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SOME NOTES ON THE USE OF SULPHANILAMIDE IN THE TREATMENT OF REPTILE DISEASE

By Alex. Holmes

One of the most common causes of death in captive reptiles, at least in Sydney, N.S.W., is what local herpetologists call "pneumonia", although no pathological evidence has as yet definitely identified it as such. The general symptoms are a watery discharge from the nostrils, wheezing respiration accompanied by bubbling from the mouth. The reptile frequently gapes widely as if to gulp air and is so somnolent that it becomes insensitive or unresponsive to touch. Frequently, especially in snakes, the animal will elevate its head as far as possible in its case and will lie in loose folds or coil, as distinct from the healthy "tight" coil with the head down in the centre. As the condition develops the throat and mouth become congested with a thick mucous and after a slow progression the reptile expires. Treatment in the past has mainly taken the form of merely raising the temperature of the case to about 90°F. for a prolonged period, and without any great percentage of recovery.

The following notes, whilst not absolutely conclusive evidence, offer a strong suggestion that the use of sulphanilamide tablets may be effective in treating the malady.

The first case was that of a 6 ft. Carpet Snake (*Morelia argus variegata*) from Cairns, North Queensland. I received this specimen during the summer months of 1950 and it was in excellent condition. It readily accepted dead mice, snatching them from my hand and "killing" them by constriction before swallowing. With the slow onset of winter I decided that, in the face of past experience, I would try and winter it in Sydney without artificial heat. It was housed in a glass-fronted wooden case with old blankets and dried grass. About the end of June, 1951, I first noticed the symptoms described above and immediately connected a 60 watt bulb to the case and raised the temperature to about 75-80°F. (It is probable that, during the early mornings it dropped to as low as 60°.) This did nothing to arrest the disease and by the end of July the snake was in an almost hopeless state.

In the customary chaos of the average family medicine chest I found a bottle of sulphanilamide tablets which had been used, I think, to treat a dog with a severe cold. I decided that nothing could be lost by trying them out on the Carpet Snake. I gave two tablets, in half-tablet doses, in the snake's mouth over four successive days. Most of the tablets, when dissolved, appeared to form a white crust around the lips but some must have been swallowed. Within a week the snake showed signs of improvement and, although slow, it was very definite until by the middle of Spring, 1951, it was completely normal and achieved a very healthy slough.

Unfortunately, it would not feed at all and having survived a very difficult illness it looked as if the snake would just die of starvation. Towards the end of summer I decided that I would give it a chance to acclimatise itself, if possible, to N.S.W. weather and obtain its own food. I therefore took it to the wild bushland in National Park, a few miles south of Sydney, and released it about half a mile from the nearest habitation, which, incidentally, was my own week-end house.

During the summer of 1952 one of the permanent resident of Bundeena, which is on the border of National Park, called round to see me during the week-end to ask if I would catch a large snake which was in the rafters of his shack and had been there for a couple of weeks. On investigation I was amazed and delighted to find my old friend the Queensland Carpet Snake. There was no possibility of a mistake as the Carpet's range does not extend as far south as Sydney, and this one was easily identifiable by an unusual lump towards the tail.

Not only had it acclimatised itself but it had evidently found the hunting quite good. It had survived the rather severe winter of 1951 and was in wonderful health. To save it from destruction at the hands of unsympathetic humans I presented it to the proprietor of a seed and produce store in the area and as far as I know it is still there.

The second case deals with the North Queensland Amythestine Python (*P. amythestinus*). This is a 13 foot specimen weighing approximately 23 lbs. and which on receipt during August, 1953, was in excellent condition. As it was destined for a friend in U.S.A. I was careful to keep it in a temperature of about 70°F. for a week prior to the date of its departure as air freight. It was necessary to enter it at the air freight depot the night before departure, and next day I received a message stating that it was not sufficiently securely packed for air transport, so I had to bring it home again and await a plane four days later.

Probably because of the lowered temperature whilst at the air freight depot it began to show the early symptoms of pneumonia within a few hours. I immediately placed it in a very small case, glass fronted, and connected a globe to raise the temperature to between 85 and 90°. The snake's breathing was a long-drawn, high-pitched whistle. This was on August 29th. With assistance I placed two full sulphanilamide tablets in the mouth. For the next two days the snake was completely inactive, with its head in the top corner of the case. On the 31st one more tablet was given. Whilst the whistling breath had ceased it was still wheezing loudly. It began to show evident improvement and by September 4th it was much more alert, resting on a tight healthy coil with the head down in the centre. The temperature at 7.30 a.m. was 66°F. On the night of September 5th the light was accidently switched off and was not discovered till the following morning. I noticed that the thermometer was lying under the coils of the snake. It registered 64°F. A few moments after removal from contact with the snake's body it had dropped to 58°F.

I was apprehensive that because of this sudden drop in temperature all the previous good work may have been undone and the snake would suffer a relapse. I switched the light on again and then left for a week-end hunting trip. On my return the following evening I found the snake appeared to have suffered no ill effects and at the moment of writing (September 7th) it is quite active in moving round its case and showing signs of normality.

From the foregoing experiences I am hopeful that a simple cure may have been found for this cause of high mortality among captive reptiles. Reptilian diseases, as far as I know, have not in the past been given much scientific thought and it undoubtedly is a field of study of very great interest. I am happy to report that a group of pathologists in Sydney with more than adequate equipment at their disposal with which to carry out research, have become interested in the investigation of these diseases and I hope to be able to offer their progressive reports to the B.H.S. Journal.

A NEOTONOUS BRITISH NEWT

By Alfred Leutscher

Neotony is a term introduced into herpetological language by Kollman in 1882. It indicates a peculiar condition of development, in which the larval state is prolonged beyond the usual period. In *partial neotony* there is merely a delay in metamorphosis and a retention of larval characters, but no maturity is reached although growth can occur. In *total neotony* the same larval way of life is continued into adulthood, i.e., the animal becomes sexually mature and can breed. The latter state occurs in a number of urodeles, as a persistent taxonomic feature, whereby the species, even the family, may be recognised. Examples are the European Olm (*Proteus anguineus*) and the N. American Blind Eel (*Amphiuma means*). The classical examples are found among members of the family Ambystomidæ, where the permanent larvæ are called *Axolotls,* from the Aztec, meaning "water beasts".

In Britain no examples of complete neotony have been recorded. Partial neotony is best known among the urodeles (*Triturus*). Individuals both of the Smooth Newt, *Triturus vulgaris,* and the Palmated Newt, *T. helveticus,* are not uncommon, but no neotonous specimens of the British Crested Newt, *T. cristatus,* seem to be on record (Malcolm Smith, 1951). Specimens are usually pale in colour, equipped with gills, and possess weak legs but a strongly webbed tail. They can reach adult size, between 8-10 cms. but are never known to breed.

In March, 1949, a small specimen was added to my collection. The finder, Mr. M. E. Bacchus, discovered it in a pond at Ruislip, near London. This pond with which he is familiar, is known to contain both Smooth and

Palmated newts, but no Crested newts. It is impossible to tell the species of my specimen, but it can be assumed that it is either of the former two.

The little animal has lived throughout in a small glass tank containing matured water, which is regularly topped up with rain water to a depth of about four inches. Water plants grow in it and support an animal population of daphnia, tubifex, asellus, and various aquatic worms.

The newt is often seen feeding by snapping at its prey, so presumably does not lack for nourishment. Neither do its living quarters appear to be cramped. Two points about its development may be noted. Firstly, there is the slow rate of growth. Measurements have been taken every year in March, from the date of capture, and are as follows: 1949—1½ cm.; 1950—1¾ cm.; 1951—2 cm.; 1952—3 cm.; 1953—4½ cm.; 1954—5½ cm. This very slow rate of growth gives an average of 8 mm. per year. Secondly, there is the matter of the delayed metamorphosis. In normal individuals of the British species of newts, this usually occurs between 2-3 months from egg laying. In cases of over-wintering where a late start from egg laying may cause the baby to pass the winter as a larva, the metamorphosis will take place in the following spring. Maturity is reached in the second or third year. My specimen is now in its fifth year in captivity, still as a larva, and still very much under-sized.

The causes of neotony are not fully understood, but may have something to do with an abnormal thyroid, which may be underdeveloped or does not supply the growth hormone. Specimens in this country and in Holland tend to appear in waters richly supplied with organic matter (Lodewijks, 1948).

The need for such a condition as neotony, and its benefit in survival, is open to dispute. There are factors, present both in water and on land, which may be for or against successful competition in an animal which normally enjoys a "double life". The Mexican axolotl appears to have achieved the permanent state of complete neotony, possibly a result of competition with the environment, and this character is now firmly woven into its genetical make-up. The name of this species is now given as *Siredon mexicana.* The adult may be produced experimentally in the laboratory, but does it occur in nature?

It is my intention to keep my little animal just as it is, making no attempt to force a transformation, to see how long it will live, and whether a normal metamorphosis will ever take place.

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SNAKES AS FOOD FOR MAN

By F. R. Irvine

In many parts of the world snakes are eaten by certain people. Those that are most sought after are the larger species such as the pythons and their relations. According to receipts given to airmen stranded in Far Eastern jungles, all snakes are edible.

Charles M. Bogert, Curator of Reptiles at the American Museum of Natural History, New York, also states that the meat of any snake is edible. though it is very doubtful whether many people have ever bothered to prepare any but the larger species, and doubts whether any world survey of this subject has been made. He states that North American Indians occasionally included snakes in their diet, and he has sometimes seen dried snake meat in the market in China Town, New York, though this may be for its supposed medicinal qualities.

Asia. The Chinese are probably the greatest snake-eaters though others put Mexican Indians and certain Africans as close seconds. A missionary, Mr. Thompson, with a long experience in China has said that he has eaten snake meat in China and found its flavour good. The Indian Python, *Python molurus,* is actually sent from India to China for food purposes, and is eaten in Hong Kong where it is to be seen in the shops. Python meat there is said to be good and its price higher than that of beef. The huge Reticulated Python, *Python reticulatus,* or the Ular Sawa Rendam or Ular Danau of the Malays which occasionally reaches a length of over thirty feet, is eaten in various parts of Malaya and elsewhere, e.g., by Chinese and other peoples in S.E. Asia. J. Waters describes how the Reticulated Python often finds its way into Chinese meat markets in Malaya. The Blood Python, *Python curtus,* is also eaten in parts of S.E. Asia though it is not so popular as food as the much larger Reticulated Python. The Blood Python, known to the Malays as Ular Sawa Tikus reaches a length of only nine feet. It is kept in captivity by animal dealers in Singapore for sale to Zoological Gardens, and whether this species is also used as food is not stated, though it is implied, by Burkill (4). Waters however describes this snake as a fat little fellow which will also be found on the (food) market. Dr. Malcolm Smith states that although it is commonly said that the python (probably the Indian python *Python molurus*) and the Rat Snake *Ptyas mucosus*—(*Zamenis*), are eaten in Thailand, where he lived for twenty years, he never saw them eaten in the town, though it is possible that they are eaten by the country people there in times of scarcity. Logan (7), writing over 100 years ago, describes several snakes as being eaten by an aboriginal tribe in Malaya and he mentions the use of their fat by a sea gypsy clan, Orang Sabimba, who killed, and ate any jungle animal they found. Dr. Malcolm Smith describes having once seen a large sea-snake being prepared as food by the Chinese in Hainan, and he believes that a good many snakes are eaten by the Chinese poor. In W. China the people are very careful to "bone" snakes before eating them (Sewell).

J. D. Romer has lived several years in Hong Kong and describes the use of various species of snakes from S.E. Asia as food in the Colony, where he observed three shops which specialised in the sale of snakes for food. Recently, he noticed in one of these shops, three specimens of *Elaphe moellendorffi* which had been sent from South China as food. Mr. Romer purchased these three snakes and presented them to the London Zoo, where they were new to the collection. Many other species of live snakes are imported in large numbers into the Colony from Southern China when the cold weather starts (October-November); these large importations do not occur in the hot season. Many snakes from these shops go to the Chinese restaurants as food or are used in preparing "snake wine" and other medicines. The following species are commonly encountered in the shops :— The Indian Cobra, *Naja naja,* (a "spitting" variety of which occurs in Malaya), the King Cobra, *Naja hannah,* occasionally, the Banded Krait, *Bungarus fasciatus,* common, the Rayed or Copperhead Racer, *Elaphe radiata,* common, the Greater Indian Rat Snake, *Ptyas mucosus,* and the Lesser Indian Rat Snake, *Ptyas korros,* common, and occasionally the Indian Python, *Python molurus.* The Red-tailed Racer, *Elaphe oxycephala,* is eaten occasionally in parts of Malaya, as is the Elephant-trunk Snake or File Snake, *Acrocordus javanicus.*

Mr. E. Esmond of Hong Kong states that the gall-bladder of snakes is greatly valued for its medicinal qualities. It is taken for a general tonic, and is swallowed raw. Many snakes have the gall-bladder removed and this is then sold separately, the snakes themselves being then sold as food. Snakes complete with gall-bladder fetch a far higher price than those that have had them removed. He also states that in Hong Kong the cold season lasts from October to January and during this time snakes are eaten as they are fat and easy to handle. In certain restaurants during this time snake meat is always on the menu, but may be of any species. On occasions special feasts, or Snake Banquets, are held where only snake meat is served. The main dish at these banquets consists of three to five different species of snakes, and in this instance the species are named. Another expensive banquet is called the Dragon and Tiger Banquet. This consists of Civet Cat and Snake Meat. When Civet Cats are unobtainable ordinary domestic cats have been known to disappear!

The Kraits (*Bungarus*) are handled fairly freely by the assistants without the fangs being removed, but the fangs of the cobras are often removed by scraping them out with a flat piece of wood. Lester reports that the mouth is sometimes even sewn up.

Angel (1) records that the "Acrochorde de Java" (*Acrochordus javanicus*) said to be common in the Far East, is eaten there. He mentions several other species used as food in various parts of Asia. These include the following :— *Hypsirhina polylepis* from New Guinea; *Hypsirhina chinensis,* an opisthoglyph well known in Tonkin (French Indo-China) and hunted near Hanoi and used there and in Tonkin as food; Blomhoff's Viper, *Agkistrodon*

blomhoffii was eaten in Japan in the 18th century, and Siebold (1838) states that its flesh was highly nutritious and high prices were paid for it in Japan; Sea-snakes are beheaded in Hainan and their flesh made into sausages.

In the Arab world al-Damiris in his "Hayat al-Hayawan (A Zoological Dictionary)", London, 1906 (2 vols.) in Vol. II, p. 64, gives a good account of Bedouin eating vipers (Hariya). This creature is said to be the horned viper (*Cerastes*).

AUSTRALIA. In Australia, according to Stirling (13), all kinds of snakes, except the poisonous ones, are eaten by the Australian Aborigines. The Carpet Snake or "Yuppi" (11) and the Diamond Python, both varieties of the same species, *Python spilotes,* and the Scrub or Amethystine Python, *Python amethystinus* are also eaten by them, the latter in Arnhemland. Ten-foot pythons, after being stiffened over the fire are wound into coils 18in. in diam. and cooked in the hot ashes (2). Such large snakes as these pythons and the Rock Pythons *Liasis fuscus* and *L. olivaceus,* are taken in numbers and are specially relished for their fat. Their eggs are also much prized. According to Daisy Bates (3), a well-known authority on the Aborigines, the long and fat Carpet Snake, "Goonia" *Python spilotes,* is rolled into lengths and roasted, while the Wombat Snake called Moolai-ongoo, probably *Aspidites,* when cooked in hot ashes for four hours becomes very tender. Clay-baking is another method, the unskinned and headless snake being wrapped in clay and baked in hot ashes for 6 to 8 hours.

A recent writer, Donald Thompson (12), states that the Javan File Snake, *Acrochordus javanicus* (a water snake), so-called because of its rough, rasp-like skin and sometimes also called Elephant Trunk Snake in Arnhemland, and Macleay's Water Snake, *Hypsirhina polylepis,* see also above, of E. Queensland streams, and probably another species of *Hypsirhina* are all eaten by aborigines in N. Australia.

AFRICA. During my time of residence on the Gold Coast, before the second world war, I once noticed Northern Territory men hunting for snakes isolated on hillocks during a flood, and saw that African Sand Snakes, *Psammophis sibilans* was one of species of snake then captured for use as food. On another occasion one of my labourers, also of Northern Territory origin (a Gurunshi), took the body of a Puff Adder, *Bitus arietans,* for food, after the poisonous head had been removed for making "Snake medicine" to cure or prevent harm from snake-bite. The snake is of course first skinned, cut into pieces and then cooked and eaten. Lester confirms my observations that Puff Adders, *Bitis spp.*, are eaten on the Gold Coast. Dr. B. M. Nicol (8), a nutrition expert writing recently from Nigeria, gives 3 grams of snake meat as an average (daily or weekly?) consumption of peasant farmers, based on a survey of 3 districts of Nigeria.

The Large African Python, *Python sebae,* which reaches a length of twenty feet is also eaten in parts of West Africa, e.g., by the Dagombas and

Gurunshis of the Northern Territories of the Gold Coast, and also in parts of Nigeria, according to Nuno. Livingstone described Bakalahari and Bushmen taking sections of a 15-20 ft. snake over the shoulders, like logs of wood. Their flesh was much appreciated by these people (6). Schmidt (12) describes the hunting of pythons in the rainy season in the Belgian Congo when they take refuge to sleep in large holes, e.g., in former termite hills. The tracks of these large snakes are followed to their retreat and nooses are set at the entrance to their holes, a similar practice being reported from French West Africa by Angel. As the python emerges it usually gets caught behind the head, while at other times they are killed with spears. These snakes are extensively eaten by Africans in that part of the Belgian Congo. The African Python, *Python sebae,* is commonly eaten (sometimes roasted) in the less sophisticated parts of A.E. Sudan, e.g., in Darfur and the Nuba area of Southern Kordofan, and further south some of the Nubas eat even certain poisonous snakes after discarding head and tail as equally poisonous (Corkill). Torday (15) gives a good deal of information on the use or non-use of snakes and other animals as food by African peoples, many of his authorities being early traveller-explorers, some of whom wrote of conditions before the comparatively settled state of modern Colonial Africa, and when famine resulting from slave raiding, from droughts and from locust attacks, probably brought much greater distress than today. Of these the Fan (A. L. Bennett) of French Equatorial Africa; the Warega (Delhaise), the Basonga (Schmitz), the Ababua (Calonne-Beaufaict), all of the Belgian Congo; the Azande (Anderson) of the Congo-Sudan border and the Batawala ("rarely"—Colle) of the N. Rhodesia-Congo border; the Kych and the Bongo ("whose children hunt for them specially"—Petherwick) of the southern part of the A.E. Sudan; and the Suk (Dundas) of Kenya are all reported by the authorities quoted as having eaten snakes, while in recent times Pitman (9) reports that the Bwamba of Uganda eat snakes.

On the other hand these early travellers noted that the following African tribes were not snake-eating, the Chuka (Orde-Brown) and Manbetu (Emin) from the Belgian Congo, and the Turkana (Emley) and the Nandi (Johnston, Hollis) of Kenya.

The French naturalist Lacépède quotes Shaw as saying that very many people in Cairo and its surroundings used to eat lizards and snakes, a practice which gave them the special privilege of walking in honoured parts of a certain yearly Moslem procession in Cairo.

AMERICA. (a) *North America.* In the United States snake meat is only eaten as a novelty. According to John E. Werler, fried rattle-snake meat was given until recently on Sundays to visitors to the San Antonio Reptile Gardens, Texas, for those who cared to try it. Ross Allen, Florida Reptile Institute, Silver Springs, Florida, can the meat of the large Eastern Diamond-back Rattlesnake, *Crotalus adamanteus,* at about $1.50 for a small can. Its flavour is said to resemble that of chicken, while Calvin L. Wilson thinks

that it resembles turkey, but is moist like chicken and the meat breaks like fish, rather than being fibrous. Others again think that it resembles frogs' legs in flavour. Lester recently tried a can of rattlesnake and found it rather like soft tasteless fish, any flavour there was appeared to be from the sauce in which the snake was tinned. The flesh is sometimes eaten fried. Angel (1) describes the use of other Rattlesnakes, *Crotalus spp.*, in Canada as food, and in early settlement days, when trees were being felled, they were abundant, and R. Vaughan Melton (1951) quotes Ross Cox (c. 1632) as saying that the Canadians of that time often ate them, first skinning them and cooking them on a stick over an open fire, turning the stick until the snake was well roasted. H. J. Coke (1852) assures us that the flavour of rattlesnake meat is better than that of the eel, with which view Thomas Aubury agrees, telling us that it also produces a very rich soup. The traveller Bartram, travelling in Eastern Florida in 1821, attended a local Governor's feast at which a rattlesnake was served. In other parts of the New World rattlesnakes have been prepared as preserves.

(b) *South America.* Anacondas, *Eunectes murinus,* are eaten in South America (Angel (1)), where the flesh of the *Boa constrictor* is regarded as a most dainty dish in Eastern South America (Ditmars (5)). Charles M. Bogert writes to say that *Boa constrictors* are reputedly eaten in some parts of Mexico, though he cannot yet substantiate this statement from first-hand experience. The Ross Allen Reptile Institute, Florida, also report that the *Boa constrictor* can be used as food. Angel (1) describes the use as food of *Urotheca bicincta* from the Guianas and Brazil.

Europe. Angel (1) describes the use of snakes as food in former times in France, e.g., the banded (collared) grass snakes *Natrix spp.*, the Montpellier Snake, *Malpolon monspessulana* and the Aesculapian Snake, *Elaphe longissima.* These snakes known as the Green and Yellow (la Verte et Jaune) *Coluber jugularis* were sometimes eaten in times of need under the name of "Hedge Eels" or "Bush Eels". Vipers (*Vipera berus*) on the other hand, were known as "Mountain Eels". Moyse Charas, an early writer, speaks in high praise of vipers as food (and of course as medicine, giving very good remedies).

During the German occupation of Paris (1941-44) Madame (Dr.) Marie Phisalix, a research worker on reptiles at the Museum of Natural History made use of eggs of vipers as food, and recommended the fat in them (and in the body of the vipers in general) to supplement the meagre fat ration of that period.

Effects of Heat on Snake Venom. Angel (1) has some interesting observations on the question of the destruction of the lethal effect of the venom of poisonous snakes, used as food. Some feel that care should be taken when killing the snake to prevent it biting its own body in its agony, so injecting the venom into the flesh intended to serve as human food. Others insist that cooking destroys the power of any such poison injected in this way. Experiments have proved that the temperature required to

destroy the power of venom differs with different species. That of *Bothrops alternotus* (S. America) is destroyed at 65 degrees C. after heating for quarter of an hour, while that of the Cascavel or Cascarelle Rattlesnake, *Crotalus terrificus,* of South and Central America needs 110 degrees C.; that of the Bushmaster, the "Surococo", *Lachesis mutus,* which comes from the same regions, required 120 degrees C.

Parasites in Humans Resulting from the Eating of Snakes. During my visit to the Gold Coast in 1948 I was shown a parasite taken from a patient in the Gold Coast Hospital in Accra, the parasite having passed to the African via a snake he had eaten. This would be the arthropod, *Porocephalus.* Dr. M. H. Hughes of the Medical Research Institute, Accra, Gold Coast, reports that these cork-screw shaped, worm-like *Porocephalus armillatus,* which grown up to three inches in length, are harboured by the following snakes:— *Python sebae, Python regius, Bitis nasicornis, Bitis gabonica* (cf. An old edition of Brumpt's "Précis de Parasitologie"). These four snakes occur in the Gold Coast, and Dr. Hughes reports that both nymphs and larvae of *Porocephalus* have not infrequently been found in the mesentery of humans at Accra and elsewhere, though their presence rarely gives rise to any symptoms, and he could give no observations whether the above four snakes, or any other species have been observed to harbour porocephalids on the Gold Coast. The nymphs are also found in monkeys e.g. on the Gold Coast. Mr. Lester confirms that various West African snakes at the London Zoo, e.g., *Bitis gabonica, Bitis arietans, Naja nigricollis* and other West African species have been found to harbour *Porocephalus.* The hosts of another Porocephalid, *Armillifer armillatus* are reported from a South African paper by Dr. Annie Porter (10) as being the species already quoted, plus *Python reticulatus*, the night Adder, *Causus rhombeatus* and *Cerastes cerastes.*

Though the origin of the infection is unknown, Porocephalids are said to be commonest amongst snake-eating peoples, who may thus ingest eggs containing the larvae of Porocephalids, e.g., when raw snake flesh is occasionally eaten as food and for ritual purposes, e.g., by certain Shangaans of Portuguese East Africa. The African reports of such infections date back to 1830 and are almost entirely from West and Central Africa so far, and are not confined absolutely to Africans, as one case from Bathurst (1854) was a European. Broden and Radham (1907) found Porocephalids in 30 out of 133 postmortems in the Congo, and Mouchet found the parasites in 22% of postmortems he conducted in Leopoldville. Cases from Jamaica (1865), from Antwerp (1897) and two cases from Constantinople (1920) were all Africans. It is the nymphs which occur as parasites in man, and have been known to have mortal effects.

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NOTES

BEHAVIOUR OF THE AFRICAN SNAKE, *PSAMMOPHIS SIBILANS*, BEFORE AND DURING EGG LAYING

These snakes were housed in a cage 30″ x 17″ x 14″. The cage was furnished with a water container, and the floor covered with fine sand.

Prior to egg laying the snakes were extremely restless, constantly nosing in the sand, perhaps to create a depression in which to deposit the eggs. The body posture at time of oviposition is similar to the defaecation posture, that is, body resting along the ground with the tail raised at an angle to it. After the first few eggs were laid the tail was lowered slightly, and at the completion was almost level with the body. The eggs could be observed approaching the cloaca, the scales being wide apart, as when the snake has recently fed. On the egg approaching the cloaca, the snake's body began jumping like a powerful pulse. The egg took over a minute to leave the cloaca. The snake appeared to rest in the period between the laying of the eggs.

The egg sizes in order of laying were as follows: 22 mm. x 10 mm.; 15 mm. x 10 mm.; 25 mm. x 12 mm.; 20 mm. x 10 mm.; 22 mm. x 11 mm.; 20 mm. x 11 mm.; 20 mm. x 12 mm.; 22 mm. x 10 mm.; 20 mm. x 10 mm.; 15 mm. x 10 mm.; 12 mm. x 15 mm.

KENNETH BLACKWELL.

SOME NOTES ON THE EGG LAYING, AND RETENTION OF THE SPERMATOZOA BY THE AFRICAN SNAKE, *BOAEDON LINEATUS*

A female specimen of *Boaedon lineatus* was received during November, 1952. On arrival the snake was placed in a cage 24″ x 12″ x 15″. This cage was furnished with a water container and a sleeping box, the floor

being covered with peat-fibre. A temperature fluctuating between 75°-85° F. was maintained. The snake sloughed on December 1st, and fed on the following dates: December 10th, 18th, 20th, 25th. On the days between January 3rd-10th, 1953, mice were introduced but, the snake showed no interest. January 22nd, the snake again sloughed. During the afternoon of the 30th of January, the snake resorted to the water container, and at 19.40 hrs. three eggs were discovered in the water, the snake being coiled around them. 19.54 hrs., 4th egg laid. 19.58 hrs., a further bulge in the cloacal region. 20.25 hrs., a 5th egg. 20.50 hrs., 6th egg. 21.15 hrs., 7th egg. The eggs were removed and placed in an incubator. The snake remained coiled in the water until the folowing day, 06.00 hrs. The greater percentage of the eggs were fertile and developed to the stage where the egg-tooth is present in the embryo.

April 16th, the snake again resorted to the water container and deposited a further eight eggs. These eggs were not discovered for some time after being laid, and became foul after a week in the incubator.

The animal was kept isolated from other snakes of the same species for a further year to determine whether the retention of the spermatozoa continued for more than one breeding season. No further eggs were laid.

The following measurements show weight of eggs in relation to size soon after being deposited: 50 mm. x 20 mm., 15.8112 grammes; 40 mm. x 20 mm., 11.34 grammes; 45 mm. x 20 mm., 11.988 grammes; 35 mm. x 20 mm., 7.9704 grammes; 35 mm. x 15 mm., 8.6832 grammes; 45 mm. x 20 mm., 11.9232 grammes; 45 mm. x 20 mm., 11.2752 grammes; 30 mm. x 20 mm., 8.244 grammes.

KENNETH BLACKWELL.

FLIES AND SNAKE

It is a well-known fact to the field naturalist that the main conspicuous insect-life as late in the year as November are flies (*Diptera spp.*) partaking of the last of the nectar "feasts" from the Ivy, one of the last of the nectar-bearing flora.

During the few warm days which may occur during this month flies are often seen in considerable numbers feeding and enjoying the warmth of the sun's heat while it may last.

On November 4th (11.50 a.m. Temperature: 40° F., aprox) and also on the following day, 5th, 1953 (2.40 p.m. Temperature: 37° F., approx.) both being bright, sunny days a number of flies (Bluebottles), ten or more in number, were seen on the mid-dorsal body surface of a fairly mature female Viper (*Vipera berus*).

The snake was stretched out in a sunny place in partly open ground of a bramble hedgerow of a local allotment, unmoving, until disturbed to identify sex.

I am wondering if it is possible for there to have been some form of "association" between the flies and the snake.

Were the flies feeding off any chemical substance between the reptile's scales?

Being poikilothermous it seems unlikely that there would be any perspiration present, for, as far as I am aware, snakes do not perspire in the ordinary sense of the word, and more so to be unlikely in November. It would also seem unlikely that the possible "attraction" might be that the snake's body temperature would be higher than that of the surrounding ground open to the sun's rays. Is it possible that there may be some pleasant nectar-like taste or some smell which may act as a stimulus to the fly's perceptive powers?

Did the flies realise that the snake was alive? For, of course, they are normally found on most dead animals laying their eggs.

There may be quite likely a simple answer to this problem-query, but, at the same time, it does suggest a problem of its own to be considered.

PETER W. HOPKINS, Ashcombe House, Sidmouth, S.E. Devon.

REVIEW

SNAKES AS PETS by Hobart M. Smith.

All-Pets Books, Inc. Fond du Lac, Wisconsin, 1953, pp.1-50.

Professor Hobart Smith is a distinguished herpetologist, well known to specialists from his numerous publications on the systematics and ecology of American reptiles. He has now written a most attractive and helpful little book for juvenile snake-fanciers. It begins, very properly, with a well illustrated chapter on how to distinguish the venomous and non-venomous species of American snakes and gives a useful key for their identification based mainly on scale characters. Other sections deal with methods of snake-hunting and how to provide suitable accommodation and food for snakes in captivity. A sensible design for an easily constructed snake cage is shown, and advice and up-to-date information on such topics as force-feeding, hibernation, moulting, diseases and reproduction is given. The illustration in fig. 20 of a "combat dance" between two Copperheads might possibly refer to amorous rather than to aggressive behaviour; it is often difficult to distinguish between the two. The merits of the different types of harmless American snakes as pets, classified according to their dietary habits, are discussed. European readers will regret that only American species are considered, but the author can hardly be blamed for this treatment. The short list of references at the end of the book is an excellent feature.

Young herpetologists will appreciate the sound advice on "the price of being a snake-fancier" in the last chapter, and should take to heart the

injunction that "an ostentatious show-off (of their interests) will only backfire"; parents may be reassured by the fact that "in being willing to learn a little bit more about snakes, we make one step forward in developing a tolerant, balanced perspective—always a mark of growth and maturity in personality."

This book is strongly recommended to all young people who keep or would like to keep snakes. The illustrations on the front and back covers, which show a jolly little boy and a charming teenage girl gazing ecstatically at pet snakes, are delightful.

This book can be obtained in the U.K. from Mr. J. R. Bailey, Bailey Bros. & Swifts Ltd., 46, St. Giles's High Street, London, W.C.2. 10/6

A. d'A. BELLAIRS.

CORRESPONDENCE

In regard to F. R. Irvine's interesting note on "Herbivorous Snakes", two references come to mind that bear on the matter. In 1917 Dr. Nelly de Rooij stated that the Elephant Snake or Karung (*Acrochordus javanicus*) "Feeds on water beetles and fruit". This statement appeared in "The Reptiles of the Indo-Australian Archipelago", vol. II, p. 43, and is, to my knowledge, unsupported by subsequent observation. A more recent, and apparently authentic, report of a snake voluntarily ingesting vegetable material appeared in the "Journal of the Bombay Natural History Society", vol. 46, pt. 4, p. 733, April 1947. This report was presented by Sivatosh Mookerjee and involved a thirteen foot wild Indian Python (*Python molurus*). The snake was found in a tea plantation just before dusk in June of 1946. It was beneath a large mango tree in the act of swallowing a mango. The snake was killed and skinned. "During the skinning of the snake, the aesophagus was also cut open, and four mangoes were recovered from it. The pericarp of these mangoes bore the marks of the teeth of the reptile, the fruits were otherwise intact."

This is a most unusual observation. Mr. Mookerjee noted that the mangoes were infested with insect larvae, but it seems unlikely that either the movement or the odour of the insects would stimulate the snake to swallow the fruit. It does remain a possibility that the movement could have been the primary stimulus. Frogs feed almost exclusively on moving animal food, but are known in rare instances to feed on falling blossoms or seeds. However, movement of the insects would be a rather remote stimulus for this peculiar performance. More likely the odour of the ripe mango was in some way attractive to the snake and caused it to swallow four of the fruit. Despite this authentic report of an unusual event, the voluntary ingestion of vegetable food by snakes remains so rare an occurrence as to be almost non-existent.

JAMES A. OLIVER, Curator of Reptiles, New York Zoological Society.
February 19, 1954.

HERBIVOROUS SNAKES

I was interested to read the article sent in by F. R. Irvine regarding the finding of a snake on the Gold Coast whose stomach contained seeds, presumably those of *Momordica fœtida*.

Some years ago I was on the Gold Coast when a snake was killed in my presence by two natives. On examination of the snake I found the mouth contained a reddish pulp and was told by the natives that the pulp came from a fruit that grew locally and that many snakes did in fact eat this fruit. It was an uncommonly dry period at the time and I assumed that this pulp had been taken by the snake to obtain moisture.

F. SALMON, Manager's Residence, Airport Animal Hostel,
London Airport, Hounslow, Middlesex.

January 27, 1954.

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The Secretary would be grateful if members would call his attention to any inaccuracies in this list.

College Press, 31 Dulwich Village S.E.21