

# A further new emerald tree monitor lizard of the *Varanus prasinus* species group from Waigeo, West Irian (Squamata: Sauria: Varanidae)

HANS J. JACOBS

## Zusammenfassung

Ein weiterer neuer Baumwaran der *Varanus prasinus*-Gruppe von Waigeo, West Irian (Squamata: Sauria: Varanidae).

Anhand von sieben Exemplaren wird auf morphologischer Basis eine neue Waranart von der Insel Waigeo, West Irian, Indonesien beschrieben. Es handelt sich um ein zum Melanistischen tendierendes Taxon, das goldgelbe Sprenkel auf schwarzem Grund zeigt. Der greiffähige, drehrunde Schwanz wie auch die äußeren Genitalstrukturen weisen es als Mitglied der Untergattung *Euprepiosaurus* und der *Varanus prasinus* Gruppe aus. Von den anderen schwarzgrundigen Taxa der Gruppe unterscheidet sich die neue Art durch die im Mittel niedrigste Schuppenzahl rund um die Körpermitte, wie auch die im Mittel niedrigste Zahl von Ventralia und Dorsalia. Die Klärung der Verwandtschaftsbeziehungen muss einer taxonomischen Revision des gesamten Komplexes auf molekularer Basis vorbehalten bleiben. Aufgrund von morphologischen Befunden steht die neue Art *V. kordensis* und *V. beccarii* am nächsten.

Schlagwörter: Squamata: Sauria: Varanidae: *Varanus prasinus* Gruppe: neue Art; Indonesien, West Irian, Waigeo.

## Abstract

On the basis of seven specimen I describe a new monitor taxon from the Indonesian isle of Waigeo (West Irian). This taxon tends to the melanistic forms of the *V. prasinus* group and shows golden yellow spots on black ground. The prehensile circular tail as well as the outer genital structures prove it to be a member of the subgenus *Euprepiosaurus* and the *V. prasinus* group. It can be differentiated from the other melanistic taxa by the lowest number of scales around midbody and the lowest number of ventrals and dorsals. The phylogenetic relationship to the other taxa of the group has to be reserved for a taxonomic review on molecular basis. With regard to morphological results the new species is closely related to *V. kordensis* and *V. beccarii*.

Key words: Squamata: Sauria: Varanidae: *Varanus prasinus* group: new species; Indonesia, West Irian, Waigeo.

## 1 Introduction

Most recently, a blue-coloured tree monitor from Batanta Island, West Irian (Indonesia) has been discovered and described as a new species: *Varanus macraei* BÖHME & JACOBS, 2001. In this paper, the authors referred already to another insular form from the neighbouring island of Waigeo which, according to photographs available in the internet, was easily distinguishable by its strikingly different colour pattern and was termed there as "golden speckled tree monitor" (see BÖHME & JACOBS 2001: 10). In the meantime, some live specimens could be obtained, and it turned out that my first view which was based on photographs only and which had led me first to regard the Waigeo population just as a colour variant of *V. macraei*, was not at all tenable. Rather, its colour pattern proved to differ not only in the colouration of the light body markings, but also in their arrangement, apart from a general chevron-like pattern which is – more or less expressed – present in all taxa of the *V. prasinus* group. This includes currently seven taxa (*prasinus*, *beccarii*, *bogerti*, *keithhornei*, *kordensis*, *macraei* and *tele-*

*nesetes*) whereas MERTENS (1942) recognised only four: the nominal subspecies *prasinus*, *kordensis*, *beccarii*, and *bogerti*. Despite the taxonomic review of the group by SPRACKLAND (1991), the taxonomic status of some of these taxa and their interrelationships are still not sufficiently analysed. In particular, molecular analyses are still lacking. In any case, closer examination and comparisons with the described forms led me to believe that a new, undescribed taxon, the eighth in the group, is involved, which I am going to describe below.

## 2 Material and Methods

In November 2002 and January 2003 I was able to obtain six specimens of the Waigeo "golden speckled tree monitor" from private sources and from the pet trade. One of them died soon, serving now as the holotype and being deposited in the Zoologisches Forschungsinstitut und Museum Koenig, Bonn, Germany. The five remaining specimens – described below as paratypes – are still in my possession. They will be deposited after their natural death in the same institution. One further dead specimen was given to me which I list as paratype VI.

The analyses of *V. beccarii* (see Tab. 1) is based on 11 specimens: ZFMK 46097-46100, 47541-47544, 64704. All specimens originate from the pet trade and lack locality data.

Scale counts, measurements, proportion indices, and pholidosis of the taxon analysed here are based on the methods applied and described by BRANDENBURG (1983) and BÖHME et. al. (1994). SVL = snout-vent-length; TaL = tail length; ToL = total length; A = head length; B = width of head; C = height of head; G = distance eye - nostril; H = distance nostril – tip of the snout. 2 = position of nostril between tip of snout and eye (G:H); 10 = relative length of head in relation to width (A:B); 11 = relative length of head in relation to height (A:C). P = number of scales across head; Q = number of scales around base of tail; R = number of scales around tail after first estimated third; S = scales around midbody; T = transverse rows of ventrals from the gular fold to the beginning of the hind legs; X = transverse rows of dorsals from the end of the eardrum to the gular fold; XY = dorsals + dorsal transverse rows from the gular fold to the beginning of the hind legs; c = supralabials; n = ventral scales from the tip of the snout to the gular fold; U = enlarged supraoculars (left/right).

## 3 Results and Discussion

### *Varanus boehmei* sp. n.

Holotype: ZFMK 77837, adult male, Waigeo, West Irian, Indonesia, 2002 by native collectors.

Paratypes: 1 adult female ZFMK 79122 (same data as holotype), 3 adult males, 1 adult female, 1 (sub)adult female (same data as holotype); still alive in my possession.

Diagnosis: A very slender tree monitor of the *Varanus* (*Euprepiosaurus*) *prasinus* group with basically black ground colour. Golden speckles arranged in chevrons. Maximum size of adults near 90 cm for the specimen analysed here. S-value between 78 and 95 with a mean of 87.

Comparisons: From *V. prasinus* and *V. kordensis* it can be distinguished by its basically black ground colour and by its different scalation (see Tab. 1). It is among the biggest-growing forms of this group: *V. beccarii* may reach the same size, and only *V. macraei* with just about 5 cm more average total length grows slightly bigger. From *V. bogerti* it can be differentiated by the texture of the head scales (rough in the former, flat and smooth in the latter), by the shape of the snout which is more pointed than in *V. bogerti*, and by its much lower S-value. With an average of 87 scales around midbody *V. boehmei* sp.n. has the lowest number only compatible with *V. beccarii* (90 [this study], MERTENS [1942] counted 81 and 86 for two specimens he analysed; BRANDENBURG [1983] counted 82 and 93 for the same two individuals), and *V. kordensis* (89: JACOBS 2002). From the geographically nearest taxon, *V. macraei*, it differs in several scalation characters (see Tab. 1): most significantly in a higher midbody scale count [S] of *V. macraei* (means: 95 vs. 87 for this taxon), a higher number of ventrals (means: 87 vs. 74 [T], 85 vs. 73 [n]) and most of all by its much lower number of dorsals (means: 50 vs. 34 [X], and 91 vs. 71 [XY]). In addition, the tail of *V. boehmei* sp.n. shows a slight indication of a double ridge, which is not seen in the other taxa.

Most striking is the closeness to *V. kordensis* and *V. beccarii* in most aspects of the scalation of *V. boehmei* sp.n. [*Vbo*, mean], *V. kordensis* [*Vk*, mean], *V. beccarii* [*Vbe*, mean]: P: 37 (*Vbo*), 34 (*Vk*), 32 (*Vbe*); S: 86 (*Vbo*), 89 (*Vk*), 90 (*Vbe*); T: 74 (*Vbo*), 77 (*Vk*), 78 (*Vbe*); c: 21 (*Vbo*), 21 (*Vk*), 22 (*Vbe*). This reminds one that DE ROOJ (1915) understood *V. beccarii* to be a subspecies of *V. kordensis* which indeed is more plausible than to see it as a melanistic form of *V. prasinus* from which it differs drastically in scalation. Different to *V. beccarii* as well as *V. kordensis* the neck scales of *V. boehmei* sp.n. are not keeled, but nearly round and granular. With regard to the dorsals *V. beccarii* has the lowest number of all (91 [XY]), whereas the new species has exactly the same number of scales as *V. kordensis* (106 [XY]).

The asymmetrical hemibacula consisting of one smaller, multicuspid and one bigger, shovel-shaped bony element as well as the highly asymmetrical sperm groove (sulcus spermaticus) are a shared derived character of all representatives of the *V. indicus* and *V. prasinus* species groups. They are diagnostic for *Euprepiosaurus*. Within the *V. prasinus* group, ZIEGLER & BÖHME (1997) found a considerable variation of hemipenial structures, and in the number of bony tips in the smaller hemibaculum (5-7) this taxon corresponds with the situation found in *V. beccarii*. However, the number of paryphasma rows reaches 8 in *V. prasinus* and 9-11 in *V. kordensis* and *V. beccarii*. Here, this taxon has a markedly lower count (only 7), which distinguishes it from *V. beccarii*.

Description of holotype (Figs. 1, 2 & 3): Habitus very slender. Nostril oval and closer to tip of snout than to the eye. Canthal ridge expressed only in the preocular region. Snout pointed. Supraoculars: right side – 5, the first (from the tip of the snout) double as long as broad, second about four times as long as broad, third as well slightly pointed towards the eye, fourth and fifth divided; left side – 5, the first two undivided, third slender pointed towards the eye, small scale near the eye, fifth very narrow. Mid-supraoculars largest. Adjacent row of scales next to the supraoculars slightly enlarged. Pineal organ covered by an enlarged somewhat irregular, nearly roundly shaped scale. Scalation of the head quite irregular. No enlarged cranial scales. Dorsal neck scales anteriorly nearly round, granular, further to the forelimbs more oval/slightly keeled. Tympanum oval. Gular scales round to oval. Dorsal scales keeled. Chest scales anteriorly rounded. Scales right in the middle of the chest strongly elongated. Ventral

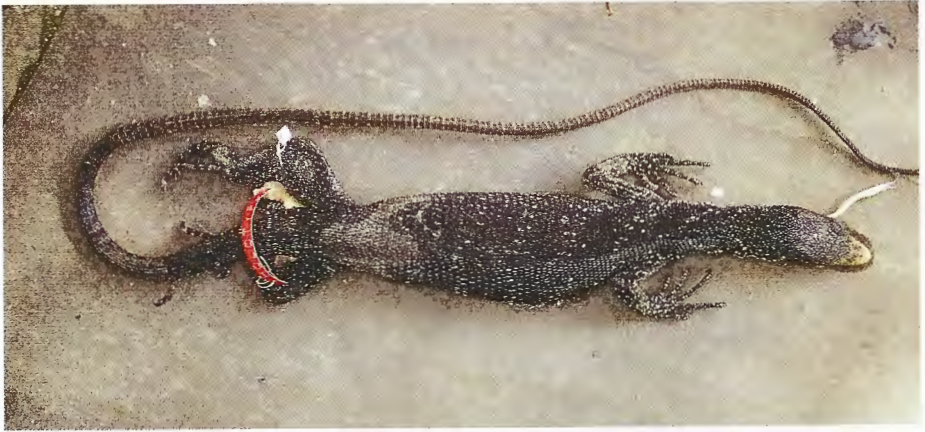


Fig. 1. Holotype of *Varanus boehmei* sp.n. (ZFMK 77837), dorsal view.  
Holotypus von *Varanus boehmei* sp.n. (ZFMK 77837), Dorsalansicht.



Fig. 2. Holotype of *Varanus boehmei* sp.n. (ZFMK 77837), ventral view.  
Holotypus von *Varanus boehmei* sp.n. (ZFMK 77837), Ventralansicht.

scales elongated. Dorsal side of limbs covered with weakly keeled scales. Ventral part of the limbs covered with mostly rounded scales.

Prehensile tail definitely not completely circular, but laterally compressed with a dorsal longitudinal keel possibly due to the poor condition of this specimen. Dorsal scales of tail keeled. Soles covered with enlarged melanin scales. For measurements, proportion indices, and scale counts see Table 1.

Colouration: General appearance nearly completely black, possibly due to the assumed advanced age of the specimen. Ventral scales tending more to light brownish towards midbody, with a tiny black spot in the lower part of the scale. Towards the



Fig. 3. Holotype of *Varanus boehmei* sp.n. (ZFMK 77837), dorsal aspect of the head.  
Holotypus von *Varanus boehmei* sp.n. (ZFMK 77837), Dorsalansicht des Kopfes.



Fig. 4. Paratypes I and V of *Varanus boehmei* sp.n. (female below, male on top).  
Paratypus I und V von *Varanus boehmei* sp.n. (Weibchen unten, Männchen oben).

	Sex	SVL	TaL	ToL	A	B	C	G	H	2	10	11	P	Q	R	S	T	X	XY	c	n	U
<i>Vbo</i> (HT, ZFMK 77837)	m	288	595	883	47.0	27.0	20.0	12.0	11.0	1.09	1.74	2.35	37	55	28	85	70	30	67	20	72	5/5
<i>Vbo</i> PT I	m	290	550	840	49.5	26.1	18.5	12.2	11.5	1.06	1.9	2.68	35	56	31	85	76	37	72	22	65	3/4
<i>Vbo</i> PT II	m	290	580	870	49.5	23.9	18.0	13.1	11.5	1.09	2.07	2.75	38	60	28	86	67	34	66	22	71	4/4
<i>Vbo</i> PT III	m	285	570	855	45.5	21.5	16.5	11.5	10.9	1.05	2.12	2.76	41	62	29	95	76	30	74	21	72	3/4
<i>Vbo</i> PT IV	f	255	520	775	42.2	18.5	15.0	11.4	11.2	1.04	2.28	2.81	39	57	28	78	79	37	72	20	83	4/5
<i>Vbo</i> PT V	f	285	540	825	45.1	21.2	15.0	12.1	11.0	1.1	2.13	3.01	38	55	32	89	79	39	79	22	68	4/3
<i>Vbo</i> (PT VI, ZFMK 79122)	f	261	510	771	41	21.1	14.2	10.2	8.9	1.15	2.19	2.89	32	56	24	89	75	35	71	22	77	5/5
<i>Vbo</i> (mean)	-	279	552	831	45.7	22.1	16.2	11.8	10.8	1.08	2.06	2.75	37.1	57.3	28.6	86.7	74.6	34.6	71.6	21.3	72.6	4/4
<i>Vbo</i> (standard deviation)	-	14.7	31.3	44.1	3.3	2.62	1.76	0.97	1	0.04	0.18	0.21	2.91	2.69	2.57	5.19	4.5	3.51	4.35	0.95	5.91	-
<i>Vbo</i> (range)	-	255-290	510-595	771-883	41.0-49.5	18.5-27.0	14.2-20.0	10.2-13.1	8.9-11.5	1.04-1.15	1.57-2.28	2.68-3.01	32-41	55-62	24-32	78-95	67-79	30-39	66-79	20-22	65-83	-
<i>Vm</i> (mean)	-	305	595	900	48	30	19	14	12	1.19	1.69	2.52	42	60	35	95	87	50	91	27	85	-
<i>Vp</i> (mean)	-	241	488	742	42.4	21.1	17.3	13.2	9.7	1.36	2.03	2.54	40.1	56.4	29.8	97.1	81.9	33	79	24.2	73.4	-
<i>Vk</i> (mean)	-	244	496	739	42.9	22.6	17.2	12	9.1	1.32	1.9	2.48	34.1	49.7	26.5	89.2	76.8	30.1	75.6	20.8	66.7	-
<i>Vbe</i> (range)	-	-	-	-	-	-	-	-	-	-	-	-	28-37	-	-	81-93	70-87	-	-	-	-	-
<i>Vbe</i> (mean)	-	275	502	777	44	21.2	16.2	14	10.2	1.37	2.1	2.73	31.6	59.6	26.9	90.2	78.4	23.8	66.7	22.1	67.1	-

Tab. 1. Measurements, proportion indices, and pholidosis of holotype (HT) and paratypes I-VI (PT) of *Varanus boehmei* sp n (*Vbo*). Means are added for *Varanus macraei* (*Vm*) (BÖHME & JACOBS 2001), *V. prasinus* (*Vp*), and *V. kordensis* (*Vk*) (JACOBS 2002) and *V. beccarii* (*Vbe*-mean) (JACOBS, this study) for comparisons. For *V. beccarii* I refer as well to the data given by BRANDENBURG (1983), who discusses the scale count of MERTENS (1942), who had only two specimen to analyse; I note here the lowest and highest number (*Vbe*-range).

SVL = snout-vent-length; TaL = tail length; ToL = total length; A = head length; B = width of head; C = height of head; G = distance eye - nostril; H = distance nostril - tip of the snout (all measurements in mm). 2 = position of nostril between tip of snout and eye (G:H); 10 = relative length of head in relation to width (A:B); 11 = relative length of head in relation to height (A:C). P = number of scales across head; Q = number of scales around base of tail; R = number of scales around tail after first estimated third; S = scales around midbody; T = transverse rows of ventrals from the gular fold to the beginning of the hind legs; X = transverse rows of dorsals from the end of the eardrum to the gular fold; XY = dorsals plus dorsal transverse rows from the gular fold to the beginning of the hind legs; c = supralabials; n = ventral scales from the tip of the snout to the gular fold. U = enlarged supraoculars (left/right).

Größenangaben, Proportionsindizes und Pholidosewerte des Holotypus, des toten und der fünf lebenden Paratypen von *Varanus boehmei* sp. n. (*Vbo*). Mittelwerte sind zum Vergleich hinzugefügt für *Varanus macraei* (*Vm*) (BÖHME & JACOBS 2001), *V. prasinus* (*Vp*) und *V. kordensis* (*Vk*) (JACOBS 2002) und *V. beccarii* (*Vbe*-mean) (JACOBS, diese Studie). Für *V. beccarii* dokumentiere ich auch die von BRANDENBURG (1983) erhobenen Werte, die sich auf die beiden gleichen Individuen beziehen, die MERTENS (1942) untersucht hat. Ich gebe jeweils den niedrigsten und den höchsten Wert an (*Vbe*-range).

SVL = Kopf-Rumpflänge; TaL = Schwanzlänge; ToL = Gesamtlänge; A = Kopflänge; B = Kopfbreite; C = Kopfhöhe; G = Entfernung Augenrand - Nasenloch; H = Entfernung Nasenloch - Schnauzenspitze (alle Maße in mm). 2 = Lage Nasenloch zwischen Schnauzenspitze und Auge (G:H); 10 = relative Kopflänge im Verhältnis zu Kopfbreite (A:B); 11 = relative Kopflänge im Verhältnis zur Kopfhöhe (A:C). P = Schuppenzahl um den Kopf; Q = Schuppenzahl um Schwanzbasis; R = Schuppenzahl um Schwanz nach erstem proximalen Drittel; S = Schuppen um Körpermitte; T = Ventralia-Querreihen von Gularfalte bis Ansatz Hinterbeine; X = Dorsalia-Querreihen vom Trommelfellende bis Gularfalte; XY = Dorsalia plus Anzahl dorsaler Querreihen von Gularfalte bis Hinterbeinansatz; c = Supralabialia; n = Ventralschuppen von Schnauzenspitze bis Gularfalte. U = vergrößerte Supraocularia (links/rechts).

flanks, merging into black, mixed with some yellow scales blending into the chevrons. Dorsally, yellow scales are forming about nine barely visible chevron markings. Tip of head lighter. Scale covering pineal organ much lighter in colouration than the yellow parts of the head, distinguished from the surrounding scales. Supralabials from the tip of snout to the middle of the jaw very light yellow which continues right to the nostril scales with black edges becoming darker further up the head. Tongue pinkish. Supraoculars nearly completely black with just tiny tips of yellow. Eye surrounded by yellow granular scales. Edges of tympanum, especially towards the eye, yellow with a tinge of orange. Gular scales with a tinge of a reddish brown.

Chest scales light yellow mostly with a dark dot in the lower part of the scale. Scales right in the middle of the chest mostly without black spot. Dorsal side of limbs covered with black scales with yellow scales in between which only in the upper region of the forelimb form a distinguished band. The other parts of the limbs seem to be spotted at random. Ventral part of the limbs covered with generally quite light yellowish scales, especially at the elbow. Hind limbs near the feet with a very light tinge of blue.

Dorsal scales of tail black, very few scales with tiny yellow spots only in the most upper part. Ventral scales in the basal part somewhat lighter black. Dorsal part of feet with yellow scales mostly at the knuckles, soles pure black.

Everted hemipenes of the holotype (terminology after ZIEGLER & BÖHME 1997) approximately 3 to 3,5 cm long. Hemipenis stout, bent around truncus, apically considerably broadened, with an oblique sperm-groove running to the outer apical lobe, which is armed with a small, terminal hemibaculum consisting of four larger (outer) and two smaller (inner) bony tips. The larger ones show the tendency to subdivide again, making them indistinctly bicuspid. The inner (larger) hemibaculum is shovel-shaped, with a more or less smooth, at best slightly crenulate upper margin. On the asulcal side, there are seven rows of paryphasmata, the upper four of them being interrupted by a large smooth median area, so that only the three lower ones are stretching across the entire asulcal hemipenial surface.

Variation (see Figs. 4, 5 & 6): General appearance, scalation and colouration of the paratypes similar to the holotype. Some differences may be due to the assumed advanced age of the holotype: The slight lateral compression of the tail might be an artefact, due to dehydration since the paratypes show more roundish tails. Plates on pileus in general definitely different to the holotype: all paratypes show large central head plates flanked by enlarged rows of scales, whereas the interocular scalation of the holotype is somewhat irregular and consists of an area of mainly smaller scales with only three enlarged central plates. All paratypes are much more colourful with distinct chevrons across the body, numerous cross bands around the tail, and temporal stripes the distinctness of which seems to correlate to the age of the particular monitor. The same seems to be true for the ventral pattern: stripes are in younger animals (paratype IV) barely noticeable. Juveniles carry a pattern similar to hatchlings of *V. macraei* (JACOBS 2002). For measurements, proportion indices, and scale counts see Tab. 1.

Distribution: As the nearest neighbour to *V. macraei* this species originates from the West Irian island Waigeo (Fig. 7). According to Indonesian exporters (SOETANTO, pers. comm.) they are found on the eastern part of the island mainly near the coast. As far as information are available no other species of the *V. prasinus* group monitors occur on this island. It is thus the most northwestern point of the distribution of the *prasinus* complex.



Fig. 5. Paratype III of *Varanus boehmei* sp.n., adult male.  
Paratypus III von *Varanus boehmei* sp.n., adultes Männchen.



Fig. 6. Paratype IV of *Varanus boehmei* sp.n., subadult female, ventral view.  
Paratypus IV von *Varanus boehmei* sp.n., subadultes Weibchen, Ventralansicht.





Fig. 7. Distribution of the species of the *Varanus prasinus* group in West Irian / Verbreitung der Arten der *Varanus prasinus* Gruppe in West Irian. \* – Waigeo (type locality *V. boehmei* sp. n.); 1 – Batanta (*V. macraei*); 2 – Biak (*V. kordensis*); 3 – Aru (*V. beccarii*); 4 – Vogelkop (*V. prasinus*).

Derivatio nominis: I name the new species in honour of WOLFGANG BÖHME, Professor of Zoology (Zoologisches Forschungsinstitut und Museum Koenig, Bonn, Germany), long-standing president of the German Herpetological Society (DGHT), and one of the internationally best-known monitor-researchers. By analogy with the English derivate I suggest the German trivial name: “Goldgefleckter Baumwaran”.

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Author: HANS J. JACOBS, Siekenweg 8, D-33178 Borchten, Germany, E-Mail: hjjacobs@gmx.de.