

ECOLOGICAL OBSERVATIONS ON THE GENUS PLEIOCRATERIUM IN GAJOLAND, SUMATRA

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(With Tab. VI).

As Prof. B r e m e k a m p has dealt with the genus *Pleiocraterium* from the taxonomic point of view, I intend to supplement his exposition here with some observations on the ecology of these remarkable additions to the Malaysian mountain flora. Some of these observations have been included already in a general report on the results of the Losir expedition published in Dutch¹. As a further illustration I am giving two photographs taken from one of the two Sumatran species in its natural habitat.

Altitude. Both species were found on the highest parts of the mountains only, viz. *Pl. gentianifolium* just below the summit of Mt Goh Lembuh, and *Pl. sumatranum* between our camp at the base of the central Peak of Mt Losir at c. 3250 m. and the summit of the latter at 3460 m. These two mountains lie rather far apart: Mt Losir is the highest top of the Barisan Range proper, whereas Mt Goh Lembuh is a more isolated mountain, rising c. 50 km. NNE of Mt Losir and separated from the latter by a wide depression. The two mountains also differ geologically.

Habitat. Both *Pl. sumatranum* and *gentianifolium* grow in the heather community found on the rather boggy highland one cannot cross without soaking one's shoes. *Pl. sumatranum* was found also abundantly on a dry and flat windswept pass just below the summit of Losir, where the Cyperacea *Oreobolus* and the grass *Monostachya* form a mat in which bushes of wind-bent *Leptospermum flavescens* are scattered (fig. 1).

The geological formation on Mt Losir is quartzite, but on Mt Goh

¹ Exploraties in de Gajolanden. Algemeene resultaten der Losir Expeditie 1937 (Tijdschr. Kon. Nederl. Aardrijkskundig Genootschap 55, 1938, p. 728—801, specially p. 760—762 and 800).

TABLE VI.



Fig. 1. Three young specimens of *Pleiocraterium sumatranum* Brem., one of them with flowers and fruits. G. Losir, ca 3400 m. alt.

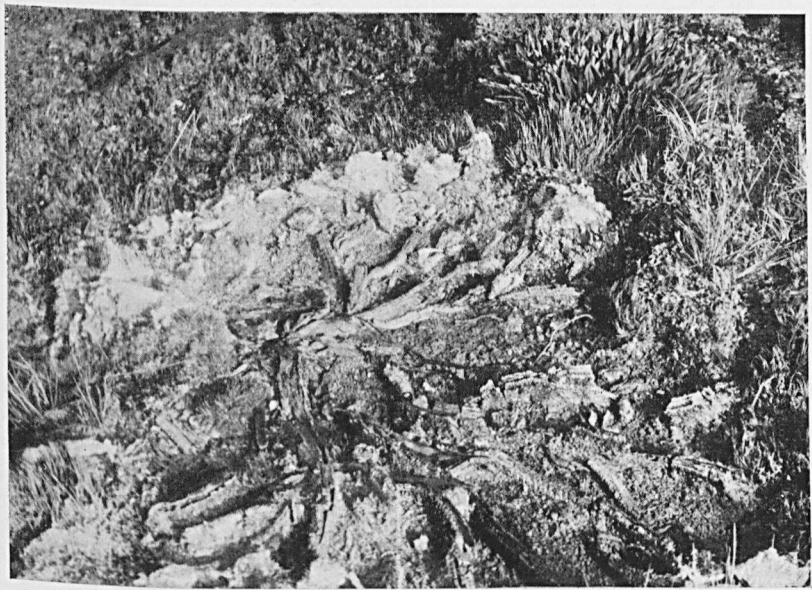


Fig. 2. Mummified remains of an old, large "Halbkugelpolster" of *Pleiocraterium sumatranum* Brem. measuring ca 1 m. in diam. The densely set scars of the leaf-insertions are very conspicuous on the radiating side-branches. The latter lie in the lead-grey powder produced by the disintegration of the plant skeleton. G. Losir, ca 3400 m. alt. — Surrounding vegetation: *Oreobolus*, *Monostachya*, and shoots of a young plant of *Pleiocraterium*.

Lembuh the formation is less uniform, shale, quartzite and breccia appearing within close range at the surface.

A b u n d a n c e. Fortunately we visited the larger highland of Mt Losir first, where I found *Pl. sumatranum* rather abundant near the central peak. Subsequently Goh Lembuh was ascended. Here I not only tried to find again the Losir species, but paid special attention to differences in the flora on this top and on Mt Losir. The somewhat lower altitude (highest peak 3100 m.) and the smaller extension of the Goh Lembuh highland did not promise such a rich flora as I had found on Mt Losir, and this presentiment proved to be right: I discovered but few novelties, and failed to collect several of the conspicuous Losir species. I first thought that *Pleio-craterium* too was absent on Goh Lembuh, but after a long search I detected a few cushions in the low heather formed by dwarfed *Vaccinium* shrubs, *Eriocaulon*, *Cyperaceae*, *Gentiana*, mosses and *Monostachya*. The *Pleio-craterium* plants appeared to differ from the Losir specimens by the smaller dimensions of flowers and leaves, so that I took it (l.c. p. 800) for a well-marked vicarial species. The presence of a specific difference has been proved now by Bre me k a m p's analysis.

A b s e n c e f r o m M t K e m i r i. The third high peak which I ascended was Mt Kemiri or Bur ni Gumpang, which is but a little lower than Losir (viz. 3314 m.), and which belongs also to the main Barisan Range. It is situated c. 30 km. E of Mt Losir, and is connected with the latter by a series of sharp crests, which as yet have not been climbed. When I reached the extensive plateau on the top, I wondered whether I should meet the Losir or the Goh Lembuh form, but though I looked specially for it, I did not succeed in tracing the plant at all.

A p p e a r a n c e. When I first saw *Pleio-craterium* on Mt Losir I took it for a *Gentianacea*: the curvinerved leaves reminded me of *Gentiana lutea* and *G. purpurea* of the Swiss Alps.

M u m m i f i c a t i o n. On the dry wind-swept pass at c. 3400 m. alt., just below the summit of the Central peak of Mt Losir, a remarkable observation was made. The almost flat pass covered by short grass was rich in *Pleio-craterium* cushions, the largest of which measured up to one metre in diameter. These large old cushions had decayed into lead-grey skeletons consisting of the main branches, which radiate from the thick central stem (fig. 2). The skeleton branches could be pulverized between the fingers, and in the grey powder obtained in this way hardly any traces of plant structure were left: fibres, for instance, could not be observed. The same peculiar phenomenon — it led me to call this pass a "botanical

cemetery" — is observed in some tussock grasses on the high volcanoes of Java, viz. *Festuca nubigena* and *Pennisetum compressum*. Here too the mummification is found in dry and open wind-swept localities only. I suppose that it is due to the influence of low temperatures and a dry atmosphere, probably accompanied by frost, on old decaying plants.

The most remarkable thing about this mummification is the fact that the entire plant skeleton is absolutely sterile. Seeds apparently do not germinate in it, and it is therefore not impossible that the powder is in some way poisonous to new plant life. The influence, however, does not pass beyond the circumference of the skeleton, for young plants of *Pleiocraterium* and grass were found just outside the margin of the powder heaps.

M o r p h o l o g y. The type of branching is the same as that found in other true "Polster" or cushion plants. Each cushion is built up by one plant only. From an erect, up to arm-thick, partly subterranean stem a number of strong branches are seen to radiate; the latter themselves are also branched. All branches are covered down to their base by old withered leaves, and the whole cushion forms a more or less spongy mass. The green tips are arranged in a hemispherical surface, which gives the plant a peculiar alpine habit. This growth-form, as *Schroeter* and *Hauri* have shown, is very scarce in Malaysia, the majority of the cushion plants being limited to the Alps of Europe, Central Asia, South America and the Antarctic. There is little doubt that the Atchenese species are descendants of the SE-Asiatic alpine stock, and date back to a remote period in the history of the flora.
