Poa Series Bulbosae Roshev. of Palestine and Syria

Author(s): Naomi Feinbrun

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XXXV — POA SERIES BULBOSAE ROSHEV. OF PALESTINE AND SYRIA.

NAOMI FEINBRUN (Hebrew University, Jerusalem).

The series *Bulbosae* has recently been distinguished from the Sect. *Bulbophorum* Asch. et Gr. by Roshevitz (1934). This series comprises those species of *Poa* whose sheaths of radical leaves are thickened to form small bulbs tunicated by sheaths of preceding years. The region of concentration of species which comprise this group is the Irano-Turanian (Eig, 1931). While the European species of Sect. *Bulbophorum* have been studied in some detail (Ascherson and Graebner, 1900; Hegi, 1907; Achtaroff, 1939), little was known of the Asiatic group of species until rather recently. In the Flora URSS (1934), a revision of the Russian species of this group is given by Roshevitz. No revision, however, of the species of the Near East has been made since Boissier (1884). These are insufficiently known both taxonomically and phytogeographically. We may cite the following passage on the S. European *P. Timoleontis* Heldr. (*P. bulbosa* ssp. *Timoleontis*) by Achtaroff (1939, 130): "Meiner Schaetzung nach muss diese Unterart als das letzte und das xerophilste Glied in der phylogenetischen Entwicklung der Sektion Bulbophorum betrachtet werden."

A revision of this group from Palestine and Syria seems thus to be desirable.

The species belonging to this group and reported from Palestine are as follows (Post, 1896, 1933; Eig, 1932):—(1) *P. bulbosa* L., (2) *P. sinaica* Steud., (3) *P. Hackeli* Post.

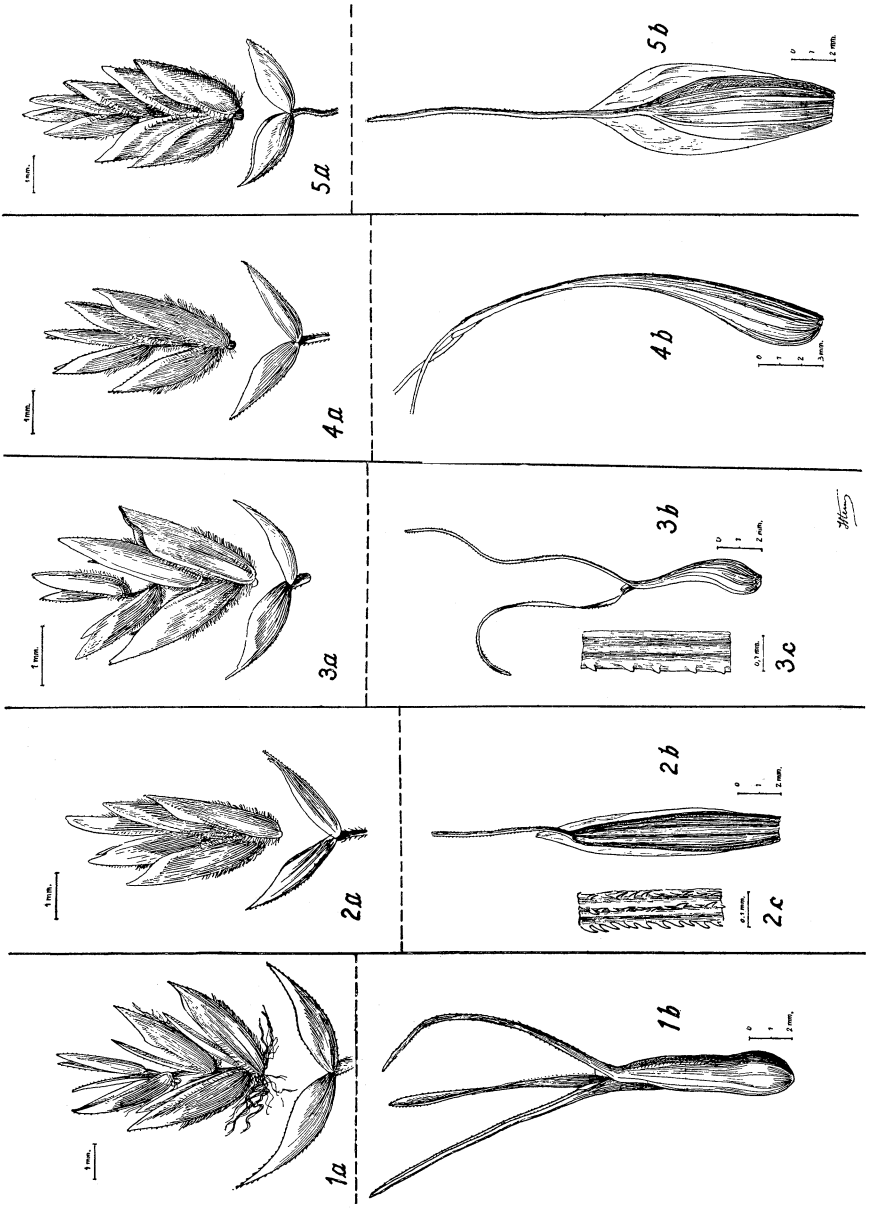
For Syria two more species are recorded:—(4) *P. macroglossa* Hack. and (5) *P. Timoleontis* Heldr.

However, since Post no new data have been obtained on the last four species.

This revision is based on the abundant material preserved at the Herbarium of the Hebrew University, Jerusalem, and collected by the staff of the Botanical Department during phytosociological and phytogeographical studies conducted especially in the steppe and desert sections of Palestine, Syria and Iraq. We were also able to examine the material found at the Dinsmore Herbarium (Jerusalem) and the Post Herbarium (Beirut).*

* The author wishes to express her gratitude to Mr. J. E. Dinsmore for placing at her disposal the material of his Herbarium and for help in procuring the type specimens of Post's Herbarium.

PLATE VII



1. *Poa bulbosa* L. 2. *P. sinaica* Steud. 3. *P. Eigii* Feinbr.
4. *P. Hackeli* Post. 5. *P. Timoleontis* Heldr.

a. Spikelet. *b*. Bulb or sheath or radical leaf with ligula.
c. Portion of lamina showing scabrosity.

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KEY TO POA SER. BULBOSAE ROSHEV. OF PALESTINE AND SYRIA.

1. Rhachis of spikelet always bearing long fleece at the base of the lower pales. Height of plant 15–30 cm.....**P. bulbosa** *L.*
   Rhachis of spikelet destitute of long fleece at the base of the lower pales, or, when bearing a few long hairs, height of plant 35–50 cm.....2
2. Ligules of radical leaves and tips of membranous sheaths enveloping the bulbils, 2–4 mm. long, produced above the tufts; blades densely scabrous at the margins and along prominent nerves (fig. 2b, c).....3
   Ligules of radical leaves and tips of membranous sheaths short, generally not produced; blades sparsely scabrous at the margins (fig. 3b, c).....4
3. Sheaths of radical leaves obovate, scarcely 1 cm. long; their ligules about 4 mm. long, generally entire, continued as broad margins of the sheath (fig. 5b). Plant 10–20 cm., rarely 25 cm. high. Spikelets 6–10-flowered.....**P. Timoleontis** *Heldr.*
   Sheaths of radical leaves usually more than 1 cm. long, oblong; ligules about 2 mm. long, generally fringed; plants 15–25 cm. high and then 4–5-flowered, or tall plants, 30–35 cm. high, with 6–7-flowered spikelets (Moab).....**P. sinaica** *Steud.*
4. Plants 10–25 cm. high forming dense and short tufts; glumes 2–2·5 mm. long; panicle 2·5–5 cm. long; sheaths of radical leaves about 1 cm. long.....**P. Eigii** *Feinbr.*
   Plants 35–50 cm. high growing in small, mostly isolated tufts; lower glumes 3–3·5 mm. long; panicle 5–10 cm. long; sheaths of radical leaves 2–3 cm. long.....**P. Hackeli** *Post*

ENUMERATION.

Poa bulbosa *L.* Specimens seen* :—Palestine: Upper Galilee: Ramah (1927 Smoly); Birket-Ram (1925 Smoly). Mt. Carmel, near Haifa (1923 E). Judean Mountains: Jerusalem, Mt. Scopus (1931 Amdursky); Jerusalem, Gehenne (1924 E); Wadi Shiban (1930 FZ); Motsa (1924 E); env. of Bethlehem (1924 E). Amman: env. of Ain Sueli (1929 EZ). Moab: Medaba (1911 Meyers & Dinsmore). Syria: Amanus Mts., Col de Beylan, 700 m. (1932 Delbes); sortie Est d'Antioche, 100 m. (1935 Delbes); ca. Aleppo (1931 Z); Lebanon, Brummana (1900 Warburg); Antilebanon (1930 Warburg).

The outstanding differential characteristic of this species, as compared with other species of this group, is the presence of long crisp fleece on the rhachis of the spikelet at the base of the lower pales

* Abbreviations:
Collectors: E—Eig, F—Feinbrun, G—Grizi, Z—Zohary.
Herbaria: DH—Dinsmore Herbarium, American Colony, Jerusalem.
PH—Post Herbarium, Beirut.
When not otherwise mentioned the specimens are from the Herbarium of the Hebrew University, Jerusalem.

(fig. 1a). *P. bulbosa* is a rather low grass (15–30 cm. high), forming small, more or less isolated tufts, with inflated bulbils at the base (fig. 1b). In Palestine, this species shows forms transitional to *P. Hackeli* Post (see below). Viviparous forms are rather frequent.

According to its geographical range this species is a plant of the Euro-Siberian-Boreo-American, Mediterranean, and Irano-Turanian regions (Eig, 1932). Roshevitz (1934) reports this species from European Russia, W. Siberia, and the Caucasus (Euro-Siberian-Boreo-American region), and from Middle Asia (Irano-Turanian region). In Palestine and Syria, however, we found it only in the eu-Mediterranean territory. There it generally appears in the last degradation stages of the constantly destroyed shrub associations, and occasionally in somewhat ruderal localities. Eig, Feinbrun, and Zohary (1934) regarded it chiefly as an Irano-Turanian species. This was based on the fact that they comprised under the name *P. bulbosa* four different species, *P. bulbosa, P. Hackeli, P. sinaica,* and *P. Eigii.* The associations in which *P. bulbosa* is given by them as principal indicator refer to the last two species which are actually Irano-Turanian. Only the following passage can be referred chiefly to the true *P. bulbosa* : " In Mediterranean Palestine *P. bulbosa* is a leading plant of an association of a very limited extension, but the genesis of this association reveals rather a secondary origin."

It is a matter of doubt whether the *P. bulbosa* of the United States is conspecific with the European plant. It is most probably a separate species, differing in height (it is 30–60 cm. tall) and in several other characteristics (Halperin, 1931, Hitchcock, 1935). Halperin, who gives a detailed description of the Californian *P. bulbosa,* does not mention the fleece of the rhachis. The species is given as introduced from Europe. If so, it would be an interesting case of a new type developed during a few hundred of years at most.

P. Hackeli *Post.* Specimens seen :—Palestine : Judean Mountains : Solomon's Pools (1886 Post, type !, PH) ; Jerusalem (1924 E) ; Wadi Rijan (1930 FZ) ; Kiryath Anavim (1923 E). Acre Plain : Jidro (1927 Smoly). Sharon : Herzlia to Arsuf (1926 Z). Shefelah : Gedera (1927 EFZ) ; Shekhunath Borokhov (1927 EFZ). Near Negeb : Tel Milh (1922 E) ; Tel Arad (1922 E). Syria : Col de Beylan (1932 Delbes) ; ca. Riha (1931 Z) ; ca. Aleppo (1931 Z) ; Bshetfin (1899 Post, PH). S. Turkey : Aintab (1887, Post, type !, PH) ; Midyat (Post, type !, PH).

Post (1897) distinguishes this species from *P. bulbosa* as follows : " Species *P. bulbosae* L. affinis praesertim glumella carina marginibusque rigidule pectinato-ciliata basi non protrahendo-lanata distincta (In Poa bulbosa cilia mollia, basi convexa, lana protrahenda)." The most important difference thus would be the long fleece at the base of the lower pales of *P. bulbosa.* The examination of the three type specimens of *P. Hackeli* Post (1, Solomon's Pools ; 2, Aintab ; 3, Midyat) from Post's Herbarium (Beirut) showed, however, that their florets were not altogether destitute of long

crisp hairs. At the base of the 1–3 lower florets we found 2–3 long hairs, while the upper ones were destitute of them or bore 1–2 shorter hairs. These hairs could be easily distinguished from the rather long cilia of the keel and margins. In our Herbarium, however, we found many species of *P. Hackeli* completely destitute of fleece on the rhachis (fig. 4a). On the other hand we possess other specimens forming a series of transitions from the true *P. bulbosa* to *P. Hackeli*.

Another important characteristic of *P. Hackeli* is its height. Post gives it as " planta sesquipedalis," i.e. about 50 cm. high and so are the type specimens from Aintab and Midyat (S. Turkey), while that of Solomon's Pools (Palestine, S. of Jerusalem) is only about 35 cm. high ; the specimens of our Herbarium are 35–50 cm. high. As given by the majority of European Floras, the height of *P. bulbosa* is 15–30 cm. Our specimens of *P. bulbosa* correspond, therefore, to these measurements. However, we also possess a few specimens transitional both in presence of fleece and height between *P. Hackeli* and *P. bulbosa*, so that it is difficult to decide in which of the two species they should be classed. These transitional forms may have been produced at the meeting place of *P. bulbosa* and *P. Hackeli* by hybridization, or else *P. Hackeli* may be regarded as a more or less recent derivative of *P. bulbosa* still connected by transitional forms with its maternal species. At all events *P. Hackeli* seems to be nearer *P. bulbosa* than other Palestinian and Syrian species of the series *Bulbosae* Roshev. All other species of this region are completely destitute of fleece.

Other important characteristics of this species are : growth in small tufts remote from one another and almost destitute of remnants of preceding years (however it is not annual as described by Post) ; culms geniculate at base ; radical leaves with very short not produced ligules and their sheaths 2–3 cm. long (fig. 4b) and their blades about 5 cm. long, generally scabrous only at the margins ; panicle 5–10 cm. long.

P. Hackeli is an East-Mediterranean species. In Palestine it is chiefly restricted to non-eu-Mediterranean parts of the country. It occurs on the one hand on the light soils of the coastal plain, where it is rather common in natural non-Mediterranean associations (as *Helianthemetum elliptici* and others). On the other hand, it is found in the eastern and southern parts of the Judean Mountains, bordering on the Irano-Turanian Judean Desert and Negeb.

Poa Eigii *Feinbr.*, sp. nov. ; affinis *P. bulbosae* L., *P. Hackeli* Post, et *P. sinaicae* Steud., sed a prima flosculis lana non connexis, caespitibus densis compactis, a secunda plantis minoribus, vaginis foliorum basalium brevioribus residuis vaginarum vetustarum dense obtectis, paniculis brevioribus, a tertia ligulis foliorum basalium brevioribus, vaginis haud membranaceo-marginatis, laminis molliori-bus glabris margine scabriusculis, glumis acuminatis, glumellis brevioribus differt.

Perennis, dense caespitosa; culmi erecti, 10–25 cm. alti, basi bulbiformi-incrassati et foliorum vaginis residuis dense tecti; folia convoluta, tenuia, glabra, margine scabriuscula, radicalia numerosa, 2–4 cm. longa, ligulis brevibus (1–1·5 mm. longis), vaginis 1–1·5 cm. longis saepissime violaceis marginibus membranaceis destitutis; panicula anguste oblongo-lanceolata, 2·5–5 cm. longa, ramis brevibus strictis; spiculae confertae, ovatae; flosculi 3–5, lana non connexi; glumae subaequales, ovato-oblongae, acuminatae, 2–2·5 mm. longae; glumella oblonga, acutiuscula, saepe breviter mucronata, carina et margine dense et longe ciliata. Spiculae in gemmas foliiferas saepe mutatae.

Specimens seen :—Palestine : Judean Desert; km. 18 on the Jerusalem-Jericho road (1935 EZG, type !); Ain Hod (1935 EZ); Tal'at ed Dam (1935 EZ). Near Negeb : E of Tel-Arad (1934 EFZ); Qurnub to Beersheba (1934 EFZ).

This species differs from *P. bulbosa* L. chiefly in the lack of connecting fleece and in its dense compact tufts forming great patches or surfaces. From *P. Hackeli* Post it differs in the smaller size of the plant; in the short sheaths of the radical leaves, which are densely covered by the residues of sheaths of the preceding years; in the shorter panicle; the smaller lower glume (2-2·5 mm., not 3–3·5 mm. long). From *P. sinaica* Steud. it can be distinguished by short, generally not produced ligules of the radical leaves, not continued as a broad membraneous margin of the sheath (fig. 3b); by softer and glabrous leaves, scabridulous only at the margins (fig. 3c); by acuminate, more unequal glumes and shorter lower pales (fig. 3a).

Phytogeographically this species is to be regarded as belonging to the Irano-Turanian element. It is an endemic possessing a restricted area (only Judean Desert and Near Negeb), but there it is very important phytosociologically. It is an important component of several Irano-Turanian plant associations and forms their spring aspect (as for instance in *Noaea mucronata—Poa Eigii* association, *Ononis Natrix—Poa Eigii* association, etc.). Its high sociability is most remarkable. The plant vegetates for a very short season; the green colour that its tufts give to the mountain slopes at the beginning of the rainy season soon changes into a yellowish colour.

P. sinaica *Steud.* The confusion surrounding this species was probably caused by Boissier (1884). His description of the lower pales is erroneous and runs as follows: " . . . glumella . . .undique plus minusve pruinoso-scabrida," and further: " Ab affini *P. bulbosa* foliis tenuissimis, panicula angustiore, flosculis lana destitutis, glumellis undique pruinosis vel glabratis nec lineatim sericeis distincta. *P. concinna* Gaud. . . .differt . . .glumella ad carinam et margines sericea " (p. 606). This is rather puzzling because the original diagnosis of Steudel (1855, 256) is very clear on this point : " flosculis . . . margine dorsoque pilosis caeterum glabris." Probably

in accordance with Boissier, Schweinfurth described his var. *aegyptiaca*, reported by Muschler (1912, 135) as follows. "This variety differs from the typical form by . . . the flowering glumes with dense ciliate nerves." It is obvious that the var. *aegyptiaca* Schweinf. is identical with the type of *P. sinaica* Steud.

In Post's Herbarium, Beirut, there are several sheets of this species. One of them was determined by Hackel who, however, considered this species as "eine schwache Art" (in the letter to Post mentioned below). The eminent agrostologist probably did not have at his disposal a sufficient number of specimens and ignored the phytogeographical importance of this species. Now there is no doubt that *P. sinaica* is a good species; within this species we were even able to distinguish several paramorphs. It is also recognised as such by Roshevitz (1934).

The most characteristic features of this species are the following: —(1) Ligules of radical leaves and tips of membraneous sheaths usually enveloping the bulbil, produced above the tuft; length of ligule about 2 mm. (2) Blades of radical leaves very narrow, convolute, densely scabrous at the margins and along the prominent nerves of the lower surface (fig. 2c). (3) Bulbils oblong, often scarcely inflated below, densely covered by residues of sheaths of preceding years. (4) Tufts rather dense; culms generally not geniculate.

The following paramorphs were distinguished:

P. sinaica *Steud.* ssp. **typica** *Feinbr.* ssp. nov.

Plantae 15–25 cm. altae; flosculi 4–5; paniculae ramuli breves.

var. **aegyptiaca** *Schweinf.*

Glumellae margine dorsoque ciliatae.

Some of the specimens seen: Sinai: Near Tih, Escarpement (1882 Post, HP). Palestine: Moab: S. of Ziza, 700 m. (1937 Dinsmore No. 10571, HD). Edom: Ain Musa, near spring (1929 EZ); 40 km S. of Ma'an, Nubian sandstone (1929 EZ); Aneze to Ma'an (1929 EZ); 12 km. S. of Jurf ed Derawish, 1000 m., Artemisietum Herbae albae (1936 EFZ); 9 km. N. of Aneze, 1050 m., Halogetonetum alopecuroides (1936 EFZ). Syria: Ain el Wa'ul to Ain el Beidha; Nebk to Karyetein; Karyetein to Ain el Wa'ul (1890 Post, det. Hackel, PH); Tell esh Shamat, 87 km. E. of Damascus; 366 km. E. of Damascus; 538 km. E. of Damascus; Wadi Muhammadi, 105 km. W. of Ramadi; 47 km. E. of Ramadi (all: 1933 EZ); 65 km. E. of Deir es Zor (1939 Dinsmore, HD); Jebel Mukeibra, 30 km. W. of Soukhne, 800 m., 17 km. W. of Hussetché, 320 m.; 120 km. S. of Homs, 1430 m. Iraq: 9 km. N. of Tauq (betw. Baquba and Kirkuk); 140 km. N.E. of Deltawa, 180 m.; 35 km. N.W. of Kirkuk; 21 km. N.W. of Kirkuk; 15 km. N. of Altum Keupri, 320 m.; Jebel Atshan (E. of Mosul), 500 m.; 10 km. N.E. of Tel Abu Dahir, 400 m.; 35 km. N.W. of Mosul, ca. 540 m.; 2–3 km. N. of Balad Sindjar, 600 m. (all: 1933, EZ).

var. **glabrescens** *Feinbr.* var. nov.

Glumella tota glabra.

Specimens seen: Palestine: Edom: 23 km. S.W. of Ma'an (1936 EFZ type); Ain Musa, near spring (1929 EZ).

ssp. **moabitica** *Feinbr.* ssp. nov.

Planta elata (30–50 cm.); foliorum radicalium vaginae 3–4 cm. longae; panicula diffusa, usque ad 13 cm. longa et 5 cm. lata; rami elongati, inferiores 5–6 cm. longi, pedunculi ramorum parte reliqua saepe longiores. Spiculae 6–7-florae; glumella glabra.

Specimens seen: Palestine: Moab: Ziza to Um el Ammud (1929 EZ type); Amman to Ziza (1929 EZ).

The geographical area of *P. sinaica* is wide, and extends over Galala of Egypt, Sinai Pensinsula, the steppe parts of Transjordan, Eastern Syria, and the Syrian Desert up to Iraq. It probably continues through Persia and is reported from Transcaucasia and Russian Middle Asia. *P. sinaica* is a typical steppe plant and, in the Near East at least, is very important phytosociologically. In the *Poa bulbosa-Carex stenophylla* and *Phlomis Bruguieri-Poa bulbosa* associations mentioned by Eig, Feinbrun, and Zohary (1934), the name *Poa bulbosa* must be replaced by *Poa sinaica*. The same relates to the *Poa bulbosa-Carex stenophylla-Ranunculus asiaticus* association characteristic of oviposition fields of the Moroccan locust. (Eig, 1935).

P. Timoleontis *Heldr.*—The record of this species from Syria in Post's Flora is based upon one specimen from El Beidha to El Jebah (Syrian Desert). This specimen, marked No. 5, was sent for determination to Hackel who designated it in his letter to Post as " genau gleich den Original-Exemplaren." Comparing this specimen with the specimens of *Heldreich* 104 we find that it is rather untypical as to its ligules, forming a transition to *P. sinaica* from which *P. Timoleontis* was never differentiated. The differential characteristics of *P. Timoleontis* are: (1) Ligules of radical leaves longer (3–4 mm.) and broader than in *P. sinaica* (fig. 5b). (2) Sheaths of radical leaves obovate, not oblong, with broader membranous margin. (3) Leaves setaceous, narrower than in *P. sinaica*. (4) Spikelets 6–10-flowered. (5) Height of plant 10–25 cm.

Phytogeographically *P. Timoleontis* differs from *P. sinaica*, which is an Irano-Turanian species. The area of *P. Timoleontis* is the Balkan Peninsula reaching as far as S. Dobrogea in the north; it grows often in community with *P. bulbosa* (Hermann, 1939). The isolated station of this species in the Syrian Desert is rather curious. Further findings are necessary to confirm its occurrence there.

At the same time there is evidence for assuming that the so-called *P. macroglossa* Hack. from Aintab (S. Turkey) is the viviparous form of *P. Timoleontis*. We shall now discuss this species.

P. macroglossa was published first in Post's Flora (1896) with reference to a letter of Hackel (" Hackel in letter "). The letter,

dated 1890, is found attached to the type specimen of this species in Post's Herbarium. The respective passage may be cited here : " Die *Poa* von Aintab ist sehr interessant. Mit *P. bulbosa* ist sie nicht nahe verwandt, sondern mit *P. alpina* L., doch scheint sie mir auch von dieser durch die sehr grosse gezaehnte Ligula hinlaenglich verschieden zu sein. Jedoch kann ich auf Grund des einzigen Halmes kein sicheres Urteil abgeben, umsoweniger als das uebersandte Exemplar kein normales, sondern *vivipar* ist. Aber auch hierbei verhaelt es sich anders als *P. alpina* und *P. bulbosa*. Denn bei letzteren entspringt die aus der Spelze hervorwachsende Laubblattspreite (lamina) aus der Spitze, bei Ihrer *Poa* aber auf dem Ruecken. Ich glaube demnach wohl annehmen zu duerfen, dass es sich hier um eine neue Art handelt, welche ich provisorisch (wegen der grossen Ligula) *P. macroglossa* nenne ; allein ich wuerde dieselbe nicht eher publizieren, bis ich davon mehr Material und namentlich auch Examplare mit entwickelten *Blueten* (nicht Brutknospen, propagula, vulgo " flores vivipari ") gesehen haben werde. Vielleicht gelingt es Thoren naechstes Jahr, solche zu erlangen." However, as testified by the remark of Post (1896 and 1933), normal specimens of the species have never been collected. He wrote : " The only specimens thus far seen are the so-called viviparous forms." No other specimens are found in Post's Herbarium. As emphasised by Hackel, it is impossible to establish a species upon a few viviparous specimens. To ascertain if the curious ligules of the viviparous bulbils occur in *P. sinaica*, we examined many viviparous specimens of this species, but found none similar to those of Aintab. However, the description of the viviparous form of *P. Timoleontis* given by Hermann (1939) corresponds fairly well to *P. macroglossa*. It is curious that on one of the two sheets of *P. macroglossa* we found the following remark made by Post : " Barbey in Plantae Postianae, 14, says that it is *Poa Timoleontis*, Heldr. forma *vivipara* " (cf. Pl. Postianae, fasc. 1, p. 14). *P. macroglossa* must be thus regarded as conspecific with *P. Timoleontis*. This widens the geographical range of this species further east to S. Turkey and the Syrian Desert. More detailed investigation of the plant in this part of its area, especially with regard to its phytosociology, would be desirable.

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XXXVI—SOME FUNGI FROM AFGHANISTAN.

B. B. MUNDKUR (Imperial Agricultural Research Institute, Delhi).

In the summer of 1939 I paid a hurried visit, lasting about six weeks, to Afghanistan. The trip, which began on the 25th of June, covered nearly 2700 miles in the northern, eastern and southern parts of the country. The north-eastern part, comprising the Pamirs and Nuristan, the central part known as the Hazarajat and the western part, comprising the province of Herat, could not be visited as the roads had been damaged and bridges washed away by the unprecedented floods of the previous spring.

Afghanistan is for the most part a mountainous country, but in the north stretches a vast prairie-like region, the southerly extension of the great central Asian Steppe. The mountains are mostly barren and vegetation is rather scarce. In the valleys which are traversed by the rivers, however, principal among which are the Kabul and the Kunduz, intensive cultivation is carried on by the people. The rivers are in spate in the late spring and early summer, but for the rest of the year they are usually dry. Annual precipitation is chiefly in the form of snow in winter ; rain is scarce.

Conditions on the whole apparently did not favour the growth and development of fungi, and the damage due to them in fields, orchards and vineyards was negligible. Both because of the scarcity of fungi and the hurry with which the journey was made, there was little time to make either close observations or any extensive collections. The few collections that were made have been