

The botanical exploration of Mt. Kanga, Tanzania

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I arrived first to Africa in the August of 1969, to teach botany at the Agricultural Faculty of East African University in Morogoro town (Tanzania), at the foot of the fabulous Uluguru Mountains. After taking a few informative excursion in these hills, guided by my colleague Dr. Bryan Harris from the Science Faculty campus in Dar es Salaam, I decided to take alone a plant collecting excursion to the remote Mount Kanga, a 2019 m high satellite at the northern side of Nguru Mountains. These mountains are part of the Crystalline Eastern Arc range from southern Kenya throughout eastern Tanzania. These mountains of Precambrian age are notorious for their richness of endemic plants, which do not occur elsewhere and in plants common with Asia or the Indian Ocean islands, not penetrating deeper westwards in continental Africa. I started more than 50 years ago, by the end of February 1970. Until this time no botanist visited yet this area. This paper is only a short account of the experiences, without enumerating all species collected. A comparative study of the vegetation and flora of Nguru Mountains (including Kanga) is given by Pócs et al. (1990). I used for the vascular plants mostly the nomenclature provided by Agnew (2013) and Beentje (1994).

There were two options to reach it. I used the shorter instead of the tarmac road. I took the shortcut with our VW Beetle, being dry season, when earth roads are crossable. This is about 70 km from Morogoro to Turiani through the Mkata Plains, then further 30 km to Kanga village. It paid the troubles, as led through an uninhabited *Acacia* savannah and I could see a carcass of a large antelope attacked by a huge flock of vultures. That time there were still many lions in the area, so probably their victim was it. After lions took the „lions' part”, usually hyenas are the next to grab the rest of the meat and finally come the vultures and the marabou storks clean away the last edible parts of it.

I arrived, after crossing Papyrus swamps, to the small Turiani town at noon, when the hot was almost unbearable. The cool Diwale River, coming down straight from Nguru Mountains flows through the town, accompanied by dense gallery forests. It was very nice to dip myself in the cataracts of it, where I could collect two very special flowering plants adapted to the running water conditions, like *Hydrostachys angustisecta* (Hydrostachyaceae), with fernlike, feathery leaves and another, which looks like a small moss, with tiny, one cell layered leaves: *Tristicha trifaria* (Podostemaceae). I presented myself to the local forester, who has shown me the guesthouse of water supply authority and promised to accompany me to Mt. Kanga. In the guest wing a caretaker helped me to make fire in the kitchen to cook my dinner. The nets on the windows had more holes than material, but in this season did not suffer from mosquito bites and had a good sleep. Next morning we could start at 8.30 to climb from Kanga village to Mount Kanga.

At the foothills at about 450 m elevation we walked through open savannah forest (called ‘Miombo woodland’), dominated by fire tolerant leguminous trees, like *Brachystegia* species or *Pterocarpus angolensis* (mwule or muninga tree, which yields high quality timber. This type of vegetation developed from previously more closed dry forests, as the result of repeatedly happening bushfires (induced by humans since thousands of years or even by, at the beginning of rainy seasons, very frequent lightings). These trees usually have very thick or

peeling bark protecting the water conducting vessels from the heat and very firm underground trunk parts being able to regenerate after fires. Among the loose network of tree canopies dense herbaceous layer develops from grasses and sedges, which is very fire prone, if its dry material accumulates for several years.

At 600 m we entered a closed dry evergreen forest among many others with the emergent, smooth and yellow barked, deciduous *Milicia excelsa* tree with wide buttressed roots (Moraceae). It yields softwood used to manufacture matches. There was also a large unknown *Cola* tree with edible, juicy, but very sour fruit pulp. Being thirsty, I tried to chow it, but it caused even stronger thirst. *Erythrina saclexii*, a nice pink flowering legume tree with spiny trunk also reached 20 m height. In the lower canopy screw palms (*Pandanus*) and dragon trees (*Dracaena laxissima*) were present. A succulent vine, *Cissus sylvicola* hanged from the trees. The soil was brick red and extremely dry, covered by masses of *Hillieria latifolia* (Phytolaccaceae), *Nephrolepis exaltata*, *Phymatodes scolopendria* and other ferns, and by a broadleaved grass, *Olyra latifolia*. On tree trunks and branches I could find interesting mosses, like the endemic *Pterobryon flagelliferum* or otherwise only on Indian Ocean islands occurring *Hildebrandtiella pachyclada*. The heat was intense and the air very damp, stifling.

The forest covered lower slopes of Kanga Mount are gentle, but the higher parts become rocky and at places very steep. After some fatiguing efforts at about 800 m we reached in the cool submontane rainforest, with the first tree ferns and many tall emergent trees like the 50-60 m tall *Parkia filicoidea*, the very hard, termite resistant timber yielding *Erythrophleum suaveolens*, both legumes, and the relative of baobab: *Bombax rhodognaphalon*. At 900 m it became wetter and the first filmy ferns (Hymenophyllaceae) appeared on rocks, tree trunks and branches, which, with their one cell layered leaves cannot survive under 80% relative air humidity.

At 1000 m altitude we reached a really wet montane rainforest, on shady rocks with an African violet species endemic to Nguru Mountains: *Saintpaulia brevopilosa* (now called also *Streptocarpus brevipilosus*) and cushions of the moss *Rosulabryum keniae*. On the rocky ridge covered by 6-8 m tall wild date palms (*Phoenix reclinata*) have we found the first specimens of the very peculiar and that time unknown species of a cycad, what I provisionally named *Encephalartos kanga*. Cycads are gymnosperm plants (like European conifers), but a very archaic group of them, having barrel shaped, 0.5-1.5 m tall trunk (other species can be much higher) and palm like leaf rosette. The species from Kanga differs from the other 50 African species by its very spiny leaf shoulder, although quite closely related to a sister species, *E. kisambo* from Kenya. Being dioecious, there are male and female plants, both sexes having cones. That time I could find only sterile plants and waited with its description. By next visit in 1987, at an elevation of 1300 m altitude we have found young female cones, still inadequate for proper diagnosis. Then my colleagues from National Museums of Kenya, with the guidance of Quentin Luke in 2007 could find female specimens with ripe, large, 60 cm long, orange-yellow cones. On this basis we could describe this nice cycad species endemic to Mount Kanga (Pócs & Luke 2007). So its description had a 37 years long story.

Anyway, already during my first visit, we continued climbing on the rocky ridge until at near 1300 m elevation, where, under a south facing granitic cliff reached a botanically very diversified habitat with many interesting plants. I revisited this place 17 years later, accompanied by Jan Lovett and staff of Kew Botanical garden. The rocky ground was covered by 1-2 m tall shrubby vegetation, in which we have found 10 specimens of the above

Encephalartos species, intermixed with *Erica arborea* and with another peculiar, shrublike plant, *Xerophyta spekei*, from the Velloziaceae family.

These interesting Velloziaceae are rare resurrection plants among phanerogams, which are able completely dry out during the dry seasons and their leaves become shrivelled and blackish brown. At the beginning of rainy seasons the plants completely recover, the same dry leaves first smoothing open, turn lemon yellow then completely regreening and carry out normal assimilation again (Tuba et al. 1993). Generally this is the property of most mosses, liverworts, lichens and some ferns, but not of flowering plants. Other peculiarity of Velloziaceae, including our *Xerophyta spekei*, that the seemingly woody, 5-20 cm thick trunks and branches consisting only of fibrous, dead leaf sheets (pseudostem) and the real stem inside is very thin, stringlike (see photos 21-22). The fibrous pseudostem serves as a good substrate for several epiphytes, some of them specially adopted to it. There is a moss species (*Fissidens gardneri*) which occurs in East Africa exclusively and regularly on the pseudostem of Velloziaceae. Even an orchid species: *Polystachya tayloriana*, specialized to this habitat as an epiphyte and do not occur on other substrate. Its thin aerial roots penetrate in the fibrous pseudostems until can reach the litter and humus accumulated under the *Xerophyta*. Some bushes are covered by so many of this orchids, that who does not know it, easily mistakes them for the flowers of *Xerophyta*, which are of similar pale pink colour. A sedge: *Coleocloa microcephala* also occurred here, which is again one of the rare resurrection plants.

Another peculiar plant at this habitat was an orchid rooting in the rocky soil: *Neobenthamia gracilis*, which occurs only here and in the neighboring mountain ranges (that is an endemic species). Its peculiarity is the 1-2 m tall, bamboo like stem, unusual for an orchid, which is crowned by a large head of pretty, purple dotted white flowers. It occurs together with another ground orchid with dark pink to lilac flowers: *Polystachya dendrobiiflora*. Among many other flowering plants, two Tanzanian endemic species are worth to mention: the 1 m tall, half shrubby, purplish flowering *Kleinia amaniensis* with fleshy, succulent leaves together with the also succulent *Aloë bussei*. Below these, creeping clubmoss (*Lycopodium*) and peat mosses (*Sphagnum*) covered the ground.

After continuing climbing upwards, near 1400 m elevation we entered a mossy cloud forest with many epiphytic ferns, clubmosses and orchids (like *Angraecopsis tenerima*, *Polystachya adansoniae* with small, green flowers and *Rangaeris muscicola* with very long spur (6-7 cm). Many bryophytes occurred on tree trunks, liverworts and mosses covered also the branches or hanging down from them, like *Frullania angulata*, *Mastigophora diclados*, *Ortostichella pandurifolia* and *O. rigida*. On the ground cushions of *Leucobryum isleanum* were common, while the shady granitic rocks were covered by the East African endemic *Leucoloma subsecundifolium*. In the cloud forest, epiphyllous liverworts were common thriving on the surface of living leaves. Among the 15 species occurring the followings should be mentioned: *Cololejeunea leloutrei*, *Colura dusenii*, *Diplasiolejeunea pellucida*, *D. symoensii*, *Drepanolejeunea friesii*, *D. pocsii*, *Leptolejeunea epiphylla*, *Microlejeunea africana* and *Odontolejeunea tortuosa*.

Then we climbed up to 1600 m altitude, where found a waterfall. From here, we already could see the very steep main peak of Mt. Kanga. We just realized that already near four p.m. and have to return quickly if we wish to be down before the tropical sunset at 6 p.m. So we hurried back, heavily loaded with bags of the collected plant specimens and arrived to the car in total darkness. Then I ate the rest of yesterday's dinner and fall dead-tired in the bed of the guesthouse.

At about 10 p.m. I was woken up by loud rattling and shouting at the door. My friend, the zoologist professor, Hosea Kayumbo sent two guys to tell me on the request of my wife, that my half year old baby son, Ábel is very ill, having fever of 42°. I set quickly in the car and accompanied by the two colleagues, started homewards through the earth road, as quickly as I could. In a dense bush, probably from an Acacia thorn, one of my tyres was punctured and the car started to dance near to overturning. Luckily I could safely stop it and with the help of colleagues we changed wheel and arrived back to the campus at midnight. In the meantime the state of my kid, after the visit of the doctor, improved.

As I mentioned, this was not the only visit to Mount Kanga. Among them my third and last visit in 1989 was quite interesting. We went up with Tanzanian botanist colleagues and with my son Bence, altogether some 8-10 people. Such a big group cannot go there unnoticed and we were informed, that have to report at the village leaders and to undergo a special ceremony to conciliate the spirits of the mountain. Otherwise they can kill or harm us. I just realised that this is the reason, why the forests could remain intact to the bottom of the slopes. As we were told, local people do not dare to climb up but if they need to collect wood or palm leaves to cover their house, cannot do without the permit of the spirits. And even so, they are not allowed to cut trees.

So we followed the rules. One of the village elders, who was to carry out the ceremonies, told that we have to bring a black goat. My son went to the next village market to obtain one but could not get it. Then the ceremony holder told that a black cock will do. That was an easier task and when it was slaughtered, the blood was collected. We had to form a circle around him and he after murmuring a long prayer, sprinkled us with the blood by a leafy twig several times then repeated prayers followed. The ceremony lasted almost half an hour but finally we were permitted to go up.

We had there interesting experiences, although we did not climb higher than 1200 m elevation, as we studied the species rich dry forests on the steep, rocky slope. There my son has found specimens of the later described, endemic, giant *Lobelia morogoroensis*, with inflorescence as tall as 4 m (Knox & Pócs 1992), which occurs only in Nguru and Uluguru Mountains. In the meantime my Tanzanian colleagues sniffed and warned me to an interesting smell. They told that this is the sure sign of the presence of a python very near. And indeed, after a few seconds we heard a strange noise like one pulls a heavy bag in the litter. And it was really the African rock python (*Python sebae natalensis*), which in East Africa can reach 7 m length. Once from our garden in Morogoro we heard the death scream of our big, red tomcat and immediately after the typical beg dragging noise and we never saw him again. The last event was, as we descended from the slopes, that one of our African colleague was chased by a buffalo (*Syncerus caffer*) in the forest and had a narrow escape. Maybe he did not take seriously the revenge of the mountain spirit! In fact, opposite of the common believe, not the lion, but African buffalo is the most dangerous game. When it rests in the dense forest and someone involuntarily disturbs the animal, furiously attacks the intruder and by horns and hoofs crushes him or her. When I worked for long in Ngoronoro forests, my African botanist colleague called my attention to the fine chirrup of a bird (Oxpecker /*Buphagus* sp.) which used to clean away the insects and worms from the skin of resting buffalo and warns it if anyone approaches. When one can hear this sound, is advised to retreat immediately.

Our 10 years long African stay still vivid in my memory and whenever I can, revisit the land, where we, with our family, spent the most beautiful part of our life.

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