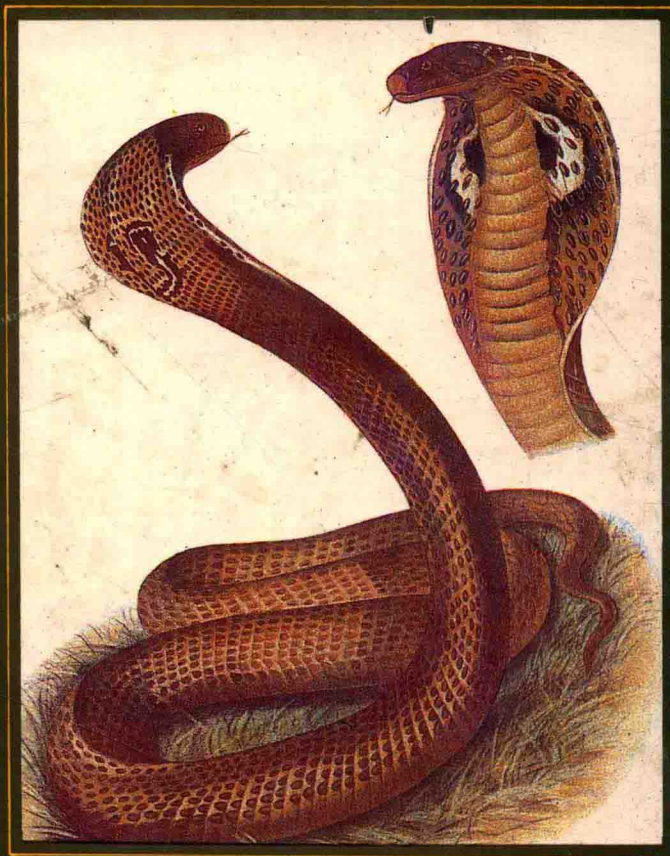


# The POISONOUS SNAKES of INDIA



Joseph Ewart

# THE POISONOUS SNAKES OF INDIA.

FOR  
THE USE OF THE OFFICIALS AND OTHERS  
RESIDING IN  
THE INDIAN EMPIRE.

COMPILED BY

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## INTRODUCTION

Snakes have all along been man's object of awe and morbid fear. Their nature was little understood, as also very little was understood about their poison system.

In tropical countries, where snakes were common and consequently snake bite and the resultant deaths were high, a vast literature and complex rituals grew around snakes. Taboo grew around killing of snakes; gods and goddesses were associated with serpents; even snakes were deified as objects of worship.

It was only in the nineteenth century that man first began to understand snakes and started recognising the poisonous species from the non-poisonous ones. Works of some serious Englishman in India helped herpetologists today to explore the dark unknown sides of these creeping creatures. Among them, Sir Joseph Fayer is always remembered for his "Thanatophidia of India" though Gunther and Col. Wall are also not forgotten. Subsequently, Dr Malcom A Smith made an outstanding study that was published in 1943 in the Fauna of British India series to pave the way for today's most serious researcher like Romulus Whittaker of the famous Snake Park, Madras.

Joseph Ewart, the Surgeon Major of the Bengal Army and Principal of the Calcutta Medical College brought out, only for use of the British Indian Empire's officials, a limited edition of an exquisite note on recognition of poisonous snakes of India. This rare publication contains scientific descriptions of Gunther, Fayer and Anderson. It describes major poisonous snakes of India from Cobra, Russels Viper, Krait to sea snakes. A score of excellent full page colour plates, specially drawn by the renowned Annoda Prosad Bagchee and others of Bengal School make this rare book a valuable possession.

It is needless to add that the Publishers, Himalayan Books, very rightly deserve thanks for their sincere efforts in bringing out a reprint after a century.

18 May, 1985  
New Delhi

Arun Kanti Biswas



## P R E F A C E.

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THE object contemplated in publishing this small work (which may be viewed as a supplement to Sir Joseph Fayrer's magnificent "*Thanatophidia of India*") has been to place in the hands of the busy officials of India a handy-book, by means of which they may easily recognise any of the poisonous reptiles of the Peninsula. Sir Joseph Fayrer, K.C.S.I., when applied to, generously sanctioned the use of the beautiful plates figured in his *Thanatophidia*.

The scientific descriptions of Günther, Fayrer, and Anderson have been preserved; but as all technical and other difficult terms have been fully explained in the Glossary, the text may be regarded as capable of being made intelligible to the mind of the ordinary reader. Any further attempt at popularising the work would have ended in redundancy, and rendered brevity and portability impossible. There is scarcely a term employed in the descriptions, which cannot at once be understood by a reference to the Glossary. The conciseness thus accomplished has enabled me generally to place the descriptions side by side with the Plates. This is a great advantage to men so fully employed as are the civil, medical, and police authorities of India.

It is believed that this work will meet a real want. It will enable the hard-worked civil surgeon to identify, without much trouble, poisonous snakes, a matter of great import to him in the practice of his profession, and in his capacity as—it may be—the sole medical jurisperite in his district. It will also enable the English speaking and reading officials of all grades and departments to distinguish poisonous from non-poisonous snakes. It is further hoped that it will obviate the necessity of paying rewards for the capture and destruction

## PREFACE.

of innocent snakes, as has frequently been done, and thus prevent the unnecessary expenditure of the public funds.

The few brief suggestions concerning treatment, down to the end of the 7th paragraph, if adopted by the non-professional persons brought into contact with those who have been poisoned, might lead to the saving of much human life. Thus there is some reason for supposing that, if the ligatures and other means recommended were applied instantly after a person has been bitten, that the absorption of the poison would be prevented or materially lessened; and that the surgeon would be placed under favourable circumstances for combating the dreadful enemy he has been summoned to oppose. Another point is that, in all probability, the excisions that were formerly practised have neither been extensive nor deep enough. My confrère, Dr. Wall, has, I believe, undertaken some most interesting experiments on the point, with a view to determine the area over which the poison is diffused from an ordinary bite, in different regions of the body. I believe the result will go to prove the absolute necessity for far more extensive excisions than have hitherto been considered needful. The minor amputations of a toe or a finger, and the large and deep excisions recommended in other parts of the body, when promptly undertaken and executed are incomparably lesser evils than those which must be encountered if any dregs of the snake poison are left behind to infect the blood, and eventually to cause almost certain death.

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# THE POISONOUS SNAKES OF INDIA.

## SYMPTOMS AND TREATMENT OF SNAKE POISONING.

*Local.*—When a person is effectively bitten by a poisonous snake, he feels a stinging sensation in the part penetrated. This is soon followed by pain, at first of a dull, aching, and subsequently, of a lancinating and piercing, character. The ultimate and rather rapid effect is numbness terminating in local paralysis of sensation. There may also be slight swelling. In poisoning by the cobra, daboia, and other terrestrial snakes, there will usually be found the marks or points, sometimes indicated by a small film of clotted blood, where the two fangs have entered half an inch or more apart. Or, as in the case of a finger being bitten, there may only be one point of penetration, the other fang having missed altogether. At a later period the part assumes a leaden or livid hue, due in great part to the effusion of blood beneath the skin (ecchymosis). When the bite has been inflicted by a salt-water snake, the fang-marks are more difficult to distinguish; because the fangs are not much larger than the fish-like teeth situated immediately behind them. There may, further, be marks or scratches of some of the teeth as well as of the fangs. As the poison gains access to the blood, the general symptoms affecting the whole nervous organisation soon divert attention from, and eclipse, the local indications. Unless the ligature has been applied at once or very soon after an effective bite these very soon make their appearance.

*General.*—Very soon after an effective bite, where the ligature has been delayed or not applied at all, the poison is absorbed into the blood, and makes its presence felt upon the great nerve-centres of the cord and medulla. The patient is extremely restless and excited. His alarm amounts to horror, intensified by a deeply-rooted conviction of the utter hopelessness of his case. As the first signs of nervous depression, languor

and muscular exhaustion make their appearance, the emotional excitement becomes increased, and, at an early period, the feeling is one of despair. The face is pallid, and covered with drops of perspiration ; pupils dilated ; pulse quickened ; there is loss of appetite, nausea or vomiting. General muscular paralysis eventually supervenes ; there is lethargy and drowsiness, ending in unconsciousness, accompanied or followed by involuntary evacuations, which are sometimes tinged with blood. The breathing becomes slow, laboured and shallow ; pupils widely dilated. The body becomes bathed in cold, clammy perspiration ; the pulse remains full, quick and compressible. The respiration is gradually stopped, and death is ushered in by convulsions, or convulsive twitchings of the muscles of the extremities and face. The pulse beats a few minutes (from three to four) after all breathing has ceased.

In some cases, where a person has been bitten by an exhausted snake, or by one whose aggregate supply of poison is small, as is the case in the tiger snake of Australia, or by a vigorous cobra, from which, owing to some cause or other, only a minute quantity of poison has been injected ; or where a person has been greatly protected against the absorption of the poison by the early application of the ligature, the above symptoms may be present only in a modified degree. Recovery from the general symptoms may take place. The consequences in the part infected may cause much trouble ; but these are to be dealt with by the surgeon on general principles.

#### TREATMENT.

1. A. *By non-professional persons.*—Whenever a person has been bitten by a poisonous reptile, issue orders at once for the attendance of a medical practitioner.

2. Pending his arrival, if the bite has been inflicted in the upper or lower extremities, promptly arrest absorption of the poison by immediately applying a strong cord very tightly round the limb, about a couple of inches above the bitten part, and two or more cords, from four or six inches apart, twisted as tightly as possible, higher up the limb. Thus, if a finger be bitten at the tip, the first ligature may be applied to the base of the digit, the second to the wrist, and the third to the middle of the forearm ; in like manner, if the end of a toe be bitten, the first cord should be secured round the base of the toe ; the second round the instep, and the

third a few inches above the ankle. In bites higher up the extremities, the ligatures should be employed, at suitable distances from each other, with the utmost promptitude. Sir Joseph Fayrer recommends the insertion of a piece of stick or other lever between the cord and the limb or member, with a view to twist the ligature to the utmost.

3. Carefully identify the punctures made by the fangs of the snake. Excise the part with a sharp penknife to the extent of a finger-nail, if the bite is on a finger or toe, if possible, round each puncture, and deeply, almost down to the bone, or in depth from a quarter to half an inch. Scarify freely the circumference of the wound, and encourage bleeding. Wash and squeeze it effectively to expel poison. Then apply to the bottom of the wound a red-hot iron so as to cauterise and kill the adjacent soft tissues so that they may be incapable of absorbing any poison that may not have been removed by the excision or destroyed by the cautery.

4. As the soft parts at the ends of the fingers and toes are comparatively dense, and the diffusion of the poison consequently limited, the extent of the excisions should be proportionately restricted. But if the fangs have penetrated the skin of any part of the extremities above, such as the leg, thigh, forearm, or upper arm, the extent of the diffusion of the poison is much greater, owing to the looser texture of the areolar tissue in these regions. The excision of the poisoned tissues must therefore be considerably extended and deeper. The scarification of the margins at the bottom of the wound and the cauterisation, either with a red-hot iron or live coal, must also be applied with more freedom. If the bite has been inflicted by the daboia, it may be needful even to excise muscular tissue, as well as skin and areolar tissue; because the fangs of this viper are much longer and penetrate deeper than those of the cobra.

5. It will often happen that absorption of poison to a greater or less extent may have occurred before the ligatures have been applied. In such cases they must not be relaxed; because their relaxation will admit the ingress of more poison into the blood. By keeping them firmly adjusted, we may hope, if they have been applied early enough, that such a limitation of the absorption of the poison may have been effected as to conduce materially to the preservation of life; whilst by their premature removal, the renewal of the absorption may, even in cases where only a small quantity of the virus has been thus introduced, turn the balance irretrievably against the patient and cause a rapidly fatal issue.

6. Doubtless mortification of the parts below the ligatures may be caused, if they are retained beyond from half an hour to an hour ; but, in patients who have been effectively bitten by any of the venomous snakes described in this work, the danger to life from mortification, which can easily be dealt with by the surgeon in due course, is not to be compared to that to be encountered by the uncontrolled absorption of the poison into the blood. In the first case, life may be saved ; in the second, judging from the vast experience of Sir Joseph Fayrer and others, death is almost certain to follow.

7. In addition to the above measures, which, notwithstanding their apparent severity, are nevertheless merciful and humane, moderate doses of stimulants may be given until the physician or surgeon arrives. Thus fifteen drops of pure liquor ammoniæ in an ounce of water may be administered every twenty minutes, until three or four doses are taken. For a similar purpose a table-spoonful of brandy, rum, whisky, or arrack thoroughly distilled in a wineglassful of water may be given from time to time until, say, a couple of ounces have been swallowed. It is doubtful whether any good is derived from over-stimulation ; under- is better than over-stimulation. Thus care must be taken not to push the doses of alcohol in the shape of brandy, rum, whisky, or arrack, so as to produce inebriation. During the exhibition of stimulants, nourishment in a liquid form—animal soups, and milk, or eggs beaten up with brandy, &c., should be employed. If the depression and feeling of sinking be marked, mustard plasters should be applied to the region of the heart or pit of the stomach, or over the medulla, behind the nape of the neck, or to all three regions at once. No apparent benefit is derived from compelling the patient to move about ; on the contrary, such enforced exertion increases the tendency to exhaustion. Give the patient rest in a cool and thoroughly well-ventilated room, protected from the sun ; he should be fanned with the punkah if needful. All these measures may be had recourse to by even untrained persons. Some of the means suggested are certainly most severe, “and not such as under any other circumstances should be entrusted to non-professional persons ; but the alternative is so dreadful that, even at the risk of unskilful treatment, it is better that the patient should have this chance of recovery.”—(Fayrer.) Galvanism to the heart and diaphragm, and the Sylvester and Marshall Hall methods of artificial respiration have also been recommended in cases where the prostration is extreme.



8. B. *By the Surgeon.*—In many cases the surgeon, on arrival, often finds himself placed under circumstances of the greatest responsibility and difficulty. Presuming that the foregoing measures have been adopted with efficiency and promptitude after the bite, and that symptoms of poisoning are consequently in abeyance, he should carefully examine the ligatures and see that they are tightened sufficiently to prevent absorption, and also the wound made by the excision, in order to ascertain whether it is wide and deep enough to facilitate the extraction of the whole of the poison or the total destruction of the remainder by the live coal or the actual cautery. In a case of this kind he will have time to find out whether the snake which inflicted the injury was, in all human probability, a poisonous one or not. If he be satisfied that the bite was inflicted by a poisonous reptile—especially by a cobra or daboia—and that it was an effective one, he is called upon, in a preponderating majority of instances, without the chance of a consultation with another surgeon, to decide on the spur of the moment as to the course to be pursued. He may reason somewhat in this way: “If the ligatures be removed, absorption will set in; the blood will be charged with a fatal quantity of the poison; the functions of the great nerve-centres will be destroyed; the respiration will cease, and soon after the circulation also, coterminously with actual death. It is true that mortification will be prevented, but then this comparatively insignificant gain at the best will only be temporary, and attained at the sacrifice of the life of the patient. On the other hand, it is quite clear that little or no poison has as yet gained access to the blood and the great nerve-centres, and that, to maintain this desirable condition, one of two things must be done; either the ligatures must be kept on until all chance of absorption be removed by gangrene, and the patient thus exposed to other risks of blood-poisoning, such as pyæmia, and a protracted convalescence ending sooner or later in amputation; or the poisoned member must be removed two or three inches or more above the site of the bite.” In the case of fingers and toes, where the bite has been proved to be effective either by the existence of the fang-marks or unimpeachable testimony, there ought to be no hesitation as to the procedure to be adopted—viz., immediate amputation. These minor amputations are generally unattended with much danger to life; whilst, if an attempt be made to save the member, life is almost certain to be lost. By amputation



before the symptoms of poisoning have become developed, owing to the prevention of absorption by the successful application of the ligatures, life may often be saved. And I am persuaded it will be usually so saved if the ligatures, excisions, and cautery have all been employed immediately after the poisoning has taken place, and also in many cases where only a very small quantity of poison has been poured into the soft parts or into the blood.

9. In poisoning of fingers and toes, where, either from delay in the application of the ligatures, &c., or from their not having been used at all, the symptoms of snake poisoning have become unmistakably pronounced, when the surgeon arrives upon the scene, the question whether amputation is justifiable naturally arises, not because there is much risk attending the procedure itself, but because, as may be argued, all operative measures may be regarded as utterly hopeless. Under such circumstances the surgeon is again placed in a situation where self-reliance and prompt decision are all-important. In cases of this kind there has probably been too much delay and hesitation already, caused by ignorance as to the measures to be adopted, or dismay at the injury which has been inflicted. Neither the one nor the other can be permitted to influence the surgeon. He may, however, reason in this way: "Life is in imminent danger, and death will probably follow, do what he may. Perhaps sufficient poison has been introduced into the circulation to produce all the signs of snake poisoning, but not enough to prove fatal, provided the ingress of fresh supplies be promptly prohibited. Thus, although a successful result is problematical, amputation is clearly the only hopeful proceeding." The part bitten should be at once isolated by the ligature if this has not been done already, and the member removed, in order to cut off all fresh supplies of the poison. When I was serving with the Meywar Bheel Corps, at Kherwarrah, near Oodeypore, a Hindoo was brought to me, having been bitten on the end of the thumb by a full-grown cobra. After getting up in the morning, he had put his hand into a gurrah, or earthen vessel, to remove something it contained. A cobra, which was secreted in the vessel, seized him by the thumb. The snake was secured and brought with the patient. He was presented to me half an hour after the accident. The marks of the fangs were identified. The native doctor had seen him a few minutes after the bite, and had applied a stout cord round the thumb at two places.

But the man was faint, depressed, nauseated, and prostrated. After seeing that the ligatures were tightened as firmly as possible, I asked the Brahmin native doctor to prevail upon the patient to let me take off his thumb, and so save his life. The thumb was first chopped off to economise time through the first phalanx, and subsequently amputated in the usual way at the metacarpo-phalangeal joint. He passed through a stage of severe nervous prostration, with intense nausea, vomiting and diarrhoea with bloody evacuations; but eventually rallied, and made a good recovery.

10. When the bite has been made on the forearm or leg, the upper arm or thigh, the ligatures, excision and the cautery may be practised more frequently, without having recourse to amputation. Because, in most cases, unless indeed the poison, as occasionally happens, is poured directly and *en masse* into a vein or artery, a sufficient quantity of the soft parts can easily be removed, so as to include the whole area of the poisoned district. The extent of the excised area must depend upon the depth of the skin and subcutaneous areolar tissue, the density of the infected areolar tissue, and the length of the penetrating fangs of the snake. Over the shin the depth of skin and areolar tissue is small; over the thigh the depth is greater, the cellular tissue is loose, and more easily penetrated by fluid, such as snake poison. Thus, in the former situation, both the area and depth of the excised part would be less than in the latter regions, because the area of its diffusion would be less. Over the shin, the depth of the excision should be down to the periosteum, and to the muscles on either side, and it should embrace an area of a square inch or more. In the thigh, the excision should be down at least to the fascia covering the muscles, and ought to be even more extensive, including an area of a couple of square inches or so. There is reason to believe that one reason why excision has not been attended with the expected success, has arisen from the fact that all the infected tissue has not been removed. It is manifest that, if any be left behind, the remaining poison may be insidiously absorbed, and eventually destroy life. Then again, if the bite has been inflicted by the daboia, on a thin and spare individual, the muscles of the calf or thigh may be penetrated. And, in such a case, muscle, in addition to skin and areolar tissue, may have to be excised.

11. Amputation here is in itself a grave proceeding, and it is fortunate that it is not primarily involved in the consideration of the case. Provided the ligatures have been tightened to the utmost, time will be allowed in which to make the excision so extensive and deep as to embrace the whole of the infected area; to resemble, in truth, in principle at least, and in completeness, the small and comparatively unimportant amputation of the fingers or toes. But it will often happen that gangrene will have resulted from the ligature, and, as a secondary measure, amputation will become needful. A case of this kind occurred to me at the Calcutta General Hospital. The patient, a Mohammedan, had been bitten in the forearm by a daboia. Ligatures and the cautery were applied. Gangrene supervened. He was admitted under my care. The soft parts, up to within half an inch of the axilla, were destroyed by sloughing and gangrene. Enough skin over the deltoid remained for a flap. The arm was taken off at the shoulder-joint, and the patient made an excellent recovery.

12. When an effective bite has been inflicted on any part of the trunk, the ligature cannot be employed. But excision and the cautery, if done at once, may be the means of saving life. In these cases sufficient time usually elapses to permit the absorption of a fatal quantity of poison before the arrival of the surgeon. It may sometimes happen, where only a limited quantity of poison has been injected, that, even after the signs of snake poisoning have been fairly developed, the complete extirpation of the infected parts may succeed in saving life, which would otherwise be sacrificed.

13. It is much to be regretted that the intravenous injection of ammonia first introduced by Fontana and the Italians, and energetically revived by Professor Halford, of Melbourne, has not been found (by the Calcutta Snake Poison Commission) to be of any practical use in dogs poisoned by Indian or Australian snakes. Nor does the liquor potassæ recommended to be injected into the blood by Dr. Short, of Madras, apparently do much good. It might do more if injected freely into the poisoned part.

Sir Joseph Fayrer recommends that liquor ammoniæ, nitric acid, carbolic acid, strong whipcord, and a small sharp knife be kept at all police stations for immediate use in cases of snake poisoning.

## N A J A.

### *Naja Tripudians—Cobra—Cobra di Capello.*

*Naja*.—The following description is given of the genus by Günther :—“ Body and tail of moderate length ; belly flat ; head rather high and short, not very distinct from neck, which is very dilatable, the anterior ribs being elongate. The shields of the head normal, but the loreal is absent. Nostrils wide, lateral, between two shields ; eye of moderate size, with round pupil. One præ-, three, sometimes two or four post-oculars. Six upper labials, the third and fourth entering the orbit ; the third forms the lower half of the anterior margin of the orbit. Scales smooth, much imbricate, in numerous series round the hood. Anal entire. Sub-caudals two-rowed. The fang is grooved, with foramen at its extremity ; one or two small ordinary teeth at a short distance behind it.”

The manners and customs, &c., distribution and varieties of the genus are admirably described by Sir Joseph Fayrer in the following quotation from the *Thanatophidia* :—“ There are several varieties, each having a distinct name given to it by the natives. They are all most deadly, and though the snake-charmers consider some more poisonous than others, it is probable that any difference that may exist is more due to the vigour of the individual snake than to anything attributable to the particular variety. They all have the hood, and never attack without distending it. They raise the anterior third of the body from the ground, slide slowly along on the posterior two-thirds, and with the hood dilated remain on the alert, darting the head forward to the attack when anything hostile approaches. This attitude is very striking, and few objects are more calculated to inspire awe than a large cobra, when with his hood erect, hissing loudly, and his eyes glaring, he prepares to strike. Nevertheless, they are not, I believe,