

## Description of a new Subspecies of the Turtle *Rhinoclemmys punctularia* (Daudin) (Testudines: Emydidae) from Southern Venezuela

Alfredo Paolillo O.

Instituto de Zoología Tropical, Universidad Central de Venezuela, Apartado 47.599, Chaguaramos 1041-A, Caracas, Venezuela

**Abstract.** *Rhinoclemmys punctularia flammigera* subsp. nov. is described from the region of confluence of the Ventuari and Orinoco rivers in southern Venezuela. The controversy on the systematic position of *Rhinoclemmys punctularia diademata* (Mertens) is discussed, and conservatively it is considered that *Rhinoclemmys punctularia* (Daudin) has three subspecies: the nominal form from eastern Venezuela, Trinidad, the three Guianas and northern Brasil; *R. p. diademata* (Mertens) from the Maracaibo Basin in Venezuela and Colombia; and the new subspecies here described. *Rhinoclemmys punctularia flammigera* subsp. nov. seems to be more closely related to *R. p. punctularia* (Daudin), the other Guianan representative of the genus. Available biological information on the new subspecies is presented.

**Resumen.** *Rhinoclemmys punctularia flammigera* subsp. nov. es descrita de la región de confluencia de los ríos Ventuari y Orinoco en el sur de Venezuela. La controversia respecto a la posición sistemática de *Rhinoclemmys punctularia diademata* (Mertens) es discutida y conservativamente se considera que *Rhinoclemmys punctularia* (Daudin) tiene tres subspecies: la nominal de Venezuela oriental, Trinidad, las tres Guayanas y Brasil septentrional; *R. p. diademata* (Mertens) de la hoya del Lago de Maracaibo en Venezuela y Colombia y la nueva subespecie descrita en este trabajo. *Rhinoclemmys punctularia flammigera* subsp. nov. parece estar más estrechamente relacionada con *R. p. punctularia* (Daudin), el otro representante guayanés del género. La información biológica disponible sobre la nueva subespecie es presentada.

### Introduction

The genus *Rhinoclemmys* ranges from northwestern Mexico to northern Brasil and coastal Ecuador, comprising thirteen recognized species and subspecies (Ernst 1978, 1981). Its nomenclature has suffered many alterations, but at the present time *Rhinoclemmys* Fitzinger is widely used, as Smith (1978) and Smith, Ernst and Smith (1980) proposed. Few Venezuelan *Rhinoclemmys* are available, and the information about them is scarce and incomplete. I have obtained some specimens in the Territorio Federal Amazonas (Venezuela) that undoubtedly belong to the species *Rhinoclemmys punctularia* (Daudin); however, they show consistent differences in the shape and ar-

rangement of the supracephalic spots to those of the other populations currently assigned to *R. punctularia* (Daudin), so now I here describe the new subspecies:

*Rhinoclemmys punctularia flammigera* ssp. nov;  
(Figs. 1-2)

**Holotype.** — 1 ♀, EBRG<sup>1</sup> 1467. Type locality: Caño Maica, 10 km SE of Carmelitas, Territorio Federal Amazonas, Venezuela (4°4'N, 66°31'W) (Fig. 3). Given to Alfredo Paolillo O. on 19/IX/1980.

**Paratypes.** — 13 specimens. EBRG 1468, EBRG 1684, MBUCV 2062, MBUCV 2067 (data as for holotype).

MBUCV 2063-2066, MBUCV 2068 (collecting site and collector as for holotype), 1/II/1981.

EBRG 1471 (collecting site and collector as for holotype), 2/II/1980.

EBRG 1469-1470, 1472: Savannas of Macuruco, Orinoco river, 4 km to SE of the Ventuari river junction, Territorio Federal Amazonas, Venezuela (3°55'N, 67°01'W) (Fig. 3). Given to J. Cerda in October, 1981.

**Diagnosis.** — A subspecies of *Rhinoclemmys punctularia* (Daudin) characterized by numerous supracephalic spots arranged in a radial pattern; loreal, middle lateral, posterior lateral and parietal spots always present on each side of the head forming a semicircle-like figure; some spots may be absent, fragmented or united, but never forming continuous lateral bands (as in *R. p. punctularia* (Daudin)), or a horseshoe-shaped figure (as in *R. p. diademata* (Mertens)); intercalar band present; femoral and anal plates mostly blackish brown; remainder of the plastron from cream yellow to blackish brown; carapace from dark brown to almost black; maximum carapace length 225 mm.

**Etymology.** — *Flammigera*, from the latin *flamma* (= flame, fire) and *gero* (= to show); in reference to the shape and arrangement of the supracephalic red spots.

**Holotype description.** — Carapace approximately ovoidal, length/width carapace = 1.4, rather domed; length carapace/height shell = 2.5; posterior surface slightly higher than the anterior; nuchal scute narrow and enlarged, subtriangular, completely separating the 1st pair of marginals; 12 pairs of marginals, 1st and 2nd marginals with a projection on the anterior external border, 3rd-7th marginals with relatively smooth external borders, last marginal pair with notched medial posterior border; 4 pleural pairs; 1st/2nd pleural length = 1.6 (measured at the middle line); 1st pleural in contact with the first five marginals; 2nd pleurals almost rectangular, and in contact with 5th-7th marginals; 3rd pleurals with posterior external border posteriorly directed, and

<sup>1</sup> EBRG = Estación Biológica de Rancho Grande, Aragua, Venezuela. MBUCV = Museo de Biología de la Universidad Central de Venezuela, Caracas.

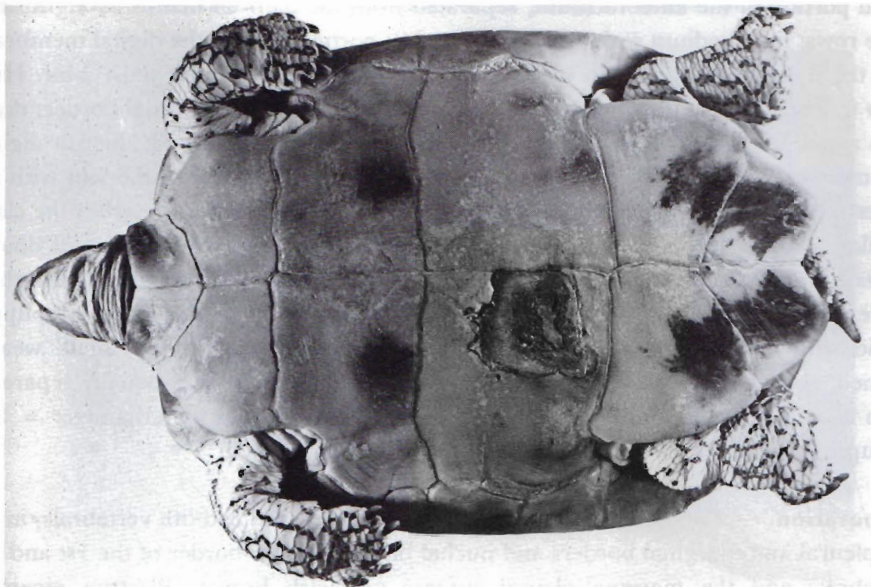
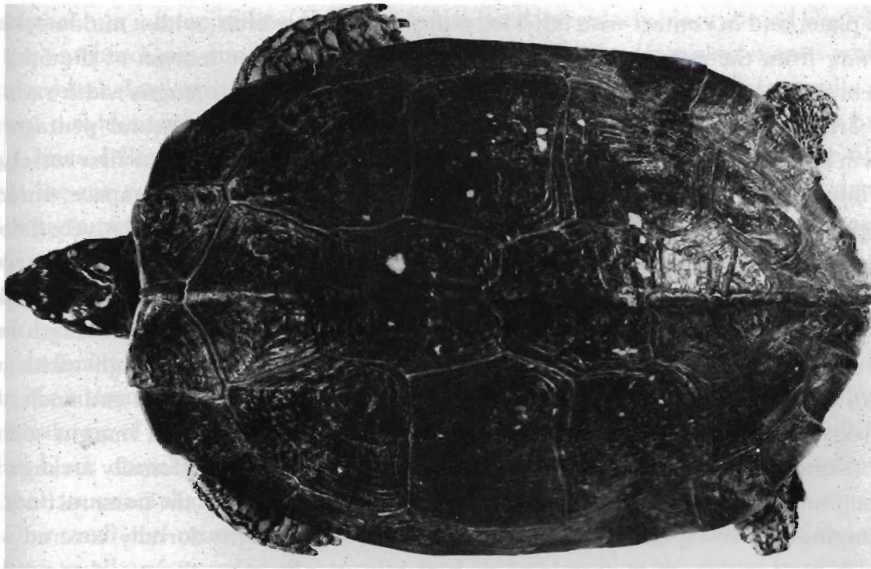


Fig. 1. Holotype of *Rhinoclemmys punctularia flammigera* subsp. nov. (EBRG 1467). A. Dorsal view. B. Ventral view.

touching the 7th-9th marginals; 4th pleurals with a bulge on the internal surface of each plate, and in contact with 9th-11th marginals; 5 vertebrals, with a middorsal keel running from the anterior margin of the 1st to the posterior margin of the 5th; 1st vertebral almost pentagonal; 2nd vertebral roughly hexagonal, length/width ratio = 1.1; 3rd and 4th vertebrals hexagonal, as long as wide; 5th vertebral pentagonal; growth annuli occur on all carapacial scutes, lightly marked on the four first vertebrals and internal pleural margins. Plastron approximately as large as the carapace, anterior margin reaching farther than the carapacial anterior border; plastron relatively flattened, except its posterior and particularly, its anterior fourth which are upturned; plastral formula: abdominal > pectoral > anal > gular > femoral > humeral; gulars not divergent; maximum humeral length equals its width; pectoral width/length ratio = 1.5; bone below right abdominal plate partially exposed; maximum width and length equal in femorals and anals; growth annuli occur on the gulars and anals, but are less marked on the abdominal and pectorals; femoral and anal margin surface almost smooth. Forelimb strongly developed; small brachial scales dorsally arranged in 18 longitudinal rows; antibrachial scales up to 8 times larger than the humeral ones, in 12 longitudinal rows; manus with 6 rows of small scales; digits dorsally covered with roughly rectangular scales, forming 3 scale rows on the first four digits and one row of two scales on the 5th; digits united by a well developed web extending to the claw. Ventral brachial surface with same characteristics as dorsal; four large scale rows on the distal portion of the antibrachium, separated from the palm of manus by eight small scale rows; five medium scale rows on the palm; portion near to the digital membrane and the membrane itself with scales similar to those of the ventral wrist joint. Hind limb robust, with 32 longitudinal scale rows toward the dorsal external border; digits with a row of 2-4 rectangular scales; the first four digits are clawed; the 5th digit is rudimentary and unclawed; the 4th digit and the internal border of the foot with a 6 scales row and one scale projected as a rounded spur; the webbing reaches the claw. Papilar scales surrounding the vent skin; there are six longitudinal rows of double scales on the underside of the tail. The head is relatively short, carapace/head length = 6.4 length/width of head = 1.3; with a projected snout, with short cut round tip; upper eyelid with three well-marked cutaneous folds, each one covered by small, weakly defined, rectangular scales; head length/eye diameter = 3.4; orbit equally separated from nasal border as from anterior tympanic border; eye/tympanum diameter = 1.4; the upper maxillary border is serrated and anteriorly notched.

**Colouration.** — Carapace blackish brown, especially on the 2nd-5th vertebrals, internal pleural and marginal borders and nuchal black; anterior border of the 1st and 5th vertebrals and the marginal-pleural sutures yellowish brown. Plastron creamish yellow, with a diffuse brown spot approximately at the center of the pectorals which contacts the abdominals; a smaller spot on the abdominal-femoral seam; femorals with a dark brown posterior spot, corresponding with a similarly colored spot covering almost all the anal scute. Bridge greyish yellow, particularly on the ventral surface of

the marginals; 4th-6th marginals with the ventral surfaces lightly mixed dark brown. Antebrachium intense yellow; brachium reticulated irregularly black; broad black lines on the antebrachium running along the majority of the border scales; manus with irregular black dots; each digit margined by a broad black line united proximally with that of neighbouring digit; the external border of antebrachium is crossed by broad black lines delimiting a very dark yellow band which reaches the distal scale of the digit; the toe webbing is black bordered. The yellow hind limb much more densely black pigmented than the forelimbs; its reticulations are less evident than those on the forelimbs; a black line runs along the external border of the web from the 4th digit to the spur proximities. The skin between hind limb and tail yellow, with irregular black semicircle-like marks; the vent is black bordered, and some black lines longitudinally converge toward the tail, which has a narrow dorsal band that is darker than the surrounding coloration, and delimited on each side by a yellow line converging on the tip of the tail; tail scale rows ventrally black bordered, converging on the tip. Head black dorsally, with seven vivid red spots on each side in life (pale yellow in alcohol); supracephalic red spots arranged on each side as follow:<sup>2</sup>

- 1) One small and rounded loreal spot at the level of the anterior border of the eye.
- 2) One small and rounded supraocular spot almost reaching the dorsal border.
- 3) One small and rounded frontal spot slightly directed toward the middle line of the head.
- 4) One rounded anterior lateral spot, near to the posterior border of the eye.



**Fig. 2.** Holotype of *Rhinoclemmys punctularia flammigera* subsp. nov. (EBRG 1467). Lateral view of head.

<sup>2</sup> To avoid confusion about the nomenclature of the head markings, I employ the terminology used by Fretey, Hoogmoed and Lescure (1977), and I provide new names for those spots not found in *Rhinoclemmys punctularia punctularia* (Daudin).

- 5) One middle lateral spot which is larger than the anterior spot, with a slight projection toward the internal side of the head, that on the left is transversally disposed and slightly enlarged.
- 6) One enlarged posterior lateral spot, with its anterior extreme wider and more rounded (it is also red in life, but its posterior extreme is intense yellow).
- 7) One relatively large parietal spot.

There is also an intercalary band between the posterior lateral and the parietal spot, constituted of black spots on a dark brown background proceeding from the neck. The neck is dorsally narrowly lined, anteriorly dark brown and posteriorly yellow. The loreal region is black with a yellowish black bordered band running from the nares to the neck and crossing below the eye. A minute red superciliary spot on the upper eyelid and the postocular region is yellowish brown, with one black bordered yellow postocular band reaching the upper margin of the tympanic membrane. The tympanic membrane has a rounded black figure; the mandible and gular region are yellowish.

**Body measurements.** See Table 1.

**Variation in paratypes.** (Fig. 4). — The frontal spots are absent in two paratypes, the anterior laterals in nine and the supraoculars in ten. The following supracephalic spots are united: frontal with the middle lateral on the left side of EBRG 1684; supraocular, frontal, anterior lateral and middle lateral on the left side of EBRG 1472; supraocular, frontal and anterior lateral on the right side in the same paratype; middle lateral and parietal in MBUCV 2066, producing a narrow line to each side; frontal, anterior lateral and middle lateral on the right side of the same paratype; an odd spot is present between the eyes in EBRG 1469, and another between the middle lateral and the parietal in EBRG 1471. Postocular band is variable in extension between the paratypes, and in EBRG 1468 is fragmented in two rounded portions. MBUCV 2065 has one small supernumerary scale between the first and the second right marginals; MBUCV 2067 has five pleurals on the right side; MBUCV 2063 lacks the left gular scute and the right one is incomplete; EBRG 1470 has a necrosis zone between the right eye and the nasal cavity; MBUCV 2065 is prognate, with the anterior mandibular margin notched. The carapace ranges from dark brown to almost black; in the juvenile MBUCV 2067 it is greenish gray, with a yellow bordered carapace. Plastron ranges in colour from predominantly creamish yellow to almost completely dark brown; most paratypes have the plastral middle line creamish yellow, except from the femorals and anals, always blackish brown. The bridge is coloured the same as the plastron, with greyish figures on the youngest paratypes (MBUCV 2067, EBRG 1471, MBUCV 2062, EBRG 1472).

**Vernacular names.** — The Maco Indians, who inhabit the type locality, call this turtle “nolamé-chuá”. The “criollos” of Macuruco call it “morrocroy negro”, apparently due to its dark carapace, partially terrestrial habits and general resemblance with the true “morrocroyes” (tortoises of the genus *Geochelone* Fitzinger).



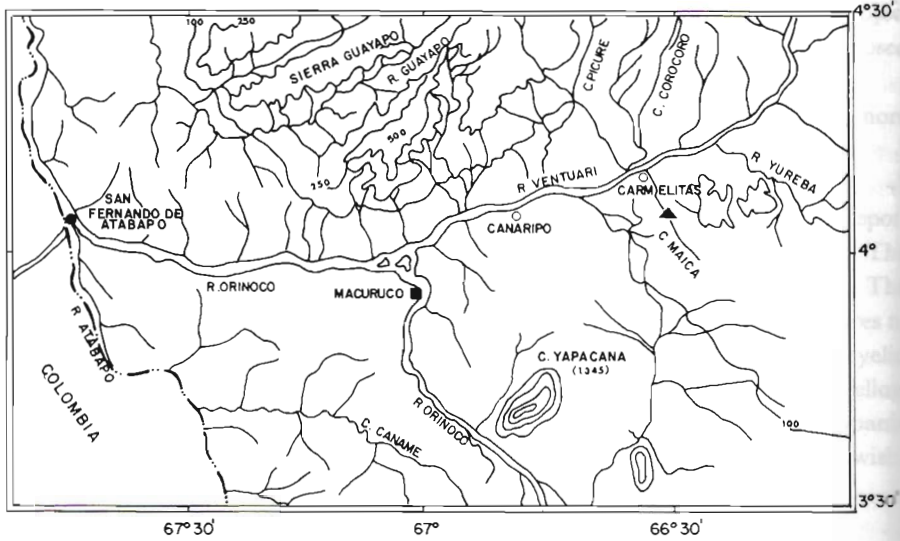


Fig. 3. Type series localities of *Rhinoclemmys punctularia flammigera* subsp. nov. in the Territorio Federal Amazonas, Venezuela. Triangle = Type locality. Square = Locality of paratypes EBRG 1469, EBRG 1470, EBRG 1472.

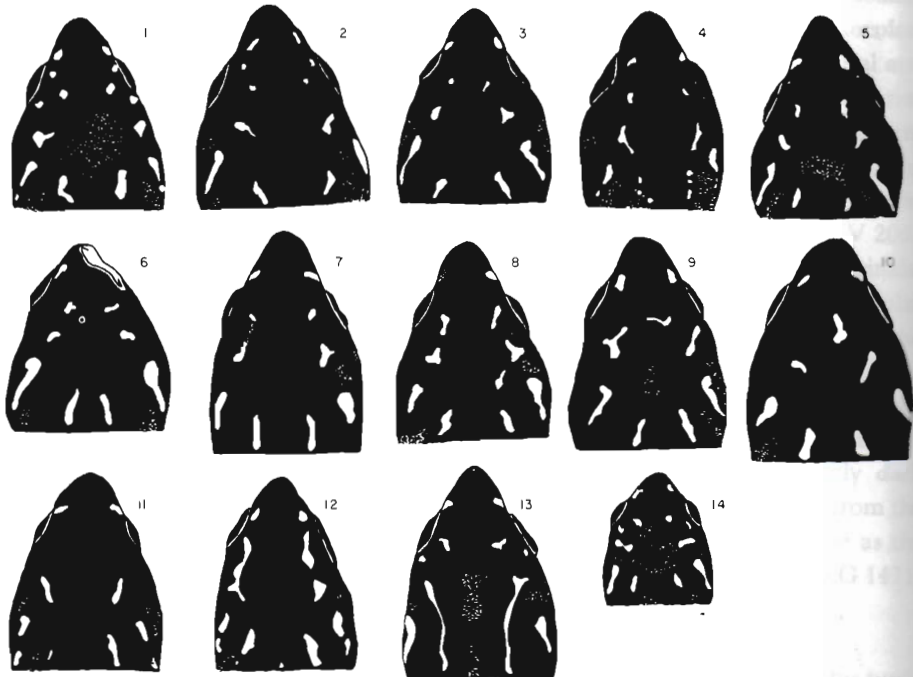


Fig. 4. Supracephalic pattern variation in *Rhinoclemmys punctularia flammigera* subsp. nov. 1- Holotype (EBRG 1467). 2-14: paratypes. 2- MBUCV 2064. 3- MBUCV 2063. 4- MBUCV 2062. 5- EBRG 1468. 6- EBRG 1470. 7- EBRG 1684. 8- EBRG 1471. 9- MBUCV 2068. 10- EBRG 1469. 11- MBUCV 2065. 12- EBRG 1472. 13- MBUCV 2066. 14- MBUCV 2067 (not to scale).



**Distribution.** (Fig. 3, Fig. 5). *Rhinoclemmys punctularia flammigera* subsp. nov. is known only from the type series, inhabiting the low Ventuari River and the confluence region with the Orinoco River in the Territorio Federal Amazonas, Venezuela.

**Habitat.** Caño Maica and Macuruco are within the Venezuelan Life Zone humid tropical forest, as defined by Ewel, Madríz and Tossi (1976), but both regions also include some savanna patches with sandy soils. The Caño Maica region has amazonic-type savannas, while Macuruco moreover has llaneran-type savannas, according to the classification of Huber (1982). The Macuruco inhabitants refer it as an uncommon turtle; the three paratypes collected there were found in the "morichales", during the fruiting season of the "moriche" palm (*Mauritia*), whose fruits are eaten by this turtle. The Maco Indians affirmed that they occasionally find it in the gallery forest during the rain season.

**Reproduction.** — The sex ratio in the type series is 1:1 (7 ♀ and 6 ♂). I examined two eggs in Carmelitas, lower Ventuari river (Fig. 3), found together practically at the same soil level, and lightly covered by dry leaves. The eggs are whitish, hard-shelled, ellipsoids, with the extremes unequally wide, the largest one measured 59.15 x 35.20 mm, smaller and wider than for eggs reported by Fretey (1977) for *Rhinoclemmys punctularia punctularia* (Daudin). Currently, I am preparing a paper in which the reproductive behavior of *Rhinoclemmys punctularia flammigera* subsp. nov. is described.

### Discussion

We still are far from an adequate knowledge of the South American *Rhinoclemmys*. This is particularly true for the controversial taxa such as *Rhinoclemmys punctularia diademata* (Mertens) from the Maracaibo Lake region in Venezuela and Colombia, and *Rhinoclemmys punctularia melanosterna* (Gray) from Panama, northwestern Colombia and western Ecuador. Ernst (1978) found significant differences for the eight body characters compared between *punctularia* and *melanosterna*, but retained them as a subspecies of *R. punctularia* (Daudin). Pritchard (1979) estimated that *R. punctularia melanosterna* (Gray) should be elevated to full specific status, and I agree with him. Pritchard (1979) also conferred specific status to *diademata*, based on the presence of the light cephalic, inverted V-shaped spot, and in the absence of intergradation with *melanosterna* or *punctularia*, its nearest geographic neighbours (Pritchard & Trebbau, in press). In my opinion, the supracephalic mark itself is not a solid criterion to separate *diademata* and *punctularia* to the species level, since its significance has not yet been proved as a discriminative trait into this taxa group. Moreover, the present geographic isolation existing between these taxa does not constitute an irrefutable argument either, because possibly the ancestor of the "*punctularia* complex" may have been a species with an extensive past range, and that its present populations are only slightly differentiated by vicariance. In their manuscript Pritchard and Trebbau say about *diademata*

and *punctularia*: "... Intergrades are not known between any of these taxa; and while this is not an absolute criterion, since the ranges are separated, there is no biological justification for considering the forms to be subspecifically related, and until such is presented, full species ranking is recommended ... the only real difference between the two species is the very clearly distinct colouration on the dorsal surface of the head ...".<sup>3</sup> By these same reasons I cannot justify a specific status to *diademata*, and I prefer to wait for a conclusive systematic revision before accepting such change.

I have no hesitation in describing *flammigera* as a subspecies of *Rhinoclemmys punctularia* (Daudin), since there seems to be no differences between the new taxon and *punctularia* except for the supracephalic colouration pattern, and for me this character has importance only at the subspecific level in this species group. For these reasons, I believe it is advisable to consider *Rhinoclemmys punctularia* (Daudin) to include *R. p. punctularia* (Daudin),<sup>4</sup> *R. p. diademata* (Mertens) and *R. p. flammigera* subsp. nov. Obviously, an evaluation of the cephalic colouration pattern as a discriminative character in the "*punctularia* complex" is needed. Sites, Greenbaum and Bickham (1981) presented some electrophoretic evidence of the relationship between *R. punctularia* (Daudin) and other species within the genus. They reported an apparent allozymic affinity between this species and *R. areolata* (Duméril and Bibron), a Central American species differing from *punctularia* in the webbing extension, the arrangement of the cephalic spots, and the plastral and carapacial colouration.

I consider *Rhinoclemmys punctularia flammigera* subsp. nov. most closely related to *Rhinoclemmys punctularia punctularia* (Daudin). Both subspecies have similarly coloured loreal, supraocular and parietal spots; the "bande latérale" of Fretey, Hoogmoed and Lescure (1977) in *R. p. punctularia* (Daudin) is equivalent in location to the fusion of the anterior, middle and posterior laterals and the frontal spots of the *R. p. flammigera* subsp. nov. (Fig. 4), and both subspecies have the posterior extreme of the lateral band (posterior lateral spot in *flammigera*) yellow coloured. The supracephalic spot pattern in *R. p. punctularia* (Daudin) was studied by Fretey, Hoogmoed and Lescure (1977) and by Ernst (1978), with large samples from much of its ranges and the recorded variation never included the arrangement found in *R. p. flammigera* subsp. nov. Body measurements of *flammigera*, globally considered, are more similar to those of *R. p. diademata* (Mertens) than to *R. p. punctularia* (Daudin) (Table 2), but the sample sizes of the first two subspecies are more reduced, especially for *diademata*, so that the observed

<sup>3</sup> However, Carl Ernst (pers. comm.) recently indicated to me that he had seen photographs of intergrades between *diademata* and *melanosterna* taken by John Iverson.

<sup>4</sup> Fretey, Hoogmoed and Lescure (1977) gave a good synonymy for this subspecies, and the following is added:

*Rhinoclemmys punctularia punctularia*: Fretey et al., 1977: 66.

*Callopsis punctularia punctularia*: Ernst, 1978: 122.

*Rhinoclemmys punctularia punctularia*: Smith, 1978: 93.

*Rhinoclemmys punctularia*: Pritchard, 1979: 182.

*Rhinoclemmys punctularia punctularia*: Ernst, 1981: 1.

**Table 2.** Mean body ratios of *Rhinoclemmys punctularia flammigera* subsp. nov., *Rhinoclemmys punctularia punctularia* (Daudin) and *Rhinoclemmys punctularia diademata* (Mertens). (\* = as Ernst 1978, p. 123; sample size in brackets).

Body ratio*	<i>flammigera</i>	<i>punctularia</i> *	<i>diademata</i> *
Width/length 2nd vertebral	1.02 (14)	1.07 (65)	1.05 (5)
Width/length 2nd pleural	1.36 (14)	1.35 (75)	1.46 (5)
Marginal width/ carapace width	0.21 (14)	0.18 (59)	0.17 (5)
Gular width/ gular length	0.80 (13)	0.99 (77)	0.88 (5)
Intergular seam length/interhumeral seam length	1.62 (13)	1.54 (77)	1.63 (5)
Carapace width/ carapace length	0.74 (14)	0.75 (65)	0.74 (5)
Interfemoral seam length/interanal seam length	0.81 (14)	0.96 (78)	0.84 (5)

differences may be merely artificial. The assumed close relationship between *punctularia* and *flammigera* is also supported by their distributional patterns (Fig. 5); their ranges are actually connected in the southern Orinoco river basin, and it is very probable that natural intergrade populations exist in the intermediate lowlands between the Caroni and Sipapo rivers in the Estado Bolívar and Territorio Federal Amazonas (Venezuela), while *R. p. diademata* (Mertens) is completely restricted to the Maracaibo Lake basin.

Rivero-Blanco and Dixon (1979) reported that *Rhinoclemmys punctularia* (Daudin) occurs in the Llanos region, but in reality no specimen of the genus is known from there; the known localities of *Rhinoclemmys* nearest to the Llanos are in the Guiana region of Venezuela. If the absence of *Rhinoclemmys* in the Llanos is real, it may be because the genus has a slow colonizing process of this new dispersive area ("neo-biota" of Mago-Leccia (1976) from the Guiana region.

Marinus Hoogmoed kindly sent me a photocopy of the paper of Methner and Wicker (1984), in which is reported a *Rhinoclemmys* female for the Magdalena River (northern Colombia) considered by these authors as *R. punctularia* (Daudin). Unfortunately, only a single specimen was collected, apparently similar to members of the eastern population of *R. punctularia*, *sensu* Pritchard (1979) (*R. p. punctularia* (Daudin), as my criterion). This record is surprising because this taxon has been recognized as an exclusive Guianan-Amazonian inhabitant. The vicinity of this *punctularia*-complex representative to the geographic range of *diademata* and *melanosterna* suggests that it is advisable to wait until more specimens become available to assess the identity of this

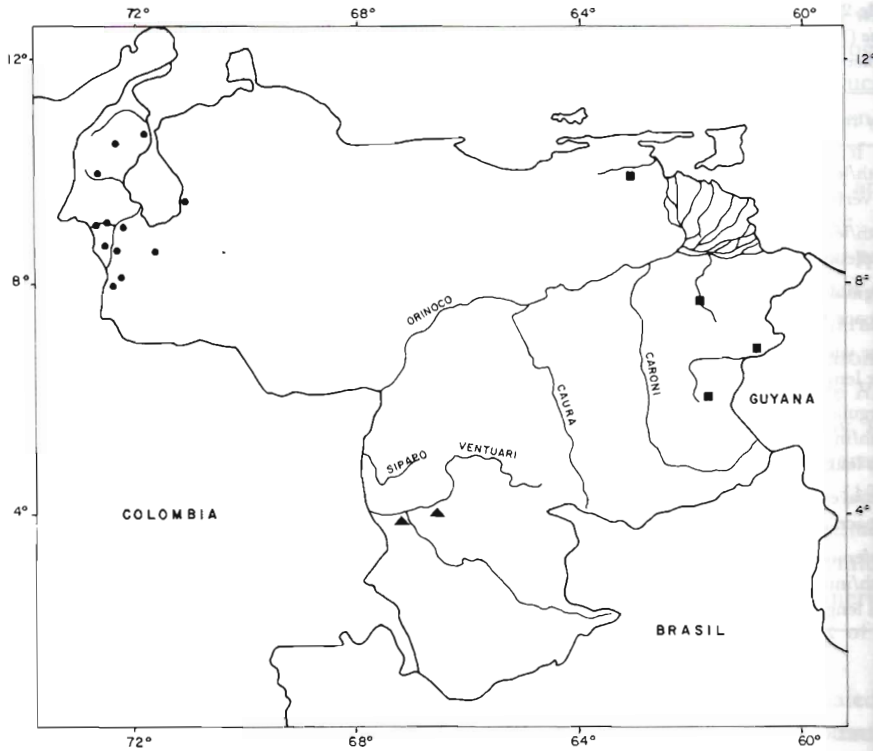


Fig. 5. Distribution of the genus *Rhinoclemmys* Fitzinger in Venezuela, based on museum specimens. Triangles = *Rhinoclemmys punctularia flammigera* subsp. nov. Squares = *Rhinoclemmys punctularia punctularia* (Daudin). Circles = *Rhinoclemmys punctularia diademata* (Mertens).

interesting *Rhinoclemmys*. Eventual proofs of sympatry and/or natural hybrids in that region would be a way to solve the present controversy regarding the taxa of the *punctularia*-complex.

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