NOTES ON INDIAN GRASSES—PROLIFERATION IN SOME MORE GENERA

The term poliferation refers to abnormal multiplication of certain parts, or growth of redundant parts or offshoots, and also to conversion of certain parts of reproductive shoots into vegetative shoots. It is in the last sense that the phenomenon of proliferation comes very close to vivipary, a term with which proliferation is considered by some to be synonymous. Stebbins (1950), Bor (1960), Arber (1934) and Joshi (1932-1933) have used the term vivipary strictly for those cases where seeds start germinating on the mother plants.

In India, proliferation has been reported by Bor (1960) and Jain (1968) in the genera *Festuca* L., *Deschampsia* P. Beauv., *Poa* L., *Eragrostis* P. Beauv. and *Bromus* L.

We have noticed marked proliferation in the inflorescence of some specimens of the genera *Apluda* L., *Centotheca* Desv., *Cyrtococcum* Stapf, *Hemarthria* R. Br. and *Panicum* L. The details of these cases of proliferation are given below :

Apluda L. (Fig. 1)

Four specimens of *Apluda mutica* L. have been found showing proliferation of floral parts. Three of these specimens are from eastern India, namely, Bihar, Assam, and eastern Himalaya ; all have been collected during the period October-November. The fourth specimen is from south India ; the date of collection is not noted.

The specimen from Bihar (Gaya, October 1902—*Nusker* s.n.) shows typical proliferation of spikelets. The sessile spikelet, which is fertile in normal specimens, tends to proliferate into vegetative shoot. In this specimen, the lower involucral glume of the sessile spikelet has, in most cases, transformed into a distinctly sickle-shaped, hardened and enlarged structure. The size of this glume in normal spikelets is about 4.5 mm but in the proliferated spikelets it is 8-9 mm. Also, the nervation on this glume has been replaced by a shining glabrous surface.

The specimen from eastern Himalayas (Sikkim, Mauflong, 5 Nov. 1835—*Griffith* 6802) superficially does not at all look like an *Apluda* L. There are no characteristic clusters of false spikes supported by spathes and the conspicuous pedicels ; but a very narrow, elongated leafy shoot has replaced the inflorescence. On dissection, however, some spathes are found to contain almost normal racemes concealed within them. In most of the cases the racemes inside the spathes are reduced ; the sessile spikelet is represented by rudimentary glumes and awn, and the pedicelled spikelets by rudimentary glumes only. The significant change in this specimen is that the peduncles of racemes are very elongated and bear leafy spathes. The racemes, instead of being in clusters, are borne on elongated shoots. The spathes have developed into very leafy structure ; their bases becoming sheath-like.

The specimens from Assam (Gauhati, Oct. 1850—*s.l.* 83 and 426, both on one sheet) show that out of 5-6 racemes in a panicle, 3-4 have almost normal spikelets, *i.e.* one fertile sessile and two pedicelled spikelets ; but the remaining 1 or 2 adopt the pattern described for the specimen from Sikkim. These specimens show an intermediate stage ; that is, only some of the racemes have been replaced by vegetative shoots.

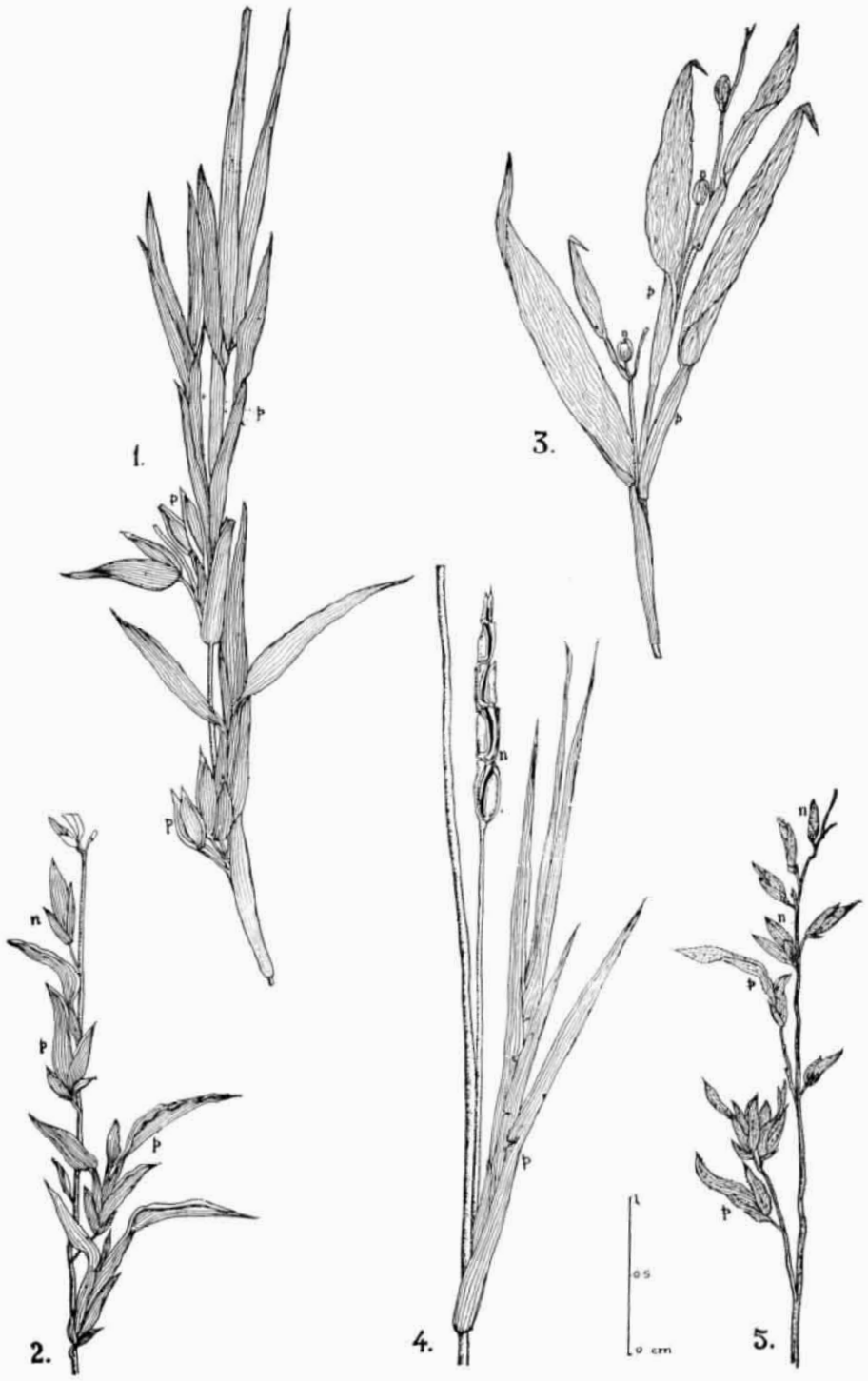
The specimen from south India (Malabar, Concan etc.—*Stocks, Law* etc. s.n.) shows shortening of penduncles of racemes, and slight enlargement and hardening of glumes of sessile spikelets. This stage seems to be the initiation of the condition observed in the Bihar specimen.

It is of interest that the first three specimens showing proliferation have been collected in October-November period, *i.e.* after rains and before the onset of winters. This factor has again been discussed later in the paper.

Centotheca Ridley (Fig. 2)

Three specimens of *Centotheca lappacea* (L.) Desv. showing marked proliferation have been found. These show characteristic structure typical of proliferation in *Poa bulbosa* L.

The normal spikelet in this grass is 2-4 flowered ; either all florets are fertile or the lower one or more florets are fertile and the upper ones reduced. In the present case the florets have been replaced by spathulate or oblanceolate, membranous, many-nerved, leafy structures. Thus each spikelet has two almost normal involucral glumes and two or more distichous conspicuous leafy structures. In many spikelets these show differentiation into a sheath-like cylindric part and a flat spathulate blade. The glumes have conserved their form. The proliferated spikelets seem to separate away from the plant, and serve as new plantlets. All stages from total transformation of florets into leafy structures,



Figs. 1-5 : A portion of inflorescence of 1. *Apluda mutica* L. 2. *Centotheca lappacea* (L.) Desv. 3. *Cyrtococcum patens* (L.) Camus. 4. *Hemarthria compressa* (L. f.) R. Br. 5. *Panicum auritum* Presl ex Nees (n = Normal spikelet. p = proliferated spikelet)

through only one or two florets changed or tending to change into leaf-like structures, to normal spikelets are seen.

The plant has an appearance of numerous small plantlets borne on branches of the inflorescence.

Cyrtococcum Stapf (Fig. 3)

Proliferation has been observed in a specimen of *Cyrtococcum patens* (L.) Camus, collected by *Griffith* (No. 6508) from Mishmi (CAL 521550). In this specimen, a few branches of the panicle bear normal spikelets, but most of the branches have transformed into small leafy structures. These leafy structures vary from small 5-8 mm long scale-like undifferentiated bracts to large 4-6 cm long leaves well differentiated into a lower terete striated sheath and an elliptic lanceolate 3-4 cm long blade. The entire branch or branchlets of the panicle get transformed into such structures. The plant appears as if bearing two types of leaves, the normal long leaves (8-10 cm long) on the culms and its branches, and the shorter leaves on branches of the panicle.

Ordinarily in this grass, the inflorescence is a lax panicle with spreading flexuous branches; the lower branches being verticillate, the upper solitary or in pairs; the branches further dividing into long capillary branchlets. In the present specimen, wherever a branch of panicle has transformed into leaves the growth of that branch gets arrested. The inflorescence, therefore, is much interrupted, small normal spikelets interspersed between conspicuous bracts or leaf-like structures.

Hemarthria R. Br. (Fig. 4)

One specimen of *Hemarthria compressa* (L.) R. Br. (Sahibganj—*Kurz*, CAL 529094) showing proliferation has been found. The specimen has some normal spikes with normal spikelets, but some spikes have proliferated into leafy shoot and do not bear spikelets at all.

The spikelets have been replaced by leafy structures; and small vegetative shoots are found arising from the spathes. The leafy structures are differentiated into a lower compressed sheath and an upper linear blade. The internodes of these shoots are very short and the shoot, therefore, gives a very condensed appearance. It is interesting to observe that at places both normal spikes as well as proliferated spikes occur in one and the same inflorescence. On some culms all the spikes have been transformed into vegetative shoots. Whether proliferated leafy shoots separate from the mother plant and give rise to new plants, or not, cannot be ascertained from the herbarium specimen.

Panicum L. (Fig. 5)

One specimen of *Panicum auritum* Presl ex Nees (Assam, Darrang, April 1902—*Chatterjee*, CAL 520403) showing marked proliferation of parts has been seen.

The normal spikelets of this grass have two florets, the lower floret is male or barren; the upper floret is fertile and hermaphrodite. In the present case, the spikelets usually have two normal involucral glumes, and two or more conspicuous leafy structures above them. The florets have been replaced by these falcate, many-nerved, hirsute leafy structures. That is, whereas the involucral glumes have mostly conserved their shape and size, the floral glumes have been transformed into vegetative structures. In some spikelets only one of the two florets is seen transformed into leafy shoot, the other floret remaining normal. At some places in the inflorescence even more than two florets are observed in spikelets; *i.e.* proliferation in the true sense has taken place. One or more, or all these florets are seen transformed into vegetative shoots.

The proliferated inflorescence has an appearance of numerous small plantlets in different stages of growth borne on branches of the panicle. These transformed spikelets seem to separate from the mother plant and serve as new plantlets. The general condition of proliferation here is very similar to what is seen in the well known cases of vivipary in *Poa bulbosa* L.

The specimens of *Apluda* showing proliferation have been gathered in the months of August and October, *i.e.* during and after rains. These support the suggestion of Arber (l.c.) that proliferation is more common during the period September to December.

The specimen of *Panicum* L. has, however, been collected in Assam in April. There are no dates of collection on others.

It will be seen from the detailed descriptions given above that the condition of proliferation vary from genus to genus. In case of *Panicum* L. sometimes only one of the two florets has changed to vegetative shoot, or both the florets have been replaced by vegetative shoots; the involucral glumes remaining partly or wholly normal. In others the

entire spikelets, including the involucral glumes have transformed into leafy structure and vegetative shoots.

In *Cyrtococcum* Ridley, the entire branches or branchlets of the panicle have been replaced by the vegetative shoots. These vegetative structures which replace the lemmas or glumes, or the entire spikelets, vary from simple bract-like scales to variously differentiated leaf-like structures with sheaths and blades. These vegetative shoots borne on branches of panicle seem to help in propagation of the plant, as the shape, size and disposition of these plantlet-like bodies is usually very similar to the characteristic plantlets seen in the well known viviparous *Poa bulbosa* L. This, however, cannot be said with unqualified certainty, as the living population of these species showing proliferation have not been seen by the authors.

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S. K. JAIN AND D. C. PAL
Botanical Survey of India, Calcutta

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A NOTE ON *LYCOPSIS ARVENSIS* AUCT. NON LINN. (BORAGINACEAE) IN THE FLORA OF ASSAM

Fischer (1938) in *Plants new to Assam* wrongly identified the sheet *N. L. Bor* 6507, collected from Japvo, Naga Hills as *Lycopsis arvensis* Linn. Probably, this lead Kanjilal *et al.* (1939) to include this species in their *Flora of Assam.* Subsequently, Fischer (1940) corrected his error and described the plant as a new species—*Onosma lycopsioides* Fisch. With the recognition of the genus *Maharanga* A. DC., by Johnston (1954) the new binomial for this species is *Maharanga lycopsioides* (Fisch.) Johnst. Complete citations are appended herewith.

Maharanga lycopsioides (Fisch.) Johnst. in Journ. Arnold Arbor. 35: 81. 1954. *Onosma lycopsioides* Fisch. in Kew Bull. 1940: 39. 1940; Johnst. in Journ. Arnold Arbor. 32: 358. 1951.—Type: From Japvo, Naga Hills, *N. L. Bor* 6507 (K), Isotype in Herb. DD. sccn. *Lycopsis arvensis* auct. non Linn.: Fisch. in Kew Bull. 1938: 211. 1938; Kanjilal *et al.* in Fl. Assam 3: 337. 1939.

S. P. BANERJEE
Botanical Survey of India, Howrah

THECAGONUM BABU—A NEW GENERIC NAME IN RUBIACEAE

The genus *Gonotheca* Bl. ex DC. (1830) was formerly treated either as a subgenus (Bentham & Hooker f. in Gen. Pl. 2: 59. 1873; Hooker f. in Fl. Brit. Ind. 3: 69. 1880) or as a section (Schumann in Pflanzenfam. 4: 4. 25. 1891) of the genus *Oldenlandia* Linn. *sensu lato* (1753). Recently, however, following Bremekamp's generic concept of the family Rubiaceae, particularly that of the tribe *Hedyotideae* (Bremekamp in Rec. Trav. Bot. Neerl. 36: 438-445. 1939 et in Verh. Kon. Akad. Wet. 48: 1-297. 1952), it is now treated as a distinct genus by modern authors (Santapau & Wagh in Bull. bot. Surv. India 5: 107. 1963). It is distinguished from *Oldenlandia* Linn. as follows:

1. Fruit 4-angled; seeds globose or subglobose. Leaves usually broader ...	*Gonotheca*
1. Fruit terete; seeds angular. Leaves usually narrower	*Oldenlandia*

The generic name *Gonotheca* Bl. ex DC. can no longer be used for this taxon, as it is illegitimate by being a later homonym of *Gonotheca* Rafin. (1808). Since there is no other valid name for this genus and moreover it is unnecessary to conserve the generic name *Gonotheca* Bl. ex DC. (1830) over