# New distribution data of the green mantella, *Mantella viridis*, from northern Madagascar (Anura: Mantellidae)

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Abstract. Mantellas are colourful small frogs endemic from Madagascar. Although data on their distribution are being accumulated, for some species only little information is available, fact influencing their conservation management. Therefore, we conducted a field work in the Antsiranana region aimed to unveil the distribution of *Mantella viridis*. Of the 42 visited sites, 32 (76%) were confirmed with the presence of the species and ten other sites (31%) with the presence of *M. ebenaui* or a different form intermediate in colouration between *M. viridis* and *M. ebenaui*. *M. viridis* was found in different primary and secondary habitats. This adaptability allows the colonization degraded habitats as well as human perturbed areas. Thus, seen both the new emerged geographic scenario, and the ecological plasticity the conservation status of this species needs to be re-evaluated.

Key words. Conservation status, ecology, IUCN, re-evaluation.

### Introduction

Mantellas are colourful and attractive small frogs endemic from Madagascar (Jovanovic et al., 2006; Glaw and Vences, 2007). The genus contains 16 species, with five species currently classified in the Red List of IUCN (Andreone and Luiselli 2003; Andreone et al. 2005; IUCN 2006) as critically endangered (CR; *M. aurantiaca*, *M. cowani*, *M. expectata*, *M. milotympanum*, and *M. viridis*), and two species classified as endangered (E; *M. bernhardi* and *M. crocea*). Since they are interested by a considerable trade they are all included in the CITES Appendix II (Rabemananjara et al., 2008).

Major threats pending on the *Mantella* species are represented by the ongoing habitat destruction and the exploitation for the international pet-trade (Andreone et al., 2006). Although data on their distribution are being accumulated, for some species only little information is available. This is the case of the green mantella, *Mantella viridis*, until very recently known only from

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south of the Antsiranana town (terra typica), and from Montagne des Français (Vences, Glaw and Böhme, 1999; Glaw and Vences, 2007). With the exception of Montagne d'Ambre National Park and Montagne des Français the Antsiranana region is severely affected by deforestation with a consequent loss of original habitats (D'Cruze et al., 2007).

The new emerged geographic scenario together with further information available on distribution, colouration, and genetics (Jovanovic et al; 2006; Metcalf et al., 2007; Rabemananjara et al., 2007) provide new tools for the interpretation of the threats affecting this species and for a better evaluation of its conservation status.

## **Material and Methods**

We conducted field work in the Antsiranana: the survey lasted from 5 to 24 January 2005, with two persons active on the field. During the day frogs were searched in all the suitable habitats or by the location of calling males. Geographic coordinates were taken using a GPS device. The distribution map has been created through the software DIVA-GIS version 5.2.0.2. Used toponyms follow the indications by local people, and must be therefore intended as unofficial names. Some representative individuals were collected by hand and euthanised by immersion in clorobutanol solution, fixed in 4% formalin or in 90° ethanol, and stored in 70% ethanol solution. Voucher specimens are currently housed in the Museo Regionale di Scienze Naturali di Torino (MRSN), and Parc Zoologique et Botanique de Tsimbazaza (PBZT).

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## Results

Several formerly unknown populations were found (Table 1; Fig. 1). Of the 42 visited sites, 32 (76%) were confirmed with the presence of the species and ten other sites (31%) with the presence of *M. ebenaui* or a different form intermediate in colouration between *M. viridis* and *M. ebenaui*. Of special interest is the presence of one population inside the third parcel of the Montagne d'Ambre N.P. (Andranobaribe), so far the only population known inside a protected area.

Suitable habitats for the species are represented by light bushed savannahs used as pasture; small parcels of secondary forests; and mango and *Eucalyptus* plantations crossed by irrigation ditches. *Mantella viridis* is present and sometimes abundant in areas with moist soil and thick leaf litter, especially near small water bodies where males are calling from elevated positions, under leaf or other hiding places.

Some preferred primary and secondary microhabitats

have been detected: (1) dead arms of torrents with very moist soil (e.g., Antomboko, Vinay); (2) small light vegetated valleys with permanent dropping water or formation of pools after rain, stones and dead wood branches as hiding place (e.g., Antsahampano, Ambovomamy, Tegnantsahampano); (3) temporary pools with edge vegetation, dead wood branches and stones as hiding places (e.g., Parchuite, Lamerouge); (4) mango plantations with abundant leaf litter and humid soil (e.g., Analamanga; Ambodimanga; Anketrabe); (5) secondary forest with temporary stream, abundant leaf litter and humid soil (e.g., Andranobaribe); (6) draining channels along roads with tight vegetation, leaf litter and wood branches as hiding places (e.g., Maleza).

## Discussion

Mantella viridis was found in different habitat conditions, thus showing a wide ecological plasticity.

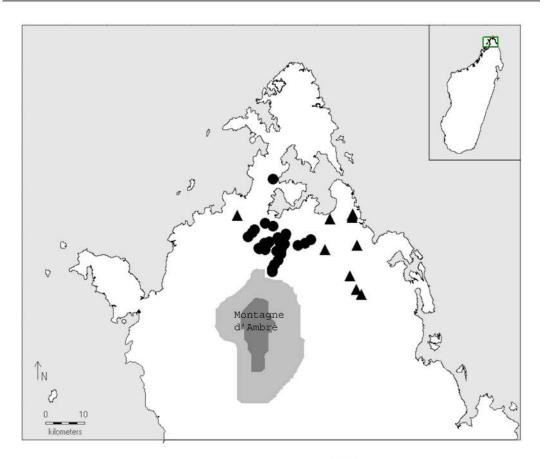


Figure 1. Distribution map of *Mantella viridis* (dots) and *M. ebenaui* or a different form intermediate between *M. viridis* and *M. ebenaui* (triangle).

**Table 1.** Localities list with presence of *Mantella viridis* in the surroundings of Antongombato and Montagne des Français; \* sites with specimens of intermediate colouration between *M. viridis* e *M. ebenaui*.

1         Ambinay         Antongombato         12°21'54"         49°08'43"         134           2         Ambodimanga 1         Ambodimanga         12°22'20"         49°17'37"         123           3         Ambodimanga 2         Ambodimanga         12°22'20"         49°17'37"         123           4         Ambovomamy         Andajampona         12°13'40"         49°12'15"         37           5         Analamandro         Antongombato         12°22'57"         49°13'22"         200           6         Analamanga 1         Antongombato         12°22'56"         49°13'39"         82           9         Analamanga 3         Antongombato         12°22'51"         49°13'39"         82           9         Analamanga 4         Antongombato         12°22'10"         49°13'31"         156           10         Andohonymangoko*         Ivovona         12°23'11"         49°12'51"         165           11         Andranobaribe         P.N. Montagne. d'Ambre         12°23'14"         49°12'51"         18           12         Anketrabe         Antongombato         12°2'10"         49°12'51"         18           13         Anketrabe         Antongombato         12°2'10"         49°12'51"		Toponymy	Regions	S	E	Alt. (m)
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11Andranomangitra* AnketrabeM. des Français Antongombato $12^{\circ}23'41''$ $49^{\circ}19'40''$ $190$ 12AnketrabeAntongombato $12^{\circ}24'22''$ $49^{\circ}13'19''$ $98$ 13Anketrabe 2Antongombato $12^{\circ}22'13''$ $49^{\circ}12'57''$ $168$ 14AnkiabeAntongombato $12^{\circ}22'00''$ $49^{\circ}12'57''$ $64$ 15Ankitsakalaninaombi*Ankitsakalaninaombi $12^{\circ}20'07''$ $49^{\circ}21'57''$ $89$ 16Anosiravo*M. des Français $12^{\circ}19'20''$ $49^{\circ}20'23'''$ $190$ 17AntamotamoAntongombato $12^{\circ}23'57''$ $49^{\circ}12'46'''$ $190$ 19Antomboko 1Antongombato $12^{\circ}23'57''$ $49^{\circ}12'28''''''''''''''''''''''''''''''''''$	18		P.N. Montagne. d'Ambre	12°23'35"	49°10'21"	165
13Anketrabe 2Antongombato $12^{\circ}25'13''$ $49^{\circ}12'57''$ $168$ 14AnkiabeAntongombato $12^{\circ}22'00''$ $49^{\circ}12'57''$ $64$ 15Ankitsakalaninaombi*Ankitsakalaninaombi $12^{\circ}30'07''$ $49^{\circ}24'51''$ $89$ 16Anosiravo*M. des Français $12^{\circ}20''$ $49^{\circ}22''51''$ $49^{\circ}22''51''$ 17AntamotamoAntongombato $12^{\circ}23'57''$ $49^{\circ}12'24''$ $190$ 19Antomboko 1Antongombato $12^{\circ}23'57''$ $49^{\circ}13'24''$ $94$ 20Antomboko 2Antongombato $12^{\circ}25'53''$ $49^{\circ}12'28''$ $222$ 21Antomboko 3Ambatomenavava $12^{\circ}25'53''$ $49^{\circ}12'28''$ $222$ 22Antomboko 4Antongombato $12^{\circ}26'25''$ $49^{\circ}12'28'''$ $231$ 23AntongombatobeAntongombato $12^{\circ}22'3'03''''''''''''''''''''''''''''''''$	11	Andranomangitra*	-	12°23'41"	49°19'40"	190
14AnkiabeAntongombato $12^{\circ}22'00"$ $49^{\circ}12'57"$ $64$ 15Ankitsakalaninaombi*Ankitsakalaninaombi $12^{\circ}30'07"$ $49^{\circ}24'51"$ $89$ 16Anosiravo*M. des Français $12^{\circ}19'20"$ $49^{\circ}20'23"$ $190$ 17AntamotamoAntongombato $12^{\circ}23'57"$ $49^{\circ}12'46"$ $190$ 19Antomboko 1Antongombato $12^{\circ}23'57"$ $49^{\circ}12'46"$ $190$ 20Antomboko 2Antongombato $12^{\circ}23'35"$ $49^{\circ}12'28"$ $222$ 21Antomboko 3Ambatomenavava $12^{\circ}25'53"$ $49^{\circ}12'26"$ $231$ 23AntongombatobeAntongombato $12^{\circ}23'03"$ $49^{\circ}13'27"$ $98$ 25Antsahampano 1Antsahampano $12^{\circ}21'25"$ $49^{\circ}11'27"$ $83$ 24Antsahampano 2Antsahampano $12^{\circ}20'25"$ $49^{\circ}11'07"$ $83$ 24Antsakoamaro*Ivovona $12^{\circ}21'25"$ $49^{\circ}11'07"$ $83$ 25Antsiasia 1Antongombato $12^{\circ}22'50"$ $49^{\circ}11'07"$ $83$ 24Antsakoamaro*Ivovona $12^{\circ}21'25"$ $49^{\circ}11'07"$ $83$ 25Antsiasia 1Antongombato $12^{\circ}23'04"$ $49^{\circ}11'07"$ $215$ 26Antsiasia 1Antongombato $12^{\circ}23'04"$ $49^{\circ}11'04"$ $210$ 29Bekamankuri*M. des Français $12^{\circ}23'04"$ $49^{\circ}21'16"$ $215$ 30Daraina*Daraina $12^{\circ}29'21''47"$ $49^{\circ}2$	12		3	12°24'22"	49°13'19"	98
14       Ankiabe       Antongombato       12°22'00"       49°12'57"       64         15       Ankitsakalaninaombi*       Ankitsakalaninaombi       12°30'07"       49°24'51"       89         16       Anosiravo*       M. des Français       12°19'20"       49°20'23"       190         17       Antamotamo       Antongombato       12°23'57"       49°12'46"       190         19       Antomboko 1       Antongombato       12°23'35"       49°13'37"       90         20       Antomboko 2       Antongombato       12°23'35"       49°12'26"       222         21       Antomboko 3       Ambatomenavava       12°25'53"       49°12'06"       231         23       Antongombatobe       Antongombato       12°23'03"       49°13'27"       98         25       Antsahampano 1       Antongombato       12°26'25"       49°12'06"       231         24       Antsahampano 2       Antsahampano       12°19'59"       49°11'07"       83         24       Antsakoamaro*       Ivovona       12°23'04"       49°11'07"       215         25       Antsiasia 1       Antongombato       12°23'04"       49°11'04"       210         29       Bekamankuri*       M. des Français	13	Anketrabe 2	-	12°25'13"	49°12'57"	168
16Anosiravo*M. des Français12°19'20"49°20'23"19017AntamotamoAntongombato12°23'57"49°12'46"19019Antomboko 1Antongombato12°23'17"49°13'37"9020Antomboko 2Antongombato12°23'35"49°13'24"9421Antomboko 3Ambatomenavava12°25'53"49°12'28"22222Antomboko 4Antongombato12°26'25"49°12'06"23123AntongombatobeAntongombato12°23'03"49°12'06"23124Antsahampano 1Antsahampano12°19'59"49°12'12"526Antsahampano 2Antsahampano12°20'25"49°12'07"8324Antsahampano 2Antsahampano12°20'25"49°11'07"8325Antsakampano 2Antsahampano12°20'25"49°11'09"22526Antsakamaro*Ivovona12°23'45"49°11'09"22527Antsiasia 1Antongombato12°23'04"49°24'14"5029Bekamankuri*M. des Français12°29'21"49°24'04"9031FrancomFrancom12°26'54"49°12'08"28133Ivovona*M. des Français12°19'12"49°23'32"1132Ivovona*M. des Français12°14'7"49°13'58"4733Ivovona*M. des Français12°14'7"49°13'58"4734LamerougeAntongombato12°21'47"49°1	14	Ankiabe		12°22'00"	49°12'57"	64
17AntamotamoAntongombato $12^{\circ}23^{\circ}57^{\circ}$ $49^{\circ}12^{\circ}46^{\circ}$ $190$ 19Antomboko 1Antongombato $12^{\circ}23^{\circ}17^{\circ}$ $49^{\circ}13^{\circ}37^{\circ}$ $90$ 20Antomboko 2Antongombato $12^{\circ}23^{\circ}35^{\circ}$ $49^{\circ}13^{\circ}24^{\circ}$ $94$ 21Antomboko 3Ambatomenavava $12^{\circ}25^{\circ}53^{\circ}$ $49^{\circ}12^{\circ}28^{\circ}$ $222$ 22Antongombato $12^{\circ}26^{\circ}25^{\circ}$ $49^{\circ}12^{\circ}06^{\circ}$ $231$ 23AntongombatobeAntongombato $12^{\circ}23^{\circ}03^{\circ}$ $49^{\circ}13^{\circ}27^{\circ}$ 25Antsahampano 1Antsahampano $12^{\circ}20^{\circ}25^{\circ}^{\circ}$ $49^{\circ}12^{\circ}12^{\circ}^{\circ}$ 24Antsahampano 2Antsahampano $12^{\circ}20^{\circ}25^{\circ}^{\circ}$ $49^{\circ}12^{\circ}12^{\circ}^{\circ}$ 25Antsakoamaro*Ivovona $12^{\circ}18^{\circ}41^{\circ}^{\circ}$ $49^{\circ}23^{\circ}39^{\circ}^{\circ}$ 26Antsiasia 1Antongombato $12^{\circ}22^{\circ}50^{\circ}^{\circ}$ $49^{\circ}11^{\circ}09^{\circ}^{\circ}$ 27Antsiasia 2Antongombato $12^{\circ}22^{\circ}50^{\circ}^{\circ}$ $49^{\circ}11^{\circ}09^{\circ}^{\circ}$ 28Antsiasia 2Antongombato $12^{\circ}22^{\circ}0^{\circ}^{\circ}^{\circ}^{\circ}$ $49^{\circ}11^{\circ}09^{\circ}^{\circ}^{\circ}$ 29Bekamankuri*M. des Français $12^{\circ}23^{\circ}44^{\circ}^{\circ}^{\circ}^{\circ}^{\circ}^{\circ}^{\circ}^{\circ}^{\circ}^{\circ}$	15	Ankitsakalaninaombi*		12°30'07"	49°24'51"	89
19Antomboko 1Antongombato $12^{\circ}23^{\circ}17^{\circ}$ $49^{\circ}13^{\circ}37^{\circ}$ $90$ 20Antomboko 2Antongombato $12^{\circ}23^{\circ}35^{\circ}$ $49^{\circ}13^{\circ}24^{\circ}$ $94$ 21Antomboko 3Ambatomenavava $12^{\circ}25^{\circ}53^{\circ}$ $49^{\circ}12^{\circ}28^{\circ}$ $222$ 22Antomboko 4Antongombato $12^{\circ}26^{\circ}25^{\circ}$ $49^{\circ}12^{\circ}26^{\circ}$ $231$ 23AntongombatobeAntongombato $12^{\circ}23^{\circ}03^{\circ}$ $49^{\circ}13^{\circ}27^{\circ}$ $98$ 25Antsahampano 1Antsahampano $12^{\circ}20^{\circ}25^{\circ}^{\circ}$ $49^{\circ}11^{\circ}07^{\circ}$ $83$ 24Antsahampano 2Antsahampano $12^{\circ}20^{\circ}25^{\circ}^{\circ}$ $49^{\circ}12^{\circ}12^{\circ}^{\circ}$ $5$ 26Antsakoamaro*Ivovona $12^{\circ}18^{\circ}41^{\circ}^{\circ}$ $49^{\circ}23^{\circ}39^{\circ}^{\circ}$ $12$ 27Antsiasia 1Antongombato $12^{\circ}22^{\circ}50^{\circ}^{\circ}$ $49^{\circ}11^{\circ}09^{\circ}^{\circ}$ $225$ 28Antsiasia 2Antongombato $12^{\circ}22^{\circ}50^{\circ}^{\circ}$ $49^{\circ}11^{\circ}09^{\circ}^{\circ}$ $225$ 29Bekamankuri*M. des Français $12^{\circ}23^{\circ}04^{\circ}^{\circ}^{\circ}$ $49^{\circ}24^{\circ}14^{\circ}^{\circ}^{\circ}$ 30Daraina*Daraina $12^{\circ}29^{\circ}21^{\circ}^{\circ}^{\circ}^{\circ}^{\circ}^{\circ}^{\circ}^{\circ}^{\circ}^{\circ}$	16	Anosiravo*	M. des Français	12°19'20"	49°20'23"	190
20       Antomboko 2       Antongombato       12°23'35"       49°13'24"       94         21       Antomboko 3       Ambatomenavava       12°25'53"       49°12'28"       222         22       Antomboko 4       Antongombato       12°26'25"       49°12'06"       231         23       Antongombatobe       Antongombato       12°26'25"       49°12'06"       231         23       Antongombatobe       Antongombato       12°26'25"       49°12'06"       231         24       Antsahampano 1       Antsahampano       12°19'59"       49°11'07"       83         24       Antsahampano 2       Antsahampano       12°20'25"       49°12'12"       5         26       Antsakoamaro*       Ivovona       12°218'41"       49°23'39"       12         27       Antsiasia 1       Antongombato       12°22'50"       49°11'09"       225         28       Antsiasia 2       Antongombato       12°22'3'04"       49°24'14"       50         30       Daraina*       Daraina       12°29'21"       49°24'04"       90         31       Francom       Francom       12°26'54"       49°12'08"       281         33       Ivovona*       M. des Français       12°18'52"	17	Antamotamo	Antongombato	12°23'57"	49°12'46"	190
20Antomboko 2Antongombato $12^{\circ}23'35''$ $49^{\circ}13'24''$ $94$ 21Antomboko 3Ambatomenavava $12^{\circ}25'53''$ $49^{\circ}12'28''$ $222$ 22Antomboko 4Antongombato $12^{\circ}26'25'''$ $49^{\circ}12'06''$ $231$ 23AntongombatobeAntongombato $12^{\circ}26'25'''$ $49^{\circ}12'06''$ $231$ 23AntongombatobeAntongombato $12^{\circ}27''''$ $98$ 25Antsahampano 1Antsahampano $12^{\circ}19'59''''''''''''''''''''''''''''''''''$	19	Antomboko 1	Antongombato	12°23'17"	49°13'37"	90
22Antomboko 4Antongombato $12^{\circ}26'25"$ $49^{\circ}12'06"$ $231$ 23AntongombatobeAntongombato $12^{\circ}23'03"$ $49^{\circ}13'27"$ $98$ 25Antsahampano 1Antsahampano $12^{\circ}19'59"$ $49^{\circ}11'07"$ $83$ 24Antsahampano 2Antsahampano $12^{\circ}20'25"$ $49^{\circ}12'12"$ $5$ 26Antsakoamaro*Ivovona $12^{\circ}23'45"$ $49^{\circ}11'09"$ $225$ 27Antsiasia 1Antongombato $12^{\circ}23'45"$ $49^{\circ}11'04"$ $210$ 29Bekamankuri*M. des Français $12^{\circ}23'04"$ $49^{\circ}24'14"$ $50$ 30Daraina*Daraina $12^{\circ}29'21"$ $49^{\circ}24'14"$ $50$ 31FrancomFrancom $12^{\circ}26'54"$ $49^{\circ}24'04"$ $90$ 31FrancomFrancom $12^{\circ}21'47"$ $49^{\circ}23'32"$ $11$ 32Ivovona*M. des Français $12^{\circ}19'12"$ $49^{\circ}23'32"$ $11$ 33Ivovona*M. des Français $12^{\circ}19'12"$ $49^{\circ}23'32"$ $13$ 34LamerougeAntongombato $12^{\circ}21'47"$ $49^{\circ}13'58"$ $47$ 35MahatsijoAmbodimanga $12^{\circ}27'29"$ $49^{\circ}23'10"$ $65$ 38MenagisyAndranotsymaty $12^{\circ}23'33"$ $49^{\circ}11'46"$ $117$ 40TegnantsahampanoAntongombato $12^{\circ}22'50"$ $49^{\circ}11'46"$ $117$ 41TsimanankaratraAndranotsimaty $12^{\circ}20'54"$ $49^{\circ}09'36"$ $114$ <td>20</td> <td>Antomboko 2</td> <td></td> <td>12°23'35"</td> <td>49°13'24"</td> <td>94</td>	20	Antomboko 2		12°23'35"	49°13'24"	94
23AntongombatobeAntongombato $12^{\circ}23'03''$ $49^{\circ}13'27''$ $98$ 25Antsahampano 1Antsahampano $12^{\circ}19'59''$ $49^{\circ}11'07''$ $83$ 24Antsahampano 2Antsahampano $12^{\circ}20'25''$ $49^{\circ}12'12''$ $5$ 26Antsakoamaro*Ivovona $12^{\circ}23'45'''$ $49^{\circ}11'09''$ $225$ 27Antsiasia 1Antongombato $12^{\circ}22'50'''$ $49^{\circ}11'09'''$ $210$ 29Bekamankuri*M. des Français $12^{\circ}23'04''''$ $49^{\circ}24'14'''''$ $50$ 30Daraina*Daraina $12^{\circ}29'21''''''''''''''''''''''''''''''''''$	21	Antomboko 3	Ambatomenavava	12°25'53"	49°12'28"	222
25Antsahampano $12^{\circ}19'59''$ $49^{\circ}11'07''$ $83$ 24Antsahampano $12^{\circ}20'25''$ $49^{\circ}12'12''$ $5$ 26Antsakoamaro*Ivovona $12^{\circ}18'41''$ $49^{\circ}23'39''$ $12$ 27Antsiasia 1Antongombato $12^{\circ}23'45''$ $49^{\circ}11'09''$ $225$ 28Antsiasia 2Antongombato $12^{\circ}22'50''$ $49^{\circ}11'04''$ $210$ 29Bekamankuri*M. des Français $12^{\circ}22'50''$ $49^{\circ}11'04''$ $210$ 29Bekamankuri*M. des Français $12^{\circ}22'304''$ $49^{\circ}24'14''$ $50$ 30Daraina*Daraina $12^{\circ}29'21''$ $49^{\circ}24'04''$ $90$ 31FrancomFrancom $12^{\circ}26'54''$ $49^{\circ}12'08''$ $281$ 33Ivovona*M. des Français $12^{\circ}19'12''$ $49^{\circ}23'33''$ $11$ 32Ivovona*M. des Français $12^{\circ}19'12''$ $49^{\circ}23'32''$ $13$ 34LamerougeAntongombato $12^{\circ}21'47''$ $49^{\circ}13'58''$ $47$ 35MahatsijoAmbodimanga $12^{\circ}21'31'''$ $49^{\circ}14'06'''$ $49$ 37Mangatokona*Mahavavona $12^{\circ}27'29'''''$ $49^{\circ}14'06'''''''''''''''''''''''''''''''''''$	22	Antomboko 4	Antongombato	12°26'25"	49°12'06"	231
24Antsahampano 2Antsahampano $12^{\circ}20'25"$ $49^{\circ}12'12"$ 526Antsakoamaro*Ivovona $12^{\circ}18'41"$ $49^{\circ}23'39"$ $12$ 27Antsiasia 1Antongombato $12^{\circ}23'45"$ $49^{\circ}11'09"$ $225$ 28Antsiasia 2Antongombato $12^{\circ}22'50"$ $49^{\circ}11'04"$ $210$ 29Bekamankuri*M. des Français $12^{\circ}23'45"$ $49^{\circ}11'04"$ $210$ 29Bekamankuri*M. des Français $12^{\circ}22'50"$ $49^{\circ}11'04"$ $210$ 30Daraina*Daraina $12^{\circ}29'21"$ $49^{\circ}24'14"$ $50$ 31FrancomFrancom $12^{\circ}26'54"$ $49^{\circ}12'08"$ $281$ 33Ivovona*M. des Français $12^{\circ}19'12"$ $49^{\circ}23'33"$ $11$ 32Ivovona*M. des Français $12^{\circ}18'52"$ $49^{\circ}23'32"$ $13$ 34LamerougeAntongombato $12^{\circ}21'47"$ $49^{\circ}13'58"$ $47$ 35MahatsijoAmbodimanga $12^{\circ}27'29"$ $49^{\circ}13'6"$ $49$ 37Mangatokona*Mahavavona $12^{\circ}27'29"$ $49^{\circ}23'10"$ $65$ 38MenagisyAndranotsymaty $12^{\circ}22'39"$ $49^{\circ}11'46"$ $117$ 40TegnantsahampanoAntongombato $12^{\circ}22'50"$ $49^{\circ}11'46"$ $117$ 41TsimanankaratraAndranotsimaty $12^{\circ}20'54"$ $49^{\circ}09'36"$ $114$	23	Antongombatobe	Antongombato	12°23'03"	49°13'27"	98
26Antsakoamaro*Ivovona $12^{\circ}18'41"$ $49^{\circ}23'39"$ $12$ 27Antsiasia 1Antongombato $12^{\circ}23'45"$ $49^{\circ}11'09"$ $225$ 28Antsiasia 2Antongombato $12^{\circ}22'50"$ $49^{\circ}11'04"$ $210$ 29Bekamankuri*M. des Français $12^{\circ}23'45"$ $49^{\circ}24'14"$ $50$ 30Daraina*Daraina $12^{\circ}29'21"$ $49^{\circ}24'04"$ $90$ 31FrancomFrancom $12^{\circ}26'54"$ $49^{\circ}12'08"$ $281$ 33Ivovona*M. des Français $12^{\circ}19'12"$ $49^{\circ}23'33"$ $11$ 32Ivovona*M. des Français $12^{\circ}18'52"$ $49^{\circ}23'32"$ $13$ 34LamerougeAntongombato $12^{\circ}21'47"$ $49^{\circ}13'58"$ $47$ 35MahatsijoAmbodimanga $12^{\circ}27'29"$ $49^{\circ}14'06"$ $49$ 37Mangatokona*Mahavavona $12^{\circ}27'29"$ $49^{\circ}14'06"$ $49$ 38MenagisyAndranotsymaty $12^{\circ}23'33"$ $49^{\circ}11'46"$ $117$ 40TegnantsahampanoAntongombato $12^{\circ}22'50"$ $49^{\circ}11'34"$ $142$ 41TsimanankaratraAndranotsimaty $12^{\circ}20'54"$ $49^{\circ}09'36"$ $114$	25	Antsahampano 1	Antsahampano	12°19'59"	49°11'07"	83
27Antsiasia 1Antongombato $12^{\circ}23'45"$ $49^{\circ}11'09"$ $225$ 28Antsiasia 2Antongombato $12^{\circ}22'50"$ $49^{\circ}11'04"$ $210$ 29Bekamankuri*M. des Français $12^{\circ}22'50"$ $49^{\circ}24'14"$ $50$ 30Daraina*Daraina $12^{\circ}29'21"$ $49^{\circ}24'04"$ $90$ 31FrancomFrancom $12^{\circ}26'54"$ $49^{\circ}12'08"$ $281$ 33Ivovona*M. des Français $12^{\circ}19'12"$ $49^{\circ}23'33"$ $11$ 32Ivovona*M. des Français $12^{\circ}18'52"$ $49^{\circ}23'32"$ $13$ 34LamerougeAntongombato $12^{\circ}21'47"$ $49^{\circ}13'58"$ $47$ 35MahatsijoAmbodimanga $12^{\circ}23'09"$ $49^{\circ}15'48"$ $271$ 36MalezaAntongombato $12^{\circ}21'31"$ $49^{\circ}14'06"$ $49$ 37Mangatokona*Mahavavona $12^{\circ}27'29"$ $49^{\circ}23'10"$ $65$ 38MenagisyAndranotsymaty $12^{\circ}22'39"$ $49^{\circ}11'46"$ $117$ 40TegnantsahampanoAntongombato $12^{\circ}22'50"$ $49^{\circ}11'34"$ $142$ 41TsimanankaratraAndranotsimaty $12^{\circ}20'54"$ $49^{\circ}09'36"$ $114$	24	Antsahampano 2	Antsahampano	12°20'25''	49°12'12"	5
28Antsiasia 2Antongombato $12^{\circ}22'50^{\circ}$ $49^{\circ}11'04^{\circ}$ $210$ 29Bekamankuri*M. des Français $12^{\circ}23'04^{\circ}$ $49^{\circ}24'14^{\circ}$ $50$ 30Daraina*Daraina $12^{\circ}29'21^{\circ}$ $49^{\circ}24'04^{\circ}$ $90$ 31FrancomFrancom $12^{\circ}26'54^{\circ}$ $49^{\circ}12'08^{\circ}$ $281$ 33Ivovona*M. des Français $12^{\circ}19'12^{\circ}$ $49^{\circ}23'33^{\circ}$ $11$ 32Ivovona*M. des Français $12^{\circ}18'52^{\circ}$ $49^{\circ}23'32^{\circ}$ $13$ 34LamerougeAntongombato $12^{\circ}21'47^{\circ}$ $49^{\circ}13'58^{\circ}$ $47$ 35MahatsijoAmbodimanga $12^{\circ}21'31^{\circ}$ $49^{\circ}15'48^{\circ}$ $271$ 36MalezaAntongombato $12^{\circ}21'31^{\circ}$ $49^{\circ}14'06^{\circ}$ $49$ 37Mangatokona*Mahavavona $12^{\circ}27'29^{\circ}$ $49^{\circ}23'10^{\circ}$ $65$ 38MenagisyAndranotsymaty $12^{\circ}22'39^{\circ}$ $49^{\circ}11'46^{\circ}$ $117$ 40TegnantsahampanoAntongombato $12^{\circ}22'50^{\circ}$ $49^{\circ}11'34^{\circ}$ $142^{\circ}$ 41TsimanankaratraAndranotsimaty $12^{\circ}20'54^{\circ}$ $49^{\circ}09'36^{\circ}$ $114^{\circ}$	26	Antsakoamaro*	Ivovona	12°18'41"	49°23'39"	12
29Bekamankuri*M. des Français $12^{\circ}23'04''$ $49^{\circ}24'14''$ $50$ 30Daraina*Daraina $12^{\circ}29'21''$ $49^{\circ}24'04''$ $90$ 31FrancomFrancom $12^{\circ}26'54''$ $49^{\circ}12'08''$ $281$ 33Ivovona*M. des Français $12^{\circ}19'12''$ $49^{\circ}23'33''$ $11$ 32Ivovona*M. des Français $12^{\circ}18'52''$ $49^{\circ}23'32''$ $13$ 34LamerougeAntongombato $12^{\circ}21'47''$ $49^{\circ}13'58''$ $47$ 35MahatsijoAmbodimanga $12^{\circ}23'09''$ $49^{\circ}15'48'''$ $271$ 36MalezaAntongombato $12^{\circ}21'31'''$ $49^{\circ}14'06'''$ $49$ 37Mangatokona*Mahavavona $12^{\circ}27'29'''$ $49^{\circ}23'10'''$ $65$ 38MenagisyAndranotsymaty $12^{\circ}22'33''''$ $49^{\circ}11'46''''''''''''''''''''''''''''''''''$	27	Antsiasia 1	Antongombato	12°23'45"	49°11'09"	225
30Daraina*Daraina $12^{\circ}29'21''$ $49^{\circ}24'04''$ $90$ 31FrancomFrancom $12^{\circ}26'54''$ $49^{\circ}12'08''$ $281$ 33Ivovona*M. des Français $12^{\circ}19'12''$ $49^{\circ}23'33''$ $11$ 32Ivovona*M. des Français $12^{\circ}18'52''$ $49^{\circ}23'32''$ $13$ 34LamerougeAntongombato $12^{\circ}21'47''$ $49^{\circ}13'58''$ $47$ 35MahatsijoAmbodimanga $12^{\circ}23'09''$ $49^{\circ}15'48''$ $271$ 36MalezaAntongombato $12^{\circ}21'31''$ $49^{\circ}14'06''$ $49$ 37Mangatokona*Mahavavona $12^{\circ}27'29''$ $49^{\circ}23'10''$ $65$ 38MenagisyAndranotsymaty $12^{\circ}23'33'''$ $49^{\circ}10'12''''$ $171$ 39ParchuiteAntongombato $12^{\circ}22'50'''$ $49^{\circ}11'34'''''$ $142''''''''''''''''''''''''''''''''''''$	28	Antsiasia 2	Antongombato	12°22'50"	49°11'04"	210
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Figure 2. Mantella viridis from Antongombato with green colouration.

This adaptability allows the colonization of secondary and degraded habitats as well as human perturbed areas. Examples of this are the populations found within the Antongombato region (inside the homonymous village) and the populations of Malema and Lamerouge, which live within the draining channels along the road. In such a context the elective habitat is represented by mango plantations with irrigation ditches where large populations of *M. viridis* have been found. We assume



Figure 3. Individual from Montagne des Français with colour traits intermediate between *Mantella viridis* and *M. ebenaui*.

that the presence of a thick and humid leaf litter together with the availability of flies attracted by the rotted fruits play an important role in determining the high population density.

In our survey we considered as *M. viridis* only the individuals with dorsal and lateral green-yellowish colouration and did not check yet whether other colour morphs should be included in the same species. Although Jovonavic et al. (2006) already pointed out that similar individuals for body size and shape, but differing for the overall colouration (being reddish instead than green) are present elsewhere in North Madagascar, such as the Ankarana Massif. Recently, a finding of *M. viridis* has been reported for the island of Nosy Hara (Metcalf et al., 2007), but its identity needs to be confirmed.

Seen the actual wide distribution of *M. viridis* in the considered area, and some populations appear to be locally abundant, the status of this species needs to be re-evaluated. This should be done within the framework of the Global Amphibian Assessment (Andreone et al., 2005), in order to draw new and updated conservation strategies.

#### Distribution of Mantella viridis



Figure 4. Typical mango plantation, habitat of M. viridis.

## Acknowledgements

The study has been done in collaboration with the Parc Botanique et Zoologique de Tsimbazaza (Antananarivo) and Université d'Antananarivo. We thank J.E. Randrianirina for his assistance to obtain the necessary research permits. The fieldwork was financially supported by DAPTF, Air Madagascar, Acquario di Genova, Nando Peretti Foundation, and Gondwana Conservation and Research.

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