emotional tone which can be created with regard to the suggestions of inhibition by the hypnotist, if it can be assumed that such emotional tone is related to the trance depth of the subject. This is once again in keeping

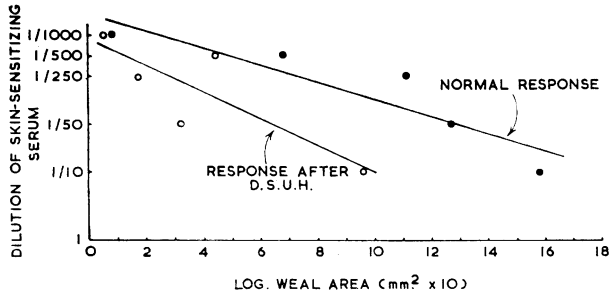

FIG. 1.—Mean of the results in seven deep-trance subjects.

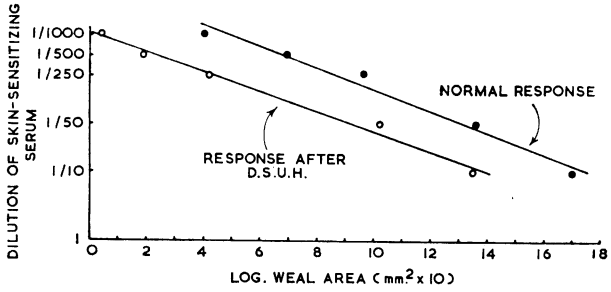

FIG. 2.—Mean of the results in seven medium-trance subjects.

with the background of clinical experience in the use of hypnosis for the treatment of psychosomatic disorders, whether allergic or otherwise, where the immediate and dramatic results are usually obtainable only with deep-trance subjects.

It was also shown earlier with regard to one case (Mason and Black, 1958) that after inhibition of the allergic response in the course of treatment for asthma and hay-fever it was still possible to produce a Prausnitz–Küstner reaction with the patient's serum in a non-allergic subject. Clearly one such case is an anecdote and not a series, and further experiments along these lines might help to clarify our understanding of the mechanisms involved. Of particular interest here, however, is the follow-up of Subject 7 (deep trance), where the first reaction to D.S.U.H. was incomplete inhibition, but complete inhibition was demonstrated six days and seven days later. This too is in keeping with the findings relating to the I.T.H. response and might favour the existence of a humoral mechanism in the psychic factor.

Of considerable interest, therefore, would be an investigation of these reactions and inhibitions in the presence of experimental nerve-block of the arm, or nerve-block due to neurological disease or trauma which might allow distinction between direct neurological central and indirect mediation by a humoral or hormonal factor.

It is concluded that a shift in the dose-response curve of the Prausnitz–Küstner reaction can be produced by direct suggestion under hypnosis and that the degree of shift is very probably a function of the depth of trance into which the subject can be hypnotized.

Summary

The effect of direct suggestion under hypnosis on the dose-response curve of the Prausnitz–Küstner reaction in seven deep-trance subjects and seven medium-trance subjects is reported. It is concluded that the degree of shift resulting is very probably a function of the depth of trance into which the subject can be hypnotized.

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EPIDEMIOLOGY OF SNAKE BITE IN NORTH MALAYA

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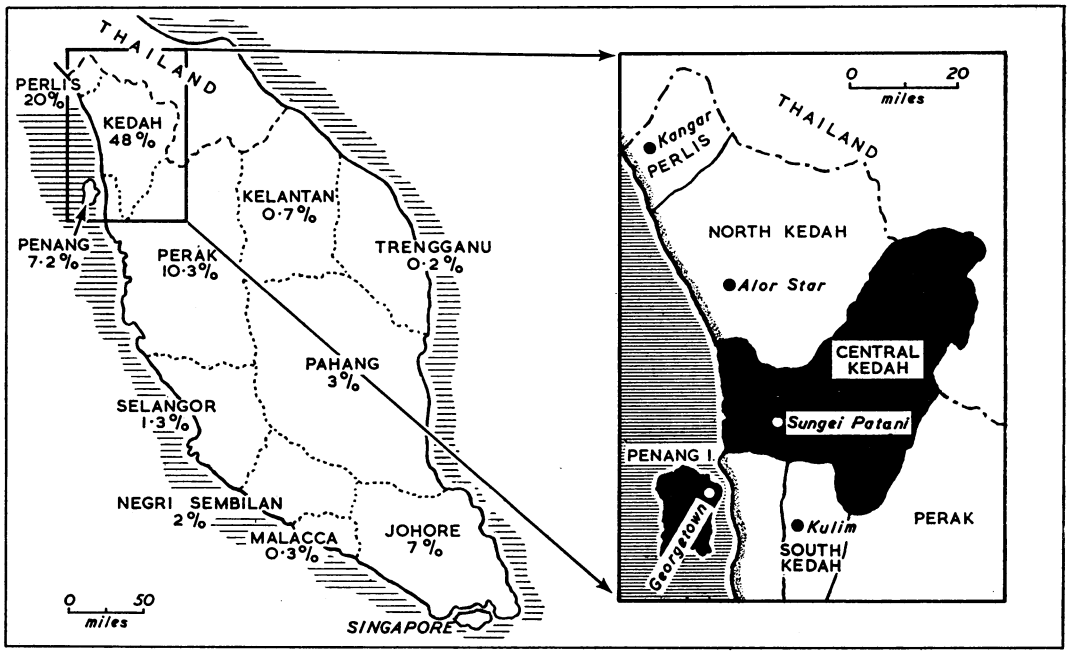
Fear of snakes and their bites is universal, affecting the reactions of both patient and doctor. The fear stems mainly from ignorance and a conditioned—contrary to popular belief, dread of snakes is not instinctive (Klauber, 1956)—exaggeration of the danger snake bite represents to man. Few doctors have studied patients in adequate numbers, because bites are mostly received in remote districts. Accurate statistics are rare, particularly in countries where snake bite is a serious medical problem. From 1958 onwards snake bite treated in Malayan Government hospitals was notified separately from bites or stings by other venomous creatures, and during the two years 1958–9 there were 2,114 admissions for snake bite. Of these bites, 68% were received in the two small north-west states of Perlis and Kedah (see Table I and Map), which contain only 12% of the total

TABLE I.—*Snake-bite Admissions to Government Hospitals in Malaya Notified During the Two Years* 1958–9

State	No. of Admissions	No. of Deaths	Population in 1,000's	Average Yearly Admissions per 100,000	Average Yearly Deaths per 100,000
Perlis* ..	415	3	107	194	1·40
Kedah	1,013	17	685	74	1·24
Penang ..	155	5	572	14	0·44
Perak	222	3	1,221	9	0·12
Selangor ..	32	—	1,013	1·6	—
Negri Sembilan	46	1	364	6·3	0·14
Malacca ..	6	—	291	1	—
Jonore ..	144	2	927	7·7	0·1
Pahang ..	60	2	313	9·6	0·32
Trengganu ..	5	—	278	0·9	—
Kelantan ..	16	1	306	1·6	0·1
Total ..	2,114	34	6,278	17	0·27

*Population of Langkawi Island is added to Perlis and subtracted from Kedah as victims from this island go to Perlis for treatment of snake bite.

population. Since early 1958 research in snake bite has been carried out at Sungei Patani Hospital in Kedah State and at Penang General Hospital. The former represents rural, the latter urban, medicine in the tropics. Accurate epidemiological data have been kept for all snake-bite patients attending these two hospitals, and form the basis of this paper.



Percentage of snake-bite admissions per state in Malaya during 1958–9 and (right) the two areas, Penang Island and Central Kedah, in which the epidemiology of snake bite was studied.

Material and Methods

All in-patients and out-patients treated for unequivocal snake bite at Sungei Patani Hospital and all victims bitten on Penang Island coming to the Penang General Hospital during the three years May, 1958, to April, 1961, are included. Sungei Patani Hospital is the only Government hospital serving Central Kedah, which has a total population of 257,669 according to the 1957 Census (Fell, 1959a), with 165,153 Malaysians, 52,156 Chinese, 33,055 Indians, and 7,305 others (mostly Thais or other Asians). Central Kedah is a rural area of 1,664 square miles (4,309 sq. km.) in which Sungei Patani is the only town (population 23,000). There are three villages with 4,000–5,000 people, but the remaining communities have fewer than 1,000. Apart from one coastal mountain, the western half consists of flat rice-fields with some rubber estates: two-thirds of the population live in this area. The eastern half is broken up by hills or mountains into a number of low valleys mostly containing rubber estates. Rice production occupies 50% of the total economically active population, rubber production 25%, and 20% are engaged in manufacturing, commerce, or services. The population of Penang Island is 338,898, of whom 234,930 reside in Georgetown City. Racial distribution is Malaysians 60,692; Chinese 229,713, Indians 40,646, others 7,847. The great majority of the economically active population work in services, commerce, or manufacturing (Fell, 1959b).

An admission form was completed for each patient—at Sungei Patani Hospital by a hospital assistant specially trained by one of us (H. A. R.). We personally observed 986 of the 1,159 patients throughout their treatment: the remaining 173 (all at Sungei Patani Hospital) were observed by the specially trained hospital assistant. Details of the standard observations and clinical criteria will be given elsewhere: local swelling was assessed by daily circumference measurements at the same level of both feet or hands, ankles or wrists (thinnest part), calves or forearms (fattest part), and thighs or arms. Severity of envenoming in land-snake bites was graded as:

Negligible or no envenoming (nil): local swelling 1 cm. or less increase in circumference (total of all measurement sites).

Slight: local swelling less than 4 cm. increase; no necrosis or systemic symptoms.

Moderate: local swelling 4 cm. or more and/or necrosis.

Severe: clinically evident systemic poisoning.

Fatal.

Results

Sex, Age, and Race of Victims

The average yearly number of patients treated per 1,000 population (Table II) is 1.34 for Central Kedah (K) and 0.12 for Penang Island (P). Thus the risk of snake bite in Central Kedah is eleven times greater than in Penang Island. In both areas the risk to males is over twice that to females in each age-group. The youngest victim was aged 10 months, the oldest 87 years. In both sexes there is an increasing liability to snake bite with ageing until the fifties. The incidence is significantly higher among Indians than among other races in Central Kedah. Including both sexes, yearly incidence per 1,000 population is 2.03 for Indians, 1.31 for Malaysians, and 1.09 for Chinese. These features are mainly occupational—two-thirds of working Indians in Kedah are employed on rubber estates compared with less than one-fifth of the Chinese. About 60% of Malays are self-employed on their rice-fields and only 10% work on rubber estates. Female Indians are also commonly employed on rubber estates, thus accounting for the relatively high number of Indian women bitten.

TABLE II.—*Age, Sex, Race, and Yearly Incidence per 1,000 Population*

Age	Malay		Chinese		Indian		Others		Totals					
	M	F	M	F	M	F	M	F	Male	Yearly Incidence per 1,000	Female	Yearly Incidence per 1,000	Total	Yearly Incidence per 1,000
Central Kedah Series														
0–9	27	17	10	6	14	4	1	1	52	0·41	28	0·22	80	0·31
10–19	92	35	20	13	24	11	2	1	138	1·78	60	0·81	198	1·30
20–29	114	51	18	9	19	13	1	1	152	2·53	74	1·17	226	1·83
30–39	95	30	21	7	17	7	5	1	138	2·88	45	1·01	183	1·98
40–49	50	30	12	7	33	15	—	1	95	2·49	53	1·75	148	2·14
50–59	41	23	20	11	27	3	—	—	88	3·42	37	1·74	125	2·66
60–69	18	7	9	2	12	1	—	—	39	3·10	10	1·03	49	2·20
70 or over	14	3	4	1	1	—	—	—	19	3·22	4	0·61	23	1·85
Total	451	196	114	56	147	54	9	5	721	1·80	311	0·83	1,032	1·34
Yearly incidence per 1,000 ..	1·83	0·79	1·36	0·77	2·67	1·22	0·63	0·66	1·80		0·83		1·34	
Penang Series														
0–9	1	1	1	3	3	—	1	—	6	0·04	4	0·03	10	0·03
10–19	6	4	15	7	9	—	1	—	31	0·27	11	0·11	42	0·18
20–29	8	4	7	1	3	1	—	1	18	0·24	7	0·09	25	0·16
30–39	3	2	9	3	3	3	—	—	15	0·24	8	0·14	23	0·19
40–49	2	1	3	—	6	1	1	—	12	0·21	2	0·04	14	0·14
50–59	1	2	—	1	—	1	—	—	1	0·03	4	0·13	5	0·07
60–69	2	—	2	1	1	—	1	—	6	0·35	1	0·06	7	0·20
70 or over	1	—	—	—	—	—	—	—	1	0·17	—	—	1	0·08
Total	24	14	37	16	25	6	4	1	90	0·17	37	0·08	127	0·12
Yearly incidence	0·27	0·15	0·11	0·05	0·32	0·14	0·32	0·08	0·17		0·08		0·12	

Identification of Snakes

The overwhelming majority of bites were due to *Ancistrodon rhodostoma* (Boie) (see Tables V and VI). On the mainland of Malaya this pit viper is not found south of Penang Island latitude (and it does not occur on Penang Island). Unlike other snakes, it does not move away even when disturbed to the extent of biting a human being—hence the high proportion of bites in north Malaya and the large number in which it is reliably identified. It was often recovered at the location of the incident several hours later. In 335 cases we identified the specimen which was brought to hospital (alive in 81 instances), in 208 it was killed but not brought, and in the remaining 190 cases *A. rhodostoma* was reliably recognized. In the 93 bites by other vipers, cobras, coral snakes, and non-poisonous snakes, we identified all specimens. In the K series, of the 222 bites in which the snake was not identified, 22 were not *A. rhodostoma* (from the description given), but at least half of the remaining 200 were probably due to this snake, which therefore caused 85% of the 1,032 bites. If *A. rhodostoma* bites (733 certain and 100 "probable" cases) are excluded, the yearly incidence per 1,000 population drops from 1.34 to 0.26—only twice the figure for Penang Island. The sea-snake was brought to hospital in three instances—*Enhydrina schistosa* (Daudin), *Hydrophis spiralis* Shaw, and *Kerilia jerdoni* Gray. In the other 25 sea-snake bites, the species (based on the fisherman's description of colour and size) were *E. schistosa* in 13, *H. spiralis* in 1, *H. cynanocinctus* Daudin in 4, and in 7 cases the species was not identified.

Location and Circumstances of Bite

In the Central Kedah series, only 18 out of 1,032 were bitten in Sungei Patani Town. Geographically the out-of-town bites were scattered throughout Central Kedah. In the Penang series, 51 received their bites within Georgetown City boundaries (but none in a built-up area), while 76 were bitten in the rural areas of Penang Island. But if *A. rhodostoma* bites are excluded the 0.26 in Sungei Patani Town, 1.44 in rural Central Kedah, 0.07 in Georgetown City, and 0.24 in rural Penang Island. But if *A. rhodostoma* bites are excluded the incidence falls to 0.04 in Sungei Patani Town (less than in Georgetown City) and 0.42 in rural Central Kedah (0.28 if the 100 "probable" *A. rhodostoma* bites are also excluded).

In 55% of the Kedah series and 32% of the Penang series victims were bitten while working in rubber estates, rice-fields, or other rural occupations (Table III). Adults bitten on a path or house compound were usually going to a well or latrine, clearing their compound, or picking up firewood. In Central Kedah the yearly incidence per 1,000 rubber estate workers is 5.36—more than three times the rate (1.52) in rice-workers and other farmers. Even more striking is the very high rate among rubber-estate weeders. The yearly number of bites per 1,000 at risk is 30.00 for weeders compared with 2.35 for tappers. The secondary undergrowth in rubber estates forms ideal cover for snakes, particularly the *A. rhodostoma*. Weeders come in contact with this undergrowth much more than tappers, thus explaining the very high rate among this group. All except two of the sea-snake-bite victims were bitten while fishing—usually sorting nets. It is abundantly clear that snake-bite in these areas is predominantly a rural and occupational hazard.

TABLE III.—*Circumstances Leading to Land-snake Bites*

Circumstances of Land-snake Bites	Central Kedah		Penang		Total	
	No.	%	No.	%	No.	%
Estate tapping ..	133	13	5	4	138	12·2
,, weeding ..	207	20	8	7	215	19·0
Rice and other farming ..	210	21	24	21	234	20·7
On path ..	269	27	47	40	316	27·9
In house compound	167	16	26	22	193	17·1
In house ..	28	3	7	6	35	3·1
Total ..	1,014	100	117	100	1,131	100

Day, Month: Light/Dark

In both series bites were most frequent on Mondays, but otherwise day-to-day differences were not statistically significant. Temperature varies little in Malaya, and

there is no hibernation among snakes. Monthly snake-bite incidence shows little variation, although it rises slightly during dry compared with wet months. Average monthly snake-bite numbers and rainfall in inches were 37 and 4.5 for January–March, compared with 29 and 13.3 for September–November. The lowest average was 23 bites in November, the highest 40 bites in March. This is mainly due to fewer people (and probably fewer snakes) going out during the wet weather when rubber tapping stops, since rain spoils the collection of latex. Two-thirds of the bites occur in daylight (when more people are exposed to risk). Severity of poisoning showed no significant variation according to the day, the month, or with bites in the light or dark. Malayan land-snakes and sea-snakes breed in late May and during June; but this did not appear to influence either frequency or severity of bites.

Interval Between Bite and Reaching Hospital

Penang Island victims reached hospital earlier than subjects in the Central Kedah series—44% compared with 16.5% arrived within one hour of the bite (Table IV)—due to the shorter distances and better transport facilities for Penang Island victims. But in both series 80% reached hospital within four hours of the bite. There was little difference in severity of poisoning among patients coming within four hours of the bite, but with longer intervals severe poisoning resulted in an increasing percentage (7% up to 4 hours, 17% with 4 to 10 hours, 22% with 10 to 20 hours, and 37% over 20 hours).

TABLE IV.—*Interval Between Bite and Reaching Hospital*

Bite–Hospital Arrival Interval (Hours)	Central Kedah		Penang		Total	
	No.	%	No.	%	No.	%
Under ½ ..	15	1	8	6	23	2·0
½–1	156	16	48	38	204	17·6
1–2	309	30	28	22	337	29·1
2–4	340	33	23	18	363	31·3
4–6	97	9	8	6	105	9·1
6–10	41	4	6	5	47	4·0
10–20	59	6	4	3	63	5·4
Over 20	15	1	2	2	17	1·5
Total ..	1,032	100	127	100	1,159	100

Site of Bite

Of the bites, 82% were on the foot, toe, or leg (see Table V)—always the common site for land-snake bite because the victim is bitten through treading on the snake. In contrast, 15 of the 28 sea-snake victims were bitten on the fingers, since sorting nets is a common sea-snake hazard. All except four victims were bitten on the limbs. Two were bitten on the face, one on the shoulder, and a fourth patient was bitten on the scrotum by a shore pit viper lurking in the saddle of his bicycle.

TABLE V.—*Site of Bite and Species of Snake Identified*

Site of Bite	Snake Species								
	A. rhodostoma (Boie)	*T. purpureomaculatus*	*T. wagleri*	*N. naja*	*M. bivirgata*	Sea-snake	Non-poisonous	Not Recognized or Not Seen	Total
Foot	412	6	12	6	—	5	13	184	638
Toe	90	5	—	3	2	2	3	58	163
Leg	107	3	2	7	—	1	3	25	148
Finger	91	1	4	4	—	15	7	24	146
Hand	28	—	4	2	—	1	—	10	45
Other	5	1	2	1	—	4	2	4	19
Total	733	16	24	23	2	28	28	305	1,159

Very few victims were wearing footwear (and those that did wore sandal type footwear which offers little protection) or long trousers when bitten.

Severity of Poisoning Following Bites

An outstanding feature is the low morbidity and mortality from the bites by poisonous snakes. Thus in the 824 cases in which the snake was reliably identified as a viper, cobra, or sea-snake (all potentially lethal to humans), 441—over one-half—of the victims escaped with slight or no poisoning (see Table VI): severe envenoming resulted in only 10%, death in 1.3% of these 824 cases. The general mortality rate was 1.57% (0.196 yearly deaths per 100,000 population) in the Penang series and 0.87% or 1.16 yearly deaths per 100,000 population in the Kedah series. Including bites by non-poisonous snakes, the distribution of poisoning severity in the two series was: nil or slight, K 59%, P 92%; moderate, K 33%, P 5%; severe or fatal, K 8%, P 3%. The higher percentage with serious poisoning in Kedah is almost entirely due to the *A. rhodostoma* bites. Excluding the latter, poisoning among the 299 remaining Central Kedah cases was nil or slight in 79%, moderate in 19%, and severe or fatal in 2%.

Variables in Severity of Ancistrodon Rhodostoma Bites

The high number of *A. rhodostoma* victims (733) justifies more detailed statistics. It is widely assumed that the young are more seriously affected than adults, but this was not found to be the case (see Table VII). At 0–14 years 54% had slight or no poisoning, 35% moderate, 11% severe; at 15–29 years, 56%, 35%, and 9%; at 30–49 years, 48%, 40%, 12%; at 50 years and over, 41%, 49%, 10%. There is thus little difference in the severity of the poisoning in any age-group. Of the 510 male patients, 13% had severe poisoning compared with 4% of the 223 female subjects; 12% Malay, 9% Indian, and 7% Chinese had severe poisoning. Generally speaking, the larger the snake the

TABLE VI.—*Severity of Poisoning in the Various Types of Snake Bite*

Snake Species	Degree of Poisoning											
	Nil		Slight		Moderate		Severe		Fatal		Totals	
	K	P	K	P	K	P	K	P	K	P	K	P
A. rhodostoma (Boie)	172	—	196	—	289	—	69	—	7	—	733	—
T. purpureomaculatus	4	—	5	2	5	—	—	—	—	—	14	2
T. wagleri	8	13	1	—	1	1	—	—	—	—	10	14
N. naja	13	1	—	—	3	1	2	1	2	—	20	3
M. bivirgata ..	2	—	—	—	—	—	—	—	—	—	2	—
Sea-snake	18	7	—	1	—	—	—	—	—	2	18	10
Not seen or not recognized ..	106	70	67	9	47	4	2	—	—	—	222	83
Non-poisonous ..	13	15	—	—	—	—	—	—	—	—	13	15
Totals ..	336	106	269	12	345	6	73	1	9	2	1,032	127

K = Central Kedah series. P = Penang Island series.

TABLE VII.—*Relation Between Severity of A. rhodostoma and Age of Patient*

Age	Degree of Poisoning										Total
	Nil		Slight		Moderate		Severe		Fatal		
	No.	%	No.	%	No.	%	No.	%	No.	%	
0–4	1	6	8	50	6	38	1	6	—	—	16
5–9	8	19	12	29	17	40	4	10	1	2	42
10–14	20	34	14	24	18	31	6	10	—	—	58
15–19	38	40	12	13	36	38	9	9	—	—	95
20–24	24	25	35	36	28	29	9	9	—	—	96
25–29	19	32	11	19	24	41	5	8	—	—	59
30–39	21	17	39	32	54	45	5	4	2	2	121
40–49	19	19	27	27	34	34	18	18	2	2	100
50–59	16	18	20	22	48	54	4	4	1	1	89
60–69	5	13	14	35	15	38	5	13	1	3	40
70 or more	1	6	4	24	9	53	3	18	—	—	17
Total	172	23	196	27	289	39	69	9	7	1	733

more likely severe poisoning would result. But 25% of those bitten by large or very large specimens (70 cm or longer) developed slight or no poisoning.

Severe poisoning followed 27% of leg bites compared with 10% of foot bites, 6% of finger bites, and 3% of hand bites. None of the patients bitten on the toes, forearm, face, or shoulder developed severe poisoning. Although finger and toe bites rarely resulted in severe poisoning, the risk of local necrosis was significantly higher; 20% of finger and 17% of toe bites resulted in necrosis, compared with only 6% in foot and leg bites, 3% in hand bites, and 8.7% of the total 733 bites.

Out of 733 victims, 576 (79%) applied a tourniquet after the bite. Some ligatures were mere tokens, being made with hair or grass; nevertheless, most were string or rubber and many were tight and were applied at several levels. There was no significant difference in the poisoning between the two groups: 49% slight or no poisoning, 41% moderate, 10% severe in those with tourniquets, compared with 56%, 33%, and 11% in those without tourniquets. Local necrosis was less common in the tourniquet group (8.5%) than in those not applying ligatures (9.1%), but the difference is not significant. Incision by the victims or their relatives was carried out in only eight instances. A burning match was applied to four bites and acid to another four bites. In 30 cases incision was performed at local dispensaries—regrettably so, since this greatly increased the likelihood of bacterial infection.

Discussion

During 1958–9 admissions to Malayan Government hospitals notified as due to venomous animals other than snakes were 2,070 cases with 20 deaths. These figures are similar to snake-bite notifications (see Table I). In Mexico, snake bite causes only 9% of deaths from attacks of venomous animals (Swaroop and Grab, 1954). It is therefore important to separate snakes from the other venomous animals in future International Statistical Classifications. Even if this is done, centrally compiled hospital statistics must be viewed with reserve. Central statistics for snake bite and other diagnostic categories in Perlis, Kedah, and Penang showed serious discrepancies when compared with data which we know to be accurate. However, the Penang and Sungei Patani Hospital figures quoted are unquestionably accurate, since *all* patients with suspected snake bite coming to these two hospitals during the three-year period were referred to us: furthermore, we made all the observations and records, with the help of one specially trained hospital assistant.

Inclusion of out-patients is most important, as they formed 14% of the total 1,159 (122 of the 1,032 K series and 42 of the 127 P series). No envenoming was present in these 164 victims, and their exclusion would obviously result in bias towards greater poisoning severity. We did exclude 41 cases in which the diagnosis of snake bite was doubtful: none had serious poisoning. But, granted accuracy, how representative are these hospital figures? Private practitioners do not treat snake-bite patients in either area. No snake-bite victims were treated at the other two hospitals on Penang Island during 1958–61. The Penang series therefore represents all Penang Island victims seeking orthodox medical treatment for snake bite. In Kedah, snake-bite patients are sometimes treated at private hospitals on rubber estates. In one such hospital twelve subjects, mostly with slight poisoning, were admitted in 1958. Our guess would be that a maximum of 50 a year from Central Kedah are treated at estate hospitals. But how many are bitten without coming to hospital?

A survey of sea-snake bite in fishing villages in this area showed that many were bitten without seeking orthodox medical treatment (Reid and Lim, 1957). Thus of 40 victims bitten in 1955 only 9 went to hospital. The local bomoh or medicine-man is consulted by Malays: Chinese have their special anti-snake herbal wine. Probably a significant number of land-snake-bite victims also do not come to hospital, particularly those bitten without serious envenoming resulting. This is confirmed by the progressive rise of severe poisoning with increase in the interval between bite and arrival at hospital over four hours. Hospital patients are a selected group which underestimates the general snake-bite incidence. The hospital figures for sea-snake bite should be at least doubled in our opinion and the land-snake-bite numbers should be increased by 50%. In Central Kedah this adjustment would give about 600 cases a year, or 233 per 100,000, and on Penang Island about 65 cases a year, or 20 per 100,000 population. Hospital statistics also underrate total snake-bite deaths.

During May, 1958, to April, 1960, no cases of fatal snake bite occurring on Penang Island were notified to the police, but in Central Kedah there were 16 notified cases in which the victim died outside hospital. It is not known whether all 16 deaths were in fact due to snake bite: "snake bite" may be a convenient euphemism for death by other means. But it is safe to assume that yearly deaths from snake bite in Malaya are at least twice the figure for hospital deaths. On this basis yearly deaths per 100,000 population would be 2.3 for Central Kedah, 0.39 for Penang Island, and 0.54 for Malaya generally. Klauber (1956) estimates the incidence in the U.S.A. as 1.5 per 100,000 and the mortality as 0.027: he thought the mortality rate in Florida might reach 0.2. Using data from Swaroop and Grab (1954), he calculates world mortality rates per 100,000 population as follows: Burma 15.4, India 5.4, Ceylon 4.2, Brazil 4.1, Venezuela 3.1, Costa Rica 1.93, Colombia 1.56, Thailand 1.3, Mexico 0.94, British Guiana 0.8, South Africa 0.57, Egypt 0.2, Japan 0.13, Australia 0.07, France 0.06, Italy 0.04, Canada, Spain, England and Wales 0.02. But the data are derived from statistics which are for the most part unreliable.

In Penang the numbers of snake-bite patients treated in 1955–60 show no significant yearly change. But snake-bite admissions to the four Government hospitals in Kedah and Perlis reveal a steady rise—533 in 1955,

625 in 1956, 653 in 1957, 688 in 1958, 733 in 1959, and 873 in 1960 (case-records all personally scrutinized). Allowing for a 2.8% annual increase in population, the yearly admissions per 100,000 population were 71, 81, 82, 84, 87, and 102. Since there was a disproportionate rise in admissions to Sungei Patani Hospital (136 in 1955 and 341 in 1960), we think greater use of hospitals is a more important factor than a progressive increase in snake-bite incidence in explaining these figures. Yet observers say there are more *A. rhodostoma* snakes than in pre-war days. This increase is ascribed to more undergrowth on the rubber estates, where less weeding has been carried out in the post-war era partly for economic reasons but also because the undergrowth prevents land erosion.

The variables in age, sex, race, location, time and circumstances of bite, and site of the bite all reflect the rural and occupational nature of the snake-bite hazard. It is noteworthy that only 18 of the 1,032 Central Kedah bites occurred in the main town. The very high incidence of bites among rubber-estate weeders is another striking feature. In Malaya the pit viper *A. rhodostoma* is much the most common species biting human victims. Because it is confined to the north in Malaya, over two-thirds of all snake-bite cases in the country take place in this region. *A. rhodostoma* is a more common cause of severe poisoning than sea-snakes or cobras. Bites from the two pit vipers *Trimeresurus wagleri* (Boie) and *T. purpureomaculatus* (Gray) rarely result in serious poisoning, and no fatality has so far been ascribed to them. Bites from the other four viper species occurring in Malaya, from king cobras, kraits, and coral snakes are extremely rare.

In our opinion the most practical single means of reducing the snake-bite hazard in Malaya would be wearing shoes or preferably boots. Long trousers would give added protection, although they are not popular among rural folk. Precautionary advice such as "Watch where you put your hands and feet" (Klauber, 1956) is unlikely to make any serious impact in rural districts of Malaya, where the markings of *A. rhodostoma* form ideal camouflage against the background of weeds and rubber leaves. Thus one of our patients saw a nest of snake eggs (*A. rhodostoma*), carefully looked around, and after satisfying himself there was no snake in the vicinity picked up the eggs. He was promptly bitten by the mother, who was lying among leaves by the side of the eggs. Reduction of poisonous snakes by killing or trapping campaigns, bounties, and so on are unlikely to succeed (when rewards were made available in India, enterprising individuals started to breed snakes specially for the bounties).

In countries where snake bite is a serious medical problem there has been little controversy over first-aid measures. The rural people have time-honoured methods which are sensible and—much more important—harmless. They virtually never use meddlesome local measures such as incision, and therefore bacterial infection is correspondingly rare, occurring only as a late complication of necrosis.

The low morbidity and mortality in human snake bite is remarkable (see Table VI). In many cases we have obtained enough venom to kill several adult human beings by milking snakes shortly after they had bitten patients. This confirms a previously stated belief (Reid, 1957) that snake bite in humans is a defensive reaction which rarely results in much venom being injected. In the light of these figures it is easy to understand how success may be (and has been) claimed for virtually any treatment in snake bite. The data also emphasize that young victims are no more susceptible to poisoning than older ones. The clinician must judge each patient individually. Thus, excluding 199 subjects in therapeutic trials, only 376 (39%) out of the remaining 960 patients required antivenene.

Summary

A prospective epidemiological study of 1,159 patients bitten during a three-year period in north-west Malaya confirms that snake bite is a rural and occupational hazard.

The pit viper *Ancistrodon rhodostoma* (Boie) causes 85% of the bites in north-west Malaya, where snake bite is a serious medical problem.

In 824 of the 1,159 cases the snake was reliably identified as a potentially lethal viper, cobra, or sea-snake. Yet 53% of these 824 victims escaped with slight or no poisoning. Poisonous snake bite is *not* synonymous with snake-bite poisoning.

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BRUNETTE TO BLONDE

DEPIGMENTATION OF HUMAN HAIR DURING ORAL TREATMENT WITH MEPHENESIN

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The hazards of modern medical treatment are now so real and diverse that it is wise to inquire routinely not only about the patient's symptoms but also about previous treatment—including that prescribed by one-self. The pills in the handbag may disclose the cause of complaints which extensive hospital investigation might fail to explain. Recent personal experiences include cycloserine epilepsy, chloroquine ("nivaquine") retinopathy, and methyldopa ("aldomet") fever. Fortunately the side-effects of many drugs are unpleasant and appea. early. Some of course are insidious and late. But what if they are not only insidious but also not unpleasant? What if the effect is actually pleasing to the patient? The following experience suggests that the patient may not then mention it to the doctor and the particular side-effect may not come to light for some time.

Case 1

A housewife aged 37 was first seen in December, 1958, and was found to be suffering from multiple sclerosis. Mephenesin carbamate ("tolseram") 0.5 g. t.d.s. was prescribed for muscular spasms, and in due course the dose was increased to 2 g. five times daily. I saw her next in May, 1959, when there was nothing unusual to report—or so I thought. I did not see her again until October, 1961, when she "looked"