HENRARDIA, A NEW GENUS OF THE GRAMINEAE

by

C. E. HUBBARD
(Royal Botanic Gardens, Kew)

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INTRODUCTION.

Most classifications of the genera of the Gramineae have been on the structure and arrangement of their spikelets, for these organs provide a far greater variety of readily distinguishing characters than do other parts of the grass plant. Nevertheless it has not always been possible to decide from morphological studies alone whether marked similarities in structure point to a close affinity or are merely examples of parallel development. The modern taxonomist, endeavouring to arrange the grass genera in as natural a sequence as possible in order to emphasise relationships and evolutionary trends, sooner or later meets with difficulties in this respect, for examples of parallelism are of common occurrence in this family. He is more fortunate, however, than his predecessors, in that his own intensive morphological studies, based on a wider range of specimens, may be supplemented by additional data gleaned from the ecological, anatomical and cytological researches of contemporary workers. Thus aided by the more complete information at his disposal, it has been possible for him to rearrange certain groups, particularly the *Festuceae* and *Hordeeae*, in which parallel development has occasionally led to unrelated genera such as *Lolium*, *Agropyron* and *Nardus*, being too closely associated. In the following account an attempt has been made to provide a more natural classification for about eighteen species frequently referred to the genus *Lepturus* R. Br. by reason of their similar spicate inflorescences.

SURVEY OF THE GENUS LEPTURUS R. BR. (SENSU LATO).

The genus *Lepturus* was described by Robert Brown (1) in 1810, being based on a single species, *L. repens* (G. Forst.) R. Br. (*Rottboellia repens* G. Forst.). This grass is now known from a wide area in the tropics of the Old World, where it occurs on sandy and stony seashores from east Africa through the Mascarene Islands, Ceylon and the Malayan Region to eastern Asia, northern Australia and the islands of Polynesia. It is characterised by the one-flowered spikelets being embedded in cavities in the internodes of the articulated rhachis of solitary spikes, each spikelet falling at maturity with the adjacent internode, by the lower glume being

usually suppressed in all except the terminal spikelets and by the upper glume closely fitting over the cavity in the rhachis and the rest of the spikelet. Brown placed *Lepturus* with the Andropogonoid genera *Rottboellia* Linn. f., *Ophiuros* Gaertn. and *Hemarthria* R. Br., no doubt being influenced by the similarity in their inflorescences.

In 1812, Palisot de Beauvois (2) described and figured *Monerma,* a genus which has been much confused with *Lepturus.* The type-species of *Monerma, M. monandra* Beauv. (= *Lepturus cylindricus* [Willd.] Trin. = *Monerma cylindrica* [Willd.] Coss.), is an annual grass widespread in the Mediterranean Region and now introduced into South Africa, Australia and temperate America. Beauvois associated *Monerma* with *Ophiuros* Gaertn. and *Nardus* L., but whilst he maintained *Lepturus* R. Br. as a distinct genus, *Rottboellia repens* G. Forst., the basis of *Lepturus repens* R. Br., was referred to his new genus. *Monerma cylindrica,* in its general spikelet structure and arrangement, bears a very close resemblance to *Lepturus repens,* and on these grounds alone would have to be treated as a member of the same genus.

Kunth (3) referred *Monerma* to his *Gramina Hordeacea* where it was classified with such diverse elements as *Triticum* L., *Lolium* L., *Ophiuros* Gaertn., *Nardus* L. and *Zoisia* Willd., whilst *Lepturus* R. Br. was included in the dubiae at the end of *Gramina Panicea,* with a note querying its affinity with the *Gramina Hordeacea.*

In 1820, Trinius (4) extended the conception of *Lepturus* R. Br. to include *Monerma* Beauv. and *Lodicularia* Beauv., together with the following species, *L. repens* (G. Forst.) R. Br., *L. cylindricus* (Willd.) Trin. (*Rottboellia cylindrica* Willd.), *L. incurvatus* (L.) Trin. (*Aegilops incurvata* L.), *L. filiformis* (Roth) Trin. (*Rottboellia filiformis* Roth) and *L. fasciculata* (Desf.) Trin., the last name being a synonym of *Hemarthria altissima* (Poir.) Stapf & Hubbard. In the same work Trinius proposed a new genus *Pholiurus,* with one species *P. pannonicus* (Host) Trin. (*Rottboellia pannonica* Host), a native of Spain, Central and South-east Europe, where it occurs in saline soils. *Pholiurus pannonicus* differs from both *Lepturus* and *Monerma,* as defined by their authors, in the rhachis of the spike being continuous, the spikelets falling alone at maturity, in having both glumes well-developed in all spikelets, and by the sides (not the back) of the lemmas being adjacent to the rhachis of the spike.

This early history of *Lepturus* may be closed with a reference to Kunth's (5) later treatment of the genus, in which *Pholiurus pannonicus* (Host) Trin. was transferred to *Lepturus* as *L. pannonicus* (Host) Kunth and the genus placed in the *Rottboelliaceae,* now separated from the *Hordeaceae.*

The second phase of this survey of *Lepturus* commences in 1883 with the publication of Bentham's account of the genus in Bentham & Hooker's Genera Plantarum (6). Kunth's (5) conception of the genus was largely followed, another species, *L. persicus* Bois.. was added, and the genus was placed in the tribe *Hordeeae* subtribe *Leptureae.* A few years later Hackel (7) re-grouped the genera of the *Hordeeae* into six subtribes, several of which (*Leptureae, Nardeae* and *Parianeae*) are now recognised in some classifications as distinct tribes. The species of *Lepturus* (sensu Benth.)

were divided between *Monerma* Beauv. in subtribe *Lolieae*, and *Lepturus* in subtribe *Leptureae*. Hackel did not mention all the species which he included in each genus, but judging from his descriptive and distributional notes it is surmised that they were as follows. *Monerma* included three species, *M. cylindrica* (Willd.) Coss. (*M. subulata* R. & S.), *M. repens* (G. Forst.) Beauv. (*Lepturus repens* R. Br.) and *M. radicans* (Steud.) Hack., in all of which only a single glume (the upper) is developed in the lateral spikelets. On the other hand, the conception of *Lepturus* was altered to include *Lepturus filiformis* (Roth) Trin., *L. incurvatus* (L.) Trin., and *L. persicus* Boiss. in sect. *Eulepturus* Hack., and *L. pannonicus* (Host) Kunth in sect. *Pholiurus* (Trin.) Hack., these species being characterised by the development of both lower and upper glumes in all the spikelets. This transfer of the type-species of *Lepturus* R. Br. to the later described *Monerma* was the cause of some confusion in European floras adopting Hackel's classification.

The third period of our review of *Lepturus* dates from 1920, when this error in its interpretation was corrected by Hitchcock (8), who returned *Monerma* Beauv. to synonymy under *Lepturus* and revived *Pholiurus* for the species which Hackel had referred to *Lepturus*. Schinz and Thellung (9) also investigated this nomenclatural and taxonomic tangle, accepted Hitchcock's arrangement and published the combinations *Pholiurus incurvus* (L.) Schinz & Thellung (*Lepturus incurvatus* Trin.) and *P. filiformis* (Roth) Schinz & Thellung (*Lepturus filiformis* Trin.). In 1922, A. Camus (10) gave a short account of the species of *Lepturus* and *Pholiurus*, limiting the former to the three species included in *Monerma* by Hackel, and enlarging *Pholiurus* to include *P. incurvus*, *P. pannonicus*, *P. persicus* (Boiss.) A. Camus (*Lepturus persicus* Boiss.) and *P. pubescens* (Bertol.) A. Camus (*Lepturus pubescens* Boiss.). This division of *Lepturus* (sensu Benth.) into two genera, *Lepturus* (incl. *Monerma*) and *Pholiurus*, which at first appeared to be a perfectly logical and natural arrangement, has been widely accepted in recent years. The writer was never quite satisfied, however, with the association of tropical species, such as *Lepturus repens* and *L. radicans*, with the temperate grass *L. cylindricus*, or with the relationship of *Pholiurus pannonicus* to our common European coastal species *P. filiformis* and *P. incurvus*. It seemed probable that similarities due to parallel development and not to close affinity, were responsible for this association of genera and species. Preliminary observations had shown that *Lepturus repens* differed in its anatomy from *L. cylindricus*, whilst the rhachis of the spike and the spikelets in *Pholiurus pannonicus* proved to be different from those of *P. incurvus* and allied species. It was decided, therefore, to re-examine in greater detail all the species referred to these genera, paying special attention to the structure of the floret and grain, for these organs had been largely neglected by previous writers. Only a short survey of the results of these investigations is given below.

Brief mention may be made here of Holmberg's (11) wise separation of the subtribe *Leptureae* Benth. from the *Hordeeae*, its elevation to tribal rank and restriction to the genus *Lepturus* (sensu Benth.). Holmberg also gave an excellent series of diagrams of transverse sections through the spikelets, illustrating the arrangement of the glumes and the position of

the spikelet in relation to the rhachis of the spike in *L. cylindricus, L. incurvatus, L. pannonicus* and *L. persicus.*

INVESTIGATION OF THE SPECIES OF LEPTURUS AND PHOLIURUS.

This division into two genera, based on the presence of one or two glumes in the spikelet, was accepted as a basis for further study, the species referred to *Lepturus* — the oldest genus, being considered first. Those species with similar florets and grains were grouped together. It was then noted that in *Lepturus* (sensu A. Camus), there existed two distinct groups, one formed by a very natural series of 8—10 perennial species ranging through the tropics of the Old World and including the type-species, *Lepturus repens* (G. Forst.) R. Br., and the other restricted to the single Mediterranean annual species, *L. cylindricus* (Willd.) Trin. (= *Monerma cylindrica* Coss.). The epidermal siliceous cells, which H. Prat (12, 13, 14) has shown to be of considerable value in indicating relationships, proved in *Lepturus repens* to be of the saddle-shaped type characteristic of the genera of the *Chlorideae,* whereas those of *Lepturus cylindricus* were of the more simple type found in the Festucoid group of tribes. The chromosomes of *Lepturus cylindricus,* reported by Avdulov (15) and Hunter (16), are in multiples of 13 (2n = 26 or 52). They are of the large type, typical of the Festucoid group. Unfortunately no species from the first group of *Lepturus* has been investigated cytologically, but judging from the association of saddle-shaped siliceous cells with the small type of chromosome in other grasses, one would expect these tropical species to have similar small chromosomes, probably in multiples of 9 or 10. It seems that we have here another example of parallel development, in which grasses in the course of their evolution from two distinct ancestral forms have reached similar stages in the reduction of their inflorescences and spikelets. *Lepturus* (type of the tribe *Leptureae*) might be placed near the *Chlorideae,* whilst *Monerma* should be retained for *Lepturus cylindricus* and placed in the same tribe as *Pholiurus incurvus* and its allies. The more important morphological distinctions between *Lepturus* and *Monerma* are listed in the following table.

Lepturus R. Br.	*Monerma* Beauv.
Ligule ciliate.	Ligule glabrous.
Lemmas 3-nerved, with the lateral nerves extending to or near the apex, glabrous, or minutely hairy at the base.	Lemmas 3-nerved, with the lateral nerves very short, glabrous.
Lodicules oblong or obcuneate.	Lodicules lanceolate to ovate.
Styles slender, distinct.	Styles extremely short or obsolete.
Grain tipped by the persistent style-bases.	Grain tipped by a shrivelled brown truncate appendage.
Scutellum elliptic, half to two-thirds the length of the grain.	Scutellum broadly elliptic, about one-fifth the length of the grain.
Hilum basal, orbicular.	Hilum linear-oblong, slightly above the base of the grain.

The study of the species of *Pholiurus* (sensu A. Camus) yielded far more interesting results, especially in the structure of the grains. It soon became apparent that here the species could be arranged in three well-defined groups. Group I, restricted to the type-species, *Pholiurus pannonicus* (Host) Trin.; II, including *Pholiurus incurvus* (L.) Schinz & Thellung; III, limited to *Pholiurus persicus* (Boiss.) A. Camus and *P. pubescens* (Bertol.) A. Camus. It was considered that there was little justification for referring the species of group II, to *Pholiurus*. The florets and grains in group II were remarkably like those of *Monerma*, but whereas in the latter only the upper glume is developed in the lateral spikelets, in *Pholiurus incurvus* and *P. filiformis* both glumes are present and placed side by side in front of the cavity in the rhachis. It is proposed therefore to transfer these two species and two other related species to a new genus, *Parapholis*, for which a latin diagnosis is given here, pending the publication of a more complete account later.

Parapholis *C. E. Hubbard*, genus novum; a *Pholiuro* Trin., rhachidibus spicarum articulatis, spiculis cum internodiis rhacheos maturitate caducis, spiculis unifloris, glumis collateralibus, lemmatibus trinervibus nervis lateralibus brevissimis, ovario apice lobulato, stylis obsoletis, caryopside apice appendice truncata sicca praedita, hilo lineari vel lineari-oblongo differt.

Species 4; *P. incurva* (L.) C. E. Hubbard, comb. nov. (*Aegilops incurva* L.); *P. filiformis* (Roth) C. E. Hubbard, comb. nov. (*Rottboellia filiformis* Roth); *P. strigosa* (Dum.) C. E. Hubbard, comb. nov. (*Lepturus strigosus* Dum.); *P. pycnantha* (Hack.) C. E. Hubbard, stat. nov. (*Lepturus filiformis* var. *pycnanthus* Hack.).

In *Pholiurus* Trin., the rhachis of the spike is continuous, dispersal of the seeds being effected by the spikelet disarticulating at its base at maturity, the spikelets are two-flowered, the glumes almost opposite, the lateral nerves of the lemma extend to the apex, the ovary is not lobed and the styles are short yet distinct, the grain is tipped by the persistent style bases and possesses an elliptic-oblong scutellum and a broadly elliptic hilum.

When the species of group III, *Pholiurus persicus* and *P. pubescens*, had been examined, it was obvious even from a study of the grain alone, that these species had been misplaced. Not only were they in the wrong genus, but also in the wrong tribe. Although the arrangement of their spikelets is somewhat similar to that of *Pholiurus* and *Parapholis*, the florets and grains revealed striking differences, indicating that in these reduced forms too much reliance should not be placed on external similarities.

The lemma, which in all previously examined species had been never more than 3-nerved, was found occasionally to have two additional nerves wholly or partially developed, moreover the lodicules were ciliate and the ovary hairy at the apex, characters alien to *Lepturus*, *Monerma*, *Pholiurus* and *Parapholis*, but characteristics of the *Hordeeae*. The grain also presented several remarkable features, being hairy at the apex, with a narrow linear hilum extending the whole of its length and situated in a longitudinal groove, thereby resembling a grain of wheat. An examination of the starch

grains showed them to be of the simple type like those of the *Hordeeae* (sensu stricto) [*Hordeeae* subtribes *Triticeae* and *Elymeae* Hack.], whereas in the preceding genera the starch grains are always compound. The form of the starch grain is well known to be of considerable taxonomic importance, being constant thoughout the genera of whole tribes. *Pholiurus persicus* and *P. pubescens* agree with the *Hordeeae* in many respects and are best accommodated in that tribe, but they differ from all the known genera in possessing delicate membranous lemmas scarcely as long as the glumes. A new genus having to be provided for their reception, the writer has great pleasure in naming it *Henrardia* after Dr J. Th. Henrard, in appreciation of his valuable contributions to our knowledge of the Gramineae.

The more important distinctions between *Henrardia, Lepturus, Monerma, Pholiurus, Parapholis* and the genera of the *Hordeeae* are summarised in the following key.

Ovary hairy, especially at the apex; grain often longitudinally grooved, with the linear hilum as long as the grain; starch grains simple; lodicules hairy; lemmas 3—5- or more-nerved:
  Lemma indurated, usually exceeding the glumes, 5- or more-nerved **Hordeeae.**
  Lemma membranous, slightly shorter than the glumes, 3—5-nerved . **Henrardia.**
Ovary glabrous; grain not grooved, with the hilum small, basal or subbasal; starch grains compound; lodicules glabrous; lemmas 1—3-nerved:
  Lemma of the first floret with its back adjacent to the rhachis of the spike; upper glume facing the rhachis; lower glume very small or suppressed in the lateral spikelets:
    Lemmas with the lateral nerves extending up to or very near the apex; ovary not lobed, with relatively long styles; grain not appendaged; hilum orbicular, basal; scutellum from half to two-thirds the length of the grain **Lepturus.**
    Lemmas with very short lateral nerves; ovary lobed at the apex, with the styles almost obsolete; grain tipped with a truncate shrivelled appendage; hilum linear-oblong, subbasal; scutellum about one-fifth the length of the grain . . . . . **Monerma.**
  Lemma with one side adjacent to the rhachis; both glumes well-developed in the lateral spikelets:
    Rhachis articulated; spikelets 1-flowered, falling with the adjacent internode of the rhachis at maturity; glumes placed side by side in front of the cavity in the rhachis; lemma with very short lateral nerves; ovary lobed at the apex; styles obsolete; grain with a dried-up appendage at the apex; hilum linear or narrowly oblong . . . . . **Parapholis.**
    Rhachis continuous; spikelets articulated at the base and falling entire at maturity; glumes nearly opposite; lemma with the lateral nerves extending to the apex; ovary not lobed; styles short, distinct; grain unappendaged; hilum broadly elliptic . . . . . **Pholiurus.**

DESCRIPTION OF THE GENUS HENRARDIA.

Henrardia *C. E. Hubbard,* genus novum; a generibus omnibus tribus *Hordeearum* spiculis 1—2-floris, glumis et lemmatibus fere aequilongis, lemmatibus membranaceis tenuiter 3—5-nervibus distinguenda.

Spiculae lanceolato-oblongae vel oblongae, muticae, solitariae, distichae, alternae, sessiles, rhachi articulatae spicarum solitariarum arcte appressae; rhacheos internodia dorso convexa, facie applanata vel leviter concava, superne incrassata, maturitate transverse tarde disarticulantia; rhachilla inter glumas et anthoecia continua, supra anthoecium terminale fertile producta et anthoecium vestigiale gerens, minute pilosa vel glabra.

Anthoecia 1—2, ♀, dorso compressa, glumis paullo breviora. *Glumae* aequales vel fere aequales, obtusae vel acutae, marginibus membranaceis angustis exceptis induratae et incrassatae; eae spicularum lateralium fere oppositae, plus minusve asymmetricae; inferior dorso applanata vel leviter convexa, superior latior, lanceolata vel oblonga, 5—9-nervis, superior dorso convexa vel carinata, subulata vel anguste oblonga, 3—7-nervis; eae spicularum terminalium oppositae et symmetricae. *Lemmata* glumis fere aequilonga, a dorso visa lanceolata vel lanceolato-oblonga, explanata lanceolato-oblonga, acuta vel obtusa, dorso applanata vel leviter convexa et marginibus inflexis, membranacea, 3—5-nervia. *Paleae* lemmatibus aequilongae vel fere aequilongae, anguste lanceolatae, explanatae lanceolato-oblongae, bicarinatae, membranaceae, inter carinas minute pubescentes. *Lodiculae* 2, oblique lanceolatae vel ovatae, ciliolatae. *Stamina* 3. *Ovarium* apice dense et minute pilosum; styli breves; stigmata plumosa. *Caryopsis* oblonga, dorso compressa, facie anguste canaliculata, apice dense et minute pilosa, inter lemma et paleam arcte inclusa; scutellum usque tertiam partem caryopsidis aequans; hilum lineare, elongatum.

Gramina annua; culmi graciles, paucinodes; foliorum vaginae ore auriculis angustis patentibus plerumque auriculatae; ligulae membranaceae; laminae angustae, planae vel convolutae; spicae graciliusculae, plus minusve cylindricae, maturitate fragiles et basi disarticulantes, glabrae vel pilosae.

Species duae, regionis Mediterraneae Asiae occidentalis scilicet ab Asia Minore usque Turkestaniam incolae. Typus: *Henrardia persica* (Boiss.) C. E. Hubbard (*Lepturus persicus* Boiss.).

Spikelets lanceolate-oblong or oblong, awnless, distichous, alternate, sessile, solitary at each node and closely appressed to the internodes on opposite sides of the articulated rhachis of solitary spikes; internodes of the rhachis rounded on the back, flat or slightly concave in front, gradually thickened upwards, transversely disarticulating at the nodes at maturity and falling with the accompanying spikelet; rhachilla continuous between the glumes and florets, produced beyond the terminal fertile floret, minutely hairy or glabrous and bearing a vestigial floret. *Florets* 1—2, ♀, dorsally compressed, slightly shorter than the glumes. *Glumes* equal or nearly equal in length, obtuse or acute, thickened and indurated except for the narrow inflexed membranous margins; those of the lateral spikelets nearly opposite, covering the florets, more or less asymmetrical; the lower glume flattened, or rounded on the back, wider than the upper, lanceolate to oblong, 5—9-nerved, the upper glume rounded or keeled on the back, subulate to narrowly oblong, 3—7-nerved; those of the terminal spikelet opposite and symmetrical. *Lemmas* nearly as long as the glumes, lanceolate to oblong in back view, lanceolate-oblong when opened out, acute or obtuse, flat or rounded on the back and with the margins inflexed along the outer nerves, membranous, 3—5-nerved, when 5-nerved with the inner pair of nerves faint and sometimes very short, hairy near the margins at the base with very minute club-shaped hairs. *Paleas* as long or nearly as long as the lemmas, narrowly lanceolate, or lanceolate-oblong when opened out, membranous, 2-keeled, minutely pubescent between the keels. *Lodicules* 2, obliquely lanceolate or ovate, hyaline above, ciliolate. *Stamens* 3; anthers oblong. *Ovary* densely and minutely hairy at the apex; styles 2, short; stigmas plumose. *Caryopsis*

oblong, dorsally compressed, narrowly grooved in front, densely and minutely hairy at the apex, tightly enveloped by the lemma and palea; scutellum one-fourth to one-third the length of the caryopsis; hilum narrowly linear, extending the whole length of the caryopsis.

Tufted annuals; culms slender, few-noded; leaf-sheaths often auriculate at the mouth, with the auricles short, triangular or narrow, spreading; ligules membranous, short, glabrous; blades narrow, flat or rolled when dry; spikes moderately slender, more or less cylindrical, glabrous or hairy, disarticulating at the base and breaking up at maturity.

Species 2: Turkey (Anatolia) eastwards through Armenia and Transcaucasia to Russian Central Asia and southwards to Iraq, Iran, Afghanistan and Baluchistan; in sandy or stony soils.

Key to the Species.

Spikes very minutely and densely pubescent with appressed hairs, or glabrous; anthers 1.5—2.2 mm long . . . . . **1. H. persica.**
Spikes minutely hispid with spreading hairs; anthers about 0.7 mm long **2. H. pubescens.**

Enumeration of Species.

1. **Henrardia persica** (Boiss.) C. E. Hubbard, comb. nov.

Lepturus persicus Boiss. Diagn. Pl. Or. Nov., Sér. 1, no. 13, 71 (1853).

A tufted annual, 10—28 cm high. *Culms* erect, curved or geniculately ascending, slender, terete, simple, or branched at the base, 2—4-noded, the lower internodes short and very minutely pubescent, the uppermost (peduncle) elongated, pubescent towards the spike, or all glabrous. *Leaf-sheaths* closely enveloping the culms and usually longer than the internodes, minutely and often densely and retrorsely hairy, or glabrous, often auriculate at the mouth; ligule truncate, about 0.5 mm long; blades linear to narrowly lanceolate, acute, 2—8 cm long, 1.5—4 mm wide, densely and minutely pubescent, asperulous or glabrous beneath, closely nerved above, with the nerves scabridulous or minutely pubescent. *Spikes* erect, straight or slightly incurved, 6—16 cm long, 1.5—2.5 mm in diameter; internodes of the rhachis 6—10 mm long, densely and minutely pubescent with retrorsely appressed hairs, or glabrous and smooth. *Spikelets* 7—10 mm long, slightly longer than the internodes of the rhachis. *Glumes* rigid, hairy like the rhachis, or glabrous, obscurely nerved, the lower oblong, wider than the upper. *Florets* 1—2, the second floret when present smaller than the first. *Lemmas* 7—8 mm long, lanceolate-oblong, minutely pubescent towards the apex or glabrous, finely 3-nerved, with the nerves extending to the apex, sometimes with two additional inner nerves rarely extending to the apex. *Paleas* minutely pubescent. *Lodicules* 1.5—1.7 mm long. *Anthers* 1.5—2.2 mm long. *Caryopsis* 6—7 mm long, hard, pale brown, with a dark brown hilum. *Rhachilla* prolongation up to 2 mm long, minutely pubescent.

Varieties of Henrardia persica.

Spikes very densely hairy with minute appressed hairs . . . . . I. var. **erecta.**
Spikes glabrous . . . . . II. var. **glaberrima.**

I. Var. **erecta** (Griseb.) C. E. Hubbard, comb. nov.

Lepturus incurvatus (L.) Trin. var. *erectus* Griseb. in Ledeb. Fl. Ross. 4: 325 (1852). "In provinciis caucasicis australibus (Szovitz)". Type not seen.

Lepturus persicus Boiss. Diagn. Pl. Or., Sér. 1, no. 13, 71 (1853). "In Persia australi, Aucher no. 2914". A sheet of this number in the Kew Herbarium is a mixture of var. *erecta* and var. *glaberrima*. — Boiss. Fl. Orient. 5:685 (1884), partim; Hackel ex Stapf, Bot. Ergebn. Polak Exped. Pers. 1:11 (in Denkschr. Math.-Nat. Cl. K. Akad. Wiss. Wien 50:1885); Aitchison in Trans. Linn. Soc., Bot., ser. 2, 3:127 (1888), partim; Roshevitz in Fedchenko & Popov, Fl. Turkmen. 1: fasc. 2, 181:1932 (Akad. Nauk SSSR., Ser. Turkm. 5); Grossheim, Fl. Kavkaza, 1:324 (1939).

Lepturus hirtulus Regel in Act. Hort. Petrop. 7:576: 1881 (Descr. Pl. Nov. fasc. 8:36). "In Turkestaniae orientalis deserto Karak, legit O. Fedtschenko". Type not examined. — Regel in Bull. Imp. Soc. Nat. Hist. St. Petersburg, 34:2, 83: 1882 (Descr. Pl. Nov. Rar. Fedtschenko in Turkest.); Trautv. in Act. Hort. Petrop. 9:312 (1884); Fedchenko, Rastitel'Nost Turkestana, 145 (1915); Popov, Descr. Pl. Envir. Tashkent, 1:39, fig. 71 (1923); Roshevitz in Act. Hort. Petrop. 38: fasc. 1, 139: 1924 (O. A. & B. A. Fedchenko, Consp. Fl. Turkest.i.).

Lepturus pubescens (Bertol.) Boiss. var. *persicus* (Boiss.) Bernowicz ex Bornmüller in Verh. K. K. Zool.-Bot. Gesellsch. Wien, 60:191 (1910). Based on *Lepturus persicus* Boiss. — Bornmüller in Beiheft. Bot. Centralbl. 28: Abt. 2, 521 (1911).

Pholiurus persicus (Boiss.) A. Camus in Ann. Soc. Linn. Lyon, 69: 90 (1922). Based on *Lepturus persicus* Boiss. — Nevski in Act. Univ. Asiae Med. Ser. 8b, Bot., Fasc. 17, 34 (1934); in Komarov, Fl. URSS, 2:589, tab. 44, fig. 14 (1934); in Act. Inst. Bot. Acad. Sci. URSS, ser. 1, fasc. 2, 42 (1936), fasc. 4, 335 (1937); Drobov. in Schreder, Fl. Uzbekistan, 1:277 (1941).

Lepturus erectus Szovitz ex Roshevitz Consp. Gram. Turkest. 81:1923 (in Act. Hort. Petrop. 38: fasc. 1, 139:1924) (O. A. & B. A. Fedchenko, Consp. Fl. Turkest. i). Based on *L. incurvatus* (L.) Trin. var. *erectus* Griseb.

Lepturus persicus Boiss. var. *genuinus* Grossheim, Fl. Kavkaza, 1:324, tab. 25, fig. 3 (1939). Apparently on *L. persicus* Boiss.

Specimens of this variety were referred to *Lepturus incurvatus* L. by Burkill in his List Fl. Pl. Baluchistan, 84 (1909).

General Distribution: — Turkey (Anatolia); Transcaucasia; Russian Central Asia (Uzbekistan, Turkmenistan, Tadjikistan, Western Tian Shan); Persia; Afghanistan; Baluchistan. On dry slopes and foothills; sometimes as a weed in cultivated fields; on sandy or stony soils.

Specimens Examined.

Turkey (Anatolia): between Sultan Han and Kaisariya, 1200 m, 14. 6. 1890, *J. Bornmüller 1642!* (partim). Turkish Armenia: Egin; Kota, 1. 7. 1890, *P. Sintenis It. Or. 2830!*

Transcaucasia: Armenia; near Erivan, 19/20. 7. 1928, *A. Grossheim* in Grossheim & Schischkin Pl. Or. Exsicc. *252!* Azarbaijan; near Seidzhadzhi, *Fischer!* († *Szovitz*).

Russian Central Asia: Western Tian Shan; near the Kabul-saj, 22. 5. 1926, *Mokeeva in Herb. Fl. As. Med. 527!*

Persia: 12 miles east of Urmia, 1500 m, 16. 5. 1929, *Cowan & Darlington 920!*

between Dauletabad and Tchitchian, 31. 5. 1882, *Pichler!* South Persia; without precise locality, *Aucher-Eloy, Herb. Or. 2914!* (partim), *5440!*

Afghanistan: Hari Rud valley, 9/10. 5. 1885, *Aitchison 409!* (partim), "Chokey", "Killa Pootoollah", both south-west of Kandahar, *Griffith 514!* (partim).

Baluchistan: without precise locality, 1851, *Stocks 1158!*

II. Var. **glaberrima** (Hausskn.) C. E. Hubbard, comb. nov.

Lepturus persicus Boiss. var. *glaberrimus* Hausskn. ex Bornmüller in Mitteil. Thüring. Bot. Ver. n. f. 20:51 (1904—5). "Cappadocia, ... prope Caesaream (Kaisarieh) ..... exsicc. no. 1642" [leg. Bornmüller]; "Armenia Turcica, Egin, ... prope Salachlii ..... P. Sintenis (exsicc. no. 2737)". A duplicate of Bornmüller 1642 in the Kew Herbarium consists of a mixture of var. *erecta* and var. *glaberrima*.

Lepturus pubescens (Bertol.) Boiss. var. *glaberrimus* (Hausskn.) Bornmüller in Verh. K. K. Zool.-Bot. Gesellsch. Wien, 60:191 (1910). Based on *L. persicus* var. *glaberrimus* Hausskn.

Lepturus erectus Szovitz var. *glabratus* Westberg ex Roshevitz, Consp. Gram. Turkest. 81:1923 (in Act. Hort. Petrop. 38: fasc. 1, 139:1924), nomen.

Pholiurus glabriglumis Nevski in Act. Univ. Asiae Med. Ser. 8 b, Bot., fasc. 17, 35 (1934), in clavi, et in Komarov, Fl. URSS, 2:589 (1934), et in Act. Inst. Bot. Acad. Sci. URSS, ser. 1, fasc. 2, 42 (1936), descr. "Prope Tengichoram Asiae mediae, lg. A. Michelson, 26. 4. 1913, no. 1144". Type not examined. — Nevski, l. c. fasc. 4, 335 (1937); Drobov in Schreder, Fl. Uzbekistan. 1:277 (1941).

Lepturus persicus Boiss. var. *glabratus* (Westb.) Grossheim, Fl. Kavkaza, 1:324, 397 (1939). On page 397, Grossheim states that apart from the glabrous spikelets this variety does not differ from *L. persicus* var. *genuinus* Grossh. and that the two varieties grow mixed together, neither having a distinct geographical area.

Lepturus persicus Boiss. var. *armeniacus* Hack. ex Grossheim, Fl. Kavkaza, 1:324 (1939), in syn.

General Distribution: — Probably occurring throughout the area of the type variety, var. *erectus*, with which it has been found in collections from Anatolia, Persia and Afghanistan. Handel-Mazzetti (in Ann. K. K. Naturhist. Hofmus. Wien, 28:32:1914) records *Lepturus pubescens* var. *glaberrimus* (Hausskn.) Bornm. from several localities in Iraq, but as these specimens have not been examined, it is not known whether they are referable to the above variety or belong to a glabrous variety of *Henrardia pubescens*.

Specimens Examined.

Turkey (Anatolia): between Sultan Han and Kaisariya, 1200 m, 14. 6. 1890, *Bornmüller 1642!* (partim).

Transcaucasia: Nakhichevan; by the river Diza-tshaj, 7. 6. 1934, *L. Prilipko!*

South Persia: without precise locality, *Aucher-Eloy Herb. Or. 2914!* (partim).

Afghanistan: Hari Rud valley, 9/10. 5. 1885, *Aitchison 409!* (partim); "Chokey" and "Killa Pootoollah", *Griffith 514!* (partim).

The presence of hairy and glabrous varieties in *Henrardia persica* is paralleled by their occurrence in other species of the *Hordeeae*, particularly in species of *Amblyopyrum* Eig., *Agropyron* Gaertn., and *Triticum* L.

2. **Henrardia pubescens** (Bertol.) C. E. Hubbard, comb. nov.

Rottboellia pubescens Bertol. Miscell. Bot. 1:10, tab. 1, figs. 3, 4

(1842). "Pl. sicc. Euphr. n. 197. Ex oris Euphratis". Collected during Col. F. R. Chesney's expedition for the survey of the Rivers Euphrates and Tigris during the years 1835 to 1837. There is a duplicate of this number in the Kew Herbarium.

Lepturus pubescens (Bertol.) Boiss. Fl. Orient. 5:685 (1884). Based on *Rottboellia pubescens* Bertol. — Handel-Mazzetti in Ann. K. K. Naturhist. Hofmus. Wien, 28:32 (1914)?

Pholiurus pubescens (Bertol.) A. Camus in Ann. Soc. Linn. Lyon, 69:90 (1922). Based on *Rottboellia pubescens* Bertol.

A tufted annual, about 15 cm high. *Culms* erect or ascending, slender, branched at the base, otherwise simple, few-noded, minutely asperulous. *Leaf-sheaths* longer than the internodes, terete, loose, striate, with membranous margins, the basal minutely and retrorsely pubescent, the remainder smooth, bearing at the mouth short narrow spreading auricles; ligules truncate, up to 1 mm long; blades linear, finely acute, up to 5 cm long and 2.5 mm wide, flat, or rolled when dry, green, minutely hispidulous on the nerves above, very minutely pubescent beneath. *Spikes* straight or incurved, up to 8 cm long and 2 mm in diameter, green; internodes of the rhachis 7—8 mm long, 1—1.5 mm wide, minutely and antrorsely hispidulous on the back, scabrid on the margins, keeled down the middle of the back. *Spikelets* 8—9 mm long, 1-flowered. *Glumes* acute, scabridly hispidulous on the back with the hairs directed forwards; lower subulate-lanceolate, 5—7-nerved; upper subulate, 3—5-nerved. *Lemma* nearly as long as the glumes, narrowly lanceolate, acute, lanceolate-oblong when opened out, 5-nerved, with the inner pair of lateral nerves better developed above the middle, scabrid on the nerves near the apex. *Palea* slightly shorter than the lemma, narrowly lanceolate, minutely pubescent between the keels. *Rhachilla* prolongation up to 1.3 mm long, glabrous. *Lodicules* 1 mm long. *Anthers* up to 0.7 mm long. *Ovary* densely hairy at the apex.

Iraq: "expedition to the Euphrates", *Chesney 197!*

It is much more probable that this rare species was collected in northern Iraq, than at the mouth of the Euphrates.

References.

1. Brown, R., Prodromus Florae Novae Hollandiae, 207 (1810).
2. Beauvois, P. de, Essai d'une Agrostographie, 116, tab. 20, fig. 10 (1812).
3. Kunth, C., Considérations Générales sur les Graminées — Mém. Mus. Hist. Nat. Paris, 2 : 74 (1815).
4. Trinius, C. B., Fundamenta Agrostographiae, 122, 131 (1820).
5. Kunth, C., Enumeratio Plantarum, 1 : 461 (1833).
6. Bentham, G., Bentham & Hooker, Genera Plantarum, 3 : 1094, 1204 (1883).
7. Hackel, E., Engler & Prantl, Die Natürlichen Pflanzenfamilien, 2 : Abt. 2, 78 (1887).
8. Hitchcock, A. S., The Genera of Grasses of the United States — U.S. Dept. Agric. Bull. no. 772, 103, 105 (1920).
9. Schinz, H. & Thellung, A., Weitere Beiträge zur Nomenklatur der Schweizerflora VII — Vierteljahrsschr. Nat.f. Ges. Zürich, 66: 264—5 (1921).
10. Camus, A., Note sur les genres Lepturus R. Br. et Pholiurus Trinius — Ann. Soc. Linn. Lyon, 69: 86—90 (1922).
11. Holmberg, O. R., Ueber die Begrenzung und Einteilung der Gramineen-tribus Festuceae und Hordeeae — Bot. Not., Lund, 1926, 71—80.

12. PRAT, H., L'Epiderme des Graminées, Etude Anatomique et Systématique — Ann. Sci. Nat., Bot., Sér. 10, 14: 261 (1932).
13. PRAT, H., Remarques sur la position systématique de genre Jouvea Fourn. et sur les limites de la tribu de Hordées — Bull. Soc. Bot. France, 80: 357—367 (1933).
14. PRAT, H., La Systématique des Graminées — Ann. Sci. Nat., Bot., Sér. 10, 18: 165—258 (1936).
15. AVDULOV, N. P., Karyo-Systematische Untersuchung der Familie Gramineen — Bull. Appl. Bot., Leningrad, Suppl. 44 (1931).
16. HUNTER, A. W. S., A Karyosystematic Investigation in the Gramineae — Canad. Journ. Res. 11: 225—227 (1934).