

ปีที่ ๕ ฉบับที่ ๑/๒/๓/๔
มีนาคม/มิถุนายน/กันยายน/ธันวาคม
๒๕๑๒

Vol. 5, Nos. 1/2/3/4
March/June/September/December
1969

วารสารสภาวิจัยแห่งชาติ
Journal of the National Research Council

OBSERVATIONS MADE ON KING COBRAS IN THAILAND
DURING MAY 1966

สังเกตการณ์เกี่ยวกับงูจงอางในประเทศไทย
เมื่อเดือนพฤษภาคม ๒๕๐๙

J.H.E. Leakey
เจ. เอช. อี. ลีคีย์

National Museum Snake Park, Nairobi, Kenya
พิพิธภัณฑสถานแห่งชาติ, ไนโรบี, คีนยา

Abstract

Collecting King Cobras was carried out during egg-laying season, from 3rd to 31st of May, 1966, in Nakorn Sri Thammaraj, southern Thailand. A total of 16 adults were taken alive, with 484 eggs from 16 nests.

The longest female King Cobra found measured 11 feet 8 inches long and weighed 7½ pounds. Only female snakes stay with the eggs during incubation period.

All the eggs were incubated artificially at room temperature. Almost all of them developed successfully, but some young snakes failed to emerge from the eggs. The new born King Cobras were 20-22 inches long. Many of them were taken to snake farm at Lake Baringo, some showed signs of adapting to their new environment. Unfortunately, they died, although from outward appearances they were in fair condition.

เรื่องย่อ

การจับงูจงอางได้กระทำที่จังหวัดนครศรีธรรมราช ตอนใต้ของประเทศไทย ในฤดูที่งูจงอางวางไข่ คือระหว่าง ๓-๓๑ พฤษภาคม ๒๕๐๙ ในการศึกษาครั้งนี้ จับงูโตเต็มวัยเป็น ๆ ได้ ๑๖ ตัว และเก็บไข่ได้ ๔๘๔ ฟอง จาก ๑๖ รัง

งูจงอางตัวเมียที่จับได้มีขนาดยาวที่สุด คือ ๑๑ ฟุต ๘ นิ้ว หน้า ๗ ๑/๒ ปอนด์ งูตัวเมียเท่านั้นที่ทำหน้าที่กกไข่ในระยะฟักไข่

สำหรับไข่ที่เก็บได้นั้น ได้นำเข้าเครื่องกกไข่ที่ใช้ความร้อน โดยปรับอุณหภูมิให้ใกล้เคียงกับอุณหภูมิในท้อง ไข่ส่วนมากเจริญดี แต่ลูกงูบางตัวเมื่อฟักแล้วไม่ออกจากไข่ ลูกงูเกิดใหม่มีความยาวประมาณ ๒๐-๒๒ นิ้ว ผู้เขียนได้นำลูกงูหลายตัวไปยังฟาร์มเลี้ยงงูที่ทะเลสาบบาริงเกอร์ ลูกงูประมาณ ๒๐ ตัวแสดงอาการว่าสามารถปรับตัวเข้ากับสภาพแวดล้อมได้ แต่ที่น่าเสียดายว่าลูกงูเหล่านั้นตายหมด ทั้ง ๆ ที่ลักษณะอาการภายนอกดูเป็นปกติดี.

Introduction

The primary objective of the expedition to Thailand, undertaken by Mr. Ionides, assisted by Mr. Leakey, was to collect and make firsthand observations on King Cobras, *Ophiophagus hannah* (Cantor), in their natural habitat. Secondary objectives were to collect live specimens of these and some of the other well-known species of Asiatic venomous snakes in order to send a good representative collection for display purposes, to the National Museum Snake Park in Nairobi. In all these respects, the expedition was most successful.

Place and time of the observations

The timing of the expedition was planned to coincide with the onset of the monsoon in May. This was considered to be the best time for collecting by the various people consulted beforehand. In point of fact, although a little rain did fall during May, the monsoon failed to break before the end of the month, by which time we had collected all our specimens and were ready to leave.

The area chosen for collecting King Cobras was in south Thailand in the moderately populated province of Nakhon Sri Thammaraj. The major part of our collecting was carried out over a roughly circular area, radiating from a small village some fifteen miles west of the town of Nakhon Sri Thammaraj. The area comprises several valleys carrying fast flowing rivers descending from heavily forested hills. These valleys open out onto a

relatively flat rice growing plain. Most of the more accessible land has been cleared of primary forest and rubber trees have been planted. In spite of these plantations, much natural vegetation, including numerous clumps of bamboo remain over most of the area.

Collecting was carried out from the 3rd to the 31st of May. During this time a total of sixteen adult King Cobras were taken alive, together with 484 eggs, obtained from sixteen "nests". In addition to the above, two Indian Cobras, *Naja naja kaouthia* Lesson in Ferussac; one Banded Krait, *Bungarus fasciatus* (Schneider); eight Malayan Pit Vipers, *Agkistrodon rhodostoma* (Boie); and a number of specimens of other species of snakes were collected. A list of these specimens can be found at the end of this text. (This list comprises snakes collected both at Nakhon Sri Thammaraj and also from Singburi, some hundred miles north of Bangkok and presented to the National Reference Collection, Applied Scientific Research Corporation of Thailand, Bangkok).

Discussion

We have decided to devote the greater part of this report to giving detailed notes and descriptions on every aspect of the collection of the King Cobras including the eggs and nests, since we consider this to be of very great interest, especially as there appear to be many apparently unfounded beliefs with regard to these snakes.

All the adult King Cobras were located as a result of information given to us by local people in the neighbourhood. In order to encourage them to bring in information, word was circulated that we would pay 100 Baht (U.S. Dollars 5) for information leading to the capture of the snakes, on condition that the informer did not in any way disturb the snake when it was seen. This method was found to be very successful and we were able to make accurate observations on all the snakes collected.

We were fortunate in that, quite by chance, we collected them during the egg-laying season. As a result, the female King Cobras, of which we took fifteen, were all found in association with their eggs and nests. In addition to these fifteen nests, one nest with 43 eggs was found without any adult snake being seen. One male, nearly 7 feet in length, which was the shortest specimen that we collected, was taken on the move at 3.40 p.m. in open grassland. We had several other reports of King Cobras being seen on the move at various times of day, but as the Rat Snake, *Elaphe radiata* (Schlegel) is commonly confused with the King Cobra, it is not possible to be certain that the snakes were in fact the species claimed. We collected three Rat Snakes which, our informants claimed, were King Cobras.

Our largest King Cobra, a female found with 41 eggs, measured 11 feet 8 inches in length and weighed $7\frac{1}{2}$ pounds. When compared with captive specimens seen at the Queen Saovabha Institute and in the private collection of Mr. Siah, both of Bangkok, which were mostly collected in this area, this was a small specimen. However, as a result of our collecting, we came to the conclusion that in this area at any rate, the large specimens of 12 feet or more, were definitely the exceptions rather than the rule and that 9 or 10 feet was the average size of adult females. All the specimens were of the dark, faintly banded colour

phase, while the male mentioned above was of a somewhat lighter, more yellow colour, approaching the yellow phase of those seen in Bangkok.

The nest with 43 eggs, where no adult snake could be located, was visited by us during a day of almost continuous rain, after a long and difficult walk. We have no doubt that had we either waited, or revisited the site on another occasion, the snake would have been on or near the nest as was the case with the other fifteen female specimens, especially as it had been seen by our informant on two occasions during the previous few days. Reference to the Table, showing the size of the snakes compared to the number of eggs, will show that it is reasonable to assume that this female would probably have measured 11 or 12 feet, since there seems to be a relationship between the length of the females and number of eggs.

For convenience, we have referred to each nest in order of collecting, by numbers 1 - 16. This simplifies reference to the Table.

Of the sixteen nests found, only the first was in vegetation other than bamboo (see Plate I). It was situated, perhaps 10 feet or less, from a relatively well-used foot path up the side of a valley, in fairly dense forest. The snake could be quite clearly seen on the nest from the path. Judging from the condition of the subsequent nests, this was one of poor quality, as the covering of forest leaves and twigs failed to prevent the interior of the nest from being extremely damp. Of the 32 eggs 24 were found to have been damaged by ants. Ten of these showed only slight damage, but the shells were unquestionably punctured, while 10 showed what we thought to be extensive damage, but were nevertheless kept. The remaining 4 were discarded after being opened and live embryos, 16 to 17 inches in length, found inside. (These were preserved and are now incorporated in the National Reference Collection in Bangkok). The 20 damaged eggs, together with the 8 that were undamaged, were kept and placed in a crude incubator, where they all started to hatch on the 26th May. This was nearly three weeks earlier than the next batch which hatched on the 11th June. The lengths at hatching varied from $20\frac{1}{4}$ to $21\frac{5}{8}$ inches, with the majority mid-way between these figures.

The remaining fourteen adult female King Cobras, all found in association with nests, were caught between the 8th and the 23rd May, inclusive. The nests were situated either in the centre or on the edge of bamboo clumps and in most cases in close proximity to water (usually not more than 50 feet distant). It was noticeable that almost all were situated near foot paths or close to places under regular cultivation. In a number of cases, the snake could be clearly seen on its nest by interested passersby without deviating from the path. Observation by people produced no noticeable reaction from the snakes and as one cannot imagine that the snakes would deliberately choose nesting sites near to foot paths, it is reasonable to assume that the King Cobra is very abundant in this part of Thailand. It was also noticeable that whereas most of the local inhabitants knew that the snakes were on nests at this time of year, they showed no undue fear of them even when at quite close quarters.

The nests which are definitely constructed by the adult King Cobras, presumably by the female, are not nests in the sense that the adult is able to enter the structure after completion. The nest is a carefully built mound of leaves and is a complete and very well-sealed unit. It obviously affords the eggs admirable protection from rain and should also be capable of maintaining a steady temperature and static percentage of humidity internally. The mounds of leaves forming the nests all follow a definite pattern of construction. The snake first appears to prepare a circular saucer or bowl-like receptacle with well-packed leaves. These receptacles are usually 3 to 4 inches in depth, but one measured 5 inches. Below this, there is a layer of leaves 2 or 3 inches thick separating the eggs from the earth. The eggs are deposited in the receptacle and are then apparently carefully covered over with well-packed dry leaves, usually of bamboo, presumably gathered by drawing them together with the coils of the body and then packed down with the snake's weight. The extent of the area from which the leaves are gathered, is not known. The base of the dome-like mound covering the eggs, can have a length and breadth of up to 40 by 36 inches and may be built up to a height of 11 inches above the eggs (nest no. 6). More usually, however, the nests are slightly smaller in proportions.

The snakes were usually found coiled on the top, or along one side of these mounds. There was never more than one snake with each nest and in every case they were found to be females. All were generally in poor state physically and we concluded that none of them had taken food for some time prior to capture.

On one occasion, two female snakes, both on nests, were found in a single clump of bamboo (nests 12 and 13). The bases of the two nests were only 15 inches apart at the nearest point (See Plate V). Similar circumstances could well have led to the belief, apparently held by many, that both the male and female snakes stay with the eggs during the incubation period.

Fourteen of the female King Cobras were captured resting on some part of the nest. One, however, was found some 6 feet away from the nest, under cover of bamboo sticks and leaves. This particular snake had allegedly been seen several times during the past few days, coiled on bamboo off-shoots, some 12 to 15 inches directly above the top of her nest. However, as with all the nests found, it seemed fairly certain that she also spent time resting on the nest, since the surface was well packed and smoothed over.

During the capture of the fifteen females, there was never any sign of aggression before the grab-sticks had actually caught the snakes. One, however, raised its head slightly and spread its hood before capture. Once caught, the snakes usually demonstrated with open mouths and spread hoods, but mostly did not make any attempt to bite the grab-sticks. On two occasions, when the grab-stick failed to hold the snake owing to becoming fouled with leaves, the snake moved away from its would-be captors. One of these was chased and caught by the tail until a grab-stick could be fastened onto it. The other, however, disappeared - this was at 9.15 a.m. By 12.50 p.m., there was still no sign of the snake but at 1.40 p.m., she was back in position on the nest and was caught as she started to move away again. These observations are quite contrary to popular belief and, we feel, go a long way towards proving that in normal circumstances a "broody" female King Cobra is not in

any way aggressive. One wonders why, if these snakes are not aggressive when with their eggs, they remain on the nests, presumably until the eggs hatch. One suggested explanation, was that they do so in order to make a meal of their hatching offspring as they emerge from the nest, but this does not seem at all probable.

Interesting observations were made at nest no. 9. Normally the highest point of the protective covering of leaves was more or less directly over the eggs. However, in this nest which was oval in shape the eggs were very near one end and covered by only about 3 inches of leaves. A similar situation was found with nest no. 10 which again was oval in shape. This nest was surrounded by five bamboo stems. The eggs were again at one end but under the highest point which was off-centre. Growing between the eggs of this clutch, was a young bamboo shoot. Five of the 22 eggs present had been destroyed by ants, but the remainder were in good condition (see Plate VIII).

The eggs, which varied in number from 20 to 43 in each clutch, were cylindrical in shape with rounded ends. The size of each egg varied from 2 to $2\frac{1}{4}$ inches in length and $1\frac{1}{8}$ to $1\frac{1}{4}$ inches in width. The shells were white and leathery and quite soft to the touch. It was possible to pick up each egg individually since they did not adhere to one another as is usual with snake eggs. All the eggs were collected and incubated artificially at room temperature, each clutch being placed on damp tissue paper, enclosed in a polythene bag, which had one or two small ventilation holes. These bags were kept in wooden crates in our hotel room in Nakhon Sri Thammaraj. On leaving Thailand, half of the eggs were brought back to Kenya in a box, while the remainder were left in Bangkok with Mr. Y. Siah. Almost all of the 484 eggs collected, developed successfully but a proportion of the young snakes were unable to emerge from the eggs, after splitting open the shell in the normal way. It is not at all clear why this should have happened.

The new born King Cobras were mostly 20 to 22 inches long, although some were longer and some considerably smaller. Clutch no. 1 was the first to hatch on 26th May, whilst clutch no. 14 was the last, hatching on 23rd July. Most of the eggs hatched during the latter part of June and early July (for details refer to the Table).

Many of the newly-hatched King Cobras were taken to the writer's snake farm at Lake Baringo, where an unsuccessful attempt was made to raise them in open pit-type enclosures. Within a few weeks many seemed to be having trouble with sloughing their skins and only a few were interested in food. The only food seen to be taken were small skinks. Mice and frogs were refused, as were many varieties of insects. About 20 individuals began to show signs of adapting to their new environment and after some two or three months had attained a length of 26 to 27 inches. Unfortunately, however, these too died, although from outward appearances they were still in fair condition.

Whilst at Nakhon Sri Thammaraj, we were also able to collect several other interesting species of snakes. One of these was a fine specimen of Banded Krait, *Bungarus fasciatus* (Schneider). This was dug out of a rodent hole in a dyke on a dry rice field, a few miles from the town. Another interesting species of which we collected eight specimens, was the Pit Viper, *Agkistrodon rhodostoma* (Boie). Six of these were females, three of which

were large and were each taken on clutches of eggs. The eggs of each clutch were soft shelled and were firmly stuck together in a single layer. These clutches were positioned in fairly sheltered localities, but were not covered. In each case, the female snake was found coiled on top of the eggs (see Plate X). The snakes were easy to capture and made no attempt to escape. An endeavour was made to incubate these eggs but only a small proportion hatched. The new born snakes were mostly 6 to 6½ inches at birth.

Before concluding our expedition to Thailand, we were able to spend a few days at Singburi nearly a hundred miles north of Bangkok. This locality is situated near the northernmost edge of the main rice growing area of Thailand. Here we were able to collect three adult specimens of *Naja naja kaouthia* Lesson in Ferussac and one adult specimen of *Vipera russelli siamensis* (M. Smith). These specimens were all collected from rodent holes in dykes dividing rice fields. One of the Cobras and the Russels Viper disgorged rodents soon after capture. From all accounts these two species are very numerous in this part of the country.

Acknowledgement

The preliminary plans and correspondence for the expedition were undertaken by the late Mr. N.P. Mitton who was to have accompanied Mr. Ionides had he not died in a tragic car accident in January, 1966. In addition to the late Mr. Mitton, our sincere thanks must go to Mr. R.H. Carcasson and Mr. J.O.P. Ashe of the National Museum in Nairobi and to a number of people in Thailand who gave us much assistance and advice in planning the expedition and also whilst we were in that country. In particular, we extend our sincere thanks to the following in Bangkok: Mr. P. Soderberg who gave us most valuable advice on suitable localities in which to collect and who also identified our entire collection at the end of the trip; Mr. Y. Siah, for his advice and for looking after some of the King Cobra eggs for us after our return to Kenya, until these hatched; Mr. Nicholls, Special Governor of the Applied Scientific Research Corporation of Thailand, together with members of his staff, who took care of much of the official paperwork of the trip on our behalf; also Mr. and Mrs. R. Soderberg and Dr. Boonsong Lekagul. In south Thailand, where most of our collecting was carried out, our thanks are also due to Mr. Mann Liliphan of Nakhon Sri Thammaraj, who helped us with unfailing kindness and generosity and who was largely responsible for the success of our expedition and also to our able assistant and interpreter Mr. Pun and the management of the International Hotel who never once raised any objections to our housing live King Cobras in our rooms.

TABLE SHOWING NEST DATA

Nest number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Date collected	7/5	8/5	9/5	10/5	13/5	14/5	15/5	19/5	19/5	19/5	20/5	21/5	21/5	21/5	22/5	23/5
Length of snake	8'-9"	11'8"	10'-11'	10'-11'	8'-9'	10'4"	9'3½"	8'0"	9'5½"	-	8'10½"	8'7½"	10'0"	8'6"	9'3"	9'3½"
Nest length	40"	38"	30"	38"	28"	26"	36"	28"	26"	-	22"	30"	26"	22"	34"	38"
Nest breadth	36"	36"	24"	34"	24"	26"	36"	26"	20"	-	20"	19"	23"	19"	30"	36"
Depth of leaves above eggs	11"	7"	8"	8"	4½"	11"	7"	4½"	6½"	-	8"	10"	5½"	7"	6"	5"
Eggs - total	33	41	34	31	23	34	30	26	26	43	22	29	29	20	33	30
Eggs - fertile	32	40	34	31	21	34	30	26	26	42	22	29	29	20	33	30
Eggs - infertile	1	1	-	-	2	-	-	-	-	1	-	-	-	-	-	-
Eggs - damaged naturally	24	-	2	3	1	-	-	4	-	-	5	1	-	-	-	-
Eggs - damaged during collection	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-
Length of embryo	17"	?	3"-4"	?	?	?	?	?	?	?	?	?	?	?	?	?
No. of eggs incubated	28	40	32	29	18	34	30	22	24	42	19	28	29	20	33	30
No. of eggs developed and/or hatched	28	-	11	-	18	-	-	22	23	21	12	25	29	?	32	28
Date when hatched	26/5	-	27/6	11/6	3/7	-	10/6	3/7	11/7	28/6	3/7	2/7	29/6	23/7	7/7	23/6
No. of eggs failed to develop	-	-	21	-	-	-	-	-	1	21	7	3	-	?	1	2

**List of snakes collected in Thailand and presented to the Applied Scientific
Research Corporation of Thailand (ASRCT)**

ASRCT**Specimen Number**

523 - 88	<i>Typhlops</i> spp. Oppel
523 - 125	„
523 - 126	„
523 - 127	„
523 - 128	„
523 - 129	„
523 - 130	„
523 - 131	„
523 - 67	<i>Cylindrophis rufus rufus</i> Schlegel
523 - 68	„ „ „
523 - 91	„ „ „
523 - 92	„ „ „
523 - 93	„ „ „
523 - 69	<i>Xenopeltis unicolor</i> Reinwart in Boie
523 - 70	„ „
523 - 90	„ „
523 - 95	„ „
523 - 80	<i>Pareas margaritophorus</i> (Jan)
523 - 66	<i>Elaphe radiata</i> (Schlegel)
523 - 77	<i>Elaphe Flavolineata</i> (Schlegel)
523 - 47	<i>Ptyas mucosus</i> (Linnaeus)
523 - 117	<i>Ptyas korros</i> (Schlegel)
523 - 82	<i>Lycodon laoensis</i> var. Gunther
523 - 72	<i>Oligodon taeniatus</i> (Gunther)
523 - 73	„ „
523 - 74	„ „
523 - 96	„ „
523 - 97	„ „
523 - 98	„ „
523 - 99	„ „
523 - 81	<i>Liopeltis scriptus</i> (Theobald)
523 - 86	<i>Ahaetulla ahaetulla ahaetulla</i> (Linnaeus)
523 - 94	„ „ „
523 - 114	„ „ „
523 - 65	<i>Natrix flavipunctata</i> (Hallowell)
523 - 75	„ „
523 - 79	<i>Natrix trianguligera</i> (F. Boie)
523 - 118	„ „
523 - 78	<i>Rhabdophis subminiatus subminiatus</i> (Schlegel)
523 - 116	„ „

523 - 83	<i>Dryophis prasinus</i> Boie	
523 - 115	<i>Chrysopelea ornata</i> (Shaw)	
523 - 124	" "	
523 - 71	<i>Enhydris plumbea</i> (Boie)	
523 - 76	<i>Enhydris bocourti</i> (Jan)	
523 - 89	<i>Enhydris enhydris</i> (Schneider)	
523 - 100	" "	
523 - 101	" "	
523 - 102	" "	
523 - 103	" "	
523 - 104	" "	
523 - 105	" "	
523 - 106	" "	
523 - 107	" "	
523 - 108	" "	
523 - 109	" "	
523 - 110	" "	
523 - 111	" "	
523 - 112	" "	
523 - 113	" "	
523 - 119	<i>Ophiophagus hannah</i> (Cantor)	} from nest no. 1
523 - 120	" "	
523 - 121	" "	
523 - 122	" "	
523 - 87	<i>Vipera russelli siamensis</i> M. Smith	
523 - 123	<i>Agkistrodon rhodostoma</i> (F. Boie)	



Plate I . This picture shows nest number 1, before it was disturbed. This was the only nest not found in bamboo. The mound of leaves comprising the nest is clearly visible just to the centre-right of the picture.



Plate II A close view of nest number 7, with the remains of the adult King Cobra's sloughed skin clearly visible round the base of the nest, which fills the picture.



Plate III The adult King Cobra can be seen lying on nest number 4. This nest was on the edge of a bamboo clump and the picture was taken before any vegetation was cut away.



Plate IV Nest number 3 with the King Cobra is just visible through the bamboo. This nest was situated in the middle of the bamboo clump.



Plate V Nests numbers 12 and 13, are situated close together in one clump of bamboo. Both nests are shown after being opened and the eggs are clearly visible.



Plate VI Side view of nest number 7 after a careful section had been cut through the nest and half of it removed. The well-packed bamboo leaves above the eggs are clearly illustrated.



Plate VII Another view of nest number 7 after opening, which shows the depression into which the eggs were deposited prior to covering. Notice the two damaged eggs, with the embryos showing, which were placed on top of the nest.



Plate VIII This picture shows the exposed eggs in nest number 10. Notice the bamboo shoot which had grown between the eggs.



Plate IX New born King Cobras shortly after hatching from the eggs of nest number 1. Notice the banded colouring which is clearly visible on the young snakes and which still shows slightly on the adult snakes.



Plate X An adult female Malayan Pit Viper on her clutch of eggs which was found in long grass.
This picture was taken of the snake and eggs exactly as they were located.