ACTA SOCIETATIS
BOTANICORUM POLONIAE
Vol. XXIV — Nr 4
1955

Poa nobilis n. sp., a new viviparous species of the High Tatra

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INTRODUCTION

In the present paper the author describes a new viviparous *Poa*-species presumably of hybrid origin occurring at higher altitudes in the granitic part of the Tatra Mts. Its first specimens have been collected at the time of the authors studies in *Poa alpina* L. var. *vivipara* L. and prior to a more thorough examination they were regarded as very vigorous plants belonging to that species. Cytological studies however revealed much higher aneuploid chromosome numbers than those of any viviparous biotypes of *P. alpina* from the Tatra Mts. Subsequently also some distinct morphological differences between the latter species and the newly found plants have been established; in some morphological features (e. g. the occurrence of stolons) they approach to *P. granitica* Br. Bl., an endemic species of the Carpathians belonging to the section *Stoloniferae* (Nannfeldt, 1940). All members of this section investigated hitherto (*P. pratensis* L. *P. arctica* R. Br. with their various subspecies, Rancken, 1934, Flovik, 1938, Akerberg, 1942, Nannfeldt, 1940, Nygren, 1950) possess high and aneuploid chromosome numbers. The same is true of *P. granitica* Br. Bl. (Skalińska, 1954, and unpublished), as well as of plants investigated in the course of the present study.

Viviparous forms of *P. granitica* have been recently recorded by some authors (Nannfeldt, l. c., p. 28 and 34, Dostál, 1950, p. 1962, Szafer, Kulczyński and Pawłowski, 1953 p. 909). It is therefore possible that plants like those which are the subject of the present study have been previously assigned erroneously to *P. granitica* as its viviparous strains. Unfortunately, no plants of this type have been found among the numerous specimens of *Poa* from the Tatra Mts, either in the Herbarium of the Botanical Institute of the Jagellonian University in Krakow, or in the collections of the Tatra-plants of the Scientific Station at Zakopane.

In his flora of Č. S. R. Dostál (1950) gave an outline drawing of the panicle of a viviparous strain of *P. granitica*. This drawing however (fig. 655, 4c) lacks some details which would enable us to ascertain whether it

really corresponds to a form allied to *P. granitica* or to a large and robust specimen of *P. alpina*, var. *vivipara*. A correct determination of such forms ought to be based on a detailed morphological (and anatomical) analysis, supplemented by a cytological study.

Already a preliminary morphological comparative study of specimens of *P. granitica* and of the viviparous biotypes permit us to establish some differences. Subsequently detailed anatomical investigations were carried out in collaboration with Mrs J. Małecka, M. Sc.; they have added further evidence in favour of the opinion that the viviparous biotypes do not belong to *P. granitica* and should be regarded as a separate group. The results of the anatomical studies have thrown some light upon the possible origin of the viviparous biotypes. They will be published separately in due course.

MATERIAL AND METHODS

The material for the present investigation originated from 8 well separated habitats in the High Tatra (Table I). The determination of the numbers of chromosomes was based on root-tip mitoses. The plants brought from their natural habitats rooted extremely easily and abundantly both in soil and in jars with tap water. The root tips were fixed in the Navashin's fixative diluted with an equal part of distilled water; cooling of the material during fixation was important for obtaining plates with well spaced chromosomes in view of their high numbers. Microtome sections were cut at 10 μ and stained with Newton's gentian violet. After fixation, the plants were transplanted into the experimental field in Krakow. They formed there very large and dense tufts, some of which attained 30cm in diameter, and in the following year they developed abundantly large inflorescences.

Table 1

List of habitats of the specimens and their chromosome numbers

Strain N.	Habitat in the High Tatra	2n
150	Slope above the eastern border of the lake Czarny Staw over Morskie Oko (c. 1650 m o. s. l.).	c. 72
214, 215	Valley Za Mnichem, on steep shady slopes (two separate habitats); (c. 1850 m o. s. l.).	76, 72
83	Pass Wrota Chałubińskiego (2022 m o s. l.); coll. J. Winnicka . .	72
246	Slope of Rysy, on scree; (c. 2050 m o. s. l.); coll. A. Sokołowska .	72
31	Path leading to the pass Pod Chłopkiem (c. 2100 m o. s. l.) . . .	82
136a	Pass between Cubryna and Zadni Mnich: in a tuft of P. alpina v. vivipara (2180 m o. s. l.); coll. Z. Radwańska-Paryska . . .	72
224, 245	Steep slope above the valley Kozia Dolinka, near the path leading to the southern peak of Granaty (1920 m o. s. l.); two biotypes .	61, c. 62
84	Slope of Kasprowy (c. 1900 m o. s. l.) possibly introduced . . .	c. 72
247	Peak of Kasprowy (1988 m o. s. l.) possibly introduced . . .	c. 78

THE TAXONOMIC POSITION AND THE DESCRIPTION OF THE NEW SPECIES

Studies in the viviparous biotypes have shown that these plants cannot be assigned either to *Poa alpina* L. var. *vivipara* L. or to *P. granitica* B r. B l. (see below). In respect of their morphological and anatomical features they constitute a separate well defined group manifesting some degree of diversity connected with a cytological differentiation. The representatives of this group are established on higher altitudes in the granitic part of the Tatra Mts, chiefly in the alpine layer, appearing there in rare and isolated habitats, frequently together with *P. laxa* Hke and *P. alpina* L. var. *vivipara* L. or sometimes with *P. granitica*.

This group which is readily distinguished from all *Poa* species occurring in the Tatra Mts deserves, in the author's opinion, the rank of a species. It seems probable that it is of hybridogenous origin. Concerning its taxonomic position, this new species should be assigned to the section *Stoloniferae* together with *P. pratensis* L., *P. granitica* B r. B l., *P. arctica* R. B r., and some other northern and arctic species. The representatives of this section are perennials developing extravaginal stolons; all its species investigated hitherto have high and aneuploid chromosome numbers. Some species of *Stoloniferae* show vivipary (N a n n f e l d t, 1935, p. 18). It should be added, too, that Nannfeldt (1940, p. 58) assumes that the section *Stoloniferae* is of hybrid origin and has originated from inter-sectional crosses.

The new viviparous species from the High Tatra is named *Poa nobilis*. Its latin diagnosis and detailed description are given below:

P o a n o b i l i s S k a l. n. sp.

Perennis; stolonifera pluricaulis; innovationes intra- et extravaginales. Culmi erecti graciles 30 — 40 cm alti, saepe bifoliati, vagina folli superioris quam lamina longior. Folia viridia 2 — 3 mm lata in pagina superiore glabra. Ligulae ad 3 mm longae subacutae sublaceratae.

Paniculae 4.5 — 8.5 cm longae. Apex inter-et post-anthesin subpendulus. Rami gracillimi superiores singuli simplices, inferiores bini vel singuli longae, adscendentes vel horisontales, in parte distali ramosi 2 — 4 spiculas gerentes.

Spiculae biflorae; flos basalis non-transformatus, flos superior viviparus.

Glumae atro-violaceae, longae (gl. inferior 3 — 4 mm, gl. superior 4 —4.5 mm); carinae glabrae vel apicem versus sparse spinulosae.

Lemmata florum basalium 5-nervia, 4 — 4.5 mm longa; carinae et nervi submarginales (ad 3/5 — 2/5) pilis longissimis crispis ornatae.

Paleae florum basalium inter carinas glabrae; carinae usque ad 0.8 semipilosae ad apicem glabrae.

Antherae semi-steriles non-dehiscentes.

Cum *Poa alpina* L. var. *vivipara* L. confusa, sed presentia stolonum culmis elatioribus, lemmatis crispo-villosis praeterea antheris nondehiscentibus et majore numero chromosomarum (2n = c. 62 — 82) distincta. E *Poa granitica* B r. B l. valde affinis sed differt foliis caulinis brevioribus, paniculae ramis singulis vel binis (nec ut in P. granitica 2 — 7), spiculis bifloribus viviparis (in *P. granitica* 3 — 7-floribus non-viviparis), glumis atro-violaceis (in *P. granitica* violaceis et flavo variegatis) etc.

Habitat in reg. alpina Tatrorum, rarius in reg. Mughi; solo granitico.

Perennial viviparous species. Plants tall or sometimes mediumsized. in nature mostly 30 — 40 (— 45) cm high, forming tufts with intra- and extra-vaginal shoots and developing also stolons. By this detail they are readily distinguished from *P. alpina* L. var. *vivipara* L. with which they might be confused in view of their vivipary.

Culms slender with two nodes; the upper internode long, reaching the length of 15 — 23 cm, the lower internode is notably shorter attaining hardly the length of 7 to 10 cm.

Leaves rather broad (2 — 3 mm), green. Upper surface smooth. The tips are abruptly pointed. Uppermost culm leaf with a very short blade: sheath c. 8.5 cm long, blade c. 4 cm long. The second leaf is of a similar shape but it is somewhat longer. The ligule attains the length of 3 mm; it is subacute, slightly lacerate.

The wholly developed panicle is 4.5 to 8.5 cm long, somewhat unilateral, usually drooping apically; in most biotypes it is rather loose, chiefly in its lower part, with relatively long spreading lateral branches; in some biotypes it is somewhat more compact. Basal panicle branches gracile 1,5 to 2.5 cm long, ramified, single or in pairs; distal branches shorter, single. The lateral branches bear 2 to 4 spikelets which are shortly pedicelled.

Spikelets two-flowered; the basal flower develops anthers and a rudimentary pistil while the second flower takes part in the formation of a bulbil. In some biotypes however (N. 224 and 245) no rudiments of anthers and pistil could be detected in the spikelets; such spikelets are one-flowered and develop a single bulbil.

The glumes are dark purple in most biotypes. They are rather long: first glume 3 — 4 mm long, c. 1.5 mm broad; second glume 4 — 4.5 mm long, c. 2 mm broad. The glumes are smooth or they may bear on the distal part of the keel very few small dentiform scabrities, fewer than on glumes of *P. alpina*.

Lemma of the basal flower 5-nerved, 4 — 4.5 mm long, distinctly keeled. The basal parts of the keel and of the marginal nerves are

densely covered to 3/5 — 2/5 by long thin twisted hairs which distally pass gradually into shorter straight silky hairs and in the upper part pass into short dentiform scabrities. Sometimes in the lower parts of the intermediate nerves also a few rather short hairs may appear.

The long and thin twisted hairs of the lemmata distinctly contrast with the adpressed straight silky hairs occurring on the lemmata of various clones of *P. alpina vivipara*. They differ too, from the undulate long hairs of the lemmata of *P. granitica*.

Palea of the basal flower 2.5 to 3 mm long, smooth. The keels are semi-pilose; the upper 0.2 and the basal 0.3 of the total length of the keels are free of scabrities. In the lower part longer hairs occur on the keels; they pass gradually into shorter dentiform scabrities.

In *P. alpina* the pilose part of the keels is longer: the dentiform scabrities extend till to the top of the palea, contrasting in this respect both with *P. nobilis* and with *P. granitica*. The hairs in the lower part are more elongated. In *P. granitica* the keels are covered in the pilose part with approximately uniform rather short bristle-like hairs.

The anthers of the basal flower show usually a defective development. They are non-dehiscent and contain chiefly abortive pollen, the proportion of viable grains usually not exceeding 10%. The viable grains are rather small as compared with those of the viviparous clones of *P. alpina*, in spite of the notably higher chromosome number; their diameter ranges from 26 μ to 33 μ; occasionally formed giant pollen grains attain c. 40 μ in diameter. In *P. alpina* v. *vivipara* the anthers are dehiscent and well developed; the pollen is fertile in a high proportion. The diameter of the pollen grains varies according to the chromosome number of the clones. In the two chromosomic types occuring in the High Tatra the mean values of the pollen diameter are: 29 μ for the type with 26 chromosomes and 34.5 μ for the type with 33 chromosomes. On the other hand, various biotypes of *P. granitica* show notable differences in respect of their pollen fertility; in most instances however the anthers are dehiscent but the pollen fertility is very low.

The floral parts of the second flower in the spikelet are transformed taking part in the formation of the propagule. The lemma develops into the first leaf of the bulbil. At maturity each bulbil has usually 3 leaves with narrow and elongated blades.

The above description of the new species is based chiefly on specimens from the valley Za Mnichem and the pass Wrota Chałubińskiego (Plate II, Fig. 5, 6) which should be considered as the type locality of *Poa nobilis*.

It has been mentioned already that the viviparous biotypes assigned to the new species show some degree of diversity. The most marked deviation from the type has been observed in two biotypes originating

from one habitat (N. 224 and 245). Their spikelets were one-flowered, narrower and longer (glumes: length 4 mm and 5.5 mm, width — 1 mm; lemma 5.5 mm, width 1.5 mm). The hairs of the lemma were of the usual type (long and twisted) they were however somewhat shorter and less interwoven than those of the other biotypes; they were confined to the lower half of the nerves. The palea was transformed into the first leaf of the single bulbil. No rudiments of anthers and pistils could be detected in the spikelets. It should be added that these two biotypes had lower chromosome numbers ($2n = 61 — 62$) than plants from other habitats ($2n = 72$, 76, c. 80, 82).

The above description of the new species shows that *P. nobilis* which is distinct from *P. alpina* v. *vivipara* evidently does not represent a viviparous form of *P. granitica*. It approaches in some respects the latter species but in some details it is similar to *P. alpina* while in others it seems to be intermediate between the two species. In the occurrence of stolons it corresponds to *P. granitica;* it differs however from this species as regards the shape of the cauline leaves the blade of which is shorter and more abruptly pointed, thus, similar to *P. alpina*. The shape of the ligule is intermediate.

As far as the inflorescences are concerned, the estimation of the differences between viviparous and seminiferous types presents difficulties in view of the reduction of the number of florets in viviparous spikelets and the transformation of their floral parts. The comparison of the characteristics is limited therefore to the glumes as well as the lemmata and paleae of the basal flowers which in the majority of the viviparous biotypes of *P. nobilis* and of *P. alpina* have remained unaltered. The glumes of *P. alpina* are usually dark purple, the various clones however lack uniformity in this respect; in some strains the anthocyanin is absent. In *P. granitica* the glumes show a striking variegation (purple and yellowish); by this detail its specimens may be readily identified in nature. Such a variegation has been never observed in the clones of *P. nobilis* the glumes of which are dark purple. Differences in the hairiness of the lemmata as well as the shape and distribution of the scabrities on the keels of the paleae have been mentioned above. The described differences are well marked and justify the recognision of *P. nobilis* as a separate species. Details of its anatomical structure give a further support to this opinion.

CYTOLOGY

The somatic chromosome numbers of all strains of *P. nobilis* studied hitherto proved to be relatively high and aneuploid. They show some degree of differentiation: they range from c. 61 to 82, the number 72

PLATE I

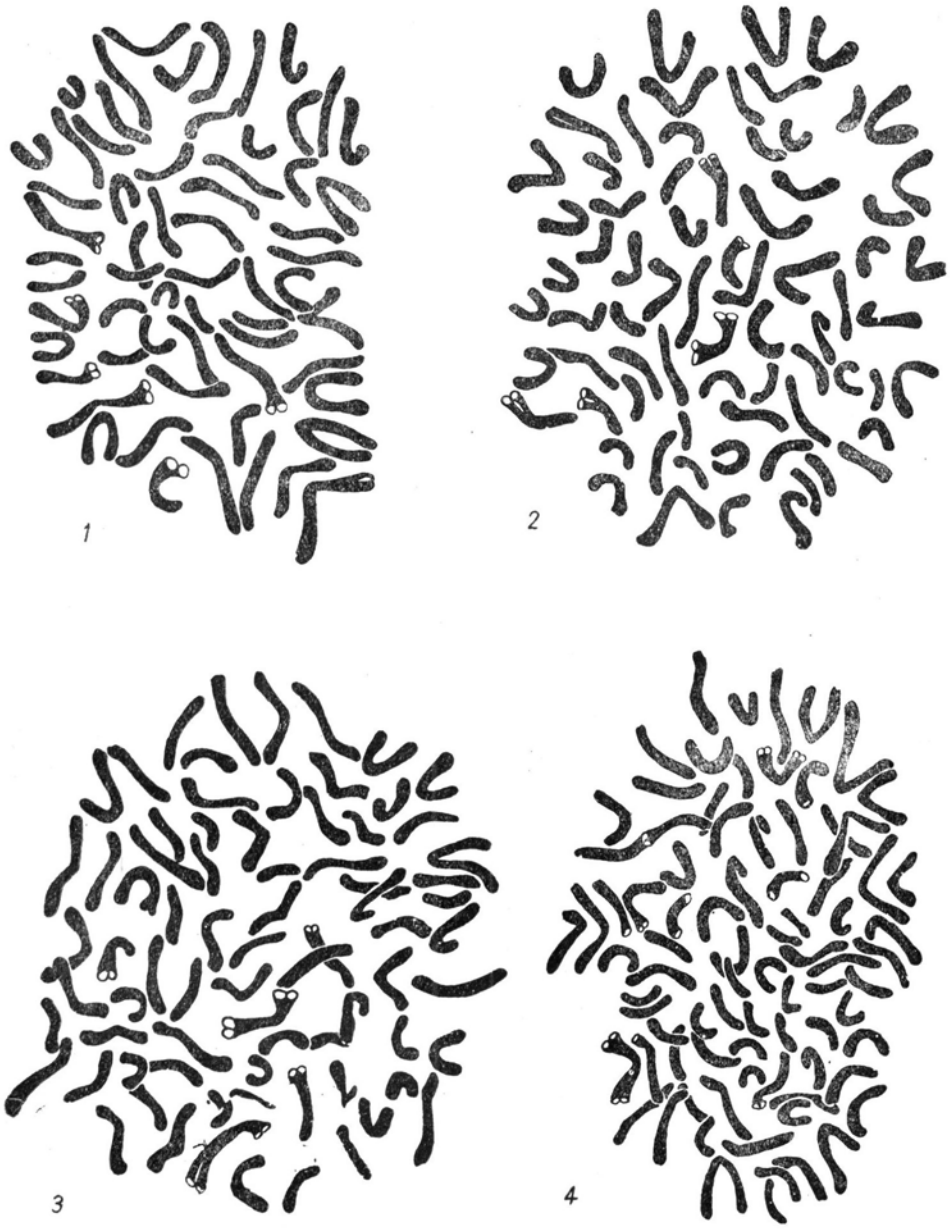

Fig. 1 — 4. Somatic metaphases from root tips of *Poa nobilis*. 1 — clone 224 (61 chromosomes); 2 — clone 215 (72 chromosomes); the same plate as that on the photo, Fig. 7; 3 — clone 214 (76 chromosomes); 4 — clone 31 (82 chromosomes) (× c. 4000).

occurring most frequently (Table I). Somatic plates of four chromosomic types, with 61, 72, 76 and 82 chromosomes are represented on figs 1 — 4 and 7. By these high numbers of chromosomes *P. nobilis* differs distinctly from *P. alpina* v. *vivipara* from the Tatra Mts (Skalińska 1952) and from other geographic areas (Müntzing, 1933, 1940, 1954; Böcher, 1938, Böcher and Larsen, 1950, Nygren, 1950). The type of cytological differentiation of this species is parallel to that found in the representatives of the section *Stoloniferae* to which it should be assigned on the basis of its morphology.

According to the results obtained by Akerberg (1942) and by Löve (1952) *P. pratensis* and its relatives show a striking diversity in respect of their chromosome numbers: in ssp. *eu-pratensis* they range from 50 to 124 (Akerberg); in the closely related Icelandic *P. irrigata* the numbers range, according to Löve, from 84 to 147. A further representative of this section, *P. arctica* R. Br. with its five subspecies described by Nannfeldt (1940) and studied cytologically by him and by Nygren (1950) shows likewise a rather high degree of cytological differentiation (2n = 39 to 88). The lowest chromosome number, viz. 39, belongs to the viviparous ssp. *stricta* (Lindeb.) Nannf. In the Tatra Mts the species *P. granitica* Br. Bl. which likewise belongs to the *Stoloniferae* also manifests some degree of cytological differentiation; the chromosome numbers in the various strains investigated hitherto by the present author range from 64 to 94 (Skalińska, 1954 and unpublished). Variable and aneuploid chromosome numbers occur also, according to the investigations of Hartung (1946) in some American species related to *P. pratensis* (*P. arida* Vasey, *P. nervosa* (Hook.) Vasey.). The cytological differentiation of *P. nobilis* is in a good accordance with that of the representatives of the section *Stoloniferae* studied till now.

THE PROBLEM OF THE ORIGIN OF *POA NOBILIS*

A few words should be added in respect of the putative origin of *P. nobilis*. Some details of its morphology and its anatomical structure suggest its hybridogenous origin. In their anatomical structure the plants studied seem to represent a combination of the features of *P. granitica* with those of *P. alpina* v. *vivipara* with a distinct prevalence of the latter species. In their morphology they are related to *P. granitica*, although in some details they approach *P. alpina* v. *vivipara*. It is possible therefore that *P. nobilis* had arisen from repeated crosses of *P. granitica* with viviparous strains of *P. alpina* which are widely distributed in in the High Tatra and produce viable pollen. Crosses of this type may lead to the production of biotypes with different chromosome numbers in view of the

Fig. 5

Fig. 6

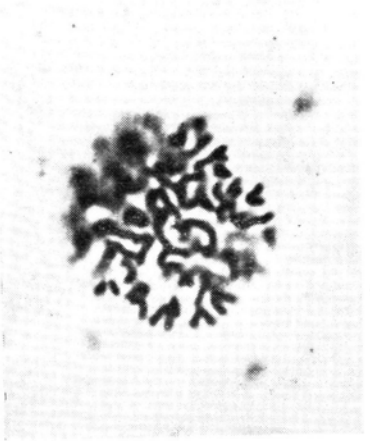

Fig. 7

Fig. 5 — Photo of a living specimen of *Poa nobilis* from the pass Wrota Chałubińskiego (clone 83). Note the occurrence of stolons (0.37 nat. size).

Fig. 6 — Photo of panicle with well developed bulbils (clone 83) (0.75 nat. size).

Fig. 7 — Microphoto of a somatic plate with 72 chromosomes (the same as Fig. 2, clone 215 (× 1750).

fact that neither of the two putative parent species is cytologically uniform.

The above assumption gains some support in the opinion of Nannfeldt (1940) concerning the putative origin of the species belonging to the section *Stoloniferae*. According to his hypothesis, they had originated from inter-sectional crosses: the patterns of evolution of *P. pratensis* L. and of *P. arctica* R. Br. involve repeated crossings and repeated chromosome summations resulting from facultative apomixis as well as intercrossing of the crossproducts (p. 58). A third species of this section, *P. granitica* Br. Bl. seems to parallel the two other species in its putative mode of origin; it is at least partially apomictic (Skalińska, 1954 and unpublished). The occurrence of inter-sectional hybrids within the genus *Poa* has been recorded frequently; these facts are important since they afford a support to the conceipt of Nannfeldt; natural hybrids between *P. alpina* (sect. *Subbulbosae)* and species of the sections *Oreinos* and *Stoloniferae* have been studied and identified by this author (Nannfeldt, 1937). The ability of forming intersectional hybrids in the genus *Poa* has been also proved by the experiments carried on in the Department of Plant Biology, Stanford, California, by Clausen, Grun et al. (1951, 1952). Artificial hybrids between the American species *Poa ampla* and *P. compressa* L. have been obtained by these authors. It should be added that *P. compressa* represents a species which has been placed by Nannfeldt, in agreement with Ascherson and Graebner, in a separate group *Tichopoa* (Nannfeldt, 1935, p. 20).

One of the two well known intersectional hybrids verified by Nannfeldt is represented by *P. jemtlandica* (Almqu.) Richt.; it is considered as a hybrid of *P. alpina v. vivipara* with *P. flexuosa* Sm. *Poa jemtlandica* is viviparous; its occurrence is restricted to central Scandinavia and Scotland; it represents a uniform group with the chromosome number $2n = 37$. The second intersectional hybrid — *Poa herjedalica* H. Smith is likewise viviparous; it is regarded as a hybrid of *P. alpina* v. *vivipara* with *P. pratensis* ssp. *alpigena*. Contrasting with *P. jemtlandica,* this hybrid manifests a high degree of diversity and represents also with regard to its chromosome numbers a non-uniform group ($2n = 47 — 80$) which, according to Nygren (1950, p. 56) bridges the two complexes corresponding to the putative ancestral species. Its area of distribution is larger than that of *P. jemtlandica;* its biotypes are widely spread in the Scandinavian mountains; it occurs also in the arctic.

Poa nobilis seems to represent in the flora of the High Tatra a species to some extent parallel to *P. herjedalica*. Like the latter form, it seems to have arisen from inter-sectional crosses; it manifests, though in a lesser degree, a morphological diversity and a cytological differentiation; it is,

likewise, viviparous and it is well established in some natural habitats on higher elevations. Its distribution in the High Tatra has not been yet studied adequately, its area however seems to be not as large as that of *P. herjedalica*. The habitats detected hitherto are distributed exclusively in the granitic (south-eastern) part of the Tatra Mts, chiefly on slopes and passes of mountain ridges in the surrounding of the lake Morskie Oko; the clones from these habitats represent the most typical forms of *P. nobilis*. Two somewhat aberrant biotypes (224 and 245) originated from a habitat situated more north-westwards. In addition to these two centres, isolated plants (listed at the end of Table I, 84 and 247) have been found in 1950 on the north-eastern slope of Mt. Kasprowy and in 1954 on its peak; the indigeneity of these plants however in the mentioned places seems doubtful in view of the fact that Kasprowy represents a track widely attended by tourists, thus, the respective plants might have been accidentally brought there in the form of bulbils from some unknown habitats on adjacent mountain ridges. A search for new habitats of *Poa nobilis* in the Tatra Mts will be undertaken in the next seasons.

In the assumption concerning the origin of *P. nobilis*, the viviparous form of *P. alpina* is considered as the putative pollen plant while *P. granitica* possibly represents the second ancestral species. The latter is an endemic species of the Carpathian range and is widely spread in the alpine layer of the High Tatra. It has high and aneuploid chromosome numbers and shows some degree of cytological differentiation. The two putative ancestral species and *P. nobilis* occur in the High Tatra in similar types of habitats, sometimes growing side by side.

It should be added that besides *P. granitica* also another species belonging to the *Stoloniferae*, viz. *P. pratensis* L. is growing in the Tatra Mts. The part of this species in the production of *P. nobilis* however is less probable in view of some differences in the anatomical structure of that species and *P. nobilis*. In ought to be emphasized too that *P. nobilis* is ecologically more similar to *P. granitica* than to *P. pratensis;* the two former species represent oreophytes; on the other hand *P. pratensis* has a remarkable ability to develop in a variety of habitats. In the Tatra Mts it is common chiefly on limestone at lower altitudes in valleys and mountain meadows, it ascends however sometimes to higher elevations and may be found there, also in the granitic part, in the form of dwarfed specimens.

It is well known that a large number of species occurring in nature are of a presumable hybrid origin, thus, in this respect *Poa nobilis* is by no means an exception. For the processes of inter-specific hybridisation especially favourable conditions seem to exist in high mountains, as it has been recently pointed out by S t e b b i n s (1954). In these regions with their great ecological diversity within relatively small areas numerous

forms of putative hybrid origin have become subsequently stabilised by some special reproductive mechanisms and are considered by taxonomists as deserving the rank of species. Apomictic forms of this origin are frequent, according to Stebbins, in the mountain flora of North America and of the Alps. The same seems to be true of the Tatra Mts with the abundance of related species within various genera and their ability of intercrossing.

Among the *Gramineae* the genus *Poa* is one of the most remarkable in this respect. Its evolutionary patterns involve intersectional crosses and intercrosses of the products of initial hybridization as well as chromosome doublings and summations resulting from facultative apomixis. In this way high and aneuploid numbers have been attained chiefly in the *Stoloniferae;* all species belonging to this section are, according to the hypothesis of N a n n f e l d t (1940), of hybrid origin. They show a various degree of intraspecific diversity and are able to hybridize with some other species. If one of the parent species represents a viviparous form, the cross-products may give forms which are fixed at once in the way of vivipary. Some degree of polymorphism of such hybrid populations in nature is evidently due to the frequently occurring intraspecific differentiation of the parent species. In spite of some degree of diversity however such hybrid populations represent in respect of their morphology and ecology well defined groups which proved able to establish themselves in a number of natural habitats. One of the well known viviparous forms of this origin which have received specific names is represented by *Poa herjedalica* widely spread in the mountains of Scandinavia and in the Arctic. *Poa nobilis* is a parallel mountain species occurring in the High Tatra.

SUMMARY

A new viviparous species of the genus *Poa*, named *Poa nobilis* (Latin diagnosis see p. 751) is described. This species is native in the alpine layer of the High Tatra. It is presumably of hybrid origin. Living plants representing biotypes collected in eight well separated natural habitats have been investigated and their chromosome numbers were determined from root-tip mitoses. The biotypes of *P. nobilis* represent a group well defined morphologically in spite of some degree of polymorphism connected with a cytological differentiation. On the basis of its morphology the new species ought to be assigned to the sect. *Stoloniferae* which, according to N a n n f e l d t (1940) had arisen from intersectional crosses. The chromosome numbers of *P. nobilis* also are in good accordance with those occurring in the *Stoloniferae:* they are relatively high and aneuploid, ranging in various biotypes from 61 to 82 (Table I). Details of the morphology and

the anatomical structure of *P. nobilis* throw some light upon its putative origin. *P. nobilis* combines the characteristics of two species growing in the Tatra Mts: *P. granitica* Br. Bl. (Sect. *Stoloniferae)* and *P. alpina* L. var. *vivipara* L. (Sect. *Subbulbosae);* these two species are considered as the putative ancestral forms from which *P. nobilis* has evolved. Thus, in its hypothetic origin the new species also parallels to some extent other species of the *Stoloniferae.*

The author's thanks are due to the persons who have kindly contributed plant specimens for the present study and to Prof. B. Pawłowski (Botanical Institute, Univ. of Krakow) and Dr. W. B. Turrill (Kew Herbarium) for taxonomical informations.

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(Entered 30.V.55)

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