REMARKES ON THE TAXONOMIC STATUS OF THE VARIOUS SUBSPECIES OF THE MEXICAN RATSNAKE *ELAPHE FLAVIRUFA* (COPE, 1867)

By: Klaus-Dieter Schulz, Tannenweg 25, 5102 Würselen, Germany.

Contents: Introduction - Subspecies - Taxa - Discussion - Material - Acknowledgements - Literature.

* * *

INTRODUCTION

The Mexican ratsnake as it was named by Mertens & Rosenberg (1943) has in the past only superficially been investigated and described. Although Dowling (1952) devoted a relative long paper to this species, his notes and knowledge are based on only a few specimens (n = 23).

My own investigations are based mainly on the pattern and colouration as they appear in the different forms of *Elaphe flavirufa*. Investigations on the scalation (pholidosis) has only been carried out in a few cases and were mainly based on the scales of the head. Literature research (Dowling, 1952; Smith & Williams, 1966; Gaige, 1936, Boulenger, 1864; Stuart, 1948, Smith, 1941), however, resulted in a few interesting differences between the different subspecies (see Table 1 and Diagram 1).

Elaphe flavirufa is a large snake, which looks reasonable slim despite its fairly strong build. The broad, flat head stands clearly out from the neck. The tail is long and accounts for a quarter or more of the total body-length. The ventral edge keels are clearly defined, as in other arboreal *Elaphe sp.*. The large, forward positioned eyes show a small oval pupil under strong (subspecies *mutabilis*) which occurs in the same area. *Elaphe flavirufa* distinguishes itself from this, and other *Elaphe* species occurring in the New World, by three supralabial scales in contact with the eye (in all other species only two supralabial scales are in contact with the eye).

This semi-arboreal, nearly exclusively nocturnal species, feeds in nature on small mammals (rodents, bats) and birds. The distribution of this neotropical species ranges from Tamaulipas (north-east Mexico) to Nicaragua (Corn Islands).

SUBSPECIES

Dowling (1952) describes a total of four subspecies of this snake *(flavirufa, pardalina, matudai, phaescens)*, Smith & Williams (1966) add another subspecies *(Elaphe flavirufa polysticha)*, which however was rejected again by Wilson & Hahn (1973) seven years later. The subspecies *Elaphe flavirufa phaescens* described by Dowling (1952) is sometimes raised as a valid species *(Elaphe phaescens*, see Smith & Taylor, 1966; Delisle, 1988).

Elaphe flavirufa matudai Smith (1941) is only known by the holotype specimen. Dowling (1952) suspects this specimen to be an intergrade between *Elaphe flavirufa flavirufa* and *Elaphe flavirufa pardalina*. In my opinion this argument is not accurate as intergrades of these two subspecies would hardly show such a deviation in pattern as *Elaphe flavirufa matudai* has, which clearly

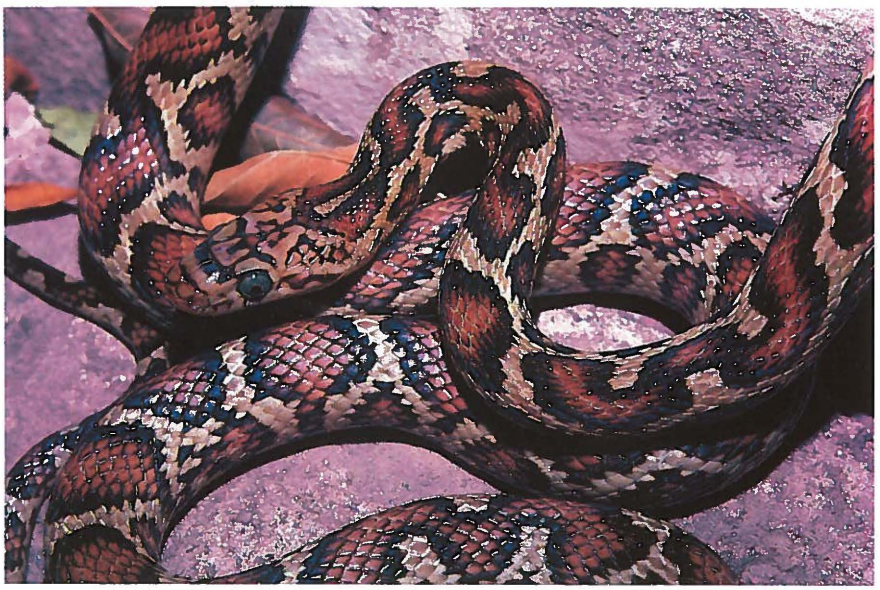


Foto 1: *Elaphe flavirufa flavirufa,* Soto la Marina, Tamaulipas, Mexico.
Foto D. Barker.

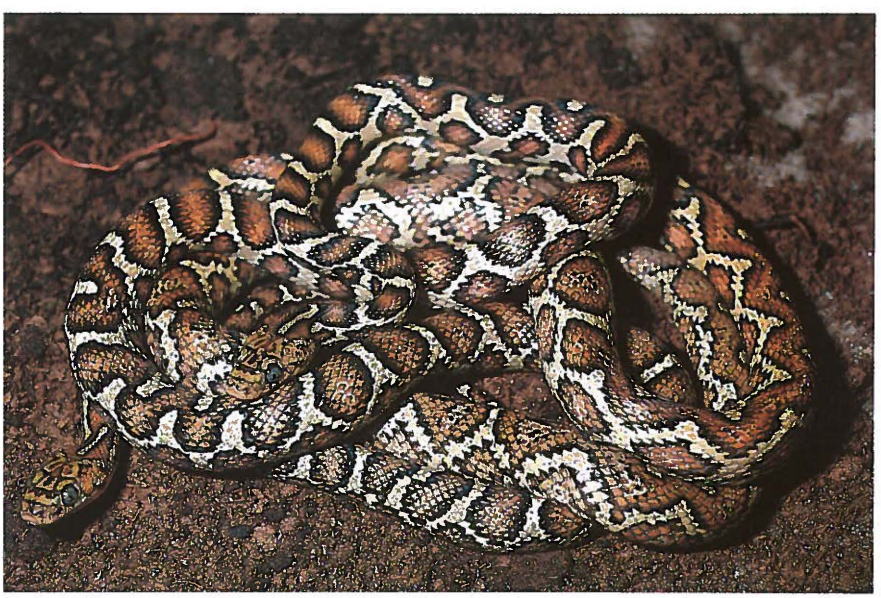


Foto 2: *Elaphe flavirufa flavirufa,* nakweek uit, captive bred from specimens from Tamaulipas, Mexico.
Foto K.-D. Schulz.

deviates it from the other subspecies. Regarding this specimen as a variant of *Elaphe flavirufa pardalina* would in this case be possibly better and wiser. In contrast to this, I fully agree with Wilson & Hahn (1973), that *Elaphe flavirufa* only in the zoogeographically separated area of Mexico (Yucatan and Chiapas) has developed into two independent forms which have adapted themselves due to geographic and climatic isolation and distinguish themselves clearly from other subspecies. A few living specimens of *Elaphe flavirufa flavirufa, Elaphe flavirufa pardalina* and *Elaphe flavirufa polysticha* have shown that only very few characteristics are present to distinguish these three forms in colour and pattern. Without precise data on the precise location of collection a precise grouping is in many cases very difficult. Dowling (1952) discriminates *Elaphe flavirufa pardalina* from *Elaphe flavirufa flavirufa* solely by a higher number of ventrals and dorsal spots, as well as a divided preocular scale. The structure of the pattern, like the colour, he considered equal in both forms. In specimens of *Elaphe flavirufa flavirufa* which were at my disposal I could only determine a slightly broader, black separation around the dorsal spots. All other characteristics are relative and hardly useful as convincing discriminating characteristics against *pardalina* and *polysticha*. The number of dorsal spots was reported by Dowling (1952) as follows:

	body	**tail**
flavirufa	33-42	17-24
pardalina	36-46	17-23
matudai	35	15?
phaescens	29-30	12-16

Diagram 1: A comparison of the subcaudal and ventral counts for the subspecies of *Elaphe flavirufa*

Elaphe flavirufa polysticha is distinguished from *Elaphe flavirufa pardalina* only by a larger number of dorsal scale rows (max. 34 versus max. 31). Colour and pattern, like other details, fully agree with *Elaphe flavirufa pardalina*.

Wilson & Hahn ignore this subspecies, as the specimens from the Bay Islands they investigated, did not exceed the number of 31 dorsal scale rows. and show no further remarkable differences when compared to the *pardalina* form of the mainland.

I also was able to determine characteristic differences in colour and pattern between *Elaphe flavirufa polysticha* and Honduran specimens from the mainland population *(pardalina)*. The presence of the undivided preocular scale in the northern population of the nominate form is a discriminating characteristic when compared to *Elaphe flavirufa pardalina* from south Guatemala and Honduras, however, clear indications about the location have to be known. In addition, several specimens have to be available for comparison, as a gradual change of the northern into the southern population is very likely and animals with both manifestations (divided and undivided preocular scales) occur. One specimen of *Elaphe flavirufa pardalina* from Honduras, living in the writer's terrarium, has for example at one side a divided and at the other side an undivided preocular scale.

Gaige (1936) describes a specimen of *Elaphe flavirufa* from Tuxpena (central-south Campeche, Mexico) with two divided preocular scales; colour and pattern are not indicated for this animal. Dowling (1952) classifies this specimen - for whatever reason - with the nominate form in the synonym list and describes it as identical to the type specimen of *Elaphe flavirufa flavirufa* (!).

Foto 3: *Elaphe flavirufa phaescens,* N. Yucatan, Mexico.
Foto K.-D. Schulz.

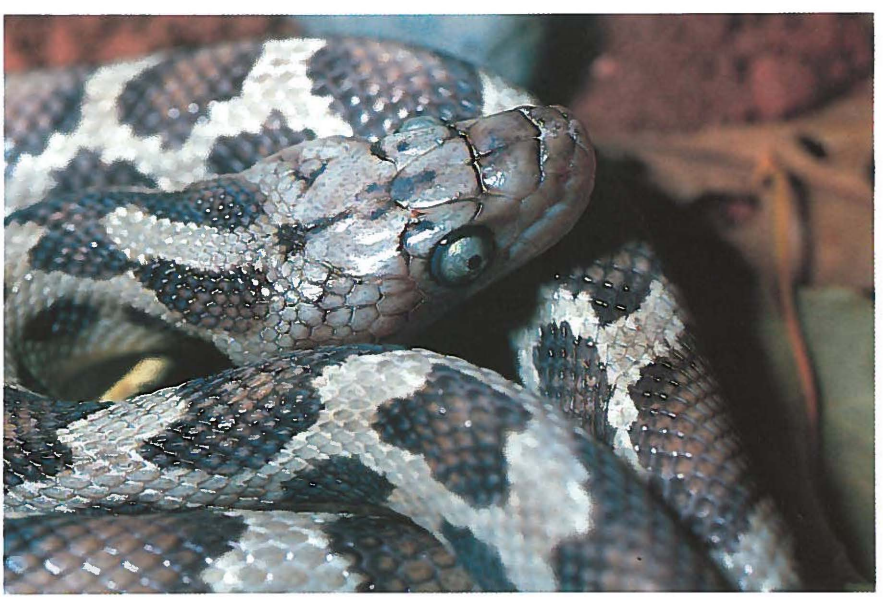
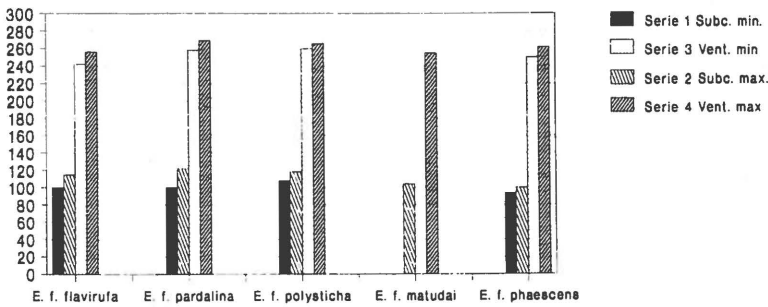


Foto 4: *Elaphe flavirufa phaescens,* kop van exemplaar van foto 3,
head of specimen of photo 3.
Foto K.-D. Schulz.

DIAGRAM subcaudalia & ventralia



Distribution map of *Elaphe flavirufa*

Elaphe rodriguezii Bocourt (1887) from Panzos (Guatemala) has not been investigated by Dowling (1952), however, it has been placed with the synonyms of *Elaphe flavirufa pardalina*. This specimen (photo 8) possesses a total of 60 dorsal body blotches (± two, due to the strong merging of blotches into a zigzag line, making it hard to determine precisely). The spots are partly angular as with *Elaphe flavirufa phaescens*, as well as oval with a broad black border like *Elaphe flavirufa flavirufa*. The preocular scales however, are divided as in *Elaphe flavirufa pardalina*. Stuart (1948), on the other hand, has placed *Elaphe rodriguezii* in the synonym list of *Elaphe flavirufa flavirufa*. A specimen from Belize (ZMB 10250) possesses 71 dorsal blotches (whole body length) and divided preoculars, and could therefore be classified among the *pardalina*-group. The border of the dorsal blotches however, is more clearly edged in black which, as a rule, is typical for the nominate form.

Boulenger (1894) and Schmidt (1941) also described a specimen from Belize (the same animal!) with 263 ventrals, 116 subcaudals and 33 dorsals, again pointing to *Elaphe flavirufa pardalina*. Schmidt (1941) however, indicates this specimen to be *Elaphe flavirufa flavirufa*. A number of animals found in trade and originating from Honduras, of which no accurate locality is given, sometimes show a large variation in the number of dorsal blotches, ranging from 61 to 73 (whole body). An accurate account is usually seriously hampered by the fusion of a few blotches into a zigzag line by most specimens of the {*flavirufa, polysticha, pardalina*}-group. All, except the already mentioned specimen, possess divided preocular scales. The colours of the three subspecies *(flavirufa, pardalina, polysticha)* are nearly equal, although dark brown and light reddish brown spotted specimens regularly occur. This colour is, as a rule, dependent on age. Only a few specimens tend to reach a notable reddish brown spotted pattern at maturity. This probably occurs within a population and cannot be included as a discriminating characteristic. In particular, young animals show sometimes a fairly strong, nearly red blotched pattern, getting continually fainter and darker as they grow older.

A corresponding polychromatic character in the {*flavirufa, pardalina, polysticha*}-group is also found in the marking of the ventral scales. Animals occur with cream coloured ventral scales as well as with intensive grey speckled ventral scales. Also specimens are found with a light pink bloom and larger, darker blotches on the keels of the ventral side. Specimens from Tamaulipas *(flavirufa)* sometimes posses a similar, less speckled marking on the ventral scales, just like the animals of Honduras *(pardalina)*.

The Yucatan populations *(Elaphe flavirufa phaescens)* distinguishes itself much more obviously from the remaining subspecies. This form does not only possess a different pattern and colour type, but also a different structure of the dorsal scales. The dorsals of *Elaphe flavirufa phaescens* are a bit smaller in the vertebral region, curved and clearly keeled, giving them a rough impression. In the remaining subspecies only the dorsal scales in the region of the back are slightly keeled, the scales are otherwise smooth. The marking of *Elaphe flavirufa phaescens* consist of large dark brown blotches at maturity, sometimes nearly black, saddle-shaped blotches fusing rarely into a waving line. The saddle-shaped blotches are more angular or H-shaped and less oval or rounded as with other forms. Near the neck two longitudinal stripes are also often present which can even connect the next saddle-shaped blotches into an H-shape. This pattern looks rather like one of the *Elaphe subocularis* (particularly the newly described *Elaphe subocularis amplinota*). The whitish ventral scales show as a rule, no marking. Dowling (1952) describes the young specimens of *Elaphe flavirufa phaescens* as being clearly more lighter coloured than mature specimens, nevertheless darker than the other subspecies. However, only preserved material was available to him and in that condition the colour is no longer original.

Villa et al. (1988), on the other hand, show two pictures of a juvenile *Elaphe flavirufa* from Yucatan. The structure of the marking fully agrees with *Elaphe flavirufa phaescens*, the strong reddish colour of the blotches, however, reminds one of the nominate form or of *Elaphe flavirufa*

Foto 5: *Elaphe flavirufa matudai,* geconserveerd exemplaar,
preserved specimen, holotype USNM 110303.
Foto W.R. Heyer.

Foto 6: *Elaphe flavirufa pardalina,* geconserveerd exemplaar,
preserved specimen, type '*Elaphe flavirufa polysticha*', BMNH 93.4.26.5.
Foto G. Vogel.

pardalina. The total number of spots (about 40) and the marking of the uppermost headparts clearly point to *Elaphe flavirufa phaescens*.

Duellmann (1965) describes a specimen of *Elaphe flavirufa phaescens* from Chichen Itza (Yucatan) with a total length of 657 mm. The colour and pattern of this animal consisted of reddish brown, black bordered blotches on a yellowish background. The adult animals (bodylength 1100-1435 mm) is described by him as having the typical dark brown blotches.

Sub-species	**Ventrals**	**Subc.**	**Supralab.**	**Supr. i.e.**	**Infralab.**	**Dors. mid-body**	**Preoc.**
flavirufa	242-256	100-115	9+9 9+10	4,5,6 (5,6,7)	14+14 13+13 (13- +12) 13+14	27-31	single
pardalina	258-269	100-122	9+9 (10+10) (8+8)	4,5,6 (5,6,7)	13+13 13+12 13+14 (15)	27-31 (34)	single + divid.
polysticha	263-266	108-118	9+9	4,5,6	13+13 13+12	31-(34)	divid.
matudai	255	104	10+10	5,6,7	13+14	31	divid.
phaescens	250-262	94-100	9+9 9+10	(5,6) 4,5,6	13+13 13+12	29-31	single

Diagram 2: Subc. = subcaudals; Supralab. = supralabials; Supr.i.e. = supralabials in contact with the eye; Infralab. = infralabials; Preoc. = preoculars; ()brackets = exceptions.

Young animals of *Elaphe flavirufa phaescens* can therefore only be identified as such by further comparison, because the reddish brown colour of the blotches strongly reminds one of the remaining subspecies. A living specimen of *Elaphe flavirufa phaescens* (photo 3 and 4) at a length of 90 cm already possessed the almost mature colour. The discolouring seems to appear a bit earlier than with the other subspecies which, as a rule, turn darker at a length of over 100 cm.

Interesting is the shorter tail length of *Elaphe flavirufa phaescens*, which, in contrast to the other forms, only comprises a maximum of a quarter of the total body length. This characteristic is with certainty based on the adaptation to its environment and its consequent way of living.

No intensive field obsrevations have been made yet, however, observations in the terrarium have shown that this form is almost exclusively terrestrial in contrast to the other subspecies which live both arboreal as well as terrestrial. Also in nature, for instance *Elaphe flavirufa pardalina* has sometimes been found in trees (Wilson & Hahn 1973). The natural food, partly consisting of birds, also suggests a semi-arboreal way of living for *Elaphe flavirufa flavirufa* and *Elaphe flavirufa pardalina*.

The only known specimen of *Elaphe flavirufa matudai* shows a strong resemblance in scale characteristics (pholidose) to the {*flavirufa, pardalina, polysticha*}-group. The marking, however, consists of large brown, saddle-shaped blotches fused partly in a typical zigzag line, but proceeding clearly further down the body flanks and covering a few of the otherwise roundish side blotches.

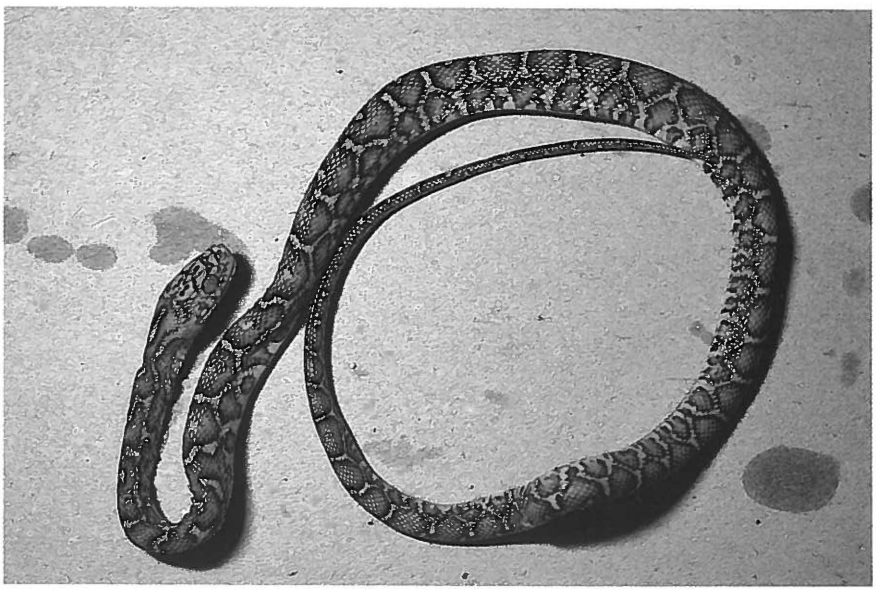


Foto 7: *Elaphe flavirufa pardalina,* geconserveerd exemplaar,
preserved specimen, holotype ZMB 3790.
Foto K.-D. Schulz.

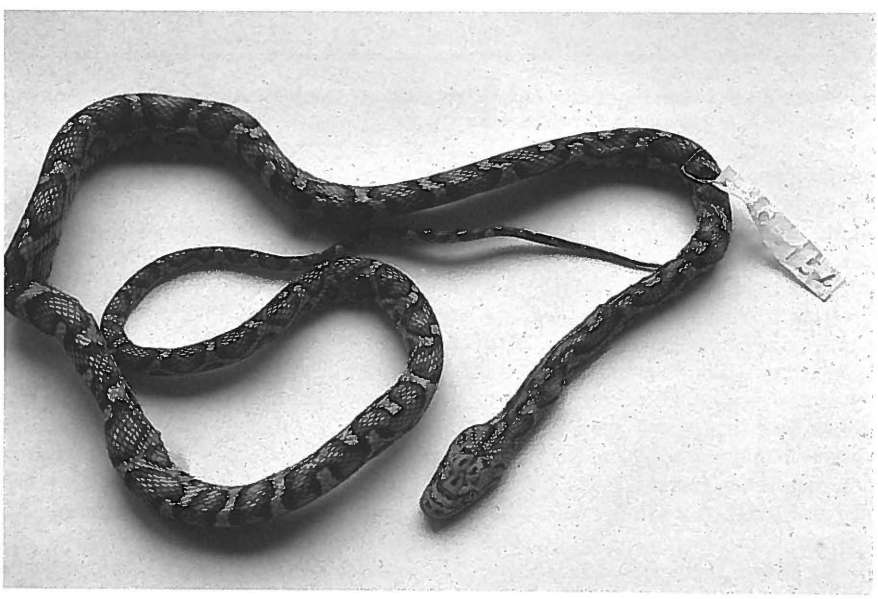


Foto 8: *Elaphe flavirufa pardalina,* geconserveerd exemplaar,
preserved specimen, type '*Elaphis rodriguezii*', MNHN 1888-154.
Foto H.P. Milt.

the colour and marking of the ventral shows no differences with the {*flavirufa, pardalina, polysticha*}-group.

TAXA

A
Pholidosis of *Elaphe flavirufa*. From the data summarized in this table, the following taxa with the corresponding synonyms and local variants can be derived:

Elaphe flavirufa flavirufa (Cope)

Coluber flavirufus Cope, 1867: 319 (Yucatan); Günther, 1887: 115 {partim} (Chiapas, Mexico); Boulenger, 1894: 39 {partim} (Mexico).

Elaphe flavirufa Taylor, 1949: 203 Xilitla, San Luis Potosi, Mexico).

Elaphe flavirufa flavirufa Smith, 1941: 132 Fig. 2 (eastern Mexico); Smith, 7; Taylor, 1945: 59 (listed, Mexico); Taylor, 1950: 448 (Ebano, San Luis Potosi); Dowling, 1952: 3 (Terra typica restricta = Campeche, Campeche Mexico); Smith & Darling, 1952: 83, fig.2 (Tamaulipas, San Luis Potosi); Conant, 1965: 13-15 + fig. 5-6 (Veracruz, Mexico); Ramirez-Bautista et al., 1982 (Huejutla, Hidalgo, Mexico).

Elaphe flavirufa pardalina (Peters)

Elaphe pardalinus Peters, 1868: 642 (Central America).

Coluber flavirufus Günther, 1887: 115 {partim} (Ruatan Island).

Elaphe flavirufa Wilson & Hahn, 1973: 126 (Roatan and Guanaje, Bay Islands, Honduras); Wilson & Meyer, 1985: 49 (Honduras).

Elaphe (Pseudoelaphe) flavirufa Mertens & Rosenberg, 1943: 60-63, fig 1-3 (Mexico).

Elaphe flavirufa pardalina Stuart, 1963: 98 (Guatemala; Villa, 1972: 15 (Great Corn Island, Nicaragua).

Elaphe flavirufa polysticha Smith & Williams, 1966: 1-2 (Isla Roatan, Bay Islands, Honduras).

Elaphe flavirufa matudai (Smith)

Elaphe flavirufa matudai Smith, 1941 (Salto de Agua, Chiapas); Smith & Taylor, 1945: 59 (listed, Mexico).

Elaphe flavirufa phaescens (Dowling)

Elaphe flavirufa Caige, 1936: 299 {partim} (Chichen Itza, Yucatan); Villa et al., 1988: pl. 56, 57 (Yucatan); Schmidt & Andrews, 1936: 172 (Yucatan).

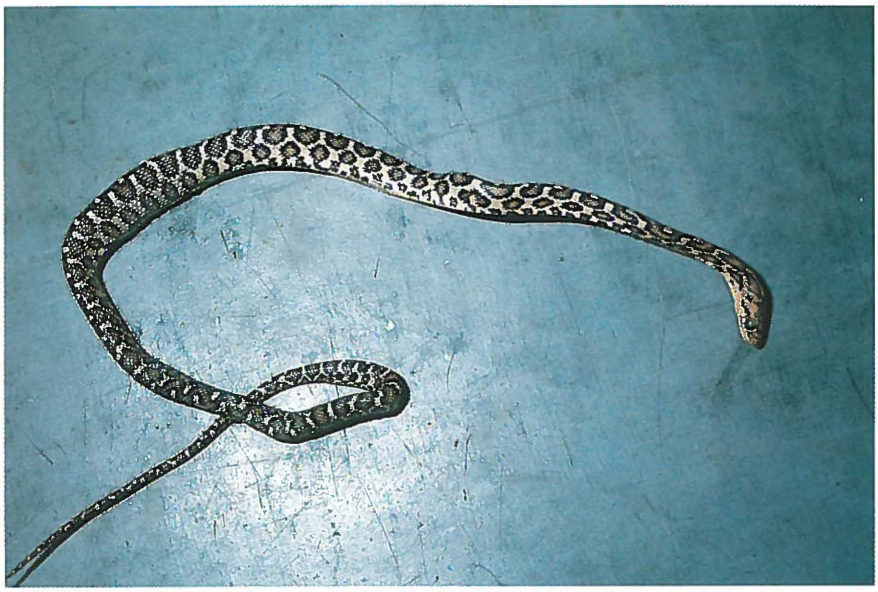


Foto 9: *Elaphe flavirufa pardalina,* geconserveerd exemplaar,
preserved specimen, ZMB 10250.
Foto K.-D. Schulz.

Foto 10: *Elaphe flavirufa pardalina,* nakweek, 2 jaar oud, captive bred,
2 years old.
Foto K.-D. Schulz.

Elaphe flavirufa phaescens Dowling, 1952: 7-9 (Chichen Itza, Yucatan); Cochran, 1961: 176 (Chichen Itza, Yucatan).

Elaphe flavirufa phaescens Smith & Taylor, 1966: 21 (Isamal, Yucatan = Terra typica restricta); DeLisle, 1988: 21 + pl. (Yucatan).

B

Possible intergrades, e.g. not definite groupable taxa:

Elaphe flavirufa Gaige, 1936: 299 {partim} (Campeche).

Elaphis rodriguezii Bocourt, 1887: 168 and 1988: 638, pl. 46 (Panzos, Guatemala).

Elaphe flavirufa flavirufa Schmidt, 1941: 501 (Belize); Stuart, 1948: 68 (Alta Verapaz, Guatemala - based on *Elaphis rodriguezii* Bocourt).

Coluber flavirufus Ferrari-Perez, 1886: 185 (listed: Chiapas).

DISCUSSION

Within the subspecies of *Elaphe flavirufa*, three main groups can be distinguished according to colour and pattern (1. *flavirufa, pardalina*; 2. *phaescens*; 3. *matudai)*. The nominate form and *Elaphe flavirufa pardalina* are not easy to discriminate both in colour and pattern. The discriminating characteristics are the undivided preocular scale, the proportionally smaller total number of spots and the smaller number of ventral scales in the northern population of *Elaphe flavirufa flavirufa*. The populations occurring in Guatemala and Belize possess characteristics of *flavirufa, pardalina* and *phaescens*. This does not preclude a transitional area in which intergrades occur and considerably hampers a correct classification.

Reliable additional evidence from these areas could possibly clarify the situation, where and according to what criteria, a dividing line can be drawn between the nominate form and *Elaphe flavirufa pardalina*.

Although I personally hold the view that both forms form a common subspecies and only show small local differences, I do not want to complicate this taxonomic problem any further, but only point out this still unsolved phenomenon.

Interesting is a comparison with *Elaphe triaspis*, that has a similar distribution to *Elaphe flavirufa*. Also with *ELaphe triaspis* the Yucatan population clearly differs from all the other subspecies. In Guatemala a transitional area of all three subspecies also possibly occurs for this species (see Schulz, 1991).

Between *Elaphe flavirufa pardalina* and *Elaphe flavirufa polysticha* no differences worth mentioning occur. The status of subspecies *Elaphe flavirufa polysticha* has already been doubted by Wilson & Hahn (1973) and at this time it is placed in the synonym list of *Elaphe flavirufa pardalina*.

The only specimen of *Elaphe flavirufa matudai* known so far, might, upon comparison with other reference animals from Chiapas (Mexico), prove to be only a variant in pattern. However, since the Sierra Madre mountain range forms a natural zoogeographic border, the current valuation as subspecies *(Elaphe flavirufa matudai)* can be considered valid. *Elaphe flavirufa phaescens* that clearly deviates from the other forms is sometimes considerd to be a separate species. To what extent this classification can be justified, I do not want to judge, since suffiecient data are still

not available. Intergrades of *Elaphe flavirufa phaescens* with *Elaphe flavirufa flavirufa* or with *Elaphe flavirufa pardalina* are not available, but they would be very valuable in this matter.

MATERIAL

The following preparations have been used for this investigation or were available as photographs:

ZMB 3790 (holotype of *Elaphis pardalinus* Peters, 1968), Central America.
ZMB 10250, Belize
PKS 20-EFR, Honduras
BM 93.4.26.5 (holotype of *Elaphe flavirufa polysticha* Smith & Williams, 1966), Isla Ruatan, Honduras.
MNHN 1888-154 (type of *Elaphis rodriguezii* Bocourt, 1887), Panzos, Guatemala.
USNM 110303 (holotype of *Elaphe flavirufa matudai* Smith, 1941), Chiapas, Mexico.
USNM 46578 (paratype of *Elaphe flavirufa phaescens* Dowling, 1952), Chichen Itza, Yucatan, Mexico.

Abbreviations of the musea:

BM = British Museum of natural History, London
MNHN = Musée National d'Histoire Naturelle, Paris
PKS = Private Collection Schulz
USNM = United Stes National Museum of Natural History, Washington D.C. ZMB = Zoologisches Museum, Berlin

ACKNOWLEDGEMENTS

For their friendly support and permission to investigate the preparations I would like to thank Dr. E.N. Arnold and Dr. C. McCarthy (Natural History Museum, London) as well as Dr. R. Günther (Zoologisches Museum Berlin).

I also like to thank G. Vogel (Heidelberg) and N. Helfenberger (Zoologisches Museum Zürich) who placed photographs and results of investigations at my disposal.

Furthermore I would like to thank K. Tepedelen (Boulder, Co., U.S.A.) and D. Barker (Stevinson, MD., U.S.A.) for providing living specimens and communicating reliable spreading data.

LITERATURE

Boulenger, G.A., 1894. Catalogue of the snakes of the British Museum (Natural History). Vol. ii, *Colubridae Aglyphae*. Taylor & Francis, London: 1-382.

Campbell, H.W. & T.R. Howell, 1965. Herpetological records from Nicaragua. Herpetologica, Lawrence, 21 (2): 130-140.

Campbell, J.A. & J.P. Vannini, 1989. Distribution of amphibians and reptiles in Guatemala and Belize. Proc. Western Foundat. Vertebr. Zool., 4 (1): 1-21.

--- & W.W. Lamar, 1989. The venomous reptiles of Latin America. Comstock Publishing Associates. A Division of Cornell Univ. Press, Ithaca and London: 1-425.

Cochran, D.M., 1961. Type specimens of reptiles and amphibians in the U.S. National Museum. Bull. U.S. Nat. Mus., Washington D.C. (220): 1-291.

Conant, R., 1965. Miscellaneous notes and comments on toads, lizards, and snakes from Mexico. Amer. Mus. Nov., New York (2205): 1-38.

Cope, E.D., 1867. Fifth contribution to the herpetology of Tropical America. Proc. Acad. Nat. Sci. Philadelphia, 18: 317-323.

---, 1885. Twelfth contribution to the herpetology of Tropical America. Proc. Amer. Phil. Soc., Philadelphia, 22: 167-194.

---, 1892. A critical review of the characters and variations of the snakes of North America. Proc. U.S. Nat. Mus., Washington D.C., 14 (882): 589-694.

De Lisle, H.F., 1988. Rare herp corner - Yucatán Rat Snake, *Elaphe phaescens* (Dowling 1952). Herpetology (Southwestern Herpetologists Society), 18 (2): 21-23.

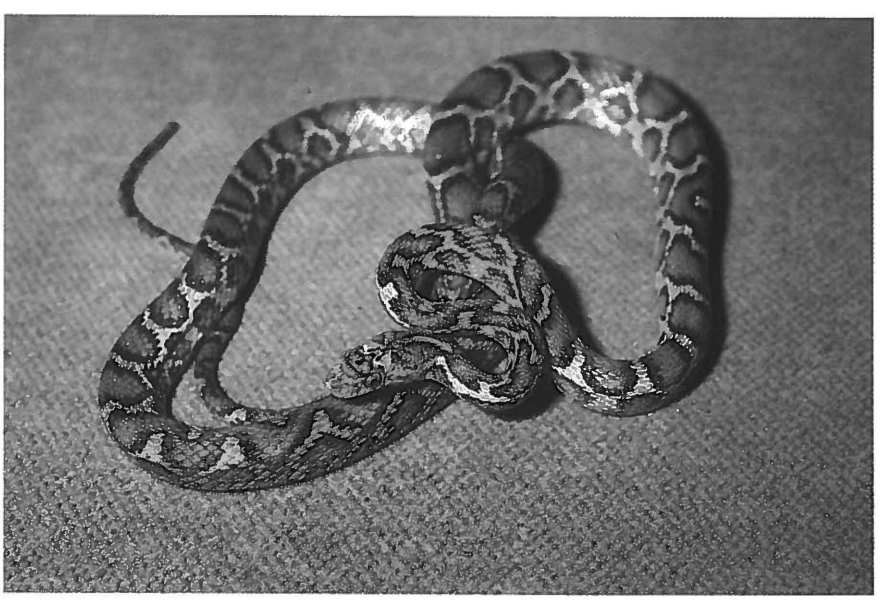


Foto 11: *Elaphe flavirufa pardalina,* waarschijnlijk uit Guatamala, probably from Guatamala.
Foto K.-D. Schulz.

Del Toro, M.A., 1982. Los Reptiles de Chiapas (3rd ed.). Publicacion del Instituto de Historia Natural Tuxtla Gutierrez, Chiapas: 1-248.

Dowling, H.G., 1951. A taxonomic study of the American representatives of the genus *Elaphe* Fitzinger, with particular attention to the forms occurring in Mexico and Central America. Not published. Dissertation, Ph.D. University Microfilms, Univ. Michigan, Ann Arbour (Publ. Nr. 3743).

-, 1952. A taxonomic study of the ratsnakes, genus *Elaphe* Fitzinger, II. The subspecies of *Elaphe flavirufa* (Cope). Occ. Pap. Mus. Zool. Univ. Michigan, Ann Arbour (540): 1-14.

Duellman, W.E., 1965. Amphibians and reptiles from Yucatán Peninsula, Mexico. Univ. Kansas Publ. Mus. Nat. Hist., 15 (12): 577-614.

Dundee, H.A., White, D.A. & V. Rico-Gray, 1986. Observations on the distribution and biology of some Yucatán Peninsula amphibians and reptiles. Bull. Maryland Herp. Soc., 22 (2): 37-150.

Ferrari-Perez, F., 1886. Catalogue of animals collected by the Geographical and Exploring Commission of the Republic of Mexico. Proc. Acad. Nat. Sci. Philadelphia, 9: 125-199.

Gaige, H.T., 1936. Some reptiles and amphibians from Yucatán and Campeche, Mexico. Carnegie Inst. Washington Publ. (457): 289-304.

Günther, A., 1894. Biologia Centrali-Americana. Reptilia and Batrachia. Society for the study of amphibians and reptiles, reprint 1987: 1-326.

Henderson, R.W. & L.G. Hoevers, 1975. A checklist and key to the amphibians and reptiles of Belize, Central America. Milwaukee Publ. Mus. Contrib. Biol. Geol. (5): 1-63.

Hudson, D.M., 1981. Blood parasitism incidence among reptiles of Isla de Roatan, Honduras. J. Herp., Athens, 15 (3): 377-379.

Johnson, J.D., 1989. A biogeographic analysis of the herpetofauna of Northwestern Nuclear Central America. Milwaukee Pub. Mus. Contrib. (76): 1-66.

Lee, J.C., 1980. A ecogeographic analysis of the herpetofauna of the Yucatán Peninsula. Univ. Kansas Mus. Nat. Hist., Lawrence (67): 1-75.

Martin, P.S., 1958. A biogeography of reptiles and amphibians in the Gómez Farias region, Tamaulipas, Mexico. Misc. Publ. Mus. Zool. Univ. Michigan (101): 1-102, Fig. 1-7.

Mehrtens, J.M., 1987. Living snakes of the world. Sterling Publishing Co., Inc., New York: 1-480.

Mertens, R., 1950. Nachruf auf eine Mexikanische Nachtnatter, *Elaphe flavirufa*. DATZ (D. Aquar. Terr. Z.), Stuttgart, 3 (5): 75-76.

--- & H. Rosenberg, 1943. *Elaphe flavirufa* (Cope), die Mexikanische Nachtnatter. Wochenschr. Aquar. Terrarienkunde, Braunschweig, 40: 60-62.

Peters, J.A. & B. Orejas-Miranda, 1986. Catalogue of the neotropical squamata. Part I: Snakes. Smithsonian Institution Press, Washington D.C., 297: 1-347.

Peters, W., 1868. Eine Mittheilung über neue Säugethiere (*Colubus, Rhinilophus, Vesperus*) und neue oder wenig bekannte Amphibien *(Hemidactylus, Herpetodryas, Spilotes, Elaphis, Lamprophis, Erythrolamprus)*. Monatsber. Akad. Wiss. Berlin: 637-642.

Ramirez-Bautista, A., Flores-Villela, O., & G. Casa-Andreu, 1982. New herpetological state records for Mexico. Bull. Maryland Herp. Soc., 18 (3): 167-169.

Savage, J.M., 1966. The origins and history of the Central American herpetofauna. Copeia (4): 719-766.

Schmidt, K.P., 1941. The amphibians and reptiles of British Honduras. Publ. Field Mus. Nat. Hist. Zool. Ser., Chicago, 22: 475-210.

--- & E.W. Andrews, 1936. Notes on snakes from Yucatán. Publ. Field Mus. Nat. Hist. Zool. Ser., Chicago 20 (18): 167-187.

Smith, H.M., 1941. Notes on Mexican snakes of the genus *Elaphe*. Copeia (3): 132-136.

--- & E.H. Taylor, 1945. An annotated checklist and key to the snakes of Mexico. Bull. U.S. Nat. Mus. (Smithsonian Institution) (187): 1-239.

---, 1950. Type localities of Mexican reptiles and amphibians. Univ. Kansas Sci. Bull., Lawrence, 33 (8): 313-380.

---, 1966. Herpetology of Mexico. Annotated checklist and keys to the amphibians and reptiles. Eric Lundberg Reprint: 1-29.

--- & K.L. Williams, 1966. The ratsnake of the Bay Islands, Honduras. Nat. Hist. Misc. (185): 1-2.

Smith. P.W. & D.M. Darling, 1952. Results of a herpetological collection from Eastern Central Mexico. Herpetologica, Lawrence, 8 (3): 81-86.

Stuart, L.C., 1948. The amphibians and reptiles of Alta Verapaz, Guatemala. Misc. Publ. Mus. Zool. Univ. Michigan (69): 1-109.

---, 1963. A checklist of the herpetofauna of Guatemala. Misc. Publ. Mus. Zool. Univ. Michigan (122): 1-150.

Taylor, E.H., 1940. Some Mexican serpents. Univ. Kansas Sci. Bull., Lawrence, 26 (14): 445-487.

---, 1949. A preliminary account of the herpetology of the state of San Luis Potosi, Mexico. Univ. Kansas Sci. Bull., Lawrence, 33 (2): 169-215.

---, 1950. Second contribution to the herpetology of San Luis Potosi. Univ. Kansas Sci. Bull., Lawrence, 33 (11): 441-457.

---, 1951. Brief review of snakes of Costa Rica. Univ. Kansas Sci. Bull., 34 (1): 3-188.