all these characters I am convinced that the *Bromus stipoides* L. is a true *Vulpia* which has to bear the name of *Vulpia stipoides* (L.) DUMORTIER, a combination given in the year 1823. Having worked out these different data, I saw to my satisfaction that the name *Festuca stipoides* was accepted for the same species as I did, by RICHTER in his *Florae Europae* as *Festuca stipoides* (L.) DESFONTAINES.

DESFONTAINES identified indeed the species he treated in his *Flora Atlantica* with LINNÉ's *Bromus stipoides*, citing LINNÉ and making the combination under *Festuca*. He had, however, a different plant or several different plants before him; nevertheless the combination is valid as the combination is based upon LINNÉ's name. Compare the case of *Digitaria filiformis* (L.) KOELER, a name for an American plant, although KOELER described another European species. I explained this case already in an earlier paper.

Concerning the nomenclature in the genus *Vulpia*, our conclusions are therefore, that of the six species of *Vulpia*, mentioned by LINNÉ under various genera, five have to be accepted under the specific names given by him.

Among the *Vulpias* there are some species where the lemmas have a very long pubescence. The first species is a very beautiful plant, named *Vulpia Alopecuros* (SCHOUSB.) LINK, being described as *Festuca ciliata*

LINK in SCHRADER's Journal f. Botanik II, (1799) p. 315. On account of the earlier *Festuca ciliata* GOUAN from the year 1768, this name is invalid. The species is easily recognizable by its very large spikelets, which are, without the awns, about $1\frac{1}{2}$ cm long. The flowers are chasmogamic with 3 stamens.

Another species with very long hairy spikelets is the *Festuca ciliata* of DANTHOINE, in LAMK. et DC. Fl. Franc. III (1805) p. 55. As is clear from the data given above under *Vulpia Alopecuroides*, this name is also a homonym and therefore changed by ASCHERSON and GRAEBNER into *Festuca Danthonii* in their Synopsis Vol. II. (1901) p. 549, which, transferred to *Vulpia*, becomes *Vulpia Danthonii* VOLKART in SCHINZ et THELLUNG, Fl. Schweiz, ed. II. p. 57. It was a great pity that such a good specific name as *ciliata* could not be used but the authors of the Synopsis neglected the fact that there were other valid names for the species. They united with their species the *Festuca ambigua* LE GALL, Flore de Morbihan (1852) p. 731, which was transferred to *Vulpia ambigua* by A. G. MORE in Journ. Linn. Soc. V. (1861) p. 190. In his paper: On the occurrence of *Festuca ambigua* in the Isle of Wight, he tells us that this grass grows abundantly on the sea-side sandhills or dunes at St. Helen's, in this island. He treated the differences with *Vulpia pseudo-myurus* SOY.-WILLEM. (which is as we know at present the true linnean *Festuca Myurus*) and with *Vulpia uniglumis*. The latter has 3 stamens and is our *Vulpia membranacea* (L.) LINK. MORE's very interesting article gives us further important notes. He says that the resemblance to *V. uniglumis*, is only superficial, as a closer examination shows the true affinity to *Vulpia pseudo-myurus* (*F. Myurus* L.), with which it agrees in the important character of the single stamen and by the constant presence of both glumes, moreover the upper glume of *Vulpia ambigua* is destitute of the awn, found in *Vulpia uniglumis*.

From these data we clearly gather that *Vulpia ambigua* is totally different from *V. uniglumis* (*membranacea*). Having obtained access to LE GALL's Flore de Morbihan, MORE feels himself satisfied that his plant, distributed by him formerly as *Vulpia pseudo-myurus*, var. *maritima*, answers to the description of *Festuca ambigua*. LE GALL considered his plant more nearly related to *Vulpia ciliata* LINK, (Hort. Berol. I. (1827) p. 147); to which he was disposed to refer his species as a non-ciliated variety. It must be admitted that, except for the cilia of the lemmas, *Vulpia ambigua* has very nearly the characters of *Vulpia ciliata*. The *Festuca ambigua* was described from the north-west coast of France as mentioned in the works of LE GALL and LLOYD. MORE gives a key

to distinguish the 3 species, this key shows clearly that *Vulpia ambigua*, although having lemmas without cilia, is more allied to *Vulpia ciliata* LINK and the proportions of both glumes in *Vulpia ambigua* (1 to 3—6) are nearly the same as in *Vulpia ciliata* (1 to 3—5), although we must not forget that in the true *Vulpia Myurus* GMEL., such proportions occur too. There is known a variety *subuniglumis* HACK. of *Vulpia Myurus* where this proportion is 1 to 5 or even 1 to 10.

DUVAL-JOUVE (*Vulpia de France* l. c. p. 47) says, however, that *Festuca ambigua* LE GALL belongs to *Vulpia Myurus* GMEL., being: „une forme du littoral de l'Ouest, à glume supérieure obtuse (?).” LLOYD has described this upper glume in his *Fl. Ouest*, ed. 3, p. 371, as acute, obtuse or truncate. Why there occur obtuse upper glumes is clearly explained by DUVAL-JOUVE (l. c. p. 30), the delicate membranous point of the glume breaks off easily as is demonstrated by microscopic examination. The obtuse upper glume is thus an accidental character and there is in my opinion no argument to accept DUVAL-JOUVE's identification. If we have to unite *Vulpia ambigua* with one of the other species of the genus, we have to place it under DANTHOINE's *Festuca ciliata*.

In doing so, the earlier epithet *ambigua* ought to have been accepted for DANTHOINE's species. The Kew Index refers *Festuca ambigua* to *Festuca Myurus*. Now there is still an earlier name, *Vulpia aetnensis* TINEO, *Pl. rar. fasc. III.* (1846) p. 22, a name accepted by RICHTER as belonging to a distinct species, *Festuca aetnensis*, but placed by ASCHERSON and GRAEBNER as forma *aetnensis* under their *Festuca Danthonii*. This *Vulpia aetnensis*, described from Sicilia, where the *Festuca Danthonii* is common, differs according to the authors of the Synopsis but little from the typical *Festuca Danthonii*, in the longer awns of the lemmas. Going over a rather large material of *Festuca Danthonii*, represented by specimens from West Europe to Asia minor and North Africa, it is easy to see that the awns of the lemmas are very variable in length. Mostly they are about as long or slightly longer than the body but not rarely the awns are up to three times as long as the body and such specimens are not confined to Sicilia.

JANKA published a key to the *Vulpias* in the *Oest. Bot. Zeit.* XVI (1866) p. 216. Here we find *Vulpia aetnensis*, placed next to his *Vulpia Myurus*; the latter he defines as „arista palea paullo longior; palea inferior margine dense ciliata”. This proves that JANKA accepted the *Vulpia Myurus* in the sense of SOYER-WILLEMET, who, as is known, named the true *Festuca Myurus* of LINNÉ as *Festuca pseudo-myurus*. Opposite to the characters of JANKA's *Vulpia Myurus* (our *Vulpia Danthonii*), we

find the characters of *Vulpia aetnensis*, given as: „arista palea 3-plo longior, palea inferior sparse ciliata”.

As to the identification of TINEO's *Vulpia aetnensis*, it is interesting to memorate STROBL's work on the flora of Sicilia. He visited the island many times and brought together a very large herbarium of the region of the Nebrodes. For the publication of a flora, he studied the different herbaria concerning the island of Sicilia, among them also GUSSONE's Herbarium siculum at Napels, which contains the types of TINEO. STROBL's work was published as „Flora der Nebroden mit Bezug auf die Flora ganz Siciliens”, in the well-known periodical „Flora” at Regensburg. This work of STROBL was issued in parts during the years 1878—1888. There exist rare copies with consecutive pagination. In such a copy we find that *Vulpia ciliata* LK. was treated on p. 121 (p. 287—288, as published in Flora 1879) with the varieties *genuina* and *aetnensis*. STROBL says emphatically that *Vulpia aetnensis* was issued as a „species” by TINEO FIL. in the year 1846 in Plantarum rariorum Siciliae minus cognitarum fasciculi III. Although STROBL cites „var. aetnensis”, we know thus that there is a valid publication of the „species” *Vulpia aetnensis*. I wish to quote here STROBL's phrases, (l. c. p. 121—122). „Diese Pflanze, die ich im „Nachtrage zum Herb. Guss., sowie im Herb. Catania's aus der Hand „Tin. sah, unterscheidet sich von den in Sizilien gewöhnlichen, kleineren „Exemplaren der *ciliata* absolut durch nichts, als durch die spärlicher, und „zwar nur am Rande bewimperten Spelzen, ein Merkmal, das ich auch an „der *ciliata* Istriens, der Nebroden etc. zu wiederholten Malen traf und das „mit der auf dem ganzen Rücken- oder nur auf dem Rücken- und Rand- „nerven bewimperten Hauptform durch die mannigfachsten Uebergänge „verbunden ist, wie ich auch in der That auf dem Originalstandorte Tin. „bei Nicolosi sowohl *cil.*, als *aetn.*, aus auch Zwischenformen antraf; es hat „daher diese Tineische Art kaum den Werth einer Varietät.”

Not a single argument can, in my opinion, be found to accept *Vulpia aetnensis* as a different species; it is to be united with *Vulpia Danthonii* and being described already in the year 1846, its name has priority over *Vulpia ambigua* and is to be accepted for our species. ASCHERSON and GRAEBNER say under *Festuca Danthonii*: „because the name *Festuca ambigua* refers to a not typical form, a new name had to be formed.” This is however not according to the rules of nomenclature.

Since DANTHOINE's species occurs in a glabrous state too, it becomes still more difficult to distinguish it from the *Vulpia Myurus* GMEL. and it is the great merit of DUVAL-JOUVE to have so exactly pointed out the differences. ASCHERSON's description in the Synopsis (l. c. p. 550) is quite

erroneous, as the small, but distinct lower glume is overlooked, so the upper one was accepted for the lower and consequently the first lower lemma was regarded as the upper glume, indicating this upper glume as „awned”, the awn as long as the body of the glume and „long hairy at its base”. We know that the second glume is not awned at all and perfectly glabrous, whereas the lowermost lemma is hairy on the back and provided with a long awn, the other lemmas are hairy along their margins. DUVAL-JOUVE gave an excellent description in latin, followed by another one in french (l. c. p. 44—45); although it often much resembles the true *Vulpia Myurus* GMEL., especially in the glabrous state, it is in its biological characters quite different, approaching only to small specimens of *Vulpia Myurus* var. *hirsuta* HACK. from Portugal, where the lemmas are hairy along the margins and often also on the back. This variety is identified by American agrostologists as *Vulpia megalura* (NUTT.) RYDBERG, the latter is accepted by them as a distinct American species, said to be introduced from the New World into Portugal. This *Festuca megalura* NUTT. is often found adventitious in Central Europe, also in the Netherlands by myself. It is, according to PIPER and HITCHCOCK, a remarkably constant species in America. I saw it in herbaria often mixed with the true *Festuca Myurus*, not only in North American but even in South American, but never in Old World collections.

The occurrence of *Vulpia Myurus* GMEL. in South America, leads us to the question, whether there exists in South America another *Vulpia* described by KUNTH in the year 1822 as *Festuca muralis*, which was based upon the *Festuca Myurus* as described by HUMBOLDT, BONPLAND and KUNTH in their *Nova Genera*. Vol. I. (1815) p. 155 from Quito. The long description, given there, fully applies to our *Vulpia Myurus* GMEL., the lower glume is given as $\frac{1}{2}$, as long as the upper one and the lemma as green and scabrous. KUNTH cited in his *Synopsis Plantarum*. Vol. I. (1822) p. 218, the same description of the *Nova Genera* and the same locality. He tried to differentiate his *Festuca muralis* but not a single diagnostic character is given. In GAY's *Flora Chilena*, Tom. VI. (1853) p. 425—426, DESVAUX treated this *Festuca muralis*, giving a latin diagnosis and a long spanish description, mentioning in both, that the palea inferior (lemma) is glabrous or scabrous and with hairs along the margins. In a note he says that the plant is variable but identical with the typical specimens of the *Festuca muralis* of KUNTH. The frequent presence of hairs on the lower palea is, in his opinion, not sufficient to separate the Chilean plant from the European one. If indeed KUNTH had the plant with hairy lemmas before him, he would certainly have indicated that,

but he says only that the flowers are scabrous. DESVAUX is rather certain that *Festuca muralis* KUNTH does not differ from *Festuca Myurus* L. It is noticeable that in STUCKERT's „Tercera Contribución al conocimiento de las gramináceas argentinas”, in Anal. Mus. Nac. Buenos Aires. Tom. XIV (1911) p. 116, *Festuca Myurus* and *Festuca muralis* are mentioned as two different species, so that it may be possible that *Festuca muralis* is an allied, hitherto overlooked species. Being a *Vulpia* it must in that case bear the name of *Vulpia muralis* (KUNTH) HENR.. In STUCKERT's work a spanish description is given, although it is but short, it gives us some characters which do not apply to our european *Vulpia Myurus*. The panicle is described as simple, all the glumes are glabrous, the lanceolate spikelets are compressed with 5—9 flowers, with awns being longer than the length of the lemmas and the latter without hairs. From these data we conclude that STUCKERT had here a different species before him. The distribution of this *Festuca muralis* is given by him as Patagonia, Chubut, Buenos Aires and further Chili and Peru. This plant is not mentioned by HITCHCOCK in his work on the grasses of the High Andes.

There is in South America another puzzling *Vulpia* which was mentioned for the first time by NEES in his Flora Brasiliensis, Vol. II (1829) p. 474. Unfortunately NEES identified it with *Festuca tenella* WILLD. and described it under that name. He divided his *Festuca tenella* into two varieties, the var. *spontanea*, with a shorter culm and awns twice as long as the lemmas and a var. *culta* „ex America boreali”, with a longer culm and awns shorter than the less scabrous lemmas. To this variety from North America belong all the synonyms given by NEES, also *Festuca octoflora* WALT., the name accepted in the manuals of the grasses of North America. NEES's description points however to the plant collected near Montevideo by SELLOW, which was seen by him in the Berlin Herbarium. In his description the awn is given as twice as long as the lemma, whereas in the North American *Festuca octoflora*, according to PIPER, the lemma is 5 mm long, with an awn 1—7 mm long. DOELL accepted the species under the name of *Festuca tenella* WILLD. in MARTIUS's Flora Brasiliensis. NEES recognized the South American plant afterwards as different from the *Festuca octoflora* and named it *Festuca australis*, a name published in the year 1854 by STEUDEL in his Synopsis Pl. Glum. I. p. 304. *Festuca australis* NEES is accepted by HITCHCOCK in his work on the Andean grasses and taken up by me as *Vulpia australis* (NEES) HENR. nov. comb..

It is also possible that we have to unite *Vulpia muralis* and *Vulpia australis*. If it would come to that, the species has to bear the name of *Vulpia muralis*. PIPER, who treated *Festuca octoflora* in his

work (l. c. p. 11) gives the distribution but says that he did not see specimens from Mexico or from Central or South America, though it is reported from Brazil by DOELL as *Festuca tenella* WILLD.. In Mexico (Lower California) *Vulpia octoflora* (WALT.) RYDBERG was detected in the year 1889 by PALMER, together with its variety *hirtella* (PIPER) HENR. nov. comb. Because DOELL's *Festuca tenella* is the same as *Vulpia australis*, it is possible that *Festuca octoflora* WALT. is not an inhabitant of South America but represented there by the vicarious species *Festuca australis* NEES.

Apart from the two insufficiently known species, there occur in South America four other species. *Festuca megalura* NUTT., *Festuca Myurus* L. and *F. bromoides* GRAY are taken up in the Flora Chilena by DESVAUX, where *Festuca megalura* is not accepted as specifically distinct. We find in Chile a species with hairy spikelets, described as *Festuca eriolepis* DESVAUX, which becomes *Vulpia eriolepis* (DESV.) HENR. nov. comb.. We know that STUCKERT mentioned three species for Argentina (*F. muralis*, *F. Myurus* and *F. sciuroides*) and HITCHCOCK accepted *F. megalura*, *F. australis* and *F. bromoides*. In his key on p. 319 of the Grasses of the High Andes, HITCHCOCK tried to differentiate *Festuca australis* and *Festuca bromoides*, the lemma of *F. australis* is given as 5 mm long, that of *F. bromoides* as about 1 cm long. I have never seen such long lemmas in *F. bromoides* and PIPER gives them as 7—8 mm long. The distribution of *Festuca australis* is given by HITCHCOCK as throughout South America at temperate altitudes, whereas *Festuca bromoides* is accepted as introduced from Europe in several places in South America. A sharp limitation of the South American *Vulpias* can only be given after a renewed study of the types.

For the flora of Uruguay, ARECHAVALETA (Las Gramíneas Uruguayas, 1894) mentions three species of *Festuca* which belong to the genus *Vulpia*. His *Festuca tenella* WILLD., said to be frequent, is probably identical with *Festuca australis*. His *Festuca geniculata* is not the species so named in our European floras but as to ARECHAVALETA's description and his plate (the latter is named *Festuca geniculata* v. *monandra*) a mixtum of two species, the var. *genuina* is the *Festuca megalura* NUTT. and the var. *glabrescens* is probably the *Festuca Myurus* L.; ARECHAVALETA's *Festuca ciliata* LINK, cited also as *Vulpia Myurus* REICHENBACH, is not our European *Festuca ciliata*, it may be *Festuca bromoides* L.. Two years afterwards, two species were treated by SPEGAZZINI in „Contribucion al estudio de la Flora de la Sierra de la Ventana” p. 74—75. The first species is „*Festuca myurus* LIN. var. *muralis* KNTH—STEUD., l. c., f. 303.”

In his Spanish description no differences are found to distinguish the plant from typical *Festuca Myurus* L. The other species of SPEGAZZINI was named by him as *Festuca delicatula* LAG.—STEUD., l. c., f. 34 (wrong indication for f. 304.). As to this description we are inclined to accept this plant as the *Festuca australis* NEES, which has in its habit a great resemblance to the Spanish plant described by LAGASCA, which however belongs to the species with a rather short lower glume, whereas SPEGAZZINI mentions the glumes as being 3 and 5 mm long. ARECHAVALETA's determinations are wholly taken from DOELL's treatment in Flora Brasiliensis, Vol. II. pars 3 (1878) p. 112. We find there: *Festuca tenella* WILLD. which is SELLOW's specimen from Montevideo and the type of *Festuca australis* NEES. The second species is *Festuca geniculata* WILLD. var. *monandra* DOELL, which is quite spurious. DOELL says that the type of *Festuca geniculata* is not rare in Southern Europe and Africa, his variety was represented in the Berlin Herbarium, with a label in French, said to be collected at Buenos Aires. In my opinion this specimen is not from South America and the indication on the label is wrong, the plant, being monandrous, certainly does not belong to *Vulpia geniculata*. The third species is *Festuca ciliata* LINK, the genuine plant is according to DOELL, not collected in South America, his var. *glabrescens*, however, at Montevideo (SELLOW d. 2252 in herb. Berol.), it is given by DOELL as being intermediate between *Festuca ciliata* and *Festuca bromoides*. It is probable that this plant indeed belongs to the latter, which is introduced in many places all over the world.

Finally we would remark that some species of North America are difficult to distinguish, so there are forms of *Vulpia pacifica* (PIPER) RYDBERG which much approach to *Vulpia bromoides* and therefore also to *Vulpia australis* and also to few-flowered specimens of *Vulpia octoflora* RYDB..

Although thus the *Vulpias* are well-recognizable by their general aspect, by their spikelets, being dilatated towards the summit during the flowering-time, and especially by the short filaments and stigmas, which are included between the lemmas and paleas, it is not an easy problem to distinguish the species by constant and sharp characters, which is one of the principal requirements for a key to the species. There are all over the world some 30 species. The *Festuca pectinella* DEL. is not accepted as a member of the genus *Vulpia* but belongs to a distinct genus *Ctenopsis* DENOR.; in this I fully agree with TRABUT and STAPP. In the Old World there are about 20 species, the New World has about 13 ones. Some of them are common to both regions. If we

go over them with the literature at hand, we find a very curious difference as to the treatment of the indumentum of the spikelets. In the American literature, this character of the indumentum is emphatically indicated as very constant and very important to recognize the species, while in the Old World, nearly all the species possess both glabrous spikelets and pubescent or hairy ones, so that we meet with the curious fact that for a key to the American species this character can be accepted and is actually used by PIPER and HITCHCOCK, whereas the same character is unfit for our Old World species.

In order to show this feature more in detail, let us first consider the European species. *Vulpia Alopecuros* (SCHOUSB.) LINK has long-hairy lemmas, but they are perfectly glabrous in var. *glabrata*, there is moreover a variety with all the glumes and lemmas densely hairy, known as var. *lanata*. See WILLKOMM et LANGE, Prod. Fl. Hispan. Vol. I (1870) p. 92. We have already pointed out above that ASCHERSON's *Festuca Danthonii*, typical with hairy lemmas, occurs as a variety with glabrous lemmas, named here *Vulpia aetnensis* TINEO var. *imberbis* (VIS.) HENR. nov. comb.; *Vulpia ligustica* (ALL.) LINK, has a var. *hispidula* PARL. with hairy spikelets. *Vulpia geniculata* (L.) LINK has a variety *ciliata* PARLATORE with ciliate lemmas, this species not rarely occurs in a much more hairy state, described here by me as a new variety: *Vulpia geniculata* (L.) LINK, var. *dasyantha* HENR. nov. var. Pedicelli pubescentes, glumae steriles fertilesque longe adpresse hirsutae. Portugal; bords des champs à Faro, Algarve, 18, IV, 1853, leg. E. BOURGEOU no. 2053 bis (mixed with typical *Vulpia geniculata* under the number 2053). Type in Herb. Lugd.-Bat.. From the same locality there is in our herbarium also a specimen of this new variety, collected by M. GANDOGER in April of the year 1904. The var. *dasyantha* occurs also in Algeria, where it was collected by B. BALANSA. In his collection there is a specimen from the year 1852. Bords de la route conduisant d'Oran à la Sénia, avril, named by him *Vulpia stipoides*, var.. The same variety was also collected by M. GANDOGER in Marocco near Melilla in April 1908. The var. *ciliata* PARL. has glabrous glumes and lemmas which are only sparingly ciliate along the margins, as is exactly indicated by PARLATORE.

Vulpia Myurus (L.) GMEL. has a var. *hirsuta* HACK. in Portugal, which is not distinguishable from the American *Vulpia megalura* (NUTT.) RYDBERG and *Vulpia bromoides* (L.) GRAY, which is always described as having only scabrous lemmas, occurs as a var. *hebestachya* AZNAVOUR with hairy spikelets, described from Constantinople (Enumération d'espèces nouvelles pour la flore de Constantinople, Magyar Botanikai Lapok.

X. [1911] p. 17). It may be that this var. *hebestachya* belongs to *Vulpia Broteri* BOISS. et REUTER, which is accepted by ASCHERSON and GRAEBNER as a subspecies of *Festuca dertonensis* (our *Vulpia bromoides*). This very interesting variety is described as having „glumis glumellisquae dense hirtulis”.

***Vulpia delicatula* (LAG.) DUMORT. var. *hirsuta* HENR. nov. var.**

Gluma sterilis superior lemmataque distincte hirsutulae.

Spain; Madrid, cum typo. Herb. Huet de Pavillon par Mr. Boissier, ded. Leresche.

In Herb. Lugd. Bat. sub no. 936, 322—153.

Thus it is a fact that we cannot use the character of the presence or absence of hairs on the spikelets to distinguish the European species, unless we accept all those varieties as species. But on the other hand it is striking that some species as *Vulpia membranacea* (L.) LINK are not known with hairy spikelets. The same can be said from *Vulpia Teneriffae* (ROTH) HENR. nov. comb. described by ROTH from the Canaries. The Portuguese *Vulpia Myurus* var. *hirsuta* which is certainly the same as the American *Vulpia megalura* RYDB. ought to be accepted in Europe as a variety together with the hairy varieties which belong to different other species, whereas in America it constitutes a distinct species. In South America both *Vulpia megalura* and *Vulpia Myurus* grow together in the same plot as was seen in specimens collected by HOLWAY in Chile.

Let us now pass in review the North American species as accepted by PIPER and by HITCHCOCK under the genus *Festuca* but transferred by me to the genus *Vulpia*. We have already stated that *Vulpia octoflora* (WALT.) RYDB. occurs with hirtellous spikelets, this variety is not accepted by American agrostologists as a species. All other forms with hairy spikelets are, however, accepted as species. In *Vulpia sciurea* (NUTT.) HENR. nov. comb., the lemmas are appressed-pubescent all over the back. This species is very characteristic by its very small lemmas. *Vulpia pacifica* (PIPER) RYDB. has spikelets not at all hirsute. *Vulpia confusa* (PIPER) HENR. nov. comb. has hirsute glumes and glabrous lemmas. *Vulpia arida* (ELMER) HENR. nov. comb. has glabrous glumes and densely woolly lemmas. *Vulpia Grayi* (ABRAMS) HENR. nov. comb. has the spikelets pubescent to villous. *Vulpia reflexa* (BUCKLEY) RYDBERG has the lemmas scaberulous only. In *Vulpia microstachys* (NUTT.) MUNRO the lemmas are pubescent only, whereas in *Vulpia Eastwoodae* (PIPER) HENR. nov. comb., the spikelets are wholly pubescent. In *Vulpia Tracyi* (HITCHC.) HENR. nov. comb., the glumes are hispid-villous and the lemmas glabrous. In Europe, agrostologists would have united the four species *Vulpia*

reflexa, *V. microstachys*, *V. Eastwoodae* and *V. Tracyi* in one species under the name of *Vulpia microstachys* (NUTT.) MUNRO, whereas *Vulpia pacifica*, *V. confusa* and *V. Grayi* would represent but one species too. If we accept for the species of the Old World the same principles as for those of the New World, we are obliged to increase the number of Old World species ad infinitum, which is against all natural grouping. The slight although remarkably constant differences in the pubescence of the spikelets, is not only found in the American species but this constancy is observed also in the European varieties, a fact which is connected with the cleistogamic pollination of the genus *Vulpia*. To find an important character, fit for a general key to determine the *Vulpias*, we know that ASCHERSON and GRAEBNER accepted the length of the first glume for a classification, but in such a classification, the *Vulpia Myurus* gives us the greatest difficulties, because the species not rarely occurs with a very minute lower glume, although it is placed in the Synopsis in the group with longer first glumes. I have already called attention to this variety *subuniglumis* HACK., where the lower glume is so short that it reaches only one tenth of the length of the second one and is in this case scarcely 1 mm long.

The classification of the *Vulpias* is greatly hampered because there occur in this genus so often depauperate forms, which are the result of bad conditions during their growth and lack of nourishment. They grow often in sterile sands and on walls; depauperate specimens of *Vulpia Myurus* are scarcely distinguishable from the glabrous variety of *Festuca Danthonii*. American authors had in their own region, to deal with about 12 species only, the pubescent varieties inclusive; it can be calculated how many species we have to accept in the Old World if we follow the American method. As to the length of the first glume in the different species, I must call attention to the fact that the uppermost spikelets of the branches of the panicles have longer first glumes, a character which induced botanists to unite *Vulpia bromoides* and *Vulpia Myurus*, especially in those forms where the panicle of *Vulpia Myurus* is long exserted and not enclosed at the base in the uppermost sheath. Both species have moreover asperulous lemmas and we see therefore that the characters to distinguish them disappear more and more. Only the typical plants of both species are at once recognizable and for such specimens it is not difficult to prepare a key; for the many depauperate specimens, so often found, it is a hopeless task. For other species the proportions of the glumes are very constant. *Vulpia ligustica* and *Vulpia geniculata*, both with 3 stamens, can always be recognized, the former

by its very short lower glume, the latter by the long one. I collected a great many specimens of *Vulpia ligustica* and had never difficulties to distinguish then, even in the depauperate forms, from *Vulpia geniculata*. At the same time I never saw the up to 4 mm long anthers hanging from the spikelets, which can not be expected on account of the very short filaments. The anthers may protrude between the lemmas and paleas but they do not hang out as in other chasmogamic grasses. Although the *Vulpias* are divided into cleistogamic and chasmogamic ones, this character of chasmogamy is here essentially different from that of other chasmogamic grasses. The very short filaments of the stamens are a peculiar character for the genus *Vulpia* and the length of the anthers is a more accidental one and not so important as to make two different genera *Vulpia* and *Loretia*, as did DUVAL-JOUVE.

Finally I will call attention to a recently published paper by F. HERMANN in the „Verhandlungen des Botanischen Vereins der Prov. Brandenburg“ Jahrg. 76 (1936). In this paper „Aus meinem botanischen Merkbuche VI“ the genus *Festuca* is treated and a synoptical key to the related genera is given. This key deals with the genera *Glyceria*, *Sphenopus*, *Sclerochloa*, *Cutandia*, *Desmazeria*, *Poa* and *Festuca*. The latter is divided into various so-called „Rotten“, which may be translated by „squads“. HERMANN's incorporations are not in accordance with taxonomical principles, because under his genus *Festuca*, the following 8 names, *Castellia* TINEO, *Micropyros* LINK, *Atropis* TRIN., *Vulpia* GMELIN, *Eufestuca* GRISEBACH, *Scleropoa* GRISEBACH, *Catapodium* LINK and *Nardurus* RCHB. are, according to the authors given behind the names, once more treated as genera (l. c. p. 28). *Vulpia* and *Cutandia* are discussed only, the former with the combinations as given under *Festuca*, the latter however with their combinations as valid under *Cutandia*; *Vulpia* is once more divided into 3 groups. We do not learn what rank they have. The three groups are named *Euvulpia*, *Ctenopsis* and *Pectinula*, the latter is proposed as new and based upon *Festuca pectinella* which is in reality the type of the genus *Ctenopsis* DENOT. Under *Vulpia* a new species was described by HERMANN as *Festuca marmaricae*; this species was already recognized by HACKEL and described by him in the year 1880 as a member of the section *Spirachne* of *Vulpia*, under the name of *Vulpia inops* (DÉL.) HACK., which is the same as *Vulpia brevis* BOISS. et REUT.. The whole treatment of this group of grasses by HERMANN is quite insufficient and incorrect for a good general view and proves that a great deal of the literature of this subject was neglected by him; his ideas are moreover based upon little knowledge of the whole tribe.

Summary.

In conclusion, we propose the following nomenclatural alterations. For a good classification, the genus *Vulpia* is to be accepted as a member of the *Festuceae*. Various names of *Vulpia* are fixed according to our present rules of nomenclature, viz. *V. bromoides* (L.) GRAY, *V. membranacea* (L.) LINK, *V. geniculata* (L.) LINK, *V. stipoides* (L.) DUM. and *V. Myurus* (L.) GMELIN. For *Vulpia ciliata* the earliest valid epithet is taken and so this widely distributed species must bear the name of *V. aetnensis* TINBO, while its glabrous variety is named *imberbis* (VIS.) HENR.. *Vulpia delicatula* (LAG.) DUM. var. *hirsuta* HENR. and *Vulpia geniculata* (L.) LINK var. *dasyantha* HENR. are described as new varieties. Among the South American species the new combinations *Vulpia eriolepis* (DESV.) HENR., *Vulpia australis* (NEES) HENR. and *Vulpia muralis* (KUNTH) HENR. are proposed, moreover the endemic *Vulpia Teneriffae* (ROTH) HENR. is mentioned. The North American species are treated in connection with the parallel variations of the European *Vulpias* and the following new combinations are given, viz. *Vulpia octoflora* (PIPER) RYDBERG, var. *hirtella* (PIPER) HENR., *V. sciurea* (NUTT.) HENR., *V. arida* (ELMER) HENR., *V. confusa* (PIPER) HENR., *V. Eastwoodae* (PIPER) HENR., *V. Grayi* (ABRAMS) HENR. and *V. Tracyi* (HITCHC.) HENR..