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NOTES ON THE REDISCOVERY AND CONGENERIC ASSOCIATIONS OF THE PFEFFER'S CHAMELEON *CHAMAELEO PFEFFERI* (TORNIER, 1900) (SAURIA: CHAMAELEONIDAE) WITH A BRIEF DESCRIPTION OF THE HITHERTO UNKNOWN FEMALE OF THE SPECIES

CHRIS WILD

38 Main Street, Normanton-On-Soar, Loughborough, Leics, LE12 5HB, U.K.

INTRODUCTION

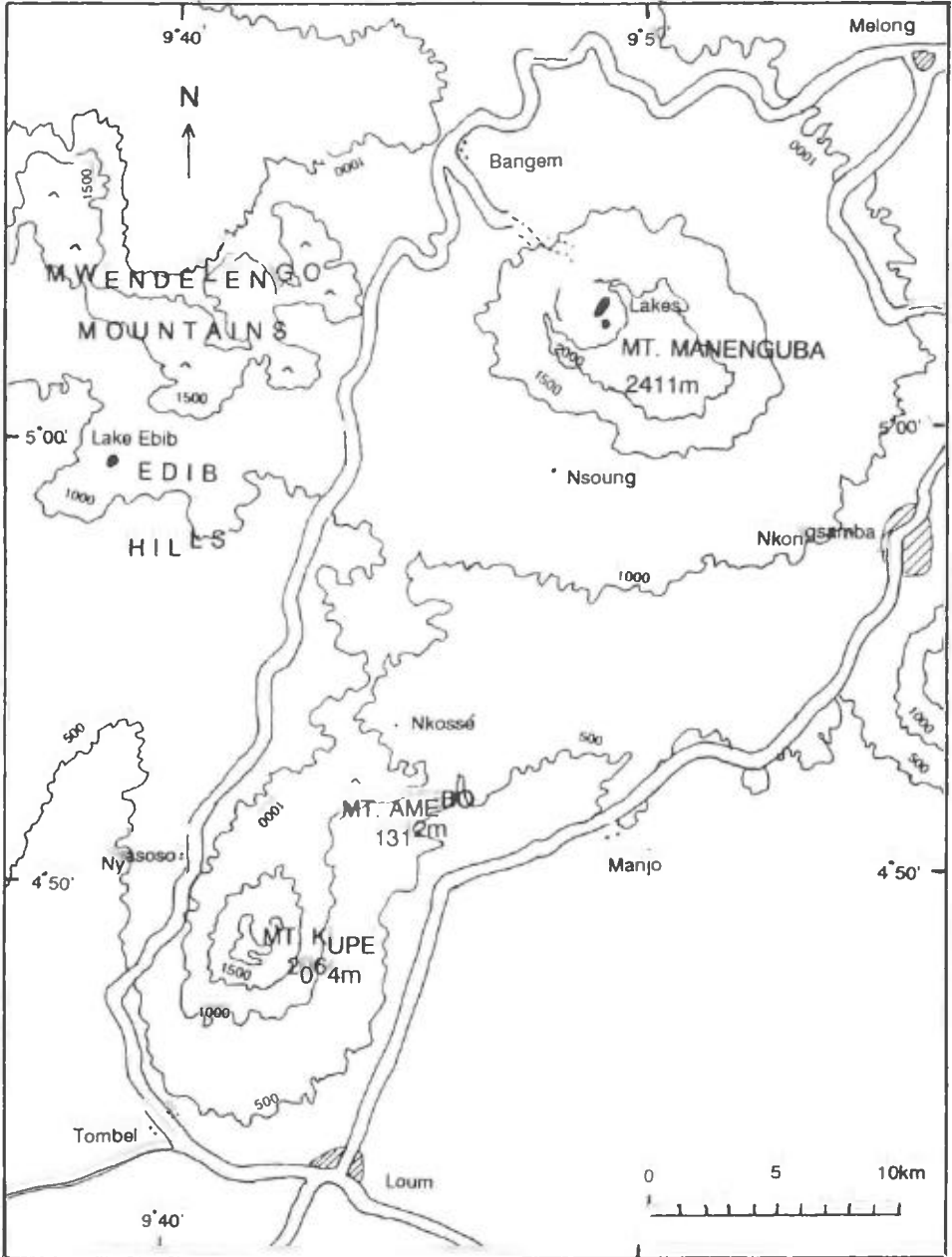
In 1899 Von Gustav Tornier, a German taxonomist, wrote; "*More and more very strangely formed chameleons from tropical Africa are becoming known and this chameleon is amongst them*". The specimen in question, a male, was collected by M. Conradt from the Kupe Mountain forest situated on the former East/West Cameroon border. Tornier named the new species *Chamaeleo pfefferi* in honour of Dr. Pfeffer of the Hamburg Natural History Museum. Since that time the Pfeffer's Chameleon remained elusive to the many herpetologists who have collected reptiles from the relatively small (21km²) forest of Mt. Kupe. Occasional references to the species have been made, invariably based on Tornier's original description (1900), or from observations of the type specimen itself.

During recent field studies I had the pleasure of collecting three specimens of this little known species from the Kupe and Manenguba mountains of western Cameroon including two examples of the hitherto unknown female of the species. The first specimen, a gravid female collected in May 1990, was discovered two metres from the ground basking in direct sunlight on secondary growth near a fallen tree in primary forest. The site was located at 1320m on the western slopes of Mt. Kupe above Nyasoso (grid ref: 4° 50'N, 9° 40'E). This specimen remained unidentified until in April 1992 I returned to the neighbouring Mt. Manenguba where a male and a second female, also gravid, were collected from village farms at Nsong situated at 1330m on southern slopes of the mountain (grid ref: 4° 59'N, 0° 49'E). The male was recovered from four metres up on the outer foliage of a Cola tree (*Cola nucifera*). Data on the perching habit of the second female was not recorded as it was found by a resident of Nsong village.

NOTE ON THE TYPE LOCALITY

The type locality given by Tornier '*Nyassosso, Nkossogebirge, Kamerun*', is worthy of some discussion as it is confusing to both cartographers and herpetologists alike. An extensive review of maps of the region has not revealed any mountain by the name of 'Nkosso' or a second Cameroon village by the name of Nyasoso (=Nyassosso) (grid ref: 4° 50' N, 9° 40' E). The US Gazeeter (Cameroon) lists a mountain south-east of Bamenda by the name '*Nkossa*' (grid ref: 5° 48' N, 10° 20' E), but this peak is an improbable location for the Type locality as there is no record of a village called '*Nyassosso*' in the area. Perret (1957) however, referred to the type locality as: "*Chamaeleo pfefferi Tornier (Zool. Anz. 23: 21-23. 1990), dont le type et unique exemplaire récolté provient de Nyassóssó, mont Nkossoo, partie sud du massif du Manenguba, à la frontière des deux Camerouns.*" This description closely corresponds with a 1312m peak formerly known as Mount Amebo rising from the 1000m

intermontane ridge 2km or so north of Kupe (grid ref: 4° 52' N, 9° 46' E; map ref: Carte de L' A.E.F. et du Cameroun AU. 200,000e. 1958, Douala, FEUILLE NB-32-IV), on the north-eastern flanks of which lies the village of 'Nkossé' (= Nkosso?) situated at 800m (grid ref: 4° 52' N, 9° 47' E). Since modern maps no longer include Amebo or Nkosso as names for distinct peaks and both Nyasoso and Nkossé lie in the premontane zone of Mt. Kupe, it is therefore reasonable to regard the type locality as follows: *'Nyasoso, Mount Kupe, Cameroon'*.



MAP OF THE KUPE AND MANENGUBA MOUNTAINS, CAMEROON.

BRIEF DESCRIPTION OF THE FEMALE HABITUS

SPECIMEN: BMNH 1992, 279.

LOCALITY: Nsoun 1330m, Mount Manenguba, Littoral Province, Cameroon.

DESCRIPTION: A small-medium sized chameleon, the female being only marginally smaller than the male. Casque moderately elevated (19%). Parietal crest slightly indicated posteriorly. Lateral and orbital crests prominent with denticulate outline. Temporal crest present and partially fused with lateral crest. Gular crest prominent, with three (2nd, 3rd and 4th) large, narrow spike-like conical scales preceded by one, and followed by two, somewhat smaller projections, ending below angle of the mouth. Posterior to forelimbs ventral crest absent. Dorsal crest absent but dorsum moderately keeled to form distinct ridge-like formation. Tail marginally shorter than body length (snout-vent).

SQUAMATION: HEAD; dorsal/parietal area comprised of polygonal and tubercular scales. Scia dentata present. Auditory area heterogeneous with granular and tubercular scales. BODY; heterogeneous, granular, irregular in shape and size except for the largest tubercular, plate like scales which are distributed at equidistant intervals and diagonally aligned across the dorso-lateral aspect of the body and limbs in conjunction with lateral interstitial veining sloping downwards posteriorly, further transversed by vertical and diagonal veining.

MEASUREMENTS:	Total length	152mm
	Head length (snout-casque apex)	24mm
	Body length (snout-vent)	80mm
	Tail length	72mm
	Mouth length (angle-snout)	15mm
	Casque apex – nostril	20mm
	Casque apex – angle of mouth	16mm
	Casque apex – occiput	3mm
	Casque elevation	19%

FEMALE LIVERY: scalation various shades of green offset by blood red interstitial skin, lateral and temporal crests red, gular crest pale green, whitish transverse dorso-lateral band mid-body sloping posteriorly, paler ventrally, claws brownish, horizontal eyestripe indicated. When roosting, scalation very bright yellow vividly offset by interstitial blood red veining.

MALE LIVERY: scalation generally dull to bright green/turquoise offset by prominent blood red interstitial veining. In courtship colours more vivid – posterior aspect of body, hindlimbs and tail bright yellowish green, anterior aspect of body, upper forelimbs and head bright turquoise. Horizontal eyestripe present, whitish transverse dorso-lateral band mid-body sloping posteriorly.

Both sexes of the species may be readily diagnosed from other Cameroonian congenics as it is the only regional form known to possess a very pronounced gular crest in the absence of a ventral crest posterior to the forelimbs.

CONGENERIC ASSOCIATIONS

It is well known that the Biafran Mountains of Cameroon, Nigeria and Equatorial Guinea have proven to be a fertile environment for speciation and endemism in many floral and faunal groups (Kingdon, 1990). In West Africa inner divergence within the genus *Chamaeleo* is nowhere expressed more highly than in the montane forests of Mts. Kupe, Manenguba and adjacent Bakossi Highlands where at least two taxa, *C. quadricornis quadricornis* and *C. pfefferi*, are thought to be endemic.



Plate 1. Male Pfeffer's Chameleon, *Chamaeleo pfefferi*, in courtship livery. 1330 metres Nsong village, Mt. Manenguba, Cameroon.



Plate 2. Gravid female Pfeffer's Chameleon, *Chamaeleo pfefferi*, 1320 metres submontane forest, western slopes of Mt. Kupe, Cameroon.



Plate 3. Female Cameroon Mountain Chameleon, *Chamaeleo montium*, 1060 metres, riparian vegetation of Mbwe River, northwest of Bangem, Mwenzekong Mts. (= Bakossi Highlands).

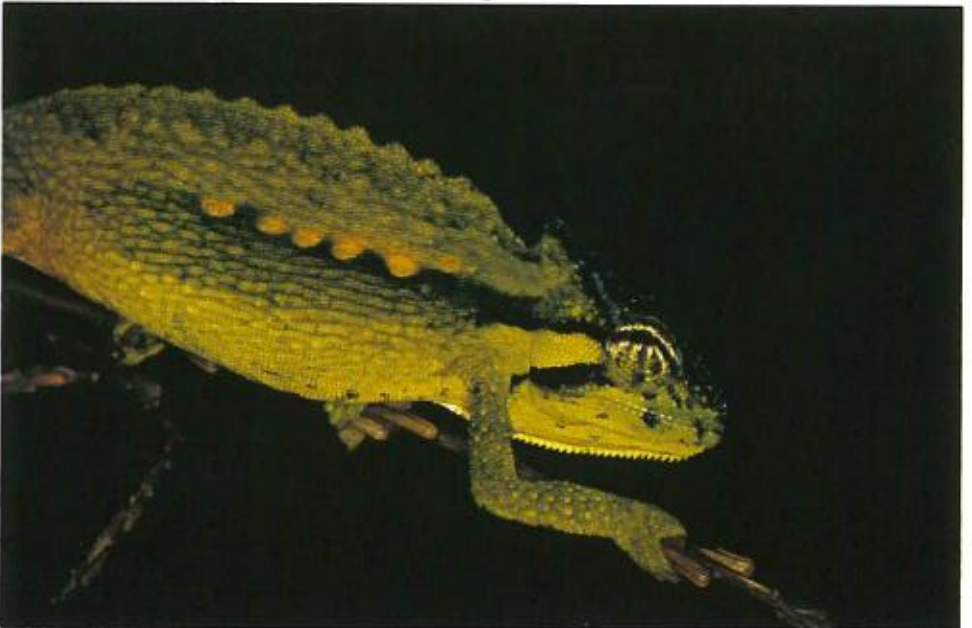


Plate 4. Male Wiedersheim's Chameleon, *Chamaeleo wiedersheimi*, in courtship livery, 1800 metres, shores of Lac Femme, Mt. Manenguba, Cameroon.

Mt. Manenguba is a largely deforested mountain due to the annual slash and burn practice of the resident Bororo herdsman. Consequently only remnant gallery forest remains within the mountain's great caldera along with a few square kilometres of montane forest on the upper peaks and on the south-eastern slopes above Nsong village. At Nsong and on local farmbush, *C. pfefferi* was found to occur sympatrically with numerous Four-Horned Chameleons, *C. quadricornis quadricornis*, a high elevation montane forest/savannah species, and the equally locally abundant Wiedersheim's Chamaeleon, *C. wiedersheimi*, a high elevation montane savannah/grassland species which has invaded the Nsong farmbush from the grassland of the mountain's caldera at 1800m. The Mountain Chameleon, *C. montium*, a premontane and lower submontane forest species was found parapatrically to the three aforementioned congeners just below Nsong at 1070m and in the forest/farm mosaic throughout the 16km Kupe-Manenguba intermontane ridge which lies chiefly above 1000m.

Within the closed canopy forest of Mt. Kupe, *C. pfefferi* was only found sympatrically with the euryzonal Western Pygmy Chameleon, *Rhampholeon spectrum*, a common and widespread semi-arboreal species of the Western Equatorial Forests. In addition, *C.q. quadricornis* has recently been recorded from the Kupe mountain forest (1550m C. Bowden pers. comm. and 1940m, C.J. Wild unpubl. data) although an undescribed four-horned chameleon from Essosong 1060m, which lies in the northern pre/submontane forest of the mountain, was previously known from the Hamburg Zoological Museum (Böhme and Klaver, 1981).

C. pfefferi, a remnant paleo-endemic is closely allied to *C. montium*, an expansive neo-endemic, to which it succeeds in the strata of vertical distribution of montane chameleons found on Mt. Kupe and Manenguba. The comparatively well known *C. montium* occupies the intermontane hill forest, premontane and lower submontane zones from 550-1170m in this region, although it has been found as high as 1250m in the elfin thicket of the summit and ridge crests near Lake Edib in the Bakossi Mountains (pers. obs.). Furthermore, the regional topography suggests that both *C. pfefferi* and *C. quadricornis* probably occur in the adjacent Mwendelengo and Mwenzekong Mts. of the Bakossi Highlands which are connected to Mt. Manenguba by intermontane plateau-like ridges rising in excess of 1300m and 1200m respectively.

Like most montane chameleons, *C. pfefferi* displays a remarkable array of ornamentation and livery (such 'ornamentation' in the Biafran chameleons being; horns, rostral appendages, dorsal, gular and ventral crests, sails, squamation and livery) which generally is far greater than that exhibited by their lowland congeners. These adaptations are thought to be due to the high species density of the chameleons occurring on these mountains which has led to the manifestation of such bizarre appearances presumably to play the role of courtship isolating mechanisms as discussed by Rand (1967).

In reference to East African montane chameleons, Rand (1967) suggested that such ornamentation served the function of species and partner recognition and that this was analogous to the bright feathers and songs of birds, to the calls of frogs, and to the strikingly coloured gular fans in iguanid lizards such as *Anolis*. Rand's hypothesis being derived not only from the fact that these chameleons exhibit strong sexual dimorphism, but also because no two sympatric taxa share the same assemblage of ornamentation or livery - a situation also common to the six endemic montane chameleon species of Biafra. One such character unique to the male *C. pfefferi* is that of the greatly enlarged canthus rostrales which meet above the nostrils to bridge the two short diverging horns in a laterally flattened and concave formation.



Plate 5. Foreground: Nyasoso village and farms, 820 metres, habitat for *C. montium*, *C. cristatus*, and *Rhampholeon spectrum*.

Background: Mt. Kupe Forest, 2064 metres, Cameroon, habitat for *C. montium*, *C. pfefferi*, *C. quadricornis*, and *Rhampholeon spectrum*.



Plate 6. Lac Femme, 1800 metres, Mt. Manenguba, Cameroon. Ungrazed patches of grass/scrub are habitat for *C. wiedersheimi*. Remnant montane and gallery forest habitat for *C. q. quadricornis*.

In his study of Malagasy chameleons, Parcher (1974) concluded that the ability of chromatic change served to communicate, noticeably in courtship, between individuals and taxa rather than the popular notion of the phenomenon being that of cryptic disguise. However the pygmy chameleons of the genus *Rhampholeon* have a more limited ability to change colour and are obviously pro-cryptic, (Cott, 1957).

The chameleons of the Cameroon Highlands are not yet fully known. Numerous mountains of high elevation remain where the reptile fauna is to date poorly known. In a region where so many allopatric populations exist in isolated mountain refuges with marked changes in environmental conditions separating them, there is strong biogeographical evidence to suggest that new taxa from this genus are still to be found in these mountains.

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