

TWO NEW SPECIES OF *STIPAGROSTIS* (ARISTIDEAE) FROM THE DUNE-NAMIB DESERT, NAMIBIA*Stipagrostis seelyae* De Winter, sp. nov.

Stipagrostis seelyae De Winter, sp. nov., *S. sabulicolae* (Sect. *Stipagrostis*) affinis, sed inter alia inflorescentia brevi ovato-oblonga ramis maturis reflexis, foliis brevioribus curvatis spinescentibus, aristarum basi supra articulum glabra et lemmate non ultra basim aristarum producto differt.

Suffrutex perennis ligneus, plus minusve 1 m altus; culmi basi simplices, sursum multo ramosi et fasciculati; nodi glabri, in culmis principalibus paribus distante et in ramis fasciculatis arcte dispositi. *Foliorum laminae* plerumque 40–70 mm longae, spinescentes, teretes, canaliculatae, curvatae. *Inflorescentia* laxa, foliis superata, 20–50 × 20–30 mm; rami mature reflexi, in fasciculis alternantibus 6–10 disposita. *Spiculae* 11–12 mm longae. *Glumae* inaequales, superiores inferiores superantes. *Lemma* 3-nervatum, tubulosum, aristarum basi articulatatum; aristae 3, omnes plumosae, aequales; callus acuminatus, pilosus.

TYPE. — Namibia, 2315 (Rostock): Namib Naukluft Park, Mnischechi's Vley, 23°43'S, 15°29'E, 23.10.1985, *Seely 2156* (PRE, holo.; G, K, M, MO, NBG, P, S, WIND, Z). Figure 15.

Stipagrostis seelyae has previously been referred to in literature as *Stipagrostis* sp. cf. *namaquensis* (Nees) Trin.

& Rupr. (Yeaton 1988; Boyer 1989). *S. seelyae* is named after Dr M.K. Seely, Officer in Charge of the CSIR, Namib Research Station at Gobabeb, who has made extensive observations on this species and collected the type material.

Perennial, robust, glabrous suffrutex (Figure 16), ± 1 m high, forming stiffly erect, sparse to dense tufts from short woody rhizomes. *Culms* woody, straw-coloured or purplish, persistent, up to 5 mm in diameter, rigid, erect, unbranched below, fasciculately and much branched above with the branches and spiny leaves forming dense erect clusters. *Nodes* glabrous, approximate in geminate pairs spaced widely apart on the unbranched lower portion of the culms, the lower node of each pair visible, upper covered by the leaf sheath of the lower node; nodes numerous, close together, spaced 2–10 mm apart towards the apex of the culms, and hidden by the leaf sheaths. *Leaves* in pairs, 50–140 mm apart on the unbranched culms; spaced 2–10 mm apart towards the ends of the branches. *Leaf sheaths* glabrous, smooth, straw-coloured, basal ones reduced to cataphylls. *Ligule* a dense fringe of very short hairs. *Auricles* inconspicuous, sparsely hairy or glabrous. *Leaf blades* rigid, terete, canaliculate, spinescent, slightly curved, stiffly erect or spreading, (15)40–70(140) × ± 2 mm; glabrous and smooth abaxially; adaxially strongly ribbed, shortly and densely bristly on the ribs.



FIGURE 15.—*Stipagrostis seelyae*. Holotype specimen, Seely 2156 (PRE), showing fasciculate branching pattern, $\times 0.3$. Photo: A. Romanowski.

Inflorescence a somewhat loose terminal panicle, overtopped by the leaves (Figure 17A), 20–50 \times 20–30 mm, glabrous except for the densely woolly points of attachment of one or two of the basal branches; branches 6–10, single or in clusters alternating on the main axis, each cluster consisting of 2–3 branchlets each bearing one to three spikelets; clusters subtended by a swollen pulvinus and reflexed when mature. **Spikelets** one-flowered, 11–12 mm long including the awns, straw-coloured, the lemma below the articulation occasionally purplish (Figure 17B, C). **Glumes** somewhat curved, straw-coloured, firmly chartaceous with thinner margins; lower glume 4.0–4.5 mm long, ovate-lanceate, 3-nerved, the lateral nerves much shorter than the midnerve which does not extend to the apex, apex obtuse, lacerate; upper glume 8–9 mm long, 3-nerved, all the nerves extending nearly to the apex, apex acute. **Lemma** chartaceous, tubular, ± 6 mm long up to the base of the awns and including the callus; callus densely hairy, acuminate, about 1.5 mm long, the hairs long at the base of the lemma, sharply diminishing in length down to the fine sharp point; articulation ± 1 mm below the branching point of the awns; awns 3, disarticulating together with the conical hollow apex of the lemma, spreading and finally reflexed when mature, equally developed, about 5 mm long, densely plumose with silvery spreading hairs, plumes lanceate in outline with the apex subobtuse. **Palea** 1.4 mm long, chartaceous, glabrous, two-nerved, the nerves strongly developed but not produced into a distinct keel, apex obtuse to

emarginate, margins inrolled. **Lodicules** 2, 1.3–1.5 mm long, narrowly obovate, one-nerved, membranous and hyaline but subfleshy and denser towards the base. **Stamens** 3; filaments hairlike, elongating at anthesis; anthers ± 4.5 mm long, yellow, linear. **Pistil** ± 3 mm long; ovary ovoid, glabrous; styles 2; stigmas plumose, very narrowly oblong in outline. **Caryopsis** narrowly subturbinate, (3)2–3(4) mm long, shallowly grooved adaxially, and rounded abaxially; hilum and embryo about $\frac{1}{3}$ of the length of the grain.

NAMIBIA. —2315 (Rostock): Namib Naukluft Park, Mnischezi's Vley, eastern edge of Namib dunes immediately south of the Kuiseb River (–CB), 07.12.1983, Seely 2154; 23.10.1985, Seely 2155, 2156 (PRE); 8 km W of Tsondap Vlei (–CD), 30.5.1969, Jensen 238 (PRE); south of Natab (–CA) 18.4.1969, Jensen 170 (PRE). 2415 (Sossusvlei): Sossus Vlei (–CB), 29.6.1974, Giess 13433 (PRE, WIND).

Affinities: even though the vegetative and inflorescence characters of *Stipagrostis seelyae* differ fairly strongly from those of *S. sabulicola* (Pilg.) De Winter as set out in the diagnosis, the spikelets show great similarity, both in size and general configuration and *S. sabulicola* is considered to be the only species closely allied to *S. seelyae*. *S. seelyae* is placed in the Section *Stipagrostis* because of the positioning of the articulation near the apex of the lemma. The similarity in habit with *S. namaquensis* can probably be ascribed to convergent adaptation to the arid and sandy habitat occupied by these two species.

Distribution and ecology: Dr Seely summarizes her extensive knowledge of the distribution and ecology of *S. seelyae*, as follows: 'It occurs extensively in the eastern Namib dunes on the middle and upper dune slope. It does not occur in the interdune valleys when these are not sandy



FIGURE 16.—*Stipagrostis seelyae* growing on a sandy dune slope, showing suffrutescent habit. Copy of a colour slide taken by M.K. Seely.

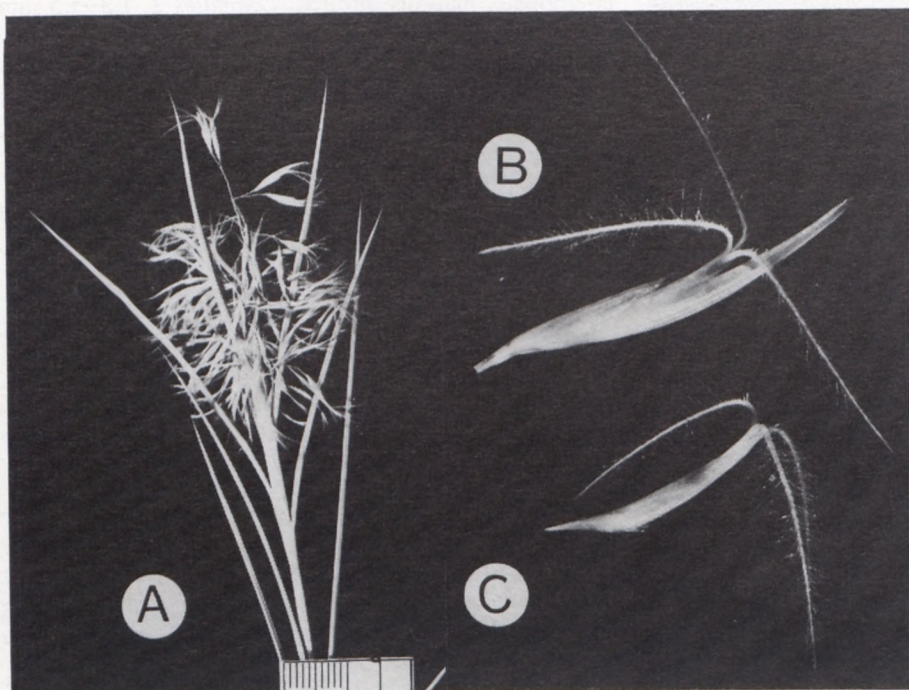


FIGURE 17.—*Stipagrostis seelyae*, Seely 2156 (PRE). A, single inflorescence overtopped by leaves, $\times 0,8$; B, spikelet showing the strongly unequal glumes, the three-awned lemma and spreading, plumose awns, $\times 4,5$; C, lemma showing acute, hairy callus, articulation below branching point of awns and reflexed awns, $\times 4,5$. Photos: A, by A. Romanowski; B, C, by M. Koekemoer.

nor does it occur on the less stable, shifting dune crest. When the full suite of dune grass species is present, *S. gonatostachys* (Pilg.) De Winter and *S. ciliata* (Desf.) De Winter occur on the gravelly interdune and *Centropodia glauca* (Nees) T.A. Cope and *Cladoraphis spinosa* (L.f.) S.M. Phillips on the low to middle dune slope. Usually *Stipagrostis lutescens* (Nees) De Winter occurs in the interdunes when they are sandy and on the base of the dunes themselves. At the very tops of the dunes, particularly in the eastern part of its range, *S. sabulicola* occupies the shifting dune crest. Where *S. seelyae* and *S. lutescens* are absent in the western part of the dune fields, *S. sabulicola* occurs throughout.

This generalized account of the zonation of the grassy elements of the vegetation, places the ecological niche occupied by *S. seelyae* in broad perspective. The composition of the suite of species with which *S. seelyae* is associated, however, does vary from site to site. Yeaton (1988) reports *S. seelyae* (*S. cf. namaquensis* (Nees) Trin. & Rupr.) as associated with *S. sabulicola*, *S. lutescens* and *Centropodia glauca* at Bushman's Circles. On this site *S. seelyae* occupies an intermediate position between *S. sabulicola* on the dune crest and *C. glauca* on the dune base. At the Far East Dune site both *S. seelyae* and *C. glauca* are absent from the suite whereas at Noctivaga Dune the three species present are clearly zoned over the dune slope. *Centropodia glauca* occupies the base of the dune and is replaced upslope by *S. seelyae* on the middune slope, which in turn is replaced at the top of the dune by *S. sabulicola*. Yeaton (1988) points out that species growing where sand movement is rapid, will only be able to survive if they are able to produce sufficient seed before being buried. Plants with strong rhizomes are more successful at establishing in moving sands and their vegetative growth may be stimulated by sand deposition. Moreover, because seeds are rapidly buried in swift-moving sand, plants surviving in such habitats do so predominantly vegetatively. In most of these respects

S. seelyae seems to be extremely well adapted to its sandy, windswept environment. For its known distribution see Figure 18.

This distinct species with its very limited distribution range (Figure 18) occupies an even more specialized niche in the dune habitat than most of the other members of the genus *Stipagrostis* which are restricted to the Namib dune environment. Further intensive study of the relationships, evolution and ecological adaptation of plants of the shifting dunes of the Namib is needed to gain an understanding of the functioning of individual species in the ecosystem.

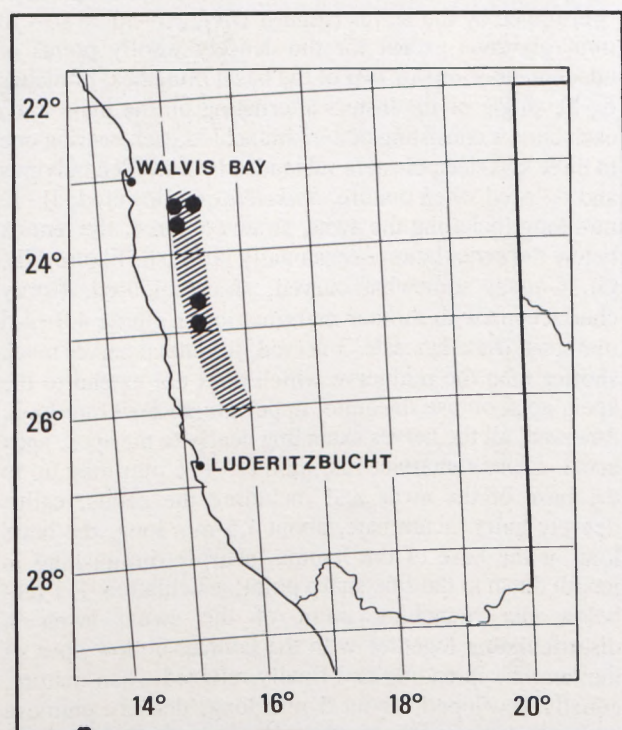


FIGURE 18.—Distribution of *Stipagrostis seelyae*. Dots represent herbarium records; hatching indicates distribution as observed by Seely.

Stipagrostis pellytronis De Winter, sp. nov.

Stipagrostis pellytronis De Winter, sp. nov., *S. hochstetterianae* affinis, sed foliis expansis marginibus cartilagineis; internodiis vaginis basalibus lanatis, callo spiraliter torto bifido differt.

Perennis caespitosa in anno primo florens, tum annum similis. *Vaginae basales foliorum* indumento lanato dense tectae vaginae collo accedentes, persistentes, coronam lanatam perennem formantes. *Nodi* annulum elevatum lanatum tecti. *Foliorum laminae* expansae, nervis marginatis costas cartilagineas formantes. *Inflorescentia* spicata, singula vel plures ex vaginis aphyllis supremis oriens, ex vagines ad maturitatem exserta, ex spiculis \pm 9 sessilibus unifloris constans. *Gluma inferior* superiorem longitudine superans. *Lemma* admodum infra medium articulatum; callus ad maturitatem spiraliter tortus, bifidus; aristae 3, tantum centrale longa plumosa, lateralibus multo brevioribus filiformibus glabris.

TYPE.—Namibia, 2315 (Rostock): (–CD) Namib Naukluft Park, Tsondab Vlei, on south-facing scree slope, 28.4.1971, *Jensen (Seely) s.n. in Herb. Giess 11519* (PRE, holo.; G, K, M, MO, NBG, WIND). Figure 20.

The specific epithet refers to the woolly indumentum on the basal leaf sheaths which ends abruptly at the collar of the sheath thus forming a sock-like structure. The Greek Lexicon by Passow gives the following: 'Pellytron, a sort

of bandage or buskin worn by runners next to the foot and ankle.' Elsewhere also referred to as 'a sock'.

Caespitose perennial 300–400 mm high (Figure 19), frequently flowering in the first year and then often very small and resembling an annual. *Culms* single (first year) or several from a perennial base, simple with a single apical inflorescence, or branched from the upper nodes bearing one to several inflorescences on each branch. *Nodes* 3–5 per culm, covered by a dense, raised ring of woolly hairs. *Internodes* (10–)50(–70) mm long, pale yellow, lower ones densely, upper ones gradually more sparsely, covered with woolly crisped hairs, glabrescent. *Leaves* mainly basal, upwards on the culms gradually reduced to the sheaths which envelop the immature inflorescences. *Leaf sheaths* with \pm 12 ribs (nerves) abaxially, smooth adaxially, shorter than the internodes; the basal sheaths covered with a dense woolly indumentum which in the perennial plants forms a wool-covered persistent basal crown, upper sheaths glabrous (Figure 21A). *Collar* on the basal leaves densely woolly, sharply demarcated from the glabrous leaf blade; in the upper leaves inconspicuous and glabrous. *Ligule* a straight line of stiff bristles of irregular length. Leaf blade very narrowly lanceate, 3–5 mm wide, expanded, (10–)40 (–110) mm long, firm in texture, glabrous, basal blades well developed, gradually diminishing in size upwards on the culms, absent from the inflorescence sheaths; marginal nerves conspicuous cartilaginous ribs; midrib inconspicuous; other nerves fine, numerous, equally strongly developed.

Inflorescence (Figure 21B) a short spike, borne singly or several together enclosed in apical sheaths on the culms or culm branches, and where more than one spike is present, their subtending sheaths also enclosed by the apical sheath when immature, exserted on a slender rhachis, when mature; \pm 40 mm long excluding the awns, each spike composed of \pm 9 sessile spikelets, arranged alternately on a slender, strongly ribbed rhachis. *Spikelets* with a single bisexual flower. *Glumes* (Figure 22B) pallid, chartaceous; lower exceeding the upper in length, 12–16 mm long, boat-shaped, lanceate, 3–5-nerved, central nerve reaching the apex, lateral nerves evanescent, tapering to a bifid or lacerate membranous apex; upper glume 10–12 mm long, 3-nerved, central nerve reaching the apex, lateral nerves slightly shorter, boat-shaped; the elongate-truncated, cartilaginous prolongation of the rhachilla or 'callus-placenta' adnate to inside base of the upper glume. *Lemma* chartaceous, tubular, glabrous, including the callus \pm 12 mm long, articulated slightly below the middle; callus \pm 2.5 mm long, strongly spirally twisted when mature, tapering to a glabrous bifid point, densely covered with short, white antrorse bristles which are 0.5–1.0 mm long at the base of the lemma, diminishing in length towards the apex (Figure 22A), awns 3, disarticulating and falling with the upper half of the lemma; central awn densely plumose with spreading silvery hairs, 25–70 mm long, plume narrowly obovate in outline, tapering to a glabrous or sparsely hairy lower third, apex of plume obtuse; lateral awns glabrous, filiform, 13–25 mm long, spreading. *Palea* a broadly-oblong, semi-chartaceous, truncate scale, \pm 1.5 mm long, the nerves represented by two approximate thickened ribs flanking a shallow depression. *Lodicules* 2, \pm 1.5 mm long, asymmetrically lanceate, fleshy at the



FIGURE 19. —*Stipagrostis pellytronis*. Perennial tufts growing on gravel derived from Tsondap sandstone. Photo: copy of a colour slide by M.K. Seely.

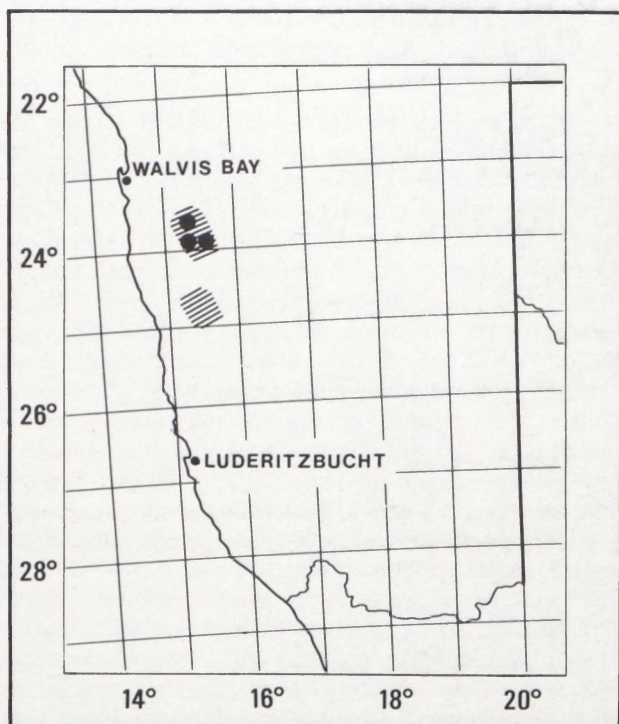


FIGURE 20. — Distribution of *Stipagrostis pellytronis*. Dots represent herbarium records; hatching indicates distribution as observed by Seely.

base, with several indistinct nerves. *Stamens* 3; anthers yellow, linear, ± 7 mm long. *Pistil* ± 6 mm long; ovary glabrous, ovate-oblong; styles 2; stigmas plumose. *Caryopsis* narrowly turbinate, oblanceolate in outline,

3–3.5 mm long, smooth, pale brown; hilum a longitudinal line as long as the grain; embryo slightly more than $\frac{1}{3}$ the length of the grain.

NAMIBIA. — 2315 (Rostock): Namib Naukluft Park, Tsondap Vlei (–CD) 23°54'S, 15°24'E, in sand at base of dune near river, 11.4.1971, Hofmeyer 45 (WIND); grass at edge of gravel mountain, 30.5.1969, Jensen (Seely) 236 (PRE); lower reaches of Tsondap River (–DC) 23°54'S, 15°21'E, 22.9.1979, Ward 256 (PRE).

S. pellytronis is unique in the genus because of the very well developed spirally twisted, bifid callus of the lemma. In spite of the unique combination of these features, an affinity with *S. hochstetteriana* (Boeck. ex Hack.) De Winter and especially the variety *secalina*, is proposed for the following reasons: the general configuration of the spikelet and particularly the inversion of the length of the glumes (the lower being longer than the upper), the spiciform inflorescence, the plumose central and the glabrous filiform lateral awns, as well as the position of the inflorescence subtended by sheaths at the apex of the culms. The placing of *S. pellytronis* in the Section *Schistachne* of *Stipagrostis*, the section in which *S. hochstetteriana* is placed, presents no particular difficulty since the allocation of species to the section is based solely on the positioning of the articulation. Both species are articulated near the middle of the lemma. Previous to the discovery of *S. pellytronis*, a bifid callus was known only in *S. obtusa* (Del.) Nees, where both pungent and bifid calli have been recorded in the same species. The unique configuration of the callus is regarded as representing a specific rather than a sectional difference.

The distribution of the species is apparently limited to exposures of Tsondap Sandstone within the central Namib



FIGURE 21. — *Stipagrostis pellytronis*. A, basal part of a first year seedling showing woolly sheaths and annular woolly covering on the nodes, $\times 1$; B, inflorescence, $\times 1$. From the holotype, Jensen (Seely) s.n. in Herb. Giess 11519 (PRE). Photo: A. Romanowski.

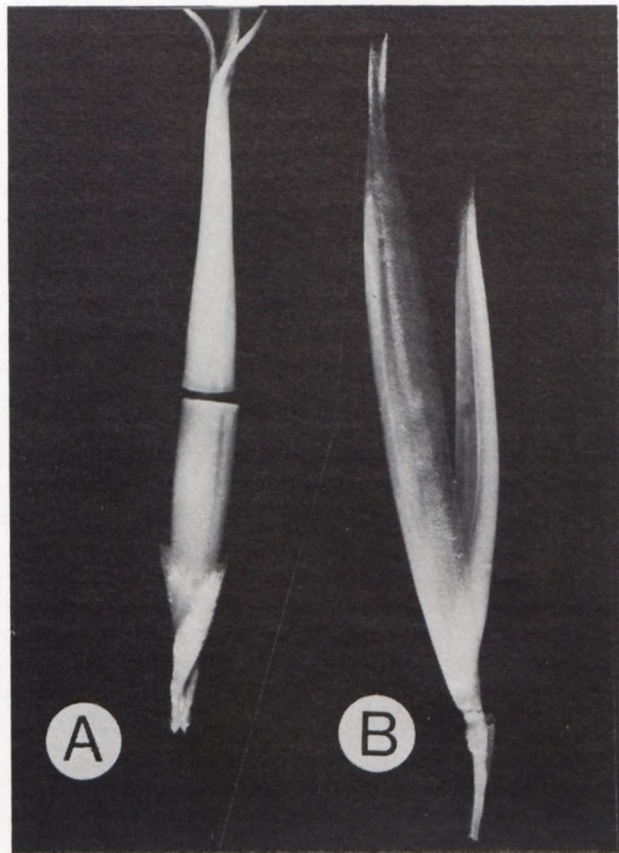


FIGURE 22. — *Stipagrostis pellytronis*. A, lemma showing articulation in middle of the body of the lemma and the spirally twisted, hairy, bifid callus; B, glumes, the lower exceeding the upper; both $\times 7$. From the holotype, *Jensen (Seely) s.n. in Herb. Giess 11519 (PRE)*. Photo: M. Koekemoer.

dune sea. The distribution map (Figure 20) indicates the area in which it has been collected or observed. Its presently known most southerly occurrence is at Sossus Vlei where Tsondap Sandstone outcrops are found. Its distribution further south is uncertain but it may occur in other areas in the eastern part of the dunes, where Tsondap Sandstone outcrops on the surface. The absence of both *S. pellytronis* and *S. seelyae* from the western part of the dune complex cannot be explained. The two species extend in an easterly direction, apparently as far as suitable habitats occur.

ACKNOWLEDGEMENTS

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