

Cobras
in
His
Garden

by
Harry Kursb

HARVEY HOUSE, INC. • *Publishers*
Irvington-on-Hudson • New York

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Second Printing 1966

Library of Congress Catalog Card No.: 65-19984
Manufactured in the United States of America

HARVEY HOUSE, INC. • *Publishers*
Irvington-on-Hudson • New York

dedicated to...

William E. Haast and his charming wife, Clarita, and their endearing, talented daughters, Naia Hannah and Shantih, who made this book possible by living it and by permitting me to become a part of their lives so that it could be written.

H. K.

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acknowledgements...

Through correspondence, telephone calls and direct interviews, many people helped the author obtain vital research data and background information relating to snakes and their venoms, venom research, snakebite treatment, and problems relating to the transportation and maintenance of snakes in captivity.

But the author accepts complete and sole responsibility for the accuracy of the information used here and wishes to acknowledge with appreciation the cooperation of:

Dr. William B. Deichmann, Professor of Pharmacology, University of Miami; *Dr. Herndon G. Dowling*, Curator of Reptiles, New York Zoological Society; *Capt. Herschel H. Flowers*, United States Army, Veterinary Corps; *Dr. Charles Francomano*, Yonkers, N.Y.; *Dr. George Grunberger*, Peekskill, N.Y.; *Dr. Joseph F. Gennaro Jr.*, Associate Professor, School of Medicine, University of Louisville; *Dr. H. I. Jhala*, Haffkine Institute, Bombay, India; *Dr. J. H. Mason*, Deputy Director, Therapeutic Substances, South African Institute for Medical Research; *Dr. Sherman A. Minton Jr.*, Department of Microbiology, Medical Center, Indiana University; *Dr. Thad Moseley*, Editor, *The Journal* of the Florida Medical Association; *Dr. Henry M. Parrish*, Chairman, Department of Community Health and Medical Practice, University of Missouri; *Dr. Murray Sanders*, Chairman, Department of Biological Sciences, Florida Atlantic University; *Dr. Ben Sheppard*, Miami, Florida; *Dr. Clifford M. Snyder*, Clinical Associate Professor, University of Miami; *Col. Colin F. Vorder Bruegge*, Acting Commander, Headquarters, United States Army Medical Research and Development Command; *Dr. Melvin L. Winer*, Los Angeles, Calif.; *Mr. William B. Allen*, Supervisor, Highland Park Zoo, Pittsburgh, Pa.; *Mr.*

Charles Bender, President, The VirTis Co., Gardiner, N.Y.; *Mrs. Eleanor E. Buckley*, Wyeth Laboratories, Philadelphia, Pa.; *Mr. C. J. P. Ionides*, Tanzania (Africa); *Mr. Donald P. Jones*, Commercial Sales Supervisor, and *Mr. Albert J. Thiesing*, Cargo Sales Supervisor, Scandinavian Airlines System, New York City.

And to thank the editors of *Argosy* and *Family Weekly* magazines for granting permission to make use of material they had originated in their published articles on William E. Haast; and the *Office of Technical Services, U.S. Department of Commerce*, for making immediately available an English translation of a recent Soviet Union monograph on poisonous snakes, treatment, research and protection.

My special thanks to Mr. Joseph Mask, of that unsung breed of dedicated librarians, for his conscientious efforts to ease the burdens of authors engaged in serious research at the New York Public Library.

Particular appreciation must also go to Mrs. June Nadel, secretary to Mr. Haast, who endured with undiminished charm and patience the author's continual demands upon her time and efforts.

Finally, it must be recorded that were it not for the much-tested indulgence of Evelyn Singer Haber and Mr. Zola Harvey — who were among the first to inspire this project and maintain keen interest in it — this book probably would not have been published.

HARRY KURSH

March, 1965
Hollowbrook Lake
Peekskill, New York

foreword...

The first time I ever saw Bill Haast catch cobras and extract their venom, I could scarcely believe my eyes. Every time I have seen him catch and extract venom, particularly from a fifteen-foot King Cobra, I am amazed. As a snake catcher myself, I am full of admiration for Bill Haast for his understanding of the habits of the snakes, his uncanny ability to read from its actions the snake's disposition at the moment and its intentions, and for his superb physical coordination and adroitness. His approach to this problem, like his approach to the larger problem of operating and performing at the Serpenterium, is the approach of a scientist, and yet Bill calls himself a layman.

Starting from scratch, William E. Haast has built the Miami Serpenterium into what is, in my opinion, the finest single attraction of its kind in the world. But it has become much more than an exhibit of snakes. It is now the showplace of one man's courage and devotion to science. It is for this reason that *COBRAS IN HIS GARDEN*, the dramatic biography of Bill Haast, is long overdue.

Many excellent books have been written about snakes. There, of course, shall be many more. The distinction of *COBRAS IN HIS GARDEN*, however lies principally in the life

and hopes and dreams of its subject, Bill Haast, who has long believed that he could help advance scientific interest in snake venoms by making such venoms readily available to researchers.

Today, we know that Bill Haast's dream of discovering new and perhaps startling benefits for mankind in snake venoms is shared by a growing roster of scientists, many of whom are now customers of the venoms produced at the Miami Serpentarium. However, only a few of us have had the privilege of really getting to know him and seeing him at work, personally and routinely handling some of the world's deadliest creatures in order to produce venoms of uniform high quality under controlled laboratory conditions.

COBRAS IN HIS GARDEN, therefore, is not only a unique introduction to the mysteries of snake venoms and deadly snakebites, but it is also an equally unique account of a hard working, dedicated, bold and imaginative layman who has dared to devote his life, and even risk his life, in a field of science that has not been much understood or appreciated by the general public.

Hence, if this book serves only to arouse a better understanding of venomous snakes, encouraging more scientific interest in and support of researchers probing the mysteries of snake venoms, it shall more than justify the many times Bill Haast has virtually stood at the brink of death following an unprecedented number of lethal snakebites.

If you have ever visited the Miami Serpentarium and seen Bill Haast extract venom, you will enjoy reading this book. If not, you will have a treat in store for you to see him in action the next time you visit Florida.

MARLIN PERKINS
Director
St. Louis Zoo

1 . . .

the story that had to be explained

In the nearly dozen years that I have known William E. Haast, director of the Miami Serpentarium, I have never ceased to wonder how he manages to stay alive. I first met him in April, 1954, shortly after he had startled doctors by walking out of a Miami hospital within hours after he was supposed to have died.

Then forty-three years old, dark-haired, handsome and slender, with a deceptively boyish face, he and his vivacious wife, Clarita, were waiting for me at a Chinese restaurant in Coral Gables, a few miles south of Miami. I was to meet them there after my arrival from New York. My assignment, for *Argosy* magazine, was to bring back a story dramatizing Bill Haast's unprecedented, gallant and seemingly futile struggle to survive one of the world's deadliest snakebites, that of the blue krait of India.

The mood at the dinner table, rounded out by several friends, was festive. They were there to celebrate. Why not! Bill was alive! He, too, joined in the banter, jesting about his experience and laughing at wearisome jokes on him, as, for instance: *There was so much snake venom in his blood that*

he should have been crawling, a transparent reference to his unusual record. He had lived through a greater variety of venomous snakebites, if not more such bites, than perhaps any person in history.

In his files was a letter from a public health physician and well known U.S. snake-venom researcher who was preparing a scientific study on the effects of repeated snakebites on humans. Asking for information about Bill's snakebites, the doctor added: "You are leading the race as to the most bites with survival."

At the time, Bill had survived about fifty bites, including several of the dreaded cobras. As this book was being prepared for final copy, he was hit for the thirty-eighth time by a cobra, in full view of three shaken visitors from the National Institutes of Health. It brought the total to eighty-five bites.

But that night at the restaurant, insofar as Bill Haast was concerned, there was nothing really to celebrate. The krait bite was not his first close call with a venomous snake, nor would it be his last. Moreover, he knew then *he was not going to die!* He was confident that as the result of a rare human guinea pig experiment on himself he had acquired immunity to the otherwise lethal virulence of venoms in the cobra and krait class.

Nor, in Bill's view, was an occasional snakebite anything to get excited about. It was simply an occupational hazard. Then, as now, it was part of his routine — every day of the year — to keep venomous snakes alive in captivity and to maintain them in good health so that he might extract from them the best quality of venoms. He has handled venomous snakes hundreds of thousands of times, including cobras numbering in the thousands. A few slips were inevitable, but his "batting average" wasn't bad.

He has lived with his occupational hazard ever since he established the Miami Serpentarium as a crude "snake-farm" exhibit shortly after World War II, when he was a restless but not shiftless man of thirty-seven years.

At first, his Serpentarium was a frankly commercial enterprise and still is, although it is now a major Florida attraction in a tropical setting of immaculate beauty, no longer a primitive "snake farm." But it was inspired by an almost boyhood dream that someday, somewhere, somehow, the scientists of the world will find in snake venoms many and possibly great medical benefits to mankind. Many noted researchers agree that there is promise of benefit to humanity in venoms. The hope for such promise can be traced to pre-Christian times.

It was Bill's dream to encourage venom research by making it easy for scientists, especially those in the United States, to obtain all sorts of snake venoms from a reliable and knowledgeable source. The money from paid admissions to the Serpentarium was only to support his dream. It almost does. Practically all his profit has been re-invested in continual expansion and for the most advanced scientific laboratory and processing equipment. Hence, the Serpentarium remains a "commercial" enterprise. Yet, as we shall see, Bill, a sometimes unapproachable and stubborn man, pays almost no attention to those essential ingredients of commercialism — advertising and promotion — which could help him increase his profits enormously. "I don't have the time for those things," he says.

Today, he is the only one in the entire Western Hemisphere, perhaps in the world, who extracts and sells venoms from species of snakes gathered from all corners of the globe. He is now the sole supplier of the cobra venom that goes into the making of a drug, *Cobroxin*®, which relieves severe

pain, such as the intractable agony of cancer, without causing addiction.

One of his biggest thrills is to receive an order for a sample of venom, no matter how small, from a laboratory making new inquiries into venoms. Among his growing roster of customers is one of the world's foremost snake-venom researchers, Dr. Sherman A. Minton Jr., son of the former United States Supreme Court Justice, who says: "Mr. Haast certainly does a great service to researchers by providing good quality snake venoms of an amazing variety of species. I have been a fairly good customer of his and, so far, an altogether satisfied one."

I felt the seriousness of Bill Haast's occupation almost from the moment we sat next to each other that night in the restaurant. His blue-green eyes, somewhat recessed under dense eyebrows, sparkled with an intense interest in everything that was being said, but he blushed readily when people came over to congratulate him. The krait-bite incident had been widely covered in Miami newspapers, radio and television. Plainly, he didn't enjoy being treated as a "hero."

I sat adjacent to him, and this seemed to cause him some difficulty. Every time he glanced in my direction for conversation, he turned his entire body. He couldn't just shift his eyes. When I asked him whether he was not suffering some after-effects of the krait bite, perhaps a stiff neck, he said calmly, "Heck, no. My eyeballs are frozen, paralyzed. I have to turn my head to see what's going on. The venom also affected my tongue. But I'm real happy tonight. I'm *tasting* food for the first time in days."

He smiled as I looked at him in amazement. Now I could see what he wanted me to emphasize in my story — not the bizarre drama of an exotic poison carrying him to the very

edge of death, but that he had lived to tell about its *effects on the human body*. For him, and perhaps for medical annals, it was a rare and priceless privilege. The incident, in fact, did finally appear as a medical report.*

Then, like a surgeon clinically appraising an unorthodox case, he described how the blue krait venom had a neurotoxic effect, different from the venom of such snakes as the rattler, which is hemotoxic. In other words, the neurotoxic venom attacked his nervous system and almost brought death by respiratory failure, whereas hemotoxic venom kills by attacking blood cells. Thus, for the first time, I was made aware of the basic differences between snake venoms, up to then having been, like most people, under the mistaken impression that all venoms of snakes were alike — bad and deadly. Actually, as we shall learn, snake venoms are highly complex substances, not completely understood.

More than anything else, however, I was impressed with Bill's detached, impersonal explanation and his keen desire to talk about the venoms, not about himself. This man, I thought, is no kooky character, no carnival operator of a wild-animal show. He was evidently dedicated to some serious purpose in life, and there that night — in fact, far into the night as we continued talking in his living room — I knew instinctively that some day I'd have to return to write a book about him.

The motive for writing the book was not long in coming. Shortly after my story had appeared in *Argosy*, under the title, *How It Feels to Die*, I found myself continually defending Bill Haast against the reactions of some readers who wanted to know "what kind of a nut loves snakes?"

I keenly felt the frustration of magazine writing — not

*American Journal of Tropical Medicine and Hygiene, Vol. 4, No. 6, November, 1955. See also, Bibliography.

having enough space to elaborate on all the precise and subtle characteristics, all the sharp contrasts and fine shadings that contribute to the adequate understanding of a complex subject as well as to the total appreciation of a man and a dream. This, therefore, is not a book about snakes and their venoms as much as it is about a unique man who has created a unique institution and who has devoted his life (which he might some day literally give) to a serious purpose serving humanity. It is neither to characterize him, nor to judge his work. Hopefully, it is to explain him fully. Toward this end, of course, it is essential to know something about snakes and their venoms, and many of these basic facts are provided in Chapter 4, *His Friends and Enemies*, where we shall learn something about the types of venomous snakes, their distribution worldwide, how snakes bite, how and why their poisons kill, proper and improper treatments of snakebites and why Bill Haast remains unconcerned about his repeated snakebite envenomations.

However, we begin the story of Bill Haast with the dramatic krait bite — although there was worse to come — because it vividly illustrates his uncommon courage and some of the reasons for it. Also, the krait bite was one of the most thoroughly documented on record. The battle for his life and the effects of the venom were under the scrutiny of highly qualified observers. Furthermore, in spite of great physical pain and uncanny mental aberrations, he was in such complete control that he insisted on keeping a detailed record, even at the risk of delaying critical medical attention. He knows the value to researchers of a documented record.

Certainly, as we shall see, hundreds of thousands of persons throughout the world are bitten annually by venomous snakes and not by any means do all or even most of them

die. Why aren't their symptoms and experiences fully recorded? Simple. The great majority are so terrified and in such a state of shock that about all they remember is their fright, horror and general pain. Nor could many of them supply reliable information about the snake's identity and about such important factors as the condition of the snake and the probable amount of venom delivered by the snake. Also, in serious cases that would be of great interest to researchers, victims seldom reach the hospital in time to describe their symptoms. It is perhaps ironic that in Thailand, where King Cobras prevail and kill many natives, a leading researcher and hospital director has never seen a patient with a King Cobra bite because none has ever reached the hospital in time: but the complete effects of a King Cobra bite are on record at the Variety Children's Hospital in Miami. It's Bill's case, probably the only one of its kind in existence.

In his recently published book, *Snakes*, written to tell the "complete story of snakes in the world," Dr. Hampton Wildman Parker, former director of the British Museum's famed Zoological Department, said: "Not a few men have been bitten by the bad types of snakes and recovered, and here, one would think, would be an ideal source of knowledge. Not a bit; the majority remember next to nothing. Besides other sufferings, the subject is in a state of terror, and terrified men are not in a state of mind to note and memorize symptoms."

In contrast, Bill Haast maintains a remarkable set of records in which are detailed such essentials as the aggressiveness of the snake, its state of health, exact weight and size, and its probable yield of venom. When a Serpenterium snake bites Bill Haast, it bites with a known history. Bill, never in the grip of fear after a bite, carefully observes symptoms.

I can vouch for it. I was there when he was hit by cobra bite No. 37. The government scientist who was a witness to cobra bite No. 38 said Bill "was completely in control of the situation. We did nothing except take him to the hospital."

In *The Snakes of South Africa*, a noted expert, F. W. Fitzsimons, said: "Fully documented reports from those who have been bitten by poisonous snakes and have suffered venom intoxication can be of great value to the toxicologist in his study on the nature and effect of the various venoms."

However, scientists have not been flocking to the Serpenterium to see Bill or to study his records, though they would be heartily welcomed. It is not easy to explain. Perhaps it's because Bill is not their "equal." He has had no formal education in herpetology, that branch of zoology which deals with reptiles and amphibians. Nor does he have academic credits in ophiology, which is the specific study of snakes. In fact, he doesn't even have a high school diploma! Moreover, Bill is not always easy to approach. He's amiable but not a socializer.

One of his greatest joys is to talk with scientists, especially those interested in any aspect of snakes and venom research. He'll devote hours to conversation with them. Any interest in medical therapy relating to venoms excites him. But if a salesman should take a minute more than necessary of his time he could be brusque. If a social caller engages him in banalities, he fidgets self-consciously, waiting for an opportunity to get away.

He regards scientists with utmost deference. But his standards of morality and ethics are high, perhaps unrealistic; and if he is suspicious of scientists' motives he can quickly arouse their scorn of him. This has happened more than once.

Still those scientists who know him well admire him for

his dedication and respect his work. Many have become his friends; among them are a variety of researchers who are university professors and physicians, including a Governor of the American College of Surgeons who said, "Only Bill's family could like him more than I do." One of Bill's proudest possessions is his honorary membership in a university fraternity reserved for outstanding scholars and distinguished professionals in biology.

Bill has done and continues to do almost everything the hard way, reading and studying on his own. Chapter 3, *Rattler on His Lap*, which tells of his early interest in snakes, his family background, his boyhood personality and closes with an account of how he finally built the Serpentarium, helps explain why he never obtained a formal education in the field he loves so dearly. Further explanation is in Chapter 8, *Life Among the Killers*, which describes in detail Bill's current experiences and routine, a routine that has him virtually imprisoned in work, 'round the clock, seven days a week.

In Chapters 5 - 7, we look at some of the highlights of his remarkable career, including perhaps the most dramatic snakebite experience of all time, his *Duel With a King Cobra*, which among his many snakebites merits a chapter in itself because some believe it was the "final proof" that he has successfully immunized himself against neurotoxic venoms which, if true, could upset some theories about immunology. The King Cobra incident also helps to explain why there has been a certain demand for Bill's blood to aid other victims of snakebite, as shown in Chapter 9.

Chapter 10 answers many questions that have been raised about Bill, his methods and his Serpentarium.

It may surprise many to learn here, for example, that Bill Haast has no faith in the classical, almost worldwide stan-

dard first-aid for venomous snakebites: tourniquets, incising the fang wounds, sucking out the poisoned blood and, more lately, "freezing" the afflicted area of bite. Bill now has complete faith only in antivenin, the substance that neutralizes snake-poisoned blood in the body. As a matter of fact, while the medical world generally agrees on the indispensability of antivenin, there is only confusion and contradictory advice on the first-aid "mechanics," a procedure which Bill believes to be useless and possibly harmful. But such first-aid is still recommended by some of the highest authorities, including the American armed forces.

Bill's numerous snakebite "incidents" have been thoroughly exploited, sometimes sensationalized, in widespread publicity, which usually leaves people wondering not only why he does it, but why he can't handle the snakes "sensibly," protect himself, use gloves, long poles, snares, anything at all to avoid the terrible bites! The answers, dealing with the "economics" of snakes in captivity and with Bill's hopes for medical discoveries in venoms, are to be found in the concluding chapter.

A bibliography and appendix of antivenin sources throughout the world have been added because these might help those who may wish to expand their knowledge of venoms and snakes. Producers of antivenin are often excellent sources of information regarding past and current activities in venom research.

Finally, for many years Bill Haast actually lived among the killers of the reptile world. His home and his laboratory were part of the Serpentarium. His food often shared refrigerator space with vials of venoms. His bedroom wall was one of the partitions for a cageful of King Cobras, considered by many to be the deadliest and most fearsome of giant beasts in the entire wildlife kingdom.

With the help of a devoted wife who, paradoxically, flees in terror at the sight of a beetle or a flying roach in her house, he has raised his family at the Serpentarium. There, together, they lived and worked side by side, and not until recently did they know the meaning of a real house. Now, they have a modest but tastefully decorated home of their own just a few blocks from the Serpentarium. It was there late one night that I was about to conclude the last of a long and intensive series of interviews with him. It was about two o'clock in the morning. We were both physically and mentally exhausted. The Florida heat and humidity that night was oppressive. Bill answers questions readily when he's relaxed, but his memory sometimes is faulty — he recalls certain events only in sharp blacks and whites, seldom cluttering his mind with details such as dates, times, descriptions of persons or places, or verbatim conversation (unless the details are significant to him). It takes considerable, almost painful, prodding to make him fetch the details from his mind.

Suddenly, irritated, he rose from his living-room chair, on which he had been sprawled, and said in a petulant tone:

"Why do a book about me? I haven't lived long enough. What have I *done*?"

It might be that Bill has "done" nothing. His work might prove of little or no value. There is genuine concern that his next bite could be his last, and that there might be no one to carry on his work. In that event, the Serpentarium might become just another Florida attraction, purely commercial.

Nonetheless, I shall be pleased if this book remains only as a tribute to men who dare to live a dream and dare to be original and bold and in doing so light fires of aspiration in others.

2 . . .

verdict by poison

The krait, a cousin to the cobra, is a dark shiny snake, a nocturnal prowler with a sharp spine, an ugly snout and an uglier disposition; it is found throughout Asia in about a dozen species, some banded with pure white underbellies. Unlike any other snake, except perhaps the mamba of Africa, it can strike in any direction. Unpredictable and fast. Aggressive. Fierce. Bad enough. But the cage Bill Haast approached was loaded. Inside was a six-foot blue krait, a particularly large and rare specimen and one of the deadliest in the species.

But there was nothing different about the picture this day to warn Bill that he was about to become a "medical case," a near-fatal victim of one of the strangest poisons in the world.

It was shortly after four in the afternoon of a mild March day in Florida, ideal for visitors to his Serpentarium, where the climax of a guided-lecture visit is to watch Bill extract venoms from a variety of poisonous species, including cobras. The blue krait cage looked no different from the others. All are nearly identical — long narrow boxes with beveled fronts and a sliding glass or hinged-glass lid which

Bill opens by removing a peg, raising the lid and keeping it open with a stick clamped between the lid and the bottom of the box. The boxes sit one upon another in tiers, forming long rows atop a shelf in a lengthy, narrow corridor. Seen from one end of the pit, it looks like a seven-layer cake of boxes attached to the wall of a square tunnel. A low roof over the tunnel protects the snakes against the heat of open sun.

Visitors, standing on well cut, grass-lined paths, about two feet above the corridor, usually gather informally in a loose semi-circle in front of the cage where Bill performs an extraction. Then they follow him along the pit as he repeats his procedure with different snakes.

Clarita, who assists Bill at most extractions, didn't like the way this group of visitors had gathered about the corridor. They were a bit too close. There has never been a venomous snakebite accident at the Serpentarium, but Clarita prefers to err on the side of safety. She wasn't worried about Bill. His concentration on the job is so intense that he is seldom aware of a crowd. He just does his work, rarely uttering a word.

But this was one snake Clarita always worried about. It was Bill's first krait. He had obtained it personally in Calcutta, after he had collected several hundred cobras for shipment to the Serpentarium. It was usual for Bill to ship the snakes about ten to a crate. But the Indians told him that most kraits, although averaging only four feet in length, were vicious and might kill anything put in the crate with them. And this one was a six-footer. A larger snake delivers much more venom than a smaller one. Bill heeded the advice of the Indians, shipping the krait in a separate basket, and after it arrived at the Serpentarium it lived up to everything that had been said about it.

“Perhaps the most vicious element in the krait,” says Bill, “is that you don’t know how, when, or why he’ll strike. He is completely unpredictable. The cobra’s striking position is known, so is the rattler’s. The cobra usually strikes forward and down, and you know the coiled rattler won’t strike in any other direction but where he’s looking.”

Bill had learned to handle the krait by holding a stick over its head, a hooked stick, which he carries in the pit to help him lift and slide snakes out of their cages and occasionally to pick up a snake that lands on the floor. “The krait usually keeps his head down on the floor of the cage,” said Bill. “So, I kept the stick hovering about half an inch above his head and came in over his head with my fingers. If he made a quick move, he’d hit the stick first, giving me ample warning to pull away.” Of course, Bill fails to note an important underlying assumption: His own reflexes almost have to match the snake’s.

Clarita, a small beautiful woman with dark hair, wide blue-green eyes and a flawless complexion, asked the visitors to move back a bit. She spoke through a tiny microphone hanging from her neck like a decorative pendant. She explained that Mr. Haast was about to extract venom from a particularly treacherous snake.

Only occasionally does she call him Bill while “on duty,” and that chiefly occurs when she gasps, “Oh, Bill,” if a deadly snake seems unusually difficult to handle.

Most visitors do not know Bill is her husband. A fashionable and immaculate dresser with a flair for high style, Clarita provides impressive running commentary during Bill’s extractions. She is articulate and knowledgeable. Facts and anecdotes about snakes and venoms roll off her tongue with remarkable ease. She fields a tremendous variety of questions with the fluency of a relaxed college professor who knows all the answers to his own quiz.

To visitors at the Serpentarium, Clarita’s narrative is the

impressive performance of a trained assistant, and it's better that way. Then they give their attention not to the wife, whose beauty might cause some to wonder what's she doing there, but to the man, whose boldness with venomous snakes is a show in itself.

Bill, dressed in clinical white, stepped quickly and in a business-like way up to the blue krait cage. He doesn't go in for showmanship. No dramatic pauses. No rolls of drums. No asking for "silence, please!" Every move in his lean and wiry frame is precise and snappy, almost instinctive. The eyes in his angular face always stare ahead — cold, fixed agates of steel. It's all business—life-and-death business.

He flipped the cage lid open and placed the stick under it, practically in one sharp motion. The krait slithered noiselessly backwards into a corner, its eyes fixed coldly on Bill, who had raised his left hand to distract the snake. The snake's head, following the hand, shot up quickly, moving from side to side, swaying violently, almost angrily.

The crowd inched back; now they didn't have to be told to do so. Although related to the cobra, the krait spreads no hood. Its slender almost neckless body sometimes looks like a strip of rug coming alive, until it makes a quick move; then the strip becomes a blur, a dark angry flash.

Bill's left hand went quickly into the cage, behind the snake's head. His right hand, almost simultaneously, shot out about a foot in front of the snake and the krait turned its head to watch the hand now in front of him. It reacted like an alert boxer momentarily uncertain about which of two adversaries to watch. Then it began, like a game — up and back, up and back, the right hand swaying and the snake swaying, together, silent sparring, perfect synchronization, an odd pair of contenders with smooth footwork in a small ring.

The snake was not going to let that hand out of its sight. Soon, it would pause momentarily, as if it knew it were

being tricked. That left hand is the adversary to guard against. It's the left hand that grabs the back of its head. But a brief hesitation is all Bill needs to snatch the snake with his left hand, gently but firmly just below the head. He had done it often enough with this krait. Yet no one is perfect. Even a seemingly docile snake, often handled by humans, can prove unpredictable. An error in judgment can happen fast and it happened this time fast enough. Clarita, watching intently, didn't see a thing. Bill himself saw only a dark streak lash out and whip behind his right hand.

"Did he get you?" Clarita asked quietly.

"No," said Bill. He was thinking of the visitors. For the moment, anyhow, he wasn't really sure. Nor would it matter. He still had to catch the snake, which he finally did, then feed it, extract its venom, remove a piece of shedding skin from its eye and return it to the cage. It didn't take long, but when it was done a boy in front of the circle suddenly cried out, "Look, his hand's bleeding!"

There was a chorus of gasps, then low murmuring, then complete silence. What happens now? The reaction was typical. A few people snapped photographs and took movies frantically, fine dramatic souvenirs of an unusual tour. Most simply stood transfixed, as though waiting for an order to move.

They had already been told by Clarita that humans rarely survive a krait bite, and there was no record of any survivor of a *blue* krait bite. At the Red Cross hospital in Bangkok, Thailand, where perhaps more krait-bite victims have been treated than anywhere else in the world, survival of victims of krait bites in the field is almost unknown. Even victims who are lucky enough to reach the hospital alive for antivenin barely make it. Nearly eight out of ten succumb in spite of treatment.

Bill looked at his hand. A rich red glob was oozing from

two fang punctures on the back of his hand, midway between the wrist and the knuckles, where the veins are prominent. One of the fang holes was right over a vein. A doctor could not have done a better job of getting poison into the blood. A fang had struck a vein, the worst type of bite, the kind that could kill an average man in a minute and Bill was well aware of this. His weight, usually 145 to 150 lbs., was just about average. The smaller the body, the quicker the action of the venom because there is less "bulk" to absorb the poison.

Bill looked at his wife. His eyes spoke. She knew what to do. Never cause panic. It isn't easy for Clarita; although she is at Bill's side almost every time he handles the deadly creatures, she has never grown quite accustomed to it. Outwardly serene, yes. Inwardly, a mass of knotted guts. She "dies" a bit with him every time he is bitten. But now she had to control herself more than ever before, even though the worst could happen. Nestling the microphone closer to her mouth and trying to look unconcerned, though her lips quivered slightly, Clarita turned to the cluster of visitors.

"It looks as if Mr. Haast was bitten by the blue krait," she lectured matter-of-factly. "But we are not terribly worried. You see, when Mr. Haast began handling cobras in large numbers he attempted to immunize himself by injecting small drops of cobra venom into his body at regular intervals. We think his immunization works. So far, he has lived through seventeen cobra bites."

This seemed to satisfy the visitors, some frightened, some with looks of horror, some puzzled, but most just listening raptly. The extraction, they were told, was over for the time being. If Mr. Haast should feel all right, he'll be out again. They walked away slowly.

But Clarita did not tell the whole story. It probably would have seemed too incredible because almost none of his visi-

tors know that all of Bill's knowledge of snakes, venoms, treatment and immunization is self-taught. Clarita did not tell them that Bill's attempt to make himself immune by injecting raw cobra venom into his body — an unprecedented and risky experiment — was designed to protect him against *certain cobra* bites only. The krait, while related as a species to the cobra, is *not* a cobra. Its venom, while predominantly neurotoxic as that of the cobra is, drop for drop, about fifteen times more lethal, second only to the virulence of the Australian tiger snake, twenty-five times more powerful than cobra venom. It acts inside the body like a spray from a chemical shotgun.

Would Bill's self-imposed immunity protect him against the blue krait?

Bill did not have to await a verdict. He could have applied emergency first aid. As was his practice then, he could have cut through the fang wounds, pumped out the poisoned blood with special suction devices.

But he decided to do exactly nothing.

He went about his business as usual, putting away his feeding equipment, confident his immunization would pull him through.

About three months earlier, on January 1, 1954, Bill had taken a booster shot — .9cc — almost a full drop of a mixture containing three different cobra venoms, including that of the King Cobra. Ordinarily, this is enough raw venom to kill about fifteen average adult males. On February 22, he was bitten by a cobra and suffered only a slight burning sensation and swelling to the third joint of his bitten finger. It had the effect of giving him another booster shot, thus adding to Bill's confidence that he could almost shrug off the krait bite.

Actually, there was another and perhaps more important reason Bill wanted to test his immunity. He was then in-

volved in a polio research project at the nearby University of Miami. He had developed a close alliance with Dr. Murray Sanders, then chairman of the university's department of microbiology. Dr. Sanders, who had received his medical degree in 1936, had long been involved in teaching and research and had authored numerous scientific reports. He was then seeking an effective treatment for polio, something that might halt the advance of the disease after early symptoms, and at least to prevent paralysis. The basic ingredient in his newest experimental drug, a toxoid, was cobra venom, which Bill supplied. Polio patients, like victims of neurotoxic venom, often die of respiratory failure caused by paralysis of nerve cells. Dr. Sanders had already achieved some striking results with his cobra venom toxoid on laboratory monkeys.

But what if the krait venom in Bill's body should prove to have an even more powerful affect on the human nervous system? Could it be a more potent anti-paralysis toxoid against polio, or perhaps against other diseases of the nervous system?

Bill wanted a complete and documented record of the krait venom's effects in his body.

That he had lived long enough to do even this much thinking filled him with more confidence. He had known of a reported incident in which two natives asleep in an open field were bitten one after the other by a krait. The first man, struck on the index finger, tried to cry out but could mutter only three words before his vocal cords were paralyzed. The other, bitten on the knee, was unable to speak. Both couldn't even rise. One died thirty minutes later. The other lived nineteen hours.

Thus, consciously and deliberately, Bill decided to allow the venom to take its complete natural course in his blood,

out of which would come the first completely authenticated record of all the possible effects of this powerful neurotoxic venom on a human body.

About an hour later, Bill was feeling perfectly fit. An hour! Almost unbelievable. Usually, after a minute or two following a neurotoxic venom injection he is aware of some symptoms. There was some pain at the location of the fang wounds but that was to be expected of almost any sharp skin puncture. He did some work, played with one of his daughters and talked on the telephone. Apparently, there would be nothing to report. But it was like the calm before the storm, even stranger.

Suddenly, he began to feel pleasantly light and weirdly buoyant, almost gay, as though he were slightly intoxicated. Bill knew this might be the first symptom of the bite. He hadn't touched any alcohol; he rarely does. At 6:30, almost two hours after the bite, he was in his office reaching for a notebook and pencil to start recording symptoms when his arm began to feel sore all over. It was starting. Bill recorded his first observations:

5:30 P.M. — Feeling light on feet. Gay spirit.

6:30 P.M. — Soreness creeping up arm, spiralling up to armpit. Irritation in throat. Slight.

After dinner, in his apartment at the rear of the Serpenterium, he prepared to leave for an eight o'clock appointment at a veterinarian's laboratory fourteen miles away, where he was a participant in an experiment to make valuable hunting dogs immune to rattler bites. The experiment was based to some extent on Bill's own self-immunization schedule. He was at the door, ready to go.

"How do you feel?" Clarita asked.

"O.K."

"Think you can handle the cobras tomorrow?"

"I can handle two at a time." Bill laughed. It was a cocky,

defiant laugh, entirely out of character for the man who takes his work seriously and rarely jokes about handling venomous snakes, especially cobras.

Clarita knew this was a peculiar effect of the krait bite and called it to Bill's attention. Before he left he made a note of this feeling and also that he had developed an acute sense of hearing, almost painfully acute. The air around him was a charivari, a veritable jungle of discordant noises. It was as if he were under the influence of a strange narcotic. Unperturbed, he drove off alone in his station wagon.

At exactly eight o'clock, he arrived at the laboratory. Outside he paused to record a new development:

8:05 P.M. — Unsteady on feet. Right arm sore to shoulder. No swelling. Jaw muscles sore. Hard to swallow. Tongue like a bed of needles. Vision unclear. Chest and stomach cramps.

At this point, Bill hesitated. Should he go in, do his work? A crisis was developing. He could sense it. It might be better to go home. But it was no time for retreat. The verdict was scarcely in. So he entered, did his work for about an hour, then experienced a change in symptoms. The feeling of buoyancy suddenly dissolved to one of increasing dizziness. Outside again, he could see his station wagon at the corner but through a "cloud." He paused to write in the notebook:

9:00 P.M. — Chest and stomach cramps severe. Come in spasms. Eyelids closing involuntarily. Eyes feel inflamed. *All muscles in body ache.* Soles of feet feel like pins and needles. Throat sore, definitely worse. Jaw muscles particularly sore. Back of throat numb. Vision blurred. Thinking and speech not affected. Will attempt to get to car, though feeling dizzy.

Getting into the station wagon was a struggle. Every muscle and fiber in his body was an exploding arsenal of

pain. From his head to his toes he was under a severe barrage of agonizing spasms, pounding, aching. The head, the neck, the teeth, the eyes, the chest, the limbs, the toes — seared with pain.

Finally on the road the car ahead of him suddenly split in two. Everything was splitting. The farther the objects were the more they split. Bill steered over to the extreme right, and to play it safe practically slowed to a crawl. The lids of his eyes were almost closed. He was now more than halfway home. But there was time, perhaps, to make one last observation. He stopped under a street lamp and wrote what was to be the final note in his hand:

9:45 P.M. — Can't touch a single place on body without causing severe pain. Vision affected. Objects split, like seeing through trick glass.

Then his eyelids closed, completely paralyzed. But he could force them open with his fingers. Reaching to his right eye with his left hand, he kept the eyelid open with his pinky and drove back to the Serpentarium. Clarita saw him pull up and struggle out. He was fighting to stay on his feet.

"Oh, Bill!" Clarita cried. She ran to his side and put her arms around him and he leaned on her slightly. They limped into the house together. Bill insisted that Clarita continue making notes for him. He dictated:

10:30 P.M. — Home. Can't walk or see. Eyes paralyzed. Feel nauseous.

11:00 P.M. — In bed. Chills. Like a perfect case of polio. Too painful to take temperature.

11:15 P.M. — Can't swallow saliva. Spitting into bucket. Mouth drooling. Breathing rapid and shallow. Can't seem to get enough air into lungs. Breathing only through mouth. Nose stuffed.

11:30 P.M. — Using nose drops every five minutes. Some-

what easier to breath through nose. Eyelids forced open. Can see well with one eye, not with two eyes open. Colors in room suddenly very brilliant. Hearing extremely sharp.

12:05 A.M. — Walked to bathroom. Sharp pains in balls of feet.

12:30 A.M. — Resting. Breathing through nose.

3:00 A.M. — Completely fatigued. Can't swallow. Eyes closed. Hands cold. Muscle spasms all over entire body, increasing in frequency.

For the next couple of hours, during which Clarita valiantly fought back tears, knowing it would be futile to ask Bill to go to the hospital, the symptoms worsened. He couldn't drink. Even the attempt to drink was painful. The water just rolled out of his mouth as though he were a helpless invalid. He turned on his side and let the saliva drip into a bucket. To Clarita it was now like a death watch and by six that morning she was sure Bill was dying. There wasn't room for any new pain or symptom. Touch any part of his body, even the enamel on his teeth, and the nerves erupted with sharp, throbbing pain. Clarita was so tense, so brittle, she would have collapsed or disintegrated if a door had slammed. Bill sensed his wife's concern.

"This venom has got to be useful," he muttered, as if to allay his wife's fear. "It can't affect every nerve in the body like this and not be useful. It must be. Some day, someone will find a use for it."

This was almost Bill's way of apologizing for dying, at least that's the way it struck Clarita. The cobra immunity was not working for the krait bite. Well, at least there was the record of the bite and what it could do to a human being. It's uncanny the way Bill doesn't seem to fear death, and

yet he's not a fatalist. "Bill has never known fear," says Clarita, "not of a thing, or an animal. He just goes along accepting life every day as it is."

"I truly believe that Bill Haast will not die until he's ready for it," says June Nadel, his secretary for more than a decade. "When he's ready, I think he will die. I think he will almost name the time and day he will die." Nearly all those who've seen Bill "sweat out" snakebites acquire this mystique about him.

Finally, Clarita could stand it no longer. Still restraining herself because Bill dislikes emotional displays, she asked quietly, "Shall I call the hospital?"

Bill did not hesitate. "No — get Dr. Sanders."

"Dr. Sanders!" Clarita was astounded. Dr. Sanders was in research. He wasn't a practicing physician.

"Tell Dr. Sanders to come here — right away. Right away." Bill spat the words between clenched teeth.

"But, Bill . . . you need the hospital. You may stop breathing any minute. There isn't a thing anyone can do for you. You need an iron lung."

Bill protested. The record of the bite. The course of the venom. The symptoms. The pains. The paralysis, shallow breathing, vomiting, frozen tongue, spasms, hearing and vision affected. These symptoms were important. Dr. Sanders was keenly interested in what snake venoms did to nerve cells. This was it. The krait bite, the blue krait bite. He might never have another such opportunity. "He's got to see me like this!"

"He'll understand," Bill pleaded.

This was the bold, stubborn Bill. Clarita had no choice. She went to the phone and before long Dr. Sanders came rushing through the door. He saw Bill standing limp against the side of the door.

"My God, man!" That was all Dr. Sanders could exclaim. Bill wanted to talk.

"Don't talk now," Dr. Sanders broke in sharply. A pipe smoker with a thick mustache, a high head of hair and soft round eyes behind plain eyeglasses, his quiet voice conveys professorial authority. "You're in no condition to talk," he continued. "We've got to get you to the hospital right away!" Dr. Sanders went to the telephone.

A bathrobe over his shoulders and supported on either side by his wife and Dr. Sanders, Bill wrestled himself into the doctor's car and on the way to the hospital, some eight miles, Bill talked incessantly – but only about the bite, the symptoms, and what it was apparently doing to his nervous system. He was trying to impress Dr. Sanders that every nerve cell in his body was afflicted. Only a man who could compare it with the results of a cobra bite would know the difference.

As soon as they pulled up to the hospital, attendants were waiting with a wheel chair. Bill plopped into the chair and was rushed into a waiting elevator and up to a private room, where an oxygen tent, an iron lung and round-the-clock shifts of nurses were standing by. In a few minutes two more doctors were in the room, one of them Dr. Ben Sheppard, a noted local polio expert.

Immediately, silently, they set about treating Bill as if he were a typical case of polio. They placed warm packs around his body and fed him liquids through a vein in one arm. Bill was practically dehydrated, having expelled over a quart of saliva and unable to replace the lost fluids with a single drop of water. There was nothing more they could do. Now it was only a matter of waiting, waiting, waiting – interminable waiting. Clarita had been through it a few times before, but it had never been this bad. She alternated between sit-

ting at Bill's bedside, exchanging polite conversation with Dr. Sheppard (not a voluble man), and pacing the outside corridor, occasionally wiping away tears. Waiting, waiting, waiting. Nothing more could be done. The next forty-eight hours, the doctors agreed, would be critical. If Bill were still breathing in two days, he might live.

Meanwhile, Dr. Sanders rushed back to the University for his files. He took out all the data he could find on krait venom. Also, another doctor had put through a call to India, the only place in the world where they might know something about the blue krait venom and might even have specific antivenin for it. He managed to reach a British medical colonel at a research institute. Krait bite! The colonel was amazed. He couldn't believe that Bill was still alive. Yes, there was antivenin, but even by the fastest possible means of transportation it would probably take nearly forty-eight hours to reach Miami. Nevertheless, he advised using it if Bill were still alive then. The krait venom, he said, was a persistent, powerful poison and if the antivenin were not used, even if Bill survived his eyeballs might be paralyzed for life.

Back in Bill's room, nurses were receiving their instructions. *If he can eat, let him eat. But don't let him fall asleep! He'll choke to death if he does. And if at any moment he stops breathing, even for a second, rush him into the iron lung.*

Bill could hear every word, even whispers. He felt utterly exhausted and helpless, but he retained all his faculties. In fact, he had one inexplicable sensation. It was a peculiar emotional reaction, yet he couldn't control it. As he lay with his eyes involuntarily closed, he could "see" things. There were "visions" in front of him. He saw the face of a smiling lamb in a niche in the wall. He saw curtains, furniture, all bright and distinct in brilliant purplish hues. Now and then,

a nurse would force his eyelids open and the "visions" disappeared completely, only to return the moment his lids closed. Bill couldn't help wondering: "Is this what it's like to die?"

Bill tried to eat but couldn't touch a bit of food. His tongue was completely numb. Fortunately, he was still able to talk and he talked and talked, through the night and the day and through every conceivable subject the nurses could think of to keep him awake. They asked him questions over and over until Bill could not sleep if he wanted to. The nurses did their job well.

Early next morning the doctors returned, elated. Bill suddenly began to feel better. Almost the way it started, the engulfing pain receded, slowly, like a lifting fog. But his eyes were still paralyzed. At the end of forty-eight hours improvement, though gradual, was marked. He could lift his eyelids voluntarily about halfway; and he could read clearly *without* glasses, something he had not been able to do for years. The krait antivenin had arrived from India but Bill refused to take it. He was confident, supremely confident now, that he would recover, completely, and he wanted the entire recovery to take place without serum so that there would be no question about the success of his self-immunization, or at least no confusion in evaluating the bite, the symptoms, the treatment and final results.

Several days later — still weak, his eyelids still somewhat paralyzed, his eyeballs still "frozen," and the pupils of his eyes unable to dilate normally — Bill left the hospital, against doctors' wishes. He can't afford to be ill for long. There's too much to be done at the Serpenterium, especially with the cobras, and only Bill Haast can do it.

The first medical report on the krait bite was published in November, 1955, in the *American Journal of Tropical Medicine and Hygiene*. The principal author, Dr. Melvin L.

Winer, then a research pathologist on the staff of the Cancer Institute at Miami, proudly included Bill as co-author. It was a distinction Bill cherished.

Because Bill had attempted immunization against cobra bites and had now recovered from the severe blue krait bite, Dr. Winer felt this suggested the possibility of developing an antivenin which might give "cross protection" for cobra and krait bites. "This would not only be of great value to the Armed Forces," said the report, "but to the ever increasing number of individuals who travel to areas where poisonous reptiles abound."

But the medical journal report meant something more important to Bill. As far as he was concerned, it proved his immunity. Theoretically, his proclaimed immunization was feasible — but highly improbable. At least, none had tried it; none dared.

On April 3, 1949, shortly after Bill had started his self-immunization shots, a well known zoologist, Maj. A. N. Weinman, superintendent of the Zoological Gardens of Ceylon, wrote in the *Ceylon Observer*:

"Truth is stranger than fiction and people are known to do all sorts of crazy things in the interests of science, or making a living, but here is the story of a man who is trying to turn himself into a source of anti-snakebite serum. His name is William E. Haast . . . Mrs. Haast is about the only person who believes that her husband will survive after one of his prize reptiles bites him."

A few days earlier Bill had received a letter from another well known zoologist, friendly to him, who said, "If you are still using whole venom for self-immunization, I wouldn't give a nickel for your chances of surviving three years."

It has been a long three years.

3 . . .

rattler on his lap

The jackpot at the end of Bill Haast's rainbow, his youthful dream, the Miami Serpentarium, hugs the shoulder of the South Dixie Highway's northbound lane, Route U.S. 1. It is exactly twelve miles south of the Biscayne Boulevard-Flagler Street junction in the city of Miami. Only a blind man could miss the Serpentarium when approaching it, especially in late afternoon. Then its colorful tile facade, well over one hundred feet long, with mosaics of twin cobras in brilliant hues and glaring gold eyes, glistens like a Taj Mahal in the tangerine rays of a setting sun. Whether one is approaching from the South or the North, the Serpentarium fairly leaps off the roadway in a blaze of colors, accented by thin jets of water spouting like fingers of liquid silver from a long, narrow reflecting pool paralleling the main entrance.

The Serpentarium stands almost in defiant contrast to its neighboring countryside. The drive from downtown Miami starts with typical sprawling modernity, plush hotels and motels, streamlined supermarkets, compact shopping centers, and a perfectly flat six-lane concrete highway separated

by a narrow island of palm trees and tall slender street lamps like rows of aluminum giants stretching their necks to see what's going on below. For the next eight miles there is almost nothing to see but railroad tracks alternately appearing and disappearing among sparse evergreens and a miasma of stucco homes in pastel, some hamburger drive-ins, gas stations, assorted industrial plants and shacks, huge billboards advertising everything from steaks to bait shops, and occasional clusters of decrepit frame bungalows which are obviously the homes of families on "the other side of the tracks," Negroes.

Then the road reverts to a four-lane divided ribbon of black and the adjacent scenery is almost bare of structures and the palms and pines grow thicker like virgin brush. Suddenly, with about two miles to go and with no forewarning of its appearance, the first view of the Serpentarium looms almost frighteningly over the horizon, a realistic replica of a sculptured King Cobra in dazzling gold. It rises from the Serpentarium's roadside entrance like a huge prehistoric monster of stone, its giant forked tongue — that legendary symbol of serpent treachery — flicking into the air. Against a deep blue sky, its massive hooded head seems to touch thick puffs of clouds that forever billow above.

The King Cobra replica, which Bill helped design and erect, might seem like crass commercialism. It could be. In that case, Bill certainly needs it. Along both sides of the highway are numerous signs and billboards, some like Times Square spectaculars, guiding visitors to every Florida attraction imaginable. But there is none for the Serpentarium. It would almost embarrass Bill to put one up, and the subject is one of occasional friction in the family. Whenever anyone asks why he does not have a large, attractive roadside sign, Clarita's eyes light up and she says, pointing to Bill, "Go ahead, ask *him!* That's what I've been asking for years."

More than anything, perhaps, the stone King Cobra is a symbol of accomplishment. It is to Bill what sudden acclaim was to the "birdman of Alcatraz," the self-taught ornithologist who won the respect of scientists everywhere after devoting almost a lifetime of study to birds while in prison. Also, it is a tribute to the faith that has been germinating in Bill since a venomous snakebite put him in the hospital for the first time when he was a boy.

It happened the year after Bill had been to scout camp at Greenwood Lake, New York, not far from his birthplace, Paterson, New Jersey. It was during his first year in camp that Bill, then eleven years old, became intrigued by snakes after he had caught a harmless garter snake, kept it as a pet for two months at home, then released it.

That winter he read as much as he could about snakes. The following summer, now a tenderfoot scout, he became the camp's unofficial herpetologist. Whenever the boys went on hikes or into the woods picking berries, Bill always had his eyes down looking for snakes, and boys who spotted snakes would report them to Bill. He caught his first rattler when he wasn't even looking for one. Three boys had stopped for a drink from a stream and one of them screamed. He had seen a snake on the opposite bank. From photographs he had been studying, Bill recognized it instantly and went after it. He was excited, but not frightened, when he approached the rattler. He took off his shirt, knotted the bottom, caught the snake, placed it in the makeshift shirt-bag, tied the sleeves to close the bag and brought it back to camp. The director killed it, cooked it, and shared it with the boys.

His first snakebite came also during that summer at camp. Bill was violating the rules. Scouts were not permitted in the woods alone, but he was alone, in a blueberry patch, a pillowcase tucked into his belt just in case he should come

across a rattler. He spotted a small timber rattler, coiled. He had already learned that a rattler without a hole into which it could rapidly retreat is apt to remain coiled, a defensive position. He caught the snake and then learned his first lesson: never to be careless with snakes. The rattler bit him as he was trying to put it into the pillow case.

He was a good scout and prepared for the emergency. He took out a knife, cut the two traditional cross marks over each fang wound and rubbed potassium permanganate into the wounds. He couldn't suck the blood out, as he had learned to do, because the bite was near the elbow.

He has no recollection of great fright or pain, remembering only that he walked the four miles back to camp, went directly to the first-aid tent and calmly announced that he had been bitten by a rattler. Chances are, even though that section of New York near the dense forests of the Bear Mountain enclave of state parks was and still is fairly well populated with rattlers and copperheads, they might not have believed him. But his arm was already swollen, and his excited scout leader rushed him to a doctor. The doctor, apparently not too familiar with the use of antivenin then, said that Bill had done all the correct things and there was nothing more to be done. Bill certainly would not agree now. Fortunately, however, it was a small snake and apparently not a serious bite and Bill recovered swiftly. Among other children such an incident might have remained a nightmarish experience or something to talk about during a lifetime of story-telling. Bill shrugged it off.

His next venomous snakebite couldn't be dismissed so lightly. It was the one that put him in the hospital for the first time late that same year. It occurred in a small shack near home where his mother had permitted him to maintain his small but growing collection of snakes. One of his speci-

mens, an unusually large copperhead, about four feet long, "as big as you'll ever see one of them," says Bill, was stretched out at the back of its cage. Bill wanted to take it out and thought he could do it by swiftly grabbing its tail. He was wrong. The snake whipped around and sank its fangs deeply into one of Bill's fingers. It was a bad bite in a delicate spot.

By now Bill carried his own anti-snakebite kit. He called a friend and asked him to inject the serum. He finally persuaded his nervous friend to jab the needle into a thigh. "It doesn't matter where you put the serum," Bill then told his friend, "as long as you get it into a muscle." Of course, he knows now that there are certain dangers connected with antivenin injections as well as certain times when it might matter where and how the injection is given.

But this time Bill ended up in the hospital for a week. That's when his mother, an understanding woman, brought him a copy of a new book on snakes, one that Bill had always wanted but couldn't afford. He read that, while copperhead venom might make you quite ill, the bite is rarely fatal. "That's the very moment," says Bill, "when I began to think about venoms and their possible value and became interested in reading more about them."

Born in 1910, the second youngest of three sons and a daughter in a working-class German-American family, Bill never found it easy to maintain his interest in snakes. To "normal" people, it was a pursuit to be viewed with distaste, disdain or horror. It was to be a "snake lover," a peculiar bizarre character. He encountered the first adverse reaction to his hobby at home. At scout camp, he had put together a nice collection of rattlers and copperheads and was not happy about letting them go at the end of camp. He took them home and placed them in a box to the rear of his

third-floor family apartment. When his mother learned what was in the box, she was horrified. She left the apartment to spend the night with Bill's sister who was then married. She returned next day a bit more resigned to her fate and told Bill he could keep the snakes, provided they were kept in a secure box and the box was never to be opened in her presence.

All that winter Bill kept the snakes in his footlocker. Always mechanically adept, he made his own snake stick out of a gun-cleaning rod to which he had brazed a U-shaped piece of metal. Snakes in captivity, Bill soon learned, needed help in shedding their skins and he never hesitated to help. He had learned to handle them with greater care and agility and after a while noticed that when handled gently the rattlers stopped their nervous, threatening rattle. He learned to slide his hand gently under them and pick them up. In fact, one timber rattler seemed so gentle that Bill didn't mind just letting it sit on his lap and once posed for a photograph with the rattler on his lap.

"I know now what a foolish thing it was to do," says Bill. "Snakes are nervous creatures. Had there been some unexpected, unusual movement anywhere in the room to frighten the snake, I might have been bitten."

Soon his mother realized that Bill's interest in snakes was serious. She allowed him to add to his collection and to purchase snakes with whatever money he might earn or save. At the age of fifteen, he bought his first "precious specimen," a diamondback rattler, from a catalog issued by a snake dealer in Eureka, Florida. The cost was huge, ten dollars, but for Bill it was a worthwhile investment. He could scarcely await its arrival. Everytime a truck rumbled down the street, Bill would run to the window hoping it was the railway express truck delivering his costly Florida cargo.

He bought the diamondback rattler "just to have another

species," but before long he was extracting its venom by forcing it to bite over a rubber-covered glass. He still has that first sample of venom, although it is probably a worthless bit of discolored powder.

At sixteen, Bill quit high school. He was a poor student. He found classes dull and he cut more classes than he attended, although never to do anything mischievous. When he wasn't in French class or in the study hall working on an English assignment, he was at home studying reptiles. When it became apparent that he was going to flunk English, the teacher told him that she'd give him a passing grade if he would stand before the class and answer every question the other pupils could ask him about snakes. He did. They asked, and he answered. Every question. She passed him.

After quitting school, Bill wanted more than anything to work at the Bronx Zoo under the world-famous herpetologist, Dr. Raymond L. Ditmars, curator of mammals and reptiles for the New York Zoological Society. Bill had virtually devoured Ditmars' best-seller, *Reptiles of the World*, which he now treasures in his own vast collection of books and scientific publications on snakes.

Bill went to see Ditmars at the Bronx Zoo and was given a warm, paternalistic reception but a brief one. Dr. Ditmars showed Bill a long, discouraging waiting list of boy applicants from all over the country. He didn't get the job, nor did he plead for it. As usual, he accepted the results and walked out. Bill has always been a strange mixture of skeptic and optimist. He hopes and plans for the best but expects the worst and is ready to accept it.

Even then, too, he was strongly individualistic with an almost innate sense of pride. He could never bring himself to ask anybody for anything, least of all to beg or plead. It is still one of his predominant characteristics.

By that time, for instance, he had been making many

lone-wolf expeditions into the Bear Mountain area, especially around Greenwood Lake, to hunt snakes. "I walked everytime, thirty-five miles," says Bill. "I would never ask for a ride, nor would I hitch-hike. That's the story of my life." His persistent refusal to erect a large billboard for the Serpentarium, although he insists it is because he cannot afford it, is more likely a reflection of his pride and independence. It would be almost like begging people to come.

By late summer, 1929, after a series of off-and-on jobs and ingenious enterprises to earn money for himself, including making and repairing guns, Bill found himself at an unusual roadside snake exhibit — a kind of traveling carnival trailer — operated by a middle-aged man with a limp. Bill only remembers his name as Van. They, of course, had much in common and much to talk about, and Bill learned that Van was about to head south, for Florida.

Bill persuaded Van to take him along, mainly because Bill would do all the driving and, as an expert auto mechanic, he would also be of great help in making any necessary repairs to the vehicle. Van agreed, but not Bill's mother. He was only nineteen. Too young. Bill insisted that he could take care of himself. Besides, how often had his mother heard him talk about Florida, how some day, if he could find a way to earn a living there, he'd remain and build a snake exhibit. His mother relented and gave him a chicken-dinner basket to share on the road with Van. In Bill's eyes, Van was a peculiar, heavy-set man with a waxed mustache, graying hair and a lumbering, shuffle-like walk. Their first stop was Fort Lauderdale, Florida, where they set up the snake exhibit at the junction of two main roads near a service station. It was Van's technique to solicit free exhibit space by convincing roadside businessmen that his attraction would bring additional business. No admission was charged. Van

relied on donations. Bill had brought his own snakes to add to the exhibit, in cages he had made out of old radio cabinets.

Business at Fort Lauderdale was not too good. And Bill learned that snakes in captivity die readily. Their stock running low, they decided to move to Miami where they could hunt for more snakes at the edge of the Everglades near Hialeah. Once there, Bill found his paradise. They set up camp in the Everglades for about two weeks and caught almost every kind of snake available in Florida, except the beautiful but small, secretive coral snake, the only species in America with a neurotoxic venom. "After coming from the north," says Bill, "I was in my heaven, catching so many different varieties of snakes."

While they were at camp, a strange thing happened. Although the area was then isolated, almost wild country, they noticed that every day a man drove by on the dirt road in a Model T Ford, sometimes with huge barrels strapped to the running boards. One day the man, equally curious about the strange carnival-truck encampment, came over to talk. His name was Walters, and apparently he knew the Everglades intimately. He told Bill where snakes were plentiful, and when Bill and Van went there they found it to be so true that they could literally pick only the snakes they wanted. It was near a man-made canal, of which there were many fringing the Everglades. Bill quickly learned to catch water snakes by diving into the canal, swimming under water up to a snake resting on a rock and, with his head still underwater, reaching up to grab it.

Bill and Walters struck up a quick friendship. Walters was a lean, wiry man with thinning brown hair and a small bald spot. He was about thirty years old, Bill guessed, and lived in the Everglades in a crude cabin made of coral stone. But

that was all Bill knew until one day Van decided that since business in the Miami area wasn't too good either he would return to the old location at Fort Lauderdale. Bill didn't want to go back. He loved it around Miami, especially his enormously successful snake hunts in the Everglades. Van was not a voluble person and was, indeed, sometimes sullen, and this led to the first argument between them. Van said he was responsible for Bill and didn't want to leave him in Florida. He felt obliged to return Bill to New Jersey and home. Van finally agreed that Bill could remain with Walters, provided Bill would drive him to Fort Lauderdale. Van suggested that Bill should ask Walters to accompany them to Fort Lauderdale. Walters could follow in his car, then Bill would return to Miami with Walters.

Walters readily agreed to the plan. But Bill did not know that it was a conspiracy to double-cross him. After taking him to Fort Lauderdale, Walters was to abandon him. In this way, Bill would be compelled to remain with Van because he had no means of transporting the footlocker which he kept on the back seat of the old Hudson auto attached to Van's trailer. The footlocker contained all of Bill's treasured possessions, including a rifle. It weighed over one hundred pounds. The double-cross was smoothly executed. Bill was abandoned — but not for long.

Irate, Bill walked back to Walters' shack, some forty miles, and persuaded Walters to return to Fort Lauderdale. Now, the plan was to double cross Van by "stealing" the footlocker from the car. It was not going to be easy. Van slept on the front seat of the Hudson. Bill gambled on his knowledge of Van's habits. He knew just when Van would be sleeping soundly.

Walters drove Bill to within about two hundred feet of the Hudson. Bill went out, crept quietly up to the Hudson,

gently opened the rear door and inched the footlocker off the seat, out of the car and over to Walters' car. It took exactly an hour, but it worked. It wasn't until the following year that Bill was to see Van again.

Meanwhile, he went to live and work with Walters. That's when Bill discovered Walters' occupation — bootlegging!

Walters was a rough-and-tumble man, good to have as a friend, not as an enemy. He sported a huge scar across one wrist, the result of a knife slash during a brawl. He lived in the Everglades cabin with his wife, Emma, a friendly, plain woman, much younger than her husband, who did exactly as she was told. Walters was the boss. The cabin had a little kitchen, small bedroom, an unfurnished living room, where Bill slept on a cot, and an outhouse.

Mechanically inclined, Bill found Walters' whiskey still, hidden in the brush some distance from the cabin, a fascinating contraption and helped Walters to run the still, producing an average of several gallons a day. Bill took the night shift and went snake hunting during the day. Walters never offered wages; Bill never asked for any. He accepted only room and board and an occasional few coins for spending-money on a trip or two into Miami.

It was an altogether satisfactory and happy relationship, and Bill could see himself remaining in Florida, soon to start planning and saving and erecting his own snake exhibit. But one day his plans ended rather abruptly. He and Walters were on the narrow trail leading to the still when Walters suddenly suspected something was wrong. "I don't know how he did it," says Bill. "It was so quiet in the Everglades that you could hear the slightest sound. I heard nothing, saw nothing, but Walters apparently did."

Walters crept quietly up to the still and saw it had been all chopped up, utterly destroyed. The revenue agents had

been there. Together, they walked back to the cabin, where Walters didn't say a thing to his wife. He packed a few things in a small bag, went outside, turned to Bill and just said, "C'mon." Bill picked up his rifle, followed Walters into the Model T and off they went together, Walters barely turning to tell his wife that he'd be back. "See ya in about six months," he said.

It was Spring, 1930; the depression had already begun. They were on the road about three months, working at odd jobs from farm to farm until they reached Kansas, then returned to Miami. Bill still doesn't know how Emma managed to survive while they were gone, but when they returned it was just as if they had only gone to town for a few hours. They greeted each other with a "Hi," and Walters promptly set about building a new still out of parts he and Bill had scavenged in a junk yard. Walters used anything he could obtain for mash, usually chicken feed and mixed cheap grains.

One day in early summer Van suddenly showed up at the cabin. Van tried to make it a friendly reunion. He wanted Bill to drive him back to New York. But Bill had other plans and refused to go. The meeting quickly degenerated into a violent argument, during which Van lunged at Bill with a knife. Bill punched him on the jaw. Van went down in the dust, looked momentarily with disgust at Bill, rose slowly, brushed his trousers with his hands, put his knife away, climbed into his car and disappeared in a cloud of dust.

A few weeks later, deciding he wasn't getting anywhere, Bill went home. Walters still wasn't paying him anything, jobs were impossible to get, and, having already sold his precious rifle, he was now almost broke. He got a ride home by chauffeuring an elderly couple to their home in Philadelphia and from there took a bus.

His mother, meanwhile, had leased an amusement concession as a small family business in Greenwood Lake to

help augment income. Bill's father, a mechanic, would come up weekends and Bill helped with work around the concession. He set up his own snake exhibit to help attract more business for his mother, and it was there that he met Ann, an attractive, energetic girl with long, dark hair and a flair for fun and athletics. Ann's mother ran a summer boarding-house and boat-renting concession in the area and her father, a maitre d'hotel at swank New York dining rooms, also came up weekends to help.

It was almost love at first sight for Bill and Ann, but her mother apparently didn't approve of her seeing Bill. They had to sneak their dates, mostly to go swimming and boating together or just walk. By the end of the summer, the romance grew serious. There was talk of marriage, but Bill had some doubts. He told Ann of his dreams, of returning to Florida, of the "snake farm." He told her how rough it was, how difficult to earn a living there, but that he was determined to do it.

It would be no life for a newly married couple.

"When are you going?" Ann asked.

"Soon," said Bill. "Just as soon as I can."

"Take me with you," said Ann.

Ann's genuine interest in Bill and his ambitions and her sincerity to go with him impressed Bill. He agreed. "Let's get married."

Ann, who was a college student, was almost Bill's age. She sold her books and between them they raised enough to buy a 1929 Ford roadster and elope to nearby Warwick, N.Y., where they were married by a justice of the peace the same afternoon they had obtained a license from the town clerk's office behind a drugstore counter. Neither of their families was pleased, but the day they left for Florida Bill's father gave them a wedding present — a full tank of gas.

By the time they arrived in Florida, Bill and Ann had no

more than twenty dollars in cash between them. Bill went back to see Walters, who allowed the newlyweds to set up house in his living room. Often, their dinner was string-beans, bread made of flour and water and some meadow-larks which Bill shot. "For months," says Bill, "we just tried to survive from day to day."

Soon, Bill's mother, who later died of anemia, came to visit Miami where she rented a small apartment in a rickety frame building off Biscayne Boulevard. She invested her meager savings in a small refreshment stand nearby, where she sold ready-made sandwiches and soft drinks. Bill and Ann moved in with her, and all managed to squeeze a bare living out of the business. Finally, Bill got a job as the result of a chance meeting.

As he was walking along Flagler Street, Miami's "Broadway," he heard: "*Hey, snakes!*" It was a man who had operated a taxicab service outside a drugstore in Bill's home town. He remembered a snake exhibit which Bill, then a schoolboy, had installed in the store window to help the pharmacist promote and sell antivenin. He sent Bill to a chophouse off Biscayne Boulevard where he obtained a job as cashier at ten dollars a week, working six days, from mid-afternoon until two or three in the morning. A few weeks later, the chophouse was converted to a speakeasy which attracted an assortment of underworld characters.

Bill's interest in snakes may have been considered a peculiarity, but his experiences with Walters in Florida, working at his mother's refreshment stand and on the job in the chophouse speakeasy convinced him that the world itself was neither as conventional nor as "normal" as others would have him believe. All about him was strange and sordid behavior.

Most vivid in Bill's recollections are vignettes of big-shot gangsters using one hundred dollar bills to pay for cheap

beer at one dollar a glass, B-girls hustling for the change left on the bar, and a little cigar-chewing man whom Bill used to observe along the street outside the refreshment stand. Almost always dressed in a dark, tight-fitting coat and a hat that covered his brows, the man could be seen daily walking up and down the street. He was a curbstone bootlegger with many customers — poor and wealthy — to whom he sold his wares from a car parked nearby. One day, Bill noticed three strange-looking men approach the bootlegger. All were dressed like caricatures of Hollywood mobsters in the “Roaring Twenties.” They quickly backed the little bootlegger to a wall and surrounded him. Suddenly a knife flashed across the chest of one of the men. Bill saw a ribbon of red spread across the victim’s white shirt as his tie, cut neatly in two, slipped between his legs. The assailants fled, leaving their critically wounded pal prostrate, a tiny stream of blood oozing down the sidewalk. The curbstone bootlegger walked casually over to Bill’s refreshment counter, wiped his knife, put it back in his pocket, winked at Bill, adjusted his hat and tie and calmly walked away. Bill never saw him again, but that incident, more than anything else, left him with the distinct feeling that snakes might be a lot easier to live with than some humans.

Meanwhile, Bill’s speakeasy job came to a sudden end when he saw a familiar scene, chopped-up furniture on the sidewalk and a rivulet of alcohol flowing out from under the entrance door. The revenue agents had struck again. Bill just turned around and went home.

Now, Ann was pregnant and Bill decided that it would be better to return to New Jersey where Ann would have the comfort of being near her mother and where jobs might be easier to hold.

The balance of Bill’s life in the 1930’s was directed at one

objective: returning to a good, stable job in Miami. He continued to hunt and purchase snakes and always had a few around the house in boxes. After his son, William Jr., was born in 1933, Bill, with the help of his father, a master auto mechanic who was seldom unemployed, landed a job as his father's helper with a construction company. While on this job for four years, he commuted several nights a week from Paterson to Newark to study aviation mechanics at the Casey Jones School of Aeronautics. He was convinced that aviation was going to be big. As a skilled mechanic he might some day work for Pan American Airways in Miami.

His first step in that direction was to take a job with the Wright Aeronautical Engine Co. in New Jersey after he had been certified. It meant a severe cut in pay, from about sixty dollars to twenty-four dollars a week. Ann was unhappy, but Bill was confident that with hard work he could earn promotions quickly, and he did. His ingenuity with engines — he actually designed and invented parts — won him a position in the highly regarded experimental division where he worked among many college graduates. Then Bill started his campaign for a job with Pan American. Every day, without fail, he mailed a postal card application to Pan American's employment office in Miami. Each card, typical of Bill's tenacity and precision, was identical, giving his name, address, age, experience and the type of job he was applying for. He knew they needed men with a knowledge of carburetor mechanics, which was his specialty. After sending out more than one hundred cards, Bill received a letter hinting that a job might be available. A hint was all he needed. Impetuous as always, packing Ann and Bill Jr. into the car, he and a friend drove to Miami over a Friday-to-Sunday weekend, making the trip down in less than thirty hours. There was no job, but two weeks later he received an offer at eighty cents an hour. Again, it meant another sharp

cut in pay. He was now earning well over one hundred dollars a week as a foreman and had just moved into a new home and had a new auto and new furniture on installments. But within a short time, he and his reluctant wife were driving to Miami again, this time for good.

With the help of a loan from his mother-in-law he bought a two thousand eight hundred dollar house on a three hundred dollar down payment. It was one of the few times in his life that he had asked anyone for anything.

After Pearl Harbor, he was assigned as a flight engineer on Pan American planes flying under Army Air Force contract, transporting men and supplies all over the world. Although a civilian, he was in special uniform and held a rank equivalent to a first lieutenant. Throughout the war, he flew routinely but uneventfully to such places as India, Asia, Africa and South America. This gave him an opportunity to purchase foreign species of snakes, including his first cobra, which he'd leave in boxes at home and study between flights. Also, on many flights he used his ample spare time to draw plans and specifications for his "snake exhibit," the Serpentarium.

Most of his fellow crewmen were intrigued with his "dream." They respected Bill's seriousness, endless energy and ability to work hard, although at times Bill was the target of good-natured japey, especially when he had to "smuggle" snakes home in his flight bag.

Bill continued flying after the war to "clean up" men and equipment returning to the States. He had been earning about five hundred dollars a month, plus seven dollars per day for overseas time. For the first time, he had money in the bank.

In 1946, he decided the time was ripe to start the Serpentarium. Ann was fearful that Bill would make another dras-

tic change in their lives, resulting again in reduced income and an uncertain future. She was right. Bill had already chosen the Serpentarium site, a 3¼-acre plot, and was on the verge of consummating its purchase. When he had an opportunity to sell his house for thirteen thousand dollars, representing a neat cash profit with which he could start construction of the Serpentarium, he sold the house and started work immediately on the Serpentarium. One night, while he and Ann were at dinner she quietly told him that it was the end of their marriage. They were divorced in Miami, agreeing that Bill Jr. could stay with his father.

Bill and his son went to live in the unfinished house that was later to serve as a combination home and laboratory for the Serpentarium. Their food came mostly out of cans, their water from a well, and their baths were taken in huge metal drums in the back yard.

During the day, Bill now worked as an aviation mechanic on the ground. All his evenings and weekends, with the help of his son, he devoted toward the completion of the Serpentarium. He worked with a passion, not only because he was anxious to see the Serpentarium come to life, but almost as much to overcome his grief and despondency. The marriage breakup was a shock. He thought he would never allow himself to fall in love again. But it happened, about six months later, when he met Clarita, who was then only twenty years old.

Born Clarita Matthews, her father was an aeronautical engineer of Scotch-English ancestry and her mother, part Mayan Indian and Spanish, came from the British Honduras. Always petite and elegant, Clarita was an art major at Mississippi State College for Women when her father moved to Miami, taking the entire family, three daughters and a son, and an entire household of furniture in a single plane load.

In Miami, Clarita worked for Dade Thornton, a photog-

rapher and naturalist and one of Bill's good friends. She was Dade's receptionist and apprentice photo-colorer. Dade deliberately arranged for Bill to meet Clarita at the office. In town the following day, Bill spotted Clarita on a street. From his auto, a custom road-racer he had converted himself, complete with plush interior green carpeting and stainless steel coiled exhausts on the sides, Bill called to Clarita.

"Stay where you are," he shouted above the traffic din. Clarita didn't budge. Bill raced several blocks, made a wild U-turn and came to a screeching halt at the curb near where she stood. Later, says Clarita, Bill admitted that he was most impressed because she had stood exactly where he had asked her to stand. Thereafter, they saw each other every night and in a few weeks were married.

Clarita left her job to live and work with Bill and his son at the Serpentarium. Clarita was a patient and understanding stepmother because she herself, after her mother's death, had become a stepdaughter at almost the same age as Bill Jr.

Home was an unfinished building at the rear of the Serpentarium. Their apartment consisted of two small bedrooms, a living room with a fireplace covering an entire wall and a tiny pullman kitchen, all with concrete floors. Dinners were served on a folding card table. They tried to make every penny count toward construction of the Serpentarium. A typical dinner was canned pork and beans — and a steady diet of good humor. Once, for example, splurging on a solid meal, Clarita dropped one of three steaks she was carrying to the table. "We shuffled the steaks so that no one would know who got the one that dropped on the floor," she recalls laughing.

Toward the end of 1947, Bill's cash ran out. He had already invested some twenty-five thousand dollars in the Serpentarium, including the price of the land and a seven thousand dollar mortgage, when the contractor left the job

unfinished. Bill, his son and Clarita worked day and night to clean up, so that they could open for business by January 1, 1948, as planned.

During the last week in December, on a bright Sunday afternoon, they were working on the grounds with the help of neighbors. There were no signs. Except for a few friends and neighbors, nobody knew just what was going on. Three large round pits with high concrete walls were conspicuous in the background. Bill had already placed about forty specimens of snakes in the pits. Mainly, they were Florida species of rattlers and moccasins gathered during snake-hunting trips and a few of the foreign snakes Bill had retained after the war.

Suddenly, a group of curious motorists pulled up to look around. "These are potential customers," said one of Bill's neighbors, Ed Britzus, a hydroponic farmer. "Why don't you start charging admission to let them look at the snakes!"

Before Bill and Clarita knew it, he had dashed back to his farm and returned with a huge bale of wire, which he strung around the Serpentarium to create the feeling of an enclosure. They painted a single sign, SNAKES, some directional arrows to the entrance, and set up a card table and a change box as an "admissions office." While Mary Britzus, Ed's wife, collected, Clarita gave guided lectures at the pits and Bill demonstrated venom extractions.

He also started his public exhibition of force-feeding snakes, then a crude method of pouring a viscous liquid diet into a funnel through a narrow rubber tube inserted into the snake's gullet. Bill forced the tube through the snake's open mouth and Clarita did the pouring. Today, this is a highly refined technique using a specially constructed stainless steel caulking gun and a solid food based on Bill's countless experiments over the years.

Clarita explained that this was the first major attempt to keep snakes in captivity alive through force-feeding, as well

as to help Bill produce good quality venoms for sale to researchers. But up to the time Clarita had met Bill, she had never seen a live snake. Still, she was not even then afraid to get in a pit with the rattlers and pick one up on a hooked stick for demonstration during a lecture. She learned readily from Bill in whom her confidence has always been supreme and remains undiminished. "If he had told me to pick up a cobra, I'd have done it without question," says Clarita, who has seen almost every one of Bill's thirty-eight cobra bites, including bite No. 26 which ended dramatically with Bill in an iron lung while a team of doctors battled desperately to keep him alive.

Thus, unofficially, without fanfare, without advertising, with visitors stumbling over rubble and stones, they were in business.

And they were elated from the first day, when about sixty admissions of adults and children yielded thirty dollars in cash receipts. The money went immediately into improving the grounds. The very next day, Bill ordered land fill which was used to smooth and raise the level of the grounds so that visitors could stand comfortably and look into the pits.

By April, 1948, Bill had left his job and devoted full time to the business which had grossed close to one thousand dollars. The Haasts continued to eat sparingly, seldom going out except to an occasional movie, and continued to put every available dollar into the Serpentarium. The wire fence was replaced with pine hedges and later with masonry walls. Trees were planted. A small lobby and gift shop were installed in the entrance shack.

For the next five years they had no help except for Bill Jr., a handsome, dark-haired youth, husky and broad-shouldered. Every day of the week, not missing a day, Clarita worked as lecturer, guide, office clerk, admissions clerk, porter, wife and then mother of two girls, Naia Hannah and Shantih, whose names respectively represent *King Cobra*

and *serenity* (or everlasting peace) in Sanskrit. About the time of birth of their first child, Naia, in 1953, admissions had soared to an average of fifty thousand a year and has remained at a level of fifty thousand to sixty thousand annually, in spite of prices raised to two dollars for adults and one dollar for children.

However, near-tragedy struck shortly after the Serpentarium was operating smoothly when Bill Jr., then sixteen, was bitten severely by a six-foot diamondback rattler. He was helping his father insert a feeding tube into the snake, when the tube accidentally buckled in the snake's mouth, giving the reptile just a fraction of a second — all the time it needed — to sink its huge, needle-like fangs into Bill Jr.'s finger. At first, the bite felt like a hot, sharp sting. His son, frightened, sat down at a desk, looked up at his father and asked, "Dad, am I going to die?"

Bill, in his usual calm, simply shook his head but he worked frantically for the next thirty-six hours to save his son. It was perhaps the only time Bill was truly frightened. The venom seemed to race along his son's entire body, up the arm down the side and into the leg, swelling the flesh as it went along. Using a scalpel and suction pumps, Bill pursued the swelling, making a total of fifty-five bloody incisions over which he attached the pumps in an attempt to draw out the poison. Bill Jr. came out of it with only a damaged fingertip where the venom caused necrosis, local "death" of flesh.

In all, Bill Jr. had been bitten four times. Gradually, he lost interest in snakes and the Serpentarium, but not because of the bites, which, like his father, he quickly learned to shrug off. He had ambitions of his own and found the work too confining, seven days a week. Also, like his father, he quit high school before graduating, met a girl and married.

Then he went into his own business, mechanical soil-packing, which he launched successfully on five hundred dollars borrowed capital.

"Losing" his son was a disappointment to Bill. He had hoped that Bill Jr. would not only work alongside him producing venoms for research, but would ultimately take over the Serpentarium. Today, however, with the help of a full-time maid, Clarita is at Bill's side almost daily, 'round-the-clock.

Several devoted employees, including a middle-aged Cuban handyman and a secretary, who have been with Bill for several years, plus a personal assistant for snake handling and maintenance, now make it possible for Bill to handle the countless chores required to keep an average of more than five hundred snakes in nearly four hundred cages, feed them, extract and process their venoms and conduct experiments as ordered or supervised by scientists. Generally, Bill extracts venoms seventy to one hundred times daily from about sixty different world-wide species purchased or gathered personally during snake-collecting trips abroad. He never wears protective clothing or gloves, which are only a handicap when a great variety of snakes have to be caught and handled repeatedly, hour after hour, day after day.

His assistant, Heyward Clamp, a slender quiet youth from Salley, South Carolina, came to Miami in 1961 as soon as he had graduated from high school. Heyward, like Bill, acquired his interest in snakes and venoms while he was a Boy Scout and once had treated himself following a copperhead bite. After reading about the Serpentarium, he drove to Florida with his parents so that he could enroll at the University of Miami as a part-time zoology major and work for Bill. His dream now is to help continue the work of the Serpentarium.

Bill is his idol.

4 . . .

his friends and enemies: snakes and their venoms

Snakes are among the most widely distributed creatures in the animal kingdom.

According to the World Health Organization, there are about two thousand five hundred different kinds of snakes (others estimate about three thousand) throughout the world. About ten per cent are known to be venomous. Their distribution has puzzled scientists for centuries. Although not great wanderers, snakes are found almost everywhere, from Siberia to the tip of South America, Asia and Africa. Some large islands and connected land masses, such as Alaska, Puerto Rico, Ireland, Cuba, the Azores, Iceland, Hawaii, Haiti and Jamaica, are entirely free of venomous snakes; and other islands, Australia, for instance, are virtually infested with them. In fact, although the neighboring island of New Zealand has none, Australia is the only country where venomous snakes outnumber the non-venomous.

Few animals appear in world literature more frequently than snakes.

Long before the Biblical account of the Garden of Eden, ancient Hebrews and Egyptians made numerous critical and

uncritical references to snakes, which were worshipped, abhorred or exploited in medicine and mythology. Even in the modern world there are snake cults, in the United States as well as Africa and Asia, in whose ranks snakes are endowed with gifts of wisdom, supernatural qualities and the power to bestow eternal youth or fertility. A lingering reminder of man's ancient attitude toward snakes is the medical profession's caduceus, the symbol of two serpents entwined about the staff of Hermes, the Olympian God of serene slumber, invention and science.

Yet no animal has been more maligned, more misunderstood, more feared and hated than the snake. Even among modern and primitive cults, whose snake rites could be traced for centuries, knowledge of snakes, particularly venomous species, scarcely exceeds the limits of superstition and unmitigated ignorance.

Once, when Bill Haast was about to depart Capetown, South Africa, with a cargo of four hundred cobras which he had collected over a period of months, a newspaper, *The Argus*, published a bitter letter of protest from a local naturalist. The Capetown writer was concerned that Bill might upset the balance of nature because he was taking so many cobras out of the country and cobras are known to eat rodents. The writer said:

It would be interesting to learn if rodent control officers notice any marked increase in the number of rats, potential plague carriers in these areas. Admittedly, the collection of reptiles for a serious scientific purpose is in a different category from a collection for profit. And I am not suggesting that any restriction should be imposed, but the occasion offers a convenient opportunity for checking up on a fairly considerable disturbance of the balance of nature in a limited and observed area.

Even though he lived in an area where cobras were prevalent, the South African neglected to note that cobras, like many snakes, are cannibalistic, feeding regularly on mole snakes. But mole snakes also eat rodents. With fewer cobras, there might be many more mole snakes.

On another occasion, Bill had hoped that if he could locate a venerable African snake cult, not only would he obtain many snakes easily, but he might learn something about snakes not known to modern science. According to an old book on African snakes, this tribe was supposed to possess a secret formula which made them immune to venomous snakebites and was also effective in treating such bites. After a week of searching in the dense forest jungle of Tanganyika, about one hundred miles south of Lake Victoria, Bill finally met a British tsetse fly researcher, a man named Jewel, who offered to take him to the snake cult in a place called Old Shinyanga.

They arrived just as the tribe was preparing for one of its famed snake festivals, climaxed by a massive, feverish circle dance around a pile of venomous snakes. Tribesmen from neighboring villages joined the dance, an event witnessed by few white men. When it was over, Jewel, acting as interpreter, introduced Bill to the tribal chief, Shisholi, who allowed Bill to examine the pile of snakes in the center of the circle. "Most of the snakes," says Bill, "were harmless. There were only two or three venomous species, one of which was a rare, rear-fanged snake, virtually harmless because it almost couldn't inject poison into your body unless you'd deliberately allow it to bite."

Without disclosing the secret ingredients, Shisholi, equally fascinated by Bill's knowledge of snakes, then demonstrated the cult's method for achieving immunity to venomous bites. It consisted largely of rubbing pulverized herbs into open

cuts and wounds in the arms of tribesmen, starting at childhood. The same medicinals were used also to treat snakebites. "But they are not really immune," says Bill, "and probably never have achieved immunity.

"If one of them recovers from a snakebite — assuming he knows it was a venomous bite — he really believes in his immunity and is not afraid to be bitten. But if one gets a truly lethal bite in spite of his 'immunity,' and dies, then they don't blame it on their secret formula. They say the dead man was not in good with the Gods and the spirits intervened to take him away. They're not fakers. They just don't know better."

Their appalling ignorance, in spite of their presumed ancient knowledge, was underscored when Bill demonstrated an extraction of venom from a puff adder, a stubby, highly toxic snake notorious among Africans because it is often accidentally stepped on while sunning itself on a trail.

Shisholi, intrigued by the extraction, was astonished to learn, for the first time, that the venom came from the snake's fangs. "He had thought, probably," says Bill, "that it came from the tongue." Bill gave the extracted venom to Shisholi, who said he would test it by injecting it into one of his tribesmen, someone he didn't particularly care for! Finally, Bill gave Shisholi some antivenin and a hypodermic syringe and taught him how to use it.

Visibly impressed, the tribe initiated Bill into their cult and later sent him some of their powdered immunizing herbs through Jewel.

All snakes have teeth, but only venomous snakes also have fangs, one on each side of the upper jaw. An almost certain sign of a venomous snakebite is distinct punctures, one or two, fang marks — as compared to a row of marks which are typical of teeth lacerations. Fangs are hollow or so distinctly

grooved that venom, manufactured in tiny head glands connected to the fangs, is injected through them as effectively as through a pair of hypodermic needles. Some snakes, like the corals, cobras and kraits, have comparatively short, fixed fangs up front; others — rattlers, moccasins and copperheads, for example — have extremely sharp, larger fangs which are somewhat farther back in the mouth, curve inward, and are retractable, hinged flat against the roof of the mouth and brought instinctively into action at the instant of the bite.

Most of the fixed-fang snakes belong to a family known as *elapidae*, whose poisons are predominantly neurotoxic. Snakes with movable fangs are in the families *viperidae* and *crotalidae*, whose venoms are largely hemotoxic. Other front, fixed-fang snakes with neurotoxic venoms are in the family, *hydrophidae*, sea snakes. A few venomous species have fangs which are so far back in the mouth that they are considered comparatively harmless and are classified as part of the family *colubridae*, to which about two-thirds of the world's snakes, almost all non-venomous, belong.

But one rear-fanged snake, the African boomslang, is considered lethal because its venom has the unique property of "thinning" blood almost to the consistency of water.

In his book, *Living Reptiles of the World*, published in April, 1957, Dr. Karl P. Schmidt, who had retired as chief curator of zoology at Chicago's Natural History Museum, wrote: "Only one of the rear-fanged snakes, the notorious boomslang of Africa, is potentially dangerous to man.* * * Ordinarily, it is a mild tempered snake and takes considerable abuse before puffing out its neck in a threatening posture. It should be treated with respect, however, for several human fatalities have been attributed to the boomslang's bite."

A few months later, the sixty-eight-year-old curator emeri-

tus was examining a boomslang at the Lincoln Park Zoo in Chicago. It bit him. He went home, collapsed, and died.

The tragic death of Dr. Schmidt confirms Bill Haast's view of venomous snakes: "They're all dangerous."

The chemistry of venoms, the manner in which a snake manufactures it, and the exact ingredients that cause death are not precisely understood. Moreover, many venoms are almost completely unknown because they have been scarcely investigated. According to *Antivenin*, an excellent booklet on snakebite symptoms and treatment issued by Wyeth Laboratories of Philadelphia, the only producers of antivenin in the United States, "Venoms are structurally complex substances; none has ever been completely analyzed."

Generally, venoms are known to contain an abundance of proteins, enzymes and some of the acids commonly found in saliva. The acids and enzymes presumably aid snakes in digesting their food, which is always swallowed whole. The acids are also believed to be responsible for the sharp, burning sensation which frequently comes immediately after certain snakebites.

There is no uniform system for reporting venom toxicities. Some are measured in *mu*'s, or "mouse units," which is the amount of venom required to kill a 20-gram white mouse within twenty-four hours. Another is LD₅₀ — a lethal dose of venom that kills at least half the animals into which it is injected. Hence, fifty *mu*'s given to fifty mice will kill all of them, but an LD₅₀ will kill only half of them.

Some researchers standardize venoms according to numerical values of danger to humans, rating the common Indian cobra as *one*. In other words, a single drop, or one *minim*, of common Indian cobra venom is enough to kill an average, healthy 150-lb. adult. A single drop of krait venom, with a rating of 15, is enough to kill fifteen adults; and a drop of

Australian tiger snake venom with rating of twenty-five — second only to the sea snake — could kill twenty-five adults.

Under the numerical rating system, the world's deadliest land snakes would include: tiger snakes, kraits, corals, cobras, mambas, fer de lance, puff adders, and gaboon vipers. At the lower end of the scale are rattlers, moccasins and copperheads.

But outside the laboratory, there are many variables which spell the difference between life and death for snakebite victims. To begin with, although the coral snake's venom is considered by many authorities to be more toxic than the cobra's, it rarely kills in one bite because the snake is small and its yield of venom is proportionately little. The amount of venom a snake yields is almost always in proportion to its size. However, to make up for abbreviated length, a small snake like the coral will sometimes attempt to chew into a human victim's flesh, giving several bites and more than enough venom to kill. This chewing technique is not a characteristic of small snakes only. Cobras do it, too, in anger.

An average, five-foot cobra, aroused, could inject several drops of venom at a time, often as much as one *cc* (a cubic centimeter, fifteen drops), making such a bite, in the absence of immediate medical aid, nearly always fatal.

Dr. Sherman A. Minton Jr., who has made numerous studies on the variables of snake venoms, wrote a snakebite chapter for the 11th (1963) edition of *Cecil's Textbook of Medicine*, in which he charted an interesting and lucid comparison between lethal doses for man and average yields of venoms. He noted, for example, that five *mg* (milligrams) of venom from a coral snake, the kind found in the southern United States, would be lethal to an average adult, but on extraction an average fully grown coral snake yielded between three and five *mg*, or barely enough to kill. A lethal dose of krait venom would be two *mg*. But on extraction, Dr. Minton showed, the

krait gave eight to twelve *mg*, or *four to six times* the amount needed to kill. Similarly, a tiger snake gave about twelve to fifteen times its lethal dose; and the Indian cobra yielded about eight to ten times its lethal dose. The Western diamond-back rattler, one of the most-feared snakes in the United States, will give an average yield of two hundred to three hundred *mg*, according to Dr. Minton, but that is only two to three times its lethal dose.

Finally, many experts consider the ferocity of the snake to be the most important factor in whether a single bite can kill a human. A bitten human usually has no way of knowing how much venom a snake has injected. Bill Haast is one of the rare exceptions because he has detailed records on each of his snakes and intimately knows not only their ferocity but their average yield of venom. However, when a snake in the field bites a human it usually does so in self-defense as the result of a momentary accidental encounter. Under these circumstances, just as it strikes prey for food only, it may give one quick bite and retreat seeking safety, perhaps under a rock or in a hole. Often, when Bill jumps into his Serpentarium pit filled with rattlers, the snakes will scatter. But if he should stand between a rattler and its escape hole the snake is apt to go on the offense and attack him. It is not uncommon for a snake, biting in self-defense, to yield little or no venom. A unique Israeli study on venom yields has shown that some snakes sometimes do not eject more than half the venom in their glands. But even a scratch from a highly toxic species could be frightening enough.

In 1953, for example, Carl F. Kauffeld, noted curator of reptiles at the Staten Island Zoo, also an author of popular books on snakes, received an accidental shot of venom from an Indian cobra which he described as a "large specimen" in a "good state of health."

"Strictly speaking," he said, "the accident was not a bite

because in the process of removing skin from the head as I held the snake with my left hand, I carelessly hooked the ball of my right thumb on the snake's fang as I moved my hand up from the chin to the top of the head where I intended to continue the process of freeing the unshed skin."

"The snake," he continued, "undoubtedly responded in normal fashion to the tension on its fang, as my hand engaged with it, by automatically giving an injection of venom. At first, I was not certain that I had actually engaged the snake's fang because the first indication was a copious flow of blood down my hand, and I believed I had possibly raked myself on the mandibular teeth."

Then Kauffeld described a complete absence of symptoms until a few minutes later when, while talking to one of his keepers, he suddenly felt a "tingling in my arms and lips, sufficient indication that the classic neurotoxin had started to work." The keeper rushed over to the laboratory for a vial of antivenin and injected it between Kauffeld's shoulder blades.

"The onset of reactions was rapid," Kauffeld continued, "yet so gradual as to be hardly perceptible to me. Probably the best way I can describe it is a sense of being anesthetized as with ether.

"I did not feel faint or nauseous but there was a definite clouding of awareness. I do not believe that I lost consciousness completely at any one time, but * * * my color was ashen, my respiration rapid and stertorous (noisy) and apparently I had lost awareness so completely that I did not feel subsequent injections of serum in my back and in my arm together with an incision of the fang puncture. This state was reached in roughly twenty minutes after the injection of venom.

"At approximately thirty to forty minutes, the serum

apparently produced a miraculous rallying of which I was quite aware because I remember having a sense of being brought back to a recognition of my surroundings fairly abruptly * * * and my recovery in the course of twenty-four hours was quite complete."

Bill Haast's snakes, on the other hand, almost always bite in anger because they aren't just encountered once, accidentally. They are handled repeatedly for extractions as well as for force-feeding and medication and they get his assistance in shedding their skins. As soon as he opens a cage door, most of his venomous species seem not only prepared to bite but eager to do so. Sometimes, just walking by a row of cobra cages in one of his long narrow pits will bring all the cobras, their hoods spread, rearing up in a magnificent spectacle of an angry file of serpents pressing forward to attack.

One of Bill's most painful experiences resulted from the bite of a comparatively small Mexican cantil, actually a species of North American moccasin, which Maj. Weinman of the Ceylon Zoological Gardens once described as "a most dangerous reptile with a savage disposition and marked agility in striking. Like the bushmaster, the cantil has a double-barrelled lethality. From its fangs are produced both neurotoxic and hemotoxic poison."

It happened shortly after the first anniversary of the Serpentarium. Bill was working with the cantil in his laboratory when the snake fell to the floor. Just as he stooped to pick it up, Clarita called to him from the office. It was one of those rare times when Bill's concentration during the handling of a venomous snake was momentarily disrupted. But in that moment the snake whipped out, biting Bill above the second joint of his left index finger.

Anxious to have a record of the bite, Bill caught the snake, promptly replaced it in its cage and walked over to his desk

to start his log of symptoms. He did not get far. He had just written "6:40 P.M., bite," when his arm suddenly went limp, as though it were a useless wet rag. He called his son to start emergency treatment, injections of antivenin, incisions and suction. The only serum he could use was a general anti-venim for North American *crotalids*. It was not specifically for the cantil. As Clarita prayerfully noted, after Bill had asked her to continue the log: "7:00 P.M., injection of anti-venim. Only thing available to use. *Hope it may help!* Injected in top of hand."

It was nine days before Bill had fully recovered; meanwhile, twenty-eight incisions and suction pumps had been applied in less than two hours and the log recorded numerous 'round-the-clock symptoms over the entire recovery period, such as: excruciating abdominal and arm pains; chills; enormous swelling to the shoulder; muscle spasms; swelling advancing to neck and stomach; and painful hives around the waist and shoulders. Later, a copy of the log was turned over to a Texas zoo director who happened then to be doing research on the cantil and who said Bill's was the first record of its kind.

Perhaps the most confusing and confused literature on snakes deals with treating a venomous snakebite. In a profusely illustrated book, handsomely printed, *Poisonous Snakes of the World*, recently published by the Office of Naval Intelligence,* a chapter on snakebite treatment was introduced this way: "The treatment of snakebite and snakebite envenomation has been subject to controversy even among experienced physicians."

The main trouble is that nobody knows for sure how venoms spread in the body and exactly how they kill, which

*See *Bibliography*.

is one reason continued study of venomous snakebite symptoms and survivors based on reliable observations is important. The hemotoxic bites of snakes in the *viperidae* and *crotalidae* families usually cause an immediate and severe burning pain in the area of the bite, followed by swelling, purplish discoloration of the skin, nausea, dizziness, profuse sweating, internal bleeding, rapid or feeble pulse, falling blood pressure, vomiting and diarrhea with or without blood, spasms, unconsciousness and finally death due to collapse of the cardiovascular (heart-blood) system. Survivors often suffer necrosis at the site of the bite. The cells seem to just die and parts of flesh slough off, leaving deep indentations. If the bite is on the finger, it may look as though part of the finger were missing.

The neurotoxic bites of *elapidae* species may or may not cause immediate pain and swelling after the bite. Often there are no symptoms for hours, when suddenly the body is engulfed with tingling sensations and numbness, sometimes preceded by a sleepy feeling or droopy eyelids. Other symptoms include: a sense of indifference or intoxication, heaviness on the chest, difficulty in breathing, convulsions, uncontrollable flow of saliva, subnormal temperatures, severe abdominal cramps, and finally death by paralysis of the nerve centers that control breathing.

Some authorities believe that certain neurotoxic venoms also contain a cardiotoxin, a chemical substance that paralyzes the heart muscle, causing death by heart failure or "cardiac arrest." Although neurotoxic venoms are severe on the nervous system, most survivors recover without permanent damage, sometimes called *sequelae*, conditions that result from other ailments.

There are further complications because not all venoms are "pure" hemotoxins or neurotoxins. Frequently, a victim

will suffer symptoms of both poisons because the venom will contain the active ingredients of both, like that of the Mexican cantil. As a matter of fact, Bill Haast believes that the classification of snakes according to species should be based on their venoms as well as on their scales, size, weight, color and other physical characteristics. He cites, by way of illustration, a species of tropical rattlesnake which ranges from northern Colombia to southern Brazil. "In this same species," says Bill, "there are enormous differences in the potency and composition of venoms. A specimen from northern Colombia may have venom that is almost purely hemotoxic but moving south it gradually changes until at the tip of Brazil the venom of the very same species is almost purely neurotoxic."

Generally, experts agree that as soon as venom breaks through the skin it is carried by the blood and distributed throughout the body where the toxins do their damage by attaching themselves to various blood or nerve cells. It is well known, for instance, that certain hemotoxic venoms will cause blood to thin while others will coagulate blood. However, there is no widespread agreement on the *speed* with which the poison is absorbed by the blood. Some believe it is so rapid that cutting through the fang marks to "drain out" the wound is a waste of time; others believe the absorption is not so rapid that some of the poison, if not most of it, cannot be drained through incisions and suction.

In the matter of first-aid for snakebites, there is wide agreement that the victim should be immediately immobilized to prevent an active heart from speeding the distribution of venom through the blood stream. It is for this reason that alcohol, stimulants, fright, panic and physical activity are considered harmful to snakebite victims. When possible, the doctor is to be brought to the victim, or the victim should move or be carried to a physician with deliberate calm and caution.

The universally accepted mode of medical treatment is

the prompt injection of antivenin, which is also called serum antivenene; snake venom anti-toxin; or simply anti-snakebite serum. Antivenin neutralizes the snake's venom in the body. It is processed from the serum of horses which have been immunized against certain snake venoms by repeated, regular injections of the same venoms. Antivenin may be produced only to treat a specific type of snakebite; or it may be a polyvalent, one that offers cross-protection against several types of snakebites. The Wyeth antivenin produced in the United States, for example, is a polyvalent for protection against North and South American *crotalids*, including the rattlesnakes, cottonmouth moccasins and copperheads found in America.

Beyond immobilization and the immediate use of antivenin, plus certain supportive therapy to treat a victim's symptoms and alleviate pain, there is frequent disagreement on what first-aid measures are best. There is not even a consensus on how to administer antivenin. Some authorities believe that for serious bites it should be administered directly into a vein; others feel that it should be injected under the skin, into a muscle, or both. Some recommend moderate well regulated doses, or initially, massive doses.

Another serious problem with antivenin is its horse-serum origin. Many people are extremely allergic to horse serum and could have an immediate fatal reaction to it. Most physicians make a quick skin test before injecting antivenin. If the victim seems to be sensitive to the horse serum, he might be given some other drug, a cortisone perhaps, to counteract any possible reaction which might be worse than the bite.

The most widely used first-aid treatment is applying a tourniquet above the bite to stem blood flow, then incising the fang punctures and sucking or pumping out the blood. However, a growing number of experts, Bill Haast among them, feel that tourniquets and incisions do not help and

may actually harm, resulting in needless necrosis or amputations of fingers, arms and limbs. In one Florida study of about ninety snakebite victims, some one-third were reported to have suffered amputations.

A spokesman for the United Fruit Co. of Panama once reported no beneficial results in the use of tourniquets and incisions among employes and others treated at a company-owned hospital, where comparisons were made of various snakebite treatments over a period of years.

In a recently published monograph based on an extensive study of snakebite treatments in the Soviet Union, a Russian scientist noted that victims treated only with antivenin had a better and higher rate of recovery, no complications, no amputations and shorter hospitalization periods. Referring to tourniquets and incisions, he said: "These harmful procedures must be eliminated as soon as possible. We must explain the danger of incisions and tourniquets to the greatest number of people, particularly to agricultural laborers."*

Bill Haast has discarded tourniquets and incisions and now relies only on antivenin whenever he feels his immunity might be ineffective against particular bites. According to Bill, the only certain way to prevent death from venomous snakebite is the fastest possible administration of antivenin, sometimes directly into a vein. Without antivenin, he believes, it is important for the victim to remain immobile, calm and "just pray that he hasn't received a lethal dose of venom." Some snakebite victims, he says, might die more quickly of fright and panic than of the bite itself because many accidental bites are not really lethal. While the symptoms might be painful and frightening, there is usually more than enough time, he believes, to seek the only proper medical care available — antivenin.

*See Bibliography *under* Sultanov.

Mortality studies on snakebites tend to support Bill's views, at least with regard to the lethality of bites.

Nobody knows how many humans are bitten by venomous snakes, but an estimated thirty thousand to forty thousand die of such bites every year, according to the World Health Organization.

As is to be expected, the great majority of bites and deaths occur in those countries of Asia and Africa and certain areas of South America where large native populations live and work under primitive conditions in snake-infested areas far from hospitals and clinics. On an average, perhaps one-third to one-half the world's fatal bites, chiefly by cobras and kraits, occur each year in India and Pakistan, where it is estimated that more than three hundred thousand humans are bitten annually.

In the United States, where there are fairly reliable figures, most reports (excluding Alaska, Maine and Hawaii) estimate an average of two thousand to twenty-five hundred venomous bites a year, largely in the South and South Western states. But Dr. Henry M. Parrish, chairman of Missouri University's Department of Community Health and Medical Practice, told me that over six thousand people are bitten annually in the United States. Completing a nationwide survey, Dr. Parrish, a prolific writer and internationally known authority on snakebite epidemiology, said that during the ten-year period, 1950-59, "there were one hundred and thirty-eight snakebite deaths in the United States."

If more than six thousand Americans are bitten but less than fifteen die, the mortality *rate* is far less than one per cent. Hence, the odds of surviving a venomous snake bite in the United States are better than ninety-nine to one. About one-third of the deaths from snakebites in the United States are children under age ten. A snakebite that might be sublethal to an adult could be deadly to a child, of course,

because a smaller body has less blood with which to "dilute" the venom. Conversely, a bite that is lethal to an adult of average size and weight might not be so for a heavier person.

In other world areas, where bites are caused by species with much higher toxicities and where medical facilities are not as prevalent, mortality rates still show that a comfortable eighty to ninety per cent or more who manage to reach a hospital or clinic and receive treatment, survive. The notable exceptions seem to be for krait and King Cobra bites. Hospital reports indicate almost an eighty per cent mortality rate for krait bites but no known survivors of King Cobra bites, except Bill Haast.

If natives in primitive areas were better protected, at least with shoes, or if they could use agricultural machines instead of hand implements, chances are the toll from venomous snakebites would fall sharply. In this regard, the experience of the United States armed forces is revealing.

"Venomous snakebites have never been serious problems to the armed forces, even during World War II when large numbers of troops were engaged in areas where poisonous snakebite was common among local civilian populations," says Col. Colin F. Vorder Bruegge, Acting Commander of the U.S. Army's Medical Research and Development Command. "In 1944, for instance, there were a total of 420 Army admissions in overseas areas as a result of the bites of venomous snakes. In 1945, this dropped to 175. During the 1950's, the overseas Army admissions for treatment of venomous snakebite varied but the average was approximately four to forty per year. A review of medical records showed that no Army personnel had died as a result of being bitten by poisonous snakes, either in the United States or overseas, during the past 24 years."

Of course, mortality reports do not minimize either the

terrifying virulence of snake venoms or the tragedy of some thirty to forty thousand deaths a year. Nor do they show the countless thousands crippled by amputations.

It is still a grim fact that of well over one million different kinds of animals in the world, not more than three hundred snake species kill more people in one year than all the wild animals of the entire world have killed in the past fifty years!

In *Dangerous to Man*, published by Chilton in 1965, perhaps the most comprehensive report ever compiled on the real and imagined dangers of almost every potential animal killer in the world, author Roger A. Caras states flatly: "There can be no argument with the statement that, today, of all animals that are potentially dangerous to man, the snakes as a whole are the most dangerous."

5 . . .

cobras for polio?
it might just work

It was exactly 6:45 in the evening, September 10, 1948. Nobody knew. Bill Haast didn't *want* anyone to know. He had discussed it casually a few times with Clarita, but now he did not even want his wife to know that he was about to start it — the experiment on his own body to make himself immune to the neurotoxic bite of a cobra.

He was going to begin with a tiny, diluted drop of venom — raw venom! So far as Bill knew no such experiment had ever been attempted on a human. On animals? Yes. As a matter of fact, Bill's knowledge of how horses are immunized to produce antivenin was his source of inspiration. Other animals could be immunized to produce antivenin, but the large amount of blood in horses, among other things, makes them choice vehicles for the commercial production of antivenin.

However, a human is not a laboratory animal. Reactions vary considerably, even among animals, a problem that complicates the researcher's efforts to grade the toxicity of venoms. As the British Museum's former chief zoologist, Dr.

Hampton W. Parker, notes in his book: "The minimum lethal dose of Australian black-snake venom is ten to twenty times greater for cats than for monkeys of the same size."

Variable reactions among humans, as among animals, could be due to several factors: individual allergies; a degree of natural immunity; and possible "acquired" immunity resulting from previous venomous bites. "Immunity is obviously as complex a problem as the composition of venom," said Dr. Parker.

On record is the story* of a South African doctor who wanted to experiment on himself with green mamba venom. He diluted the raw snake venom to one-tenth its strength and of this injected into his arm two-tenths of a cc. Within five minutes he was afflicted with symptoms, swelling and itching. Minutes later came nausea, general weakness, uncontrollable flow of saliva, numbness, difficult breathing, and maddening sensitivity to sound. At the end of fifteen minutes, he called it quits and started treatment to counteract the injection. But agonizing symptoms persisted through the night and the following day until he had recovered fully.

Before him, Bill now contemplated a small but precious amount of the dried, raw, lemon-colored venom from the African Cape cobra, a highly toxic species. If he were to achieve immunity, Bill reasoned, this venom might give him cross-protection against other cobras, including possibly the King Cobra and other snakes with neurotoxic venoms.

At first, he thought he'd work with processed or "detoxified" venom because it had been used widely on animals with no apparent harm. A detoxified venom is comparable to processed or "weakened" live viruses in vaccines.

According to the well established principles of immun-

*Crompton, John: *Snake Lore*, p. 72. See *Bibliography*.

ology, when foreign substances — bacteria, viruses, or snake-venom proteins — enter the body, a natural defense mechanism (not entirely understood) produces antibodies to neutralize or destroy the invaders. “Infecting” the body in advance with a weakened version of the same substance stimulates the production of antibodies, which might remain in the body for a short period or forever, to fight off future attacks of the real thing. If the antibody level is short-lived, it can be renewed with periodic “booster” shots.

But Bill was unable to obtain detoxified venom. When he wrote to the South African Institute for Medical Research, asking for instructions on how to detoxify the venom (or get some of theirs), they refused his request. “They said they did not want the responsibility for advising or supplying materials on self-immunization,” Bill recalls.

Later, in a letter to me, Dr. J. H. Mason, deputy director of the South African Institute, said: “Some years ago, we tried to immunize a few snake catchers against Cape cobra venom with detoxicated venom; although they received six spaced injections their sera, at the end of the course, were without detectable antivenom. If we had the ‘courage’ to carry on with unmodified (raw) venom, we would almost certainly have stimulated them to produce antibody, but we were unwilling to take the risk.”

Now, there was no more time to waste. Bill had already stocked twenty cobras and was handling them daily for venom extractions. He was quite prepared for the risks of self-immunization. Although he did not know then that he was soon to become involved in a unique polio experiment requiring countless thousands of cobra handlings, he also was already planning to expand his cobra-venom production to make the Serpentarium the world’s largest and most reliable source of such venom under the most advanced, controlled conditions.

He prepared and measured his first injection carefully. It

was to be a cautious, extremely small amount, highly diluted, one part venom to one thousand parts of normal saline solution. Then, using a small, No. 25 hypodermic needle, he drew 1/100th of a cc into the syringe and injected it under the skin of his left forearm. He immediately felt a stinging sensation around the injection site, but it disappeared two hours later. That was all, or so he thought.

Next day, Clarita noticed a strange-looking sheet of graph paper on Bill's desk. It had all the earmarks of a precise hospital chart. Printed on it, in small, brown-ink letters, were: a code indicating injection sites; a title, "Immunization Schedule," and eight captioned columns showing an injection series by number; date; time of day; time lapse between injections; volume of injection; weight of venom; injection-site code, and type of injection as, for example, intradermal (within the skin).

"He's getting ready to start," Clarita thought.

Then Bill walked in. Immediately, she noticed something different. The vibrant, energetic man with eyes always alert, intense, wide-awake, looked surprisingly sleepy. His eyelids seemed to droop.

"Tired, honey?" Clarita asked.

"No, not a bit," Bill replied. "Why do you ask?"

"You look tired."

"Well, I don't feel tired."

Bill, smiling sheepishly, like a boy caught in the cookie jar, knew what Clarita was referring to. Although he did not feel it, the venom apparently was having a slight paralytic effect on his eyes. His smile was revealing. Clarita remembered the chart.

"You've started! You're immunizing yourself! Aren't you?"

Bill nodded.

"Have you taken a physical?" Clarita asked.

"No."

"Don't you think you ought to?"

Bill just shrugged and walked away to resume his work. He knew Clarita was concerned because raw venom was thought to be harmful to vital organs, such as the liver and kidneys. That's why a zoologist, after Bill's immunization had been disclosed, wrote to tell him that he wouldn't "give a plugged nickel" for Bill's life in three years.

If Bill had started with a thorough physical examination, at least he could have checked himself periodically to avoid serious damage to his health. But he had supreme confidence in his own rugged constitution as well as in his careful plan for small, spaced injections. His concept was rudimentary. "After all," he says, "if they could do it to animals, I could do it to myself. The human is a pretty good animal." Theoretically, Bill was correct—only there is a vast and troublesome wasteland between theory and practice, and up to that point no one had been willing to venture into the wasteland. There were no precedents to guide him, no trial-and-error experience upon which to draw. His would be the first trial—or error.

Bill, of course, could have started with his own animal experiments. However, in addition to a lack of funds, his problem was—as it always has been—a question of time. He's a man in a hurry, with much to do. He doesn't waste motions or time. "The fear of death is not within me," he once wrote in his travel diary. "It is the thought of leaving so much undone that haunts me."

Nonetheless, the injection series went very well, on the whole with no known harmful side effects, no severe reactions, except for some unsightly boils caused by his neglect to use sterile solutions. Gradually, he increased the concentration of venom and the volume of the injection until he was able to take a full drop of raw venom, ordinarily lethal. In all, he took more than eighty injections and booster shots. The boosters were always a full drop, spaced about every three months, the last one in 1959.

He summarized symptoms, which generally were mild swellings and soreness, and noted when the regularity of his series was interrupted by rattler and copperhead bites. Later, he also combined three venoms, injecting equal parts of King, Indian and Cape cobra poisons.

A test came eleven months after the first injection. It was a cobra bite, his first, and it happened shortly after the start of the polio research project. Bill was then handling at least eighty cobras a day to provide venom for experiments on monkeys at the University of Miami. The bite was in his thumb. He did absolutely nothing about it. He suffered some local swelling, throbbing pain and loss of tissue at the site of the bite. There was no elation, no celebration. It was expected. He lost not an hour of working time. He went on, incredibly, with his cobra work, in addition to extracting venoms from other snakes. Of course, cobra bite No. 1 could have been sub-lethal, like so many accidental field bites. But there were many more tests to come, over a score of cobra bites, and some very close calls indeed, as the polio project intensified. Bill was utterly dedicated to it. More than anything in the world, he wanted it to succeed. The thought of a snake venom proving useful in a disease that had almost terrorized a nation filled him with such passion for work that at times he was handling cobras at the rate of one a minute! It was because of this scientific work that nobody prevented his departure from South Africa with an unbelievable cargo of four hundred cobras!

The genesis of the polio research project was almost coincidental with the start of the Serpentarium. While Bill was still flying as a Pan American engineer, when he began importing cobras from Africa and India, his hunger for knowledge about snakes was unappeasable. He feasted on as much as he could read about snakes and venoms. He had read that cobra venom attacks the motor cells in the central

nervous system, particularly in the areas of the spinal cord controlling the use of arms and legs, and also paralyzes the nerve cells that control breathing. At the time, the newspapers and magazines were filled almost daily with accounts of polio, especially with reports on advancing research and the imminence of a successful cure or preventive vaccine. Since cobra venom seemed to attack the human body in much the same manner as the polio virus, Bill wondered whether it might not interfere with the invading polio virus if injected into a patient. Could it halt paralysis? Prevent death? Cure entirely?

Bill once mentioned his thoughts to a friend, a biochemist, associated with a hospital. His friend offered to let him use a laboratory if he wanted to experiment. Bill refused. There were problems. Firstly, he thought it would be presumptive of him to do so. He was not a physician, scientist or even a laboratory technician—although if he had used the laboratory he certainly would have sought the knowledge to experiment properly. Furthermore, there was the business of the Serpentarium. It was 1948, and he was off to a good start and had already quit his job to direct the Serpentarium full time. Among other things, also, he needed more time to maintain his cobras.

“It was a job just keeping them alive,” says Bill. “They seemed to need a constant temperature of about 80° F., and like many snakes they resisted eating in captivity.” He had to find the right diet to force-feed them, and this was a painstaking process which was not finally achieved, at least not to his satisfaction, until eight years later.

Meanwhile, his cobras were dying almost as fast as he could replace them and in order not to exaggerate their “normal” mortality rate he had to learn how to handle the cobras with increasing gentleness, which few could under-

stand. Bill was continually prodded with remarks about why was he so nuts about cobras that he couldn't or wouldn't wear protective apparel. Those who were really interested learned that barehanded, gentle handling of the cobras was as much economic necessity as it was Bill's desire to extract venom under optimum natural conditions for the snakes.

But Bill is an extremely sensitive human, keenly responsive to the pains and sufferings of others. Not long ago, for instance, a scientist who had received a pint of Bill's blood for study asked for a second donation of blood. Bill declined to give it then. He was concerned that it might upset his antibody level, and he wanted to be prepared to donate his blood to save a human snakebite victim as he had been called upon to do and has done a number of times, without compensation of any kind. On another occasion in Africa, he was the only one out of an entire busload of passengers to make any effort to render assistance to a native who had been seriously injured when a rickety, old truck he had been driving spilled over an embankment in an attempt to avoid a collision with the bus.

The thought of cobra venom to save lives and to alleviate suffering consumed Bill, almost haunted him, like a dream that would not go away. "You know how we are as kids," says Bill. "Some of us wish for a million dollars. I was like a kid. I wished that someday I would meet a scientist doing research in polio who would listen to my idea."

That day was just around the corner.

It was early 1949. Bill's cobras were dying regularly of a lung condition tantamount to pneumonia. He had tried many remedies, including medication. A friend, Frank Olson, sold ultraviolet lamps which were used in laboratories to maintain healthful conditions for experimental animals. Frank suggested that Bill install the lamps in the Serpen-

tarium. Bill was willing to try it. "I wasn't making much money," says Bill, "but I would have given anything to keep the cobras alive."

Frank was to return in a few days with suggestions for installation. But instead of lamps, Frank showed up with a handful of strange capsules and explained to Bill that after he had left the Serpentarium, he had called on Dr. Murray Sanders whose microbiological research laboratory was having similar difficulties keeping monkeys alive and who was interested in ultraviolet lamps. The coincidence was too much for Frank. He told Dr. Sanders about Bill's problem with cobras, and Dr. Sanders gave him a handful of antibiotic tablets to try on the cobras. The drug seemed to help, but Bill quickly exhausted his supply. He telephoned Dr. Sanders to see if he could not obtain more. Dr. Sanders, friendly and easy-going but ever the scientist, said he'd gladly supply the drug if Bill would keep records on its unusual use. Bill immediately rushed to Dr. Sanders' office, where he was invited to look at some monkeys. "This one," said Dr. Sanders, pointing to a paralyzed monkey lying in a cage, "has polio. We have injected the virus into his brain. We give these fellows polio so that we might better understand the disease when it strikes humans. We know so very little. . . ."

Bill could feel the flesh creeping all over his body. There it was! The wish coming true! The kid was being handed his million dollars.

The remainder of Dr. Sanders' conversation came through a haze. "I was utterly tongue-tied," Bill recalls. "I can't remember what happened after that. I can't even remember how I left the doctor's office and got back to the Serpentarium, but when I did I mentally kicked myself all over the place for not speaking up. Why didn't I tell him about my

idea? Why didn't I go right back and tell him? Was I a coward? I stayed awake all that night, first resolving to go back in the morning, then fearing the very thought of it."

Bill didn't know then that Dr. Sanders' interest in polio went back to his research days at Columbia University in 1937 and that Dr. Sanders was among the first to show an interest in a challenging concept of virology known as the "interference phenomenon," in which one infectious agent in the body could destroy another infectious agent without harm to the host, the human body.

But that night, pacing the floor with Bill, Clarita encouraged him to go back to Dr. Sanders, first thing in the morning.

"They might laugh at me," Bill protested.

"Maybe," said Clarita, "but if they're really looking for something to lick polio, they'll listen."

Bill's apprehension was understandable. He was a layman making a scientific suggestion—preposterous! Bill didn't know that such suggestions, while unusual, were not unique in the history of science. In fact, behind the celebrated story of Jenner's smallpox vaccine, which set the ground for Pasteur's science of immunology, there was the little-known history of how Jenner's work was inspired by a lay person, Lady Mary Wortley Montagu, the wife of the British ambassador to Turkey in the early 18th Century.

An intelligent, gregarious, party-loving woman who enjoyed meeting people and talking about any subject, Lady Mary was also a sharp observer and a prolific letter writer. In 1717, writing to a friend in England, she told about how some old Turkish women had virtually conquered the problem of smallpox, then the scourge of the world. She described what amounted to a crude vaccination technique, the women using large needles to scratch smallpox germs

into the veins of children who would then become ill with typical smallpox symptoms, shortly recover, and never again contract the full, fatal disease itself. Sometimes, there were "smallpox vaccination" parties for the children which, astonishingly, resembles a modern medical technique of bringing young girls together in a house where there is German measles so that the girls will get the disease at an early age, thus immunizing them against the hazards of contracting German measles while pregnant later in life.

"I am patriot enough to take pain to bring this useful invention into fashion in England," wrote Lady Mary, "and I should not fail to write to some of our doctors very particularly about it, if I knew any one of them that I thought had virtue enough to destroy such a considerable branch of their revenue for the good of mankind."*

When Lady Mary returned to England to promote the smallpox "vaccination," she encountered a violent storm of opposition. Her cause, ironically, was taken up by another layman, who set up a "vaccination" center in England, and later in America by Cotton Mather, whose home was bombed by outraged vigilantes of morality and health, even though he was supported by a Boston physician, Dr. Zabdiel Boylston. Jenner, impressed by further evidence—English milkmaids who rarely caught smallpox because they had been previously infected by cowpox—began his inoculation experiments on a human in 1796. The rest is popular history, although schoolboys now associate only the name of Dr. Edward Jenner with the conquest of smallpox.

Bill went back to Dr. Sanders and explained his idea. He could see, he recalls, how Dr. Sanders was interested but plainly torn between his desire to try the cobra venom on a

*Walker, Kenneth: *The Story of Medicine*, New York: Oxford Press, 1955, pp. 245-247.

few infected monkeys and the fear of losing valuable animals. Scientists have budget problems, too. Then Bill revealed the details of his own self-immunization, telling Dr. Sanders how he had taken injections of raw venom with no apparent ill effects and, indeed, was already giving himself a full lethal drop. Fearful that Dr. Sanders might turn him down, Bill promptly left, saying he'd be back the next day with a sample of cobra venom.

Next day, in the presence of several of the doctor's colleagues, Bill gave him the venom, and Dr. Sanders said, "Well, I suppose it's worth a try. I guess we can spare three monkeys." His colleagues agreed.

Dr. Sanders turned to Bill. "Would you like to work with us on this?" he asked.

"Would a fish refuse to swim?" Bill thought. Of course he would work with them!

They lost eight monkeys before a sub-lethal dose could be established. Then Dr. Sanders tried cobra venom on monkeys that had been infected with polio virus. The results were promising. Dr. Sanders and his colleagues were mildly excited and enthusiasm for the years of laborious work that lay ahead consumed Bill.

On the morning of April 7, 1954, Dr. Sanders invited me to his laboratory to watch an advanced, critical experiment. He was going to inject into the brains of monkeys a dose of polio virus that would be eighty times lethal, and then with cobra toxoid (toxoid is the term for a toxin that has been deprived of its virulence but not of its ability to stimulate antibodies) he would try to halt the onset of progress of polio in the monkeys. Dr. Sanders said that he had planned this experiment meticulously for weeks, even to the point of exercising with a rubber ball so that he could strengthen his grip on the monkeys, who were not anesthetized. He had

research assistants, plus two aides to help him catch the monkeys, hold them and return them to their cages. Together they worked with the quiet, practiced precision of a team in surgery.

"What if this experiment succeeds?" I asked.

"I'll go out and get drunk," Dr. Sanders replied.

Everyone, including the aides and Bill, standing beside me, all of us in white surgical gowns, could sense Dr. Sanders' air of jubilation over the possibility of announcing a treatment to save human lives and prevent paralysis.

Meanwhile, Bill already had received a contract from the University of Miami to enlarge his facilities and go to Africa for the required supply of cobras to meet the project's growing need for more venom. Moreover, if the research were to prove successful there would be an enormous demand for cobra venom and it was necessary to be prepared for it.

But long before that day in the laboratory in 1954, relations between Dr. Sanders and Bill had become strained to the point of enmity. After Bill had returned from Africa in 1950, he had worked at a furious pace, averaging over four hundred cobra extractions weekly and was bitten six times by cobras that year. Later, one cobra bite was serious enough to rush Bill under police escort to the hospital where an iron lung was kept at his side. But it was not used, neither was antivenin, and he walked out of the hospital the next morning.

While Dr. Sanders and Bill were in New York to show a dramatic film of the monkey experiments to a drug company, hoping to obtain a grant to enlarge and continue the polio project, the story of the research, which Dr. Sanders had hoped to keep secret, leaked out in a Walter Winchell radio broadcast and then in one of the famed columnist's newspaper articles.

By this time, December, 1950, Bill was perturbed that Dr. Sanders had not yet published any of his findings. Dr. Sanders' toxoid, disguised in the records as a vitamin, had been secretly administered to hospitalized patients in Miami. Some of the results were dramatic, if not spectacular.

As later reported in a Sunday supplement article by distinguished author Philip Wylie, a good friend of Dr. Sanders, one beneficiary of the toxoid had already received the last rites. Another polio victim, a pretty young girl, "had been put in an iron lung with paralysis of limbs and respiratory center," according to Mr. Wylie. "Specialists told her parents she would never be able to walk again."* After she had received the toxoid and was discharged from the hospital, Mr. Wylie's article was illustrated with a photograph of the former patient, smiling, actively washing an automobile. Ironically, the toxoid had been administered also with apparent success to the son of a hospital trustee who had originally objected to the secret trials on humans.

Bill knew about these cases and others. Several years later he received a letter from the president of an oil company thanking him for providing the venom that had saved his child, a polio victim. Bill thought that since the toxoid was at least harmless, it should be made known and wherever possible used on polio patients.

Dr. Sanders did not agree. He felt that the laboratory work and the human trials were still limited. One of the purposes of the trip to New York was to get cash for setting up a broad, controlled clinical experiment on hospitalized polio patients. But when the Winchell story broke, Dr. Sanders thought that Bill had "leaked" it to get publicity for the Serpenterium, and Bill thought that Dr. Sanders had

*"Will Snake Venoms Stop Polio," *This Week*, Nov. 29, 1953, pp. 7-9.

done it to promote his own name and fame as a scientist. Even now, nobody knows how Winchell obtained his information, although the project was an "open secret" among many newspapermen in Miami. At the request of the University of Miami, the Florida journalists had accepted a mutual pledge of silence until the University could publish the first report in a scientific journal. Several reports finally were published about three years later by Dr. Sanders and his colleagues. It was, as the University later admitted, an unusual delay in reporting experiments.

Dr. Sanders apparently had reasons for his personal, if not professional, caution. Many were puzzled. Why, for instance, wasn't Dr. Sanders able to obtain a grant from the then active and highly promotional-minded National Foundation for Infantile Paralysis? I tried to find the answer myself. I talked to a number of officials at the Foundation in New York, at the Rockefeller Institute and at leading drug companies. All answers were evasive and many were conspicuously hostile to Dr. Sanders. Clearly, Dr. Sanders had enemies in the world of science. Some of the antagonism could be traced to his earlier polio research work at Columbia University. Dr. Sanders had published a scientific report on what appeared to be some promising anti-polio results with a drug produced by Lederle. But other scientists were unable to duplicate Dr. Sanders' efforts, and it looked bad for Dr. Sanders. He was criticized for his work. Lederle officials said it embarrassed them.

"I'm havng a battle with them," Dr. Sanders told me then in Miami, referring to the Foundation, "but they have done us a great deal of good instead of hurt." He did not elaborate on the cryptic reference to "good instead of hurt."

Apparently, Dr. Sanders had attempted to obtain Foundation assistance indirectly, through a friend. Dr. Sanders

thought that his “suggestive” findings with the cobra toxoid warranted the Foundation’s support. But referring to a letter he had received from a Foundation official, Dr. Sanders said he was told “it isn’t enough that your results are suggestive. They had better be striking, or else. . . .”

The “or else,” said Dr. Sanders, was a clear threat that if he failed to produce a successful drug to combat polio, his reputation would be ruined.

Was this the politics of science?

Foundation officials denied that Dr. Sanders had sought a grant from them and, in fact, they knew little about his work. But in 1954, when a reader wrote a letter to the editors of the supplement that had published Mr. Wylie’s article, seeking more information about the toxoid, he was told by an editor: “I was very sorry to hear that you have had trouble in trying to learn about Dr. Sanders’ treatment for polio. I’m afraid that you have run into a political argument which, sad to say, occasionally happens even in scientific circles.

“The facts are that the National Polio Foundation (sic) despite its denials has been kept directly informed on Dr. Sanders’ experiments.

“His work has also been reported in the appropriate medical journals. The Foundation’s denial of this apparently stems from the fact that they are backing Dr. Salk’s serum, and refuse to consider other therapies.”

These were serious charges which, at the time, were not brought into the open.

Nonetheless, after the Winchell revelations, the University of Miami and Bill and Dr. Sanders were besieged with requests from almost every major newspaper, magazine, radio and television station in America for details of the polio project. It exemplified an overpowering, nationwide

emotional reaction, easily attributable to the Foundation's massive, impassioned fund-raising campaigns and anti-polio publicity. But for a long time neither Bill, Dr. Sanders, nor the University would grant interviews. Bill had said that he wouldn't, and he didn't, turning away priceless publicity. Once, he even rejected a request to appear on a major network radio show which had reached him by telephone while he was in conference with University officials and Dr. Sanders.

By the time the polio project had ended, more than 2,400 monkeys were expended, plus 250,000 laboratory mice. The project died, according to Dr. Sanders, "a natural death" with the announcement of the Salk vaccine to prevent polio.

Was the cobra-venom toxoid effective for humans?

"I think it was," said one leading physician, a polio specialist who had administered it to patients in Miami. He termed some of the recoveries he had witnessed "miraculous."

Even now, Bill Haast has not lost faith in the toxoid. He believes that if it were introduced as a proven drug it could still help those in this country and abroad who are struck by polio in spite of the vaccine—especially in those areas of the world, including the United States, where widespread introduction of the Salk vaccine has been unsuccessful due to primitive conditions, lack of education and local economics.

Asked about his toxoid in March, 1965, Dr. Sanders replied: "I flatly state unequivocally that so far as I am concerned the fifteen years of experience obtained with the cobra venom toxoid by all means indicate the advisability of continued research with it and that it has definite therapeutic value. This is my opinion based on clinical observation with at least two hundred doctors and over a period of years."

KING COBRAS

...world's deadliest challengers...

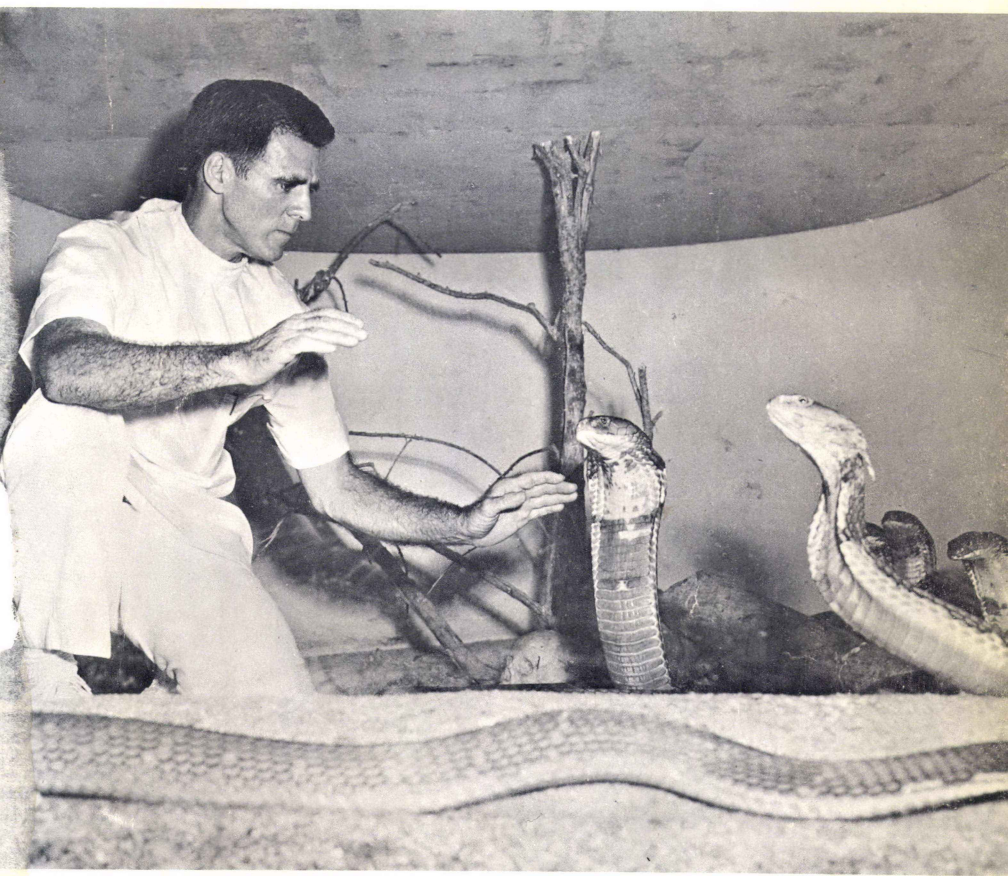


Photo by Dade W. Thornton

The King Cobra — fiercely aggressive and wily — is believed to be most dangerous beast in the animal kingdom. A single drop of its venom could kill fifteen adult humans. Shown here, 1958, William E. Haast, Miami Serpentarium founder and director, faces five King Cobras. Four years later he became only human to survive King Cobra bite, one of many dramatic highlights in a lifetime devoted to supplying venoms for research.

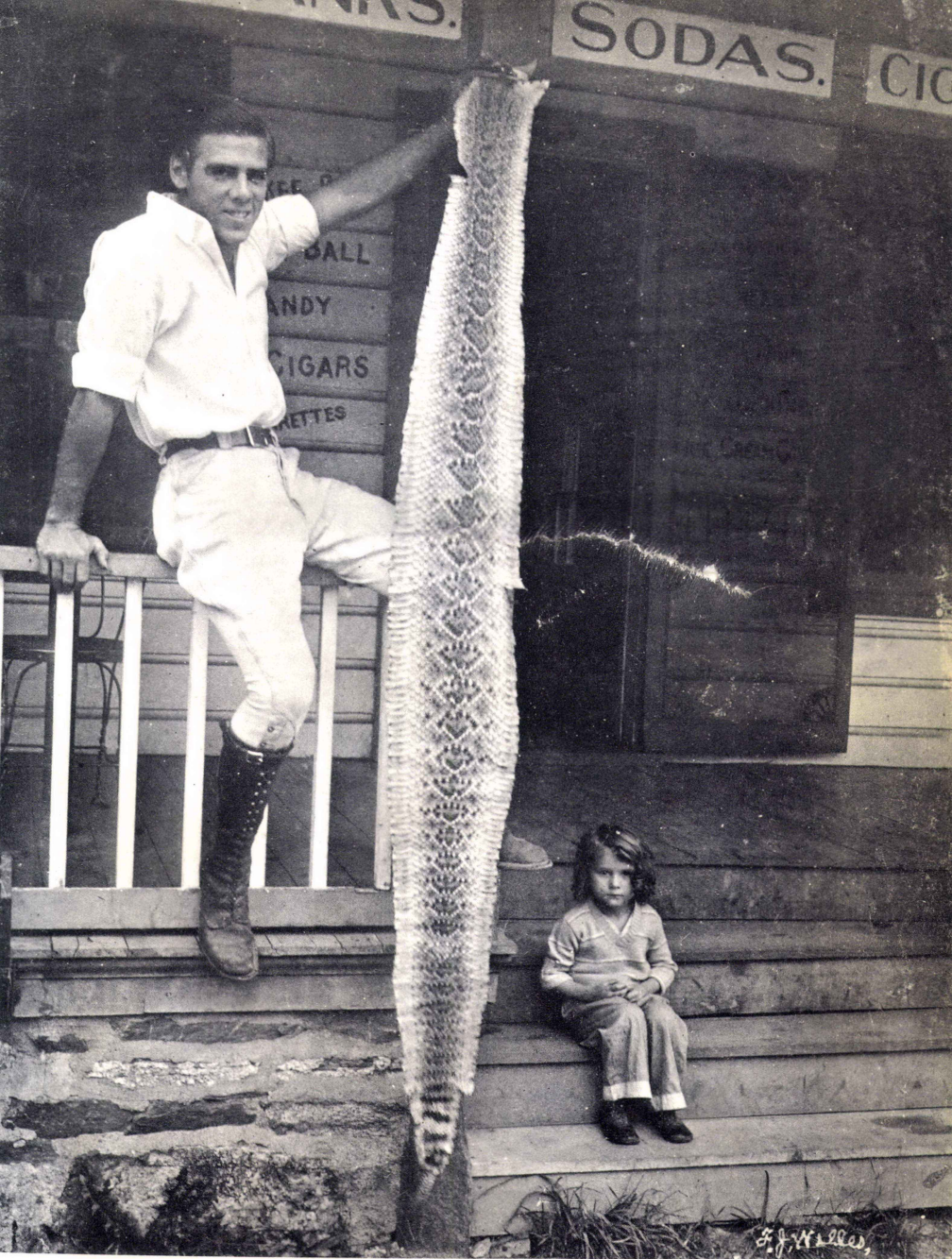


Bill Haast's interest in snakes started on banks of river near his Paterson, N. J. birthplace. Coiled around arm is a small rattler.

Something Bill would not do today: hold rattler on lap.



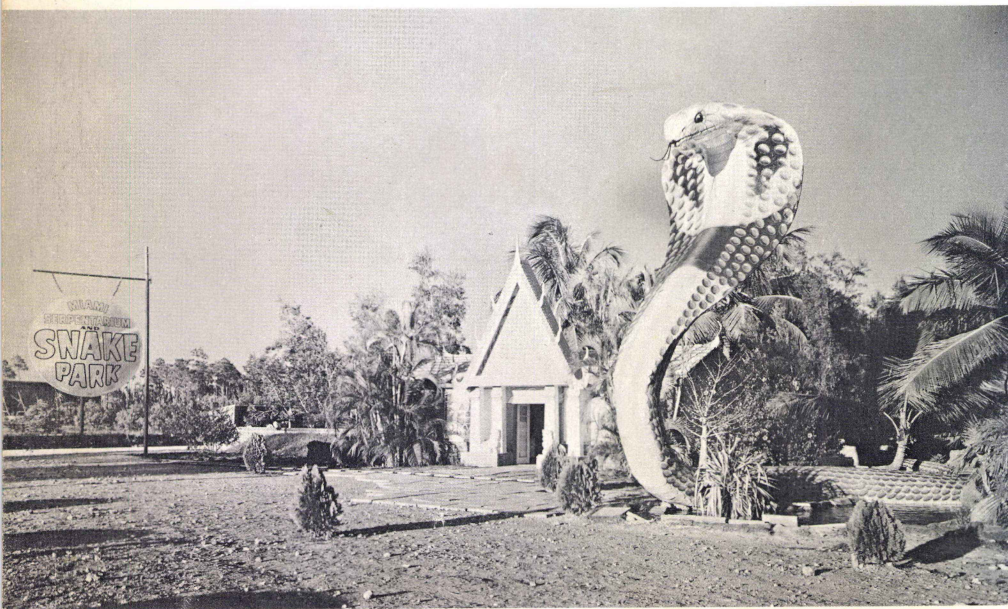
He caught his first rattler while in Boy Scout camp not far from home. First venomous snakebite occurred at Scout camp.



At the age of twenty-one, Bill was a veteran snake hunter in his favorite forest area, Greenwood Lake, N. Y., near state-park compounds of Bear Mountain. Unusual skin specimen, Texas diamondback rattler, intrigued a local, bearded photographer who admired young Haast.



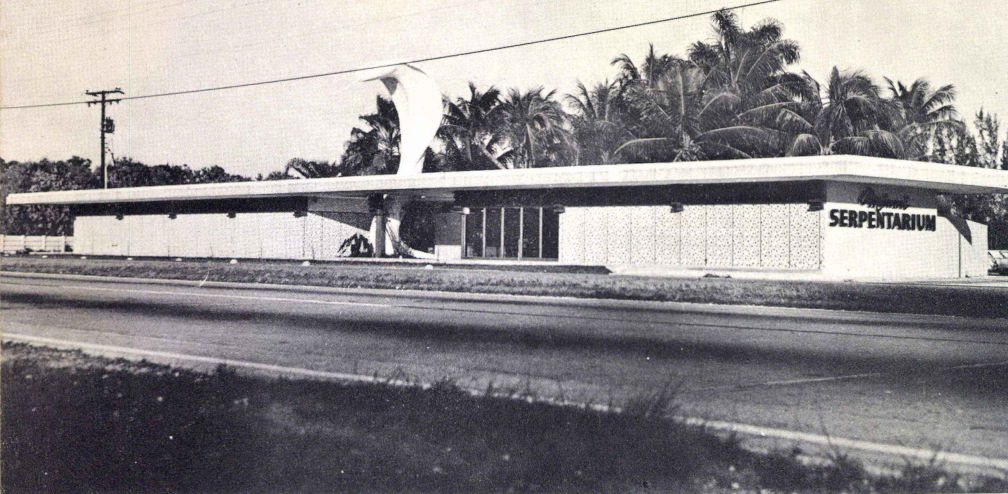
Shortly before official 1948 opening of his rudimentary snake exhibit off U.S. Highway One, a few miles below Miami, Bill poses proudly at wheel of his car parked at main entrance of unfinished-cabin admission hall, later to grow into colorful facade in the style of a modern Taj Mahal.



Emerging from primitive exhibit stage, Miami Serpentarium begins to take shape as an attraction that lures many visitors for guided, lecture-tour and public demonstrations of venom extractions. Huge replica of King Cobra glistening in sun is symbol of challenge he faces daily.

Wife, Clarita Haast, during early days of Serpentarium frequently hopped into pits with rattlers and moccasins to demonstrate characteristics of venomous snakes. Here she uses hooked snake stick to keep huge diamondback rattler off balance. Now, at home, insects frighten her!





Harry Kursh

Attractive, modern Miami Serpenterium, built around huge King Cobra replica, sits majestically adjacent to shoulder of northbound lane of South Dixie Highway. Facade is all tile of variegated colors, simulating Asian patterns. Modern office and laboratories take up entire left side of building.

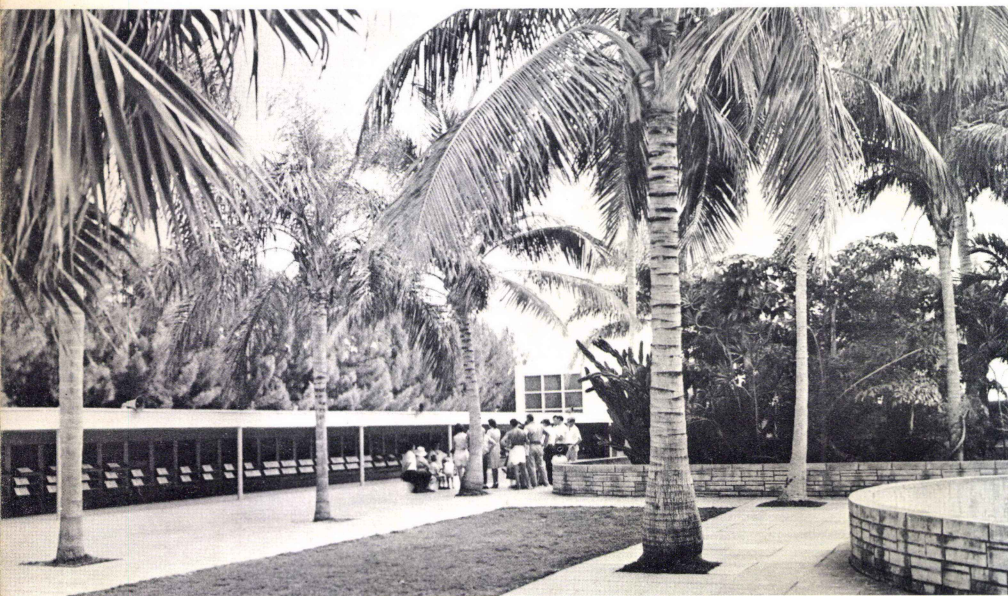


Photo by Dade W. Thornton

Beyond front entrance, lies immaculate garden with shade provided by transplanted palm trees. Narrated tours take visitors around pits containing snakes, then along concrete corridors of snake cages, where Bill Haast daily extracts venoms from many exotic species, including cobras.

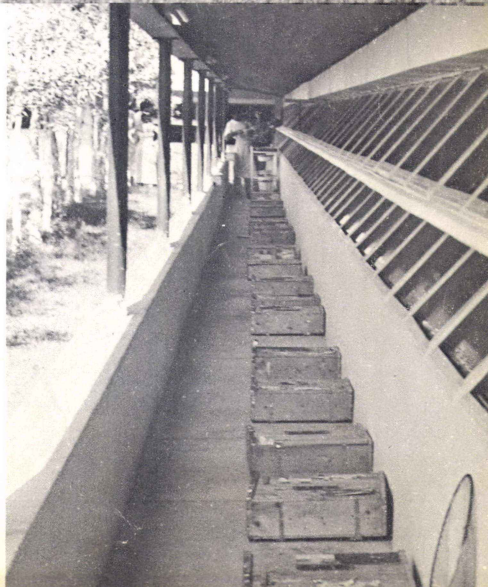


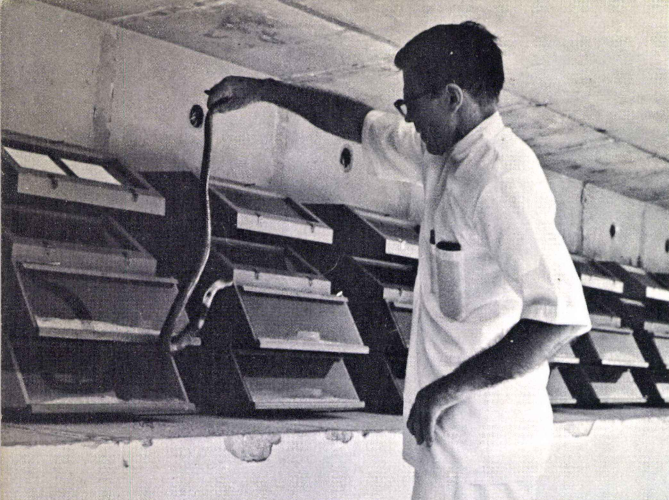
Wide World Photos

Every Sunday, King Cobras are brought from cages, placed on lawn, then caught for venom extractions. Fierce aggressiveness of King Cobra is shown in this remarkable photo of swift, upward strike. Bill Haast gets clue to wily cobra's intent by concentrating on snake's eye movements.

Early photo of concrete corridor containing cages for venomous snakes gathered from all corners of the globe.

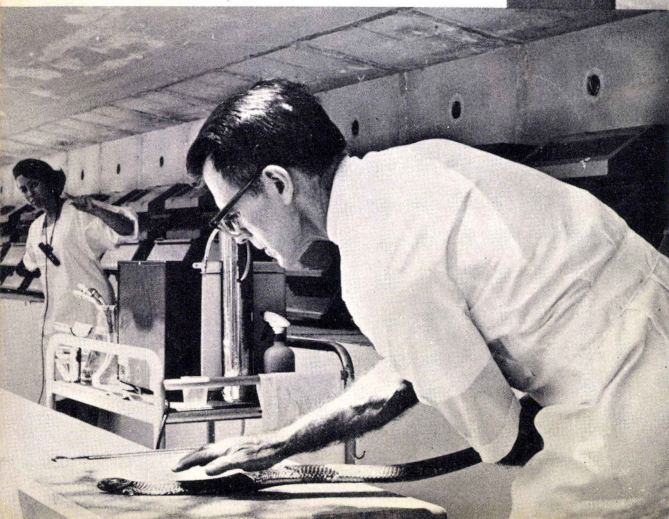
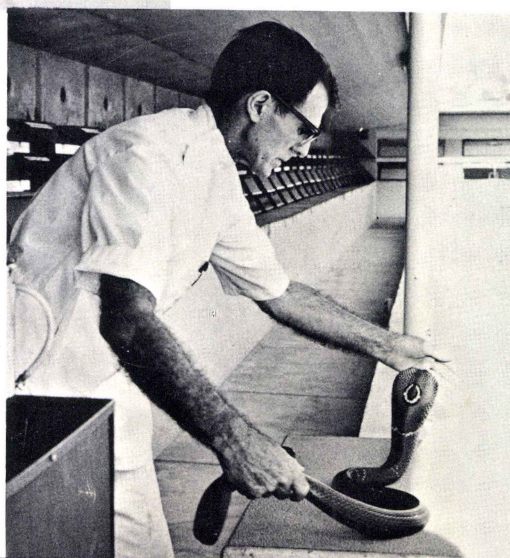
Photo by Dade W. Thornton





Cobra, left, held by tail is kept off balance when carried from cage to "catching board" prior to extraction.

On "catching board," right, Bill Haast distracts cobra with one hand, preparing to release tail and catch snake behind neck with other hand.

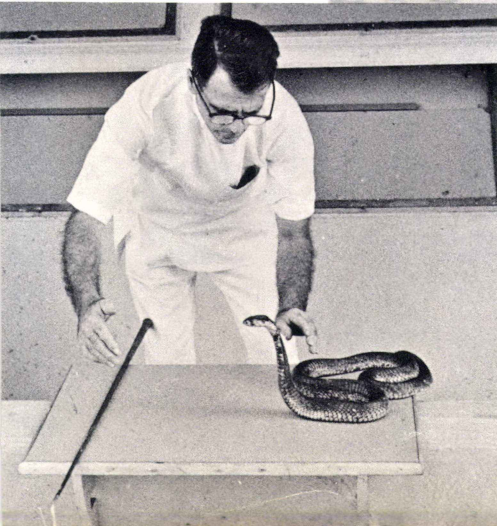


Flat on "catching board," its hood no longer spread, cobra is still in risky catching position. One recent cobra bite occurred from this position.



Another technique, left, is to "trick" cobra into watching movements in crowd before it, then Bill closes in with other hand.

While wife, Clarita, narrates over portable transmitter-microphone, Bill demonstrates another technique for catching cobras to extract venoms.

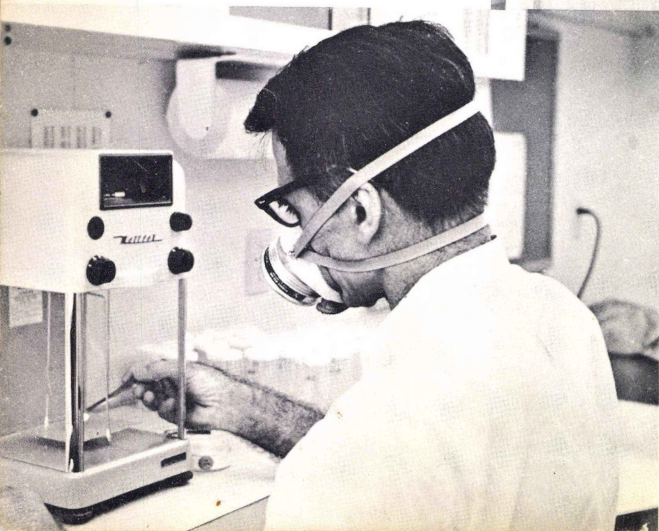
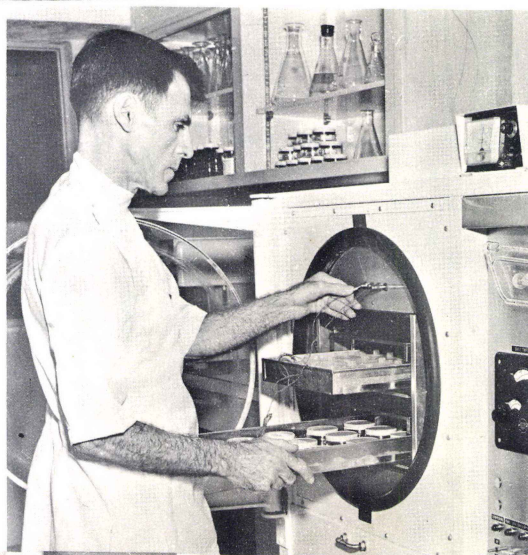


Left, snake hook shown on "catching board" is also used to carry snakes from cages, sometimes to help catch snakes when flat on board or "escaped" in concrete corridor after fall from hook.

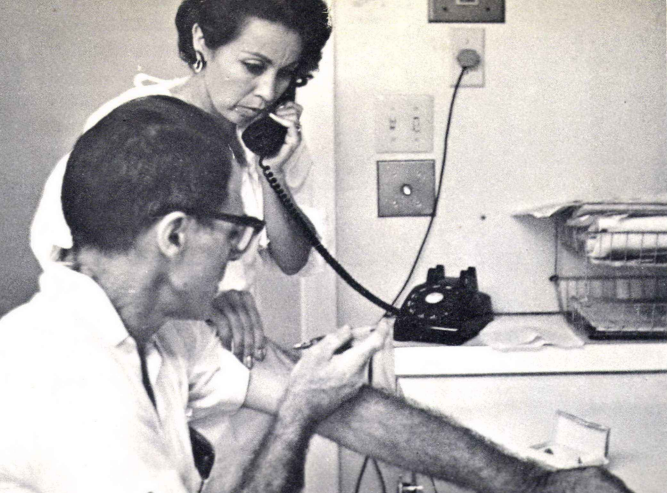


Left, King Cobra injects its venom voluntarily into glass vial before wondrous eyes of young visitors.

Bill Haast processing venoms by freeze drying in latest scientific equipment, sublimator, designed and manufactured for him by The VirTis Co., Gardiner, N. Y. Freeze drying helps produce venom of high quality for research.

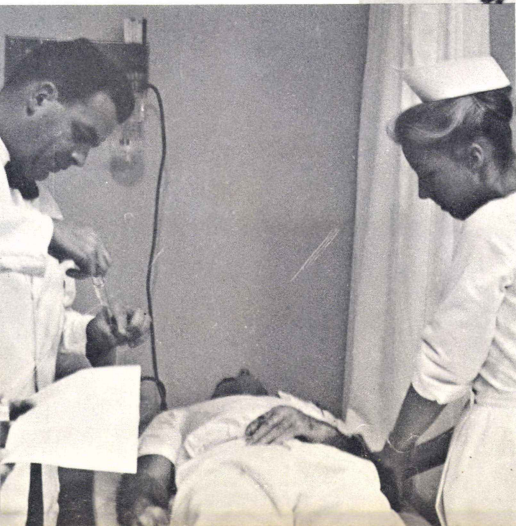
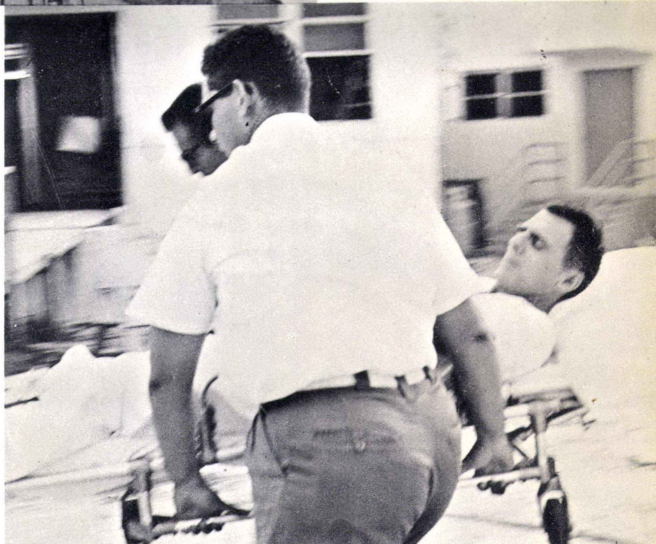


In laboratory, now allergic to dust of processed venoms, Bill Haast, wearing protective mask, carefully weighs dried venom on electronic scale.

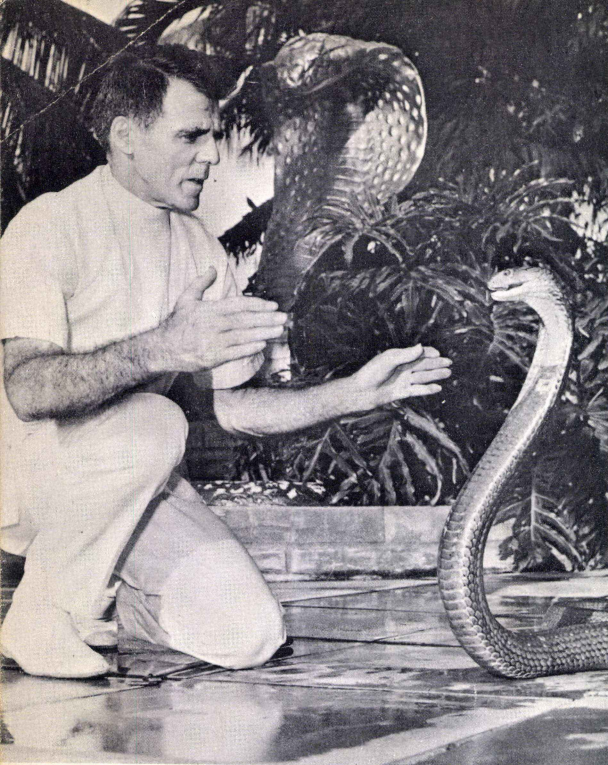


Photo, left, by author, was taken minutes after cobra bite in Sept. 1964. Bill Haast injects antivenin while wife starts emergency calls for police escort to hospital and physician.

Bill, on stretcher, is rushed into ambulance which sped to hospital at up to 125 mph. Relaxed in ambulance, Bill has faith in his *immunized blood* to pull him through another vicious bite.



At hospital, no time is lost by standby team of physicians and nurses who continue antivenin injections. No serious symptoms occurred. Fully recovered, Bill walked out of the hospital following morning.

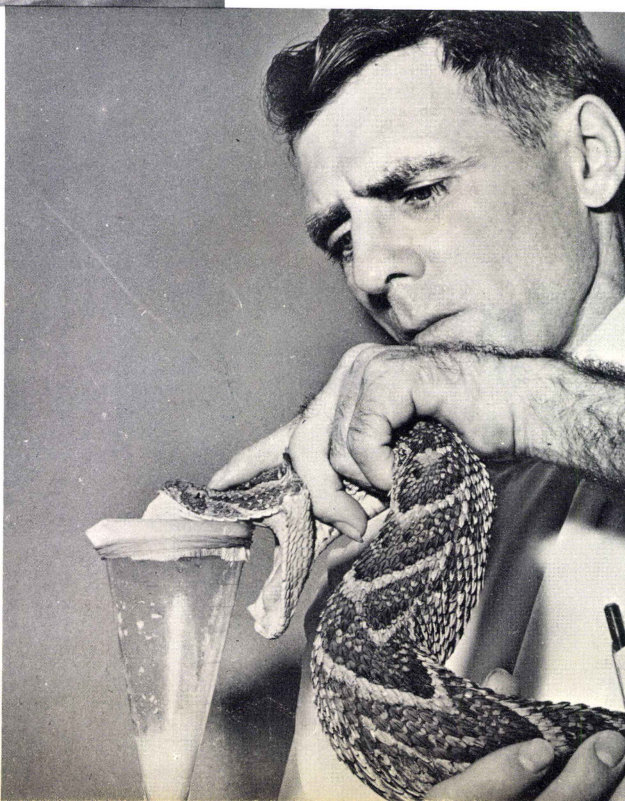


Left, real King Cobra, posed in front of small gold-colored replica in Serpentarium garden, shows intense stare of its large, round lidless eyes just prior to strike. Hood spread with majestic beauty shows snake's angry defense.

Photo by Dade W. Thornton

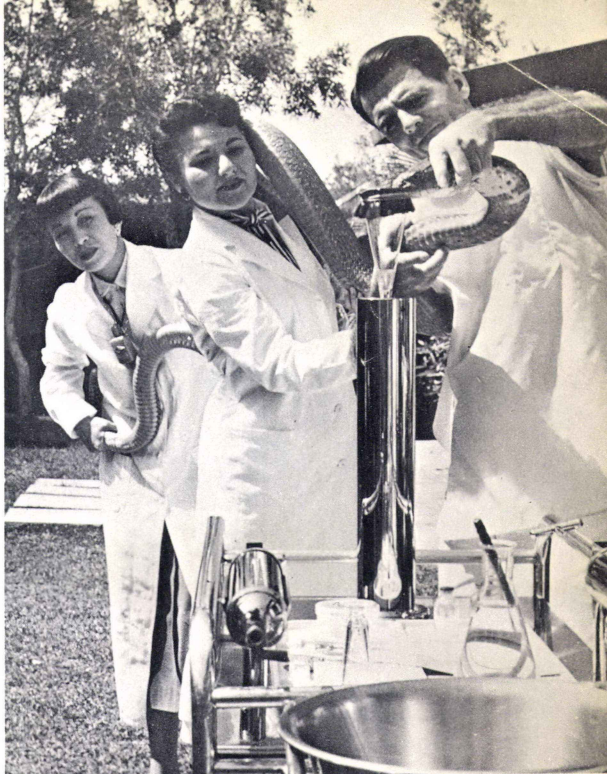
Extracting venom from deadly African puff adder, Bill Haast sometimes uses finger to gently massage snake's glands, encouraging injection of more venom. Venoms of different species are collected in separate vials for processing.

Miami Serpentarium



Early photo, right, shows Bill with help of wife, Clarita (rear) and secretary, Mrs. June Nadel, bringing head of King Cobra to extraction stand where it bites voluntarily over covered vial held firmly in position by clamped metal tube attached to instrument-laden cart on wheels. Vial is placed immediately in portable freezer then stored in laboratory freezer for later processing.

Photo by Dade W. Thornton

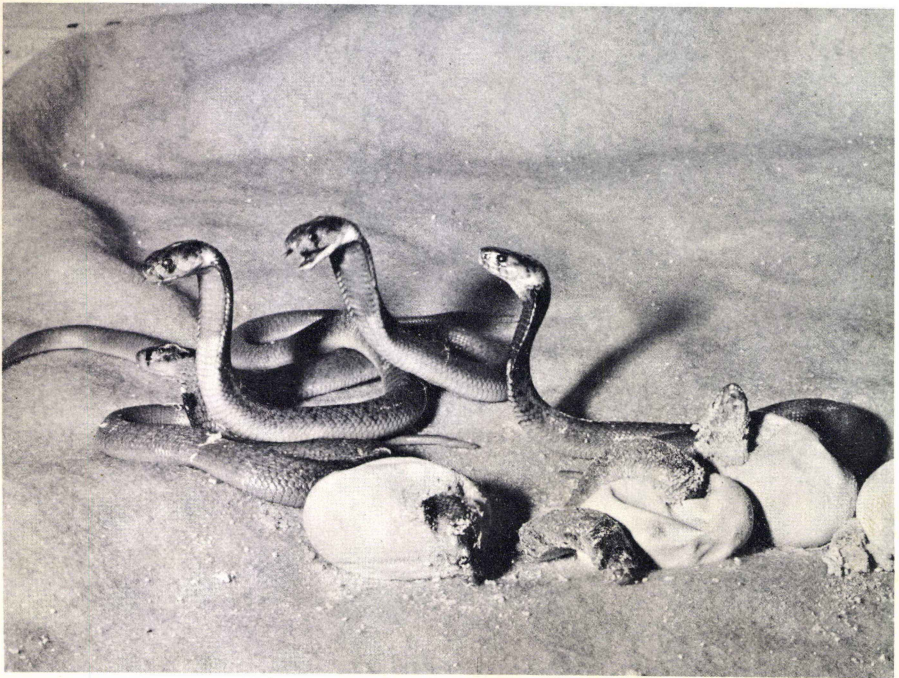


Force-feeding technique developed by Bill Haast over period of years helps snakes live longer, healthier lives for high-quality venom production. Feeder, designed by Bill, squeezes special formula of food through tube inserted into snake's mouth.

Photo by Dade W. Thornton



Unusual photo above shows emergence of baby cobra at instant of hatching from egg. Glove is necessary protection. Snakes have venomous bites even from moment of birth.



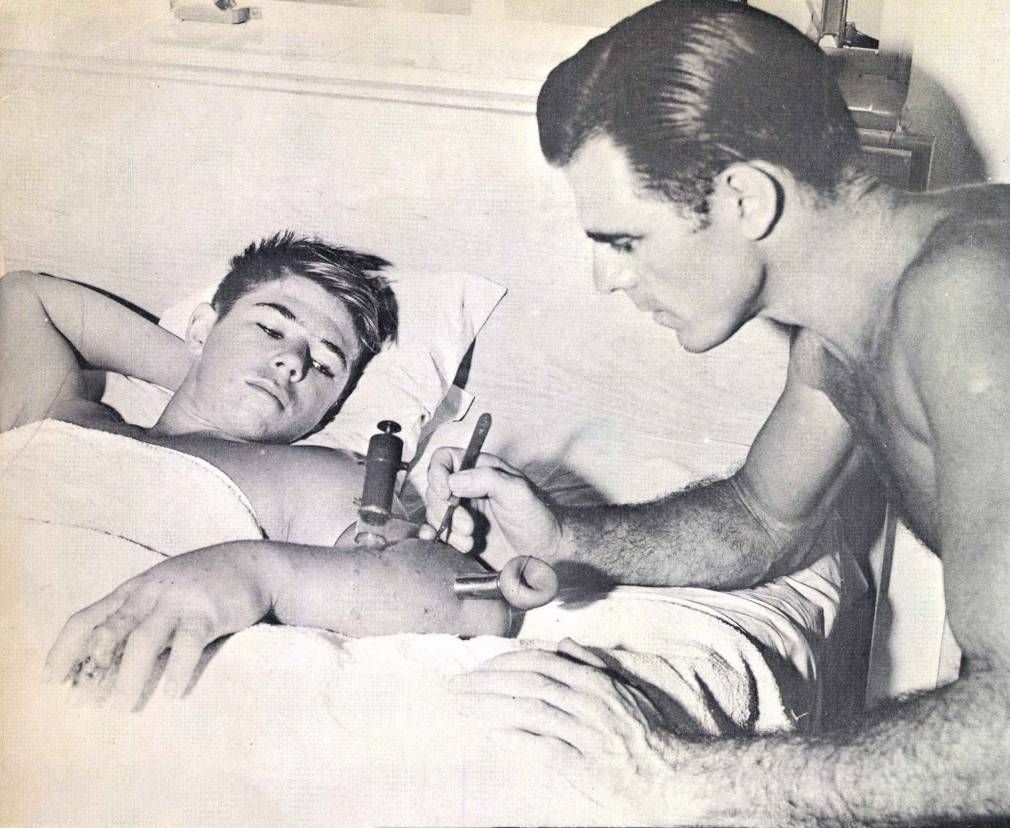
Shortly after emerging from eggs, baby cobras show classical instinctive reaction, the spread hood, sign of irate defense during striking stance.



Visiting photographer caught this photo above at Serpentarium just a fraction before actual bite of cobra as cage was opened.

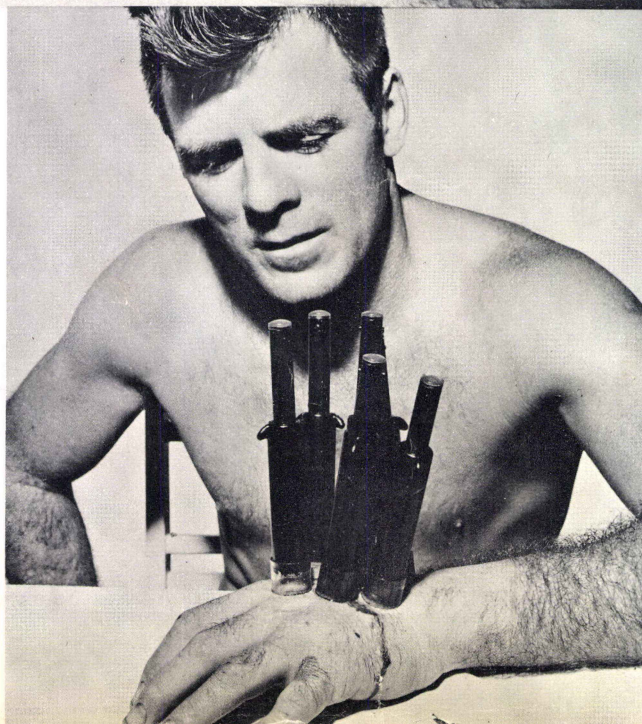


Fang marks of bite, circled, show clearly on left index finger of Bill Haast as cobra retreats to corner.



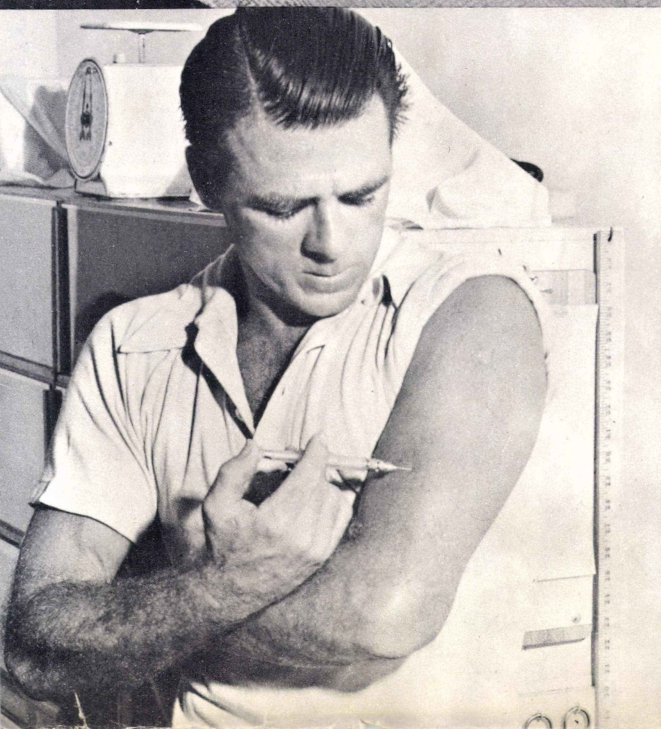
Early photo shows son, Bill Jr., receiving emergency treatment for rattlesnake bite as swelling races from finger up arm. Technique, no longer used by Bill, was to incise wound and pump out poisoned blood.

Prior to immunization and use of antivenin, Bill Haast, in another early photo is treating himself. When plungers in small "pumps" rise, blood is drawn from incisions.



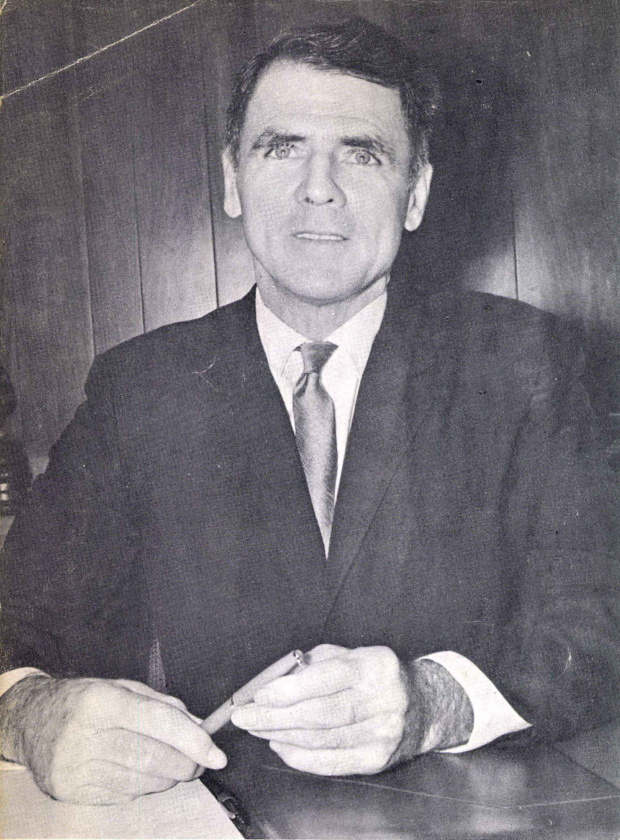


After "pumps" are removed from incised wounds (photo above) blood continues to ooze from openings. Fang marks, circled, show clearly on left index finger. Technique was abandoned later for exclusive use of antivenin.



On Jan. 10, 1948, Bill Haast started daring program of immunizing himself against the neurotoxic venom of cobra bites. His immunization was maintained with "booster" injections.

Photo by Kaye & Moldan



In rare pose, behind office desk in his modern Miami Serpentarium, Bill Haast, now in his fifties, enjoys discussing herpetology, venoms and venom research with scientists. His many admirers include physicians, university professors, and researchers in varied scientific disciplines throughout the United States. Unpretentious, he prefers the open-collar shirt and slacks to business suit.

Clarita Haast, petite and attractive, with blue-green eyes and flawless complexion, married Bill in 1947 after exciting, brief romance. She met him at Miami studio of his photographer-friend, Dade Thornton, where she worked as secretary and photo colorer.



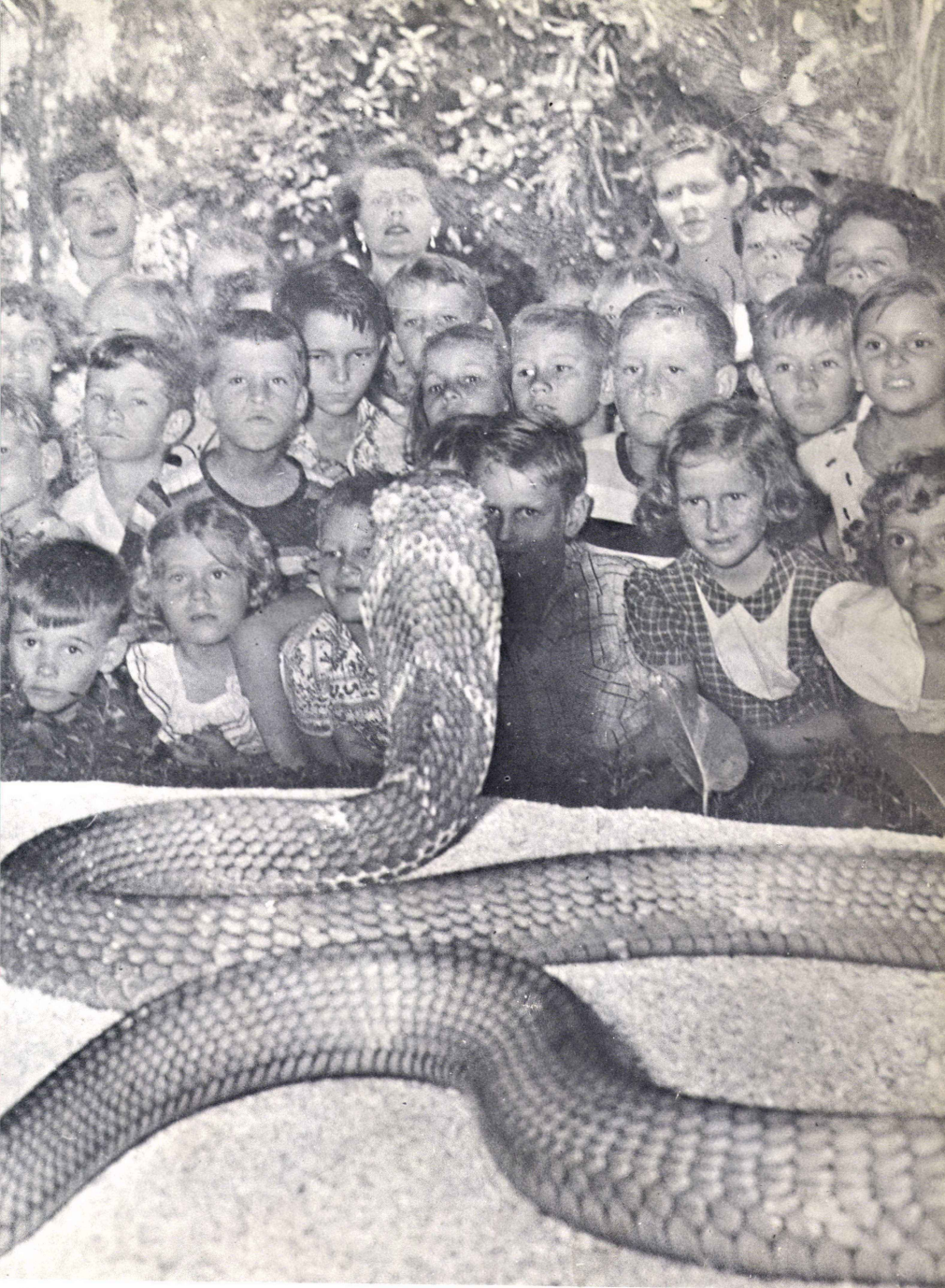


Photo by Kurt Severin

Many school classes, receiving special rates, visit Miami Serpentarium throughout the year. Children as well as adults never fail to be intrigued by sight of hooded King Cobra in its classical stance of hooded defense. Early photo shows King Cobra in glass-lined cage.



Photo by Kurt Severin

Narrated tour of Miami Serpentarium begins with introduction to harmless blue indigo snake which almost never bites even when roughly handled. Budding naturalist here is interested in closer examination of snake's scales.



Photo by Kurt Severin

With head of dead rattlesnake, Bill Haast vividly demonstrates how sharp retractable fangs, curving inward, bite through flesh like a pair of hypodermic needles. Wound of recent cobra bite (dark spot on left index finger) still shows.



Photographer was present when Bill Haast was bitten by cobra. Here, Bill, pausing before treatment, shows fang wounds on finger to horrified visitors. First rule after venomous snakebite: never panic!



Photo by Dade W. Thornton

Bill Haast, bearded, has travelled widely to collect exotic species of snakes. Wife and friends help here to unpack crated python.

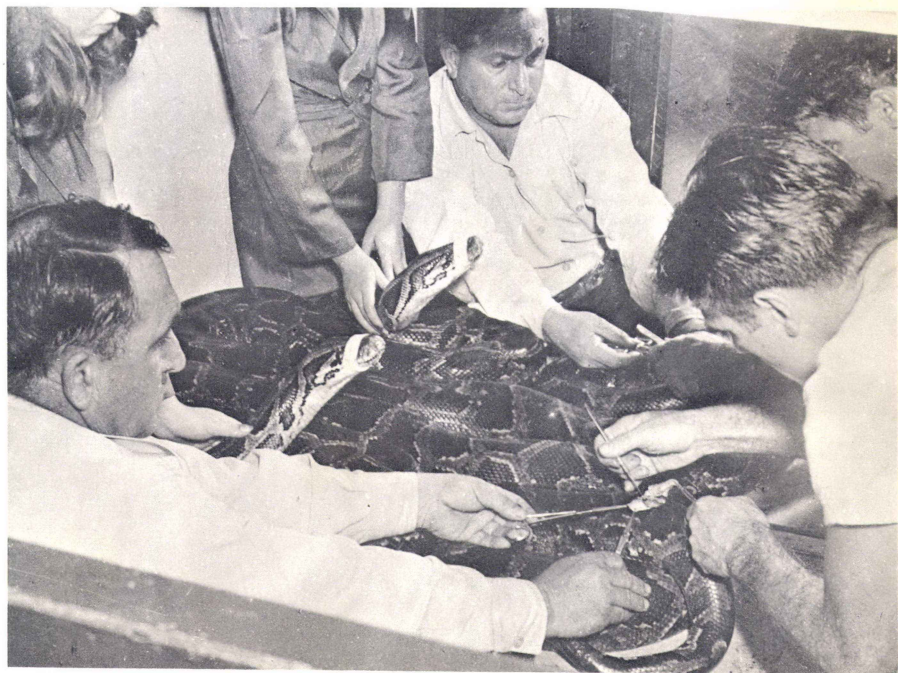


Photo by Dade W. Thornton

Bill, in corner, (right) performs surgery on python while friends help.

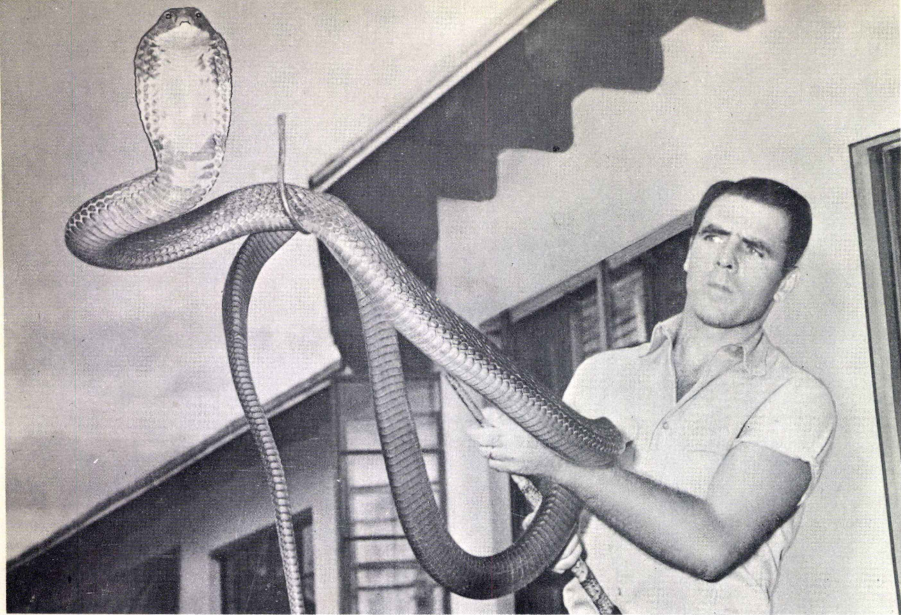


Photo by Dade W. Thornton

Unusual photo, 1952, shows how Bill Haast carries huge King Cobra from cage off balance on large, hooked stick. Spread hood indicates King Cobra, largest of venomous species, is prepared to strike.

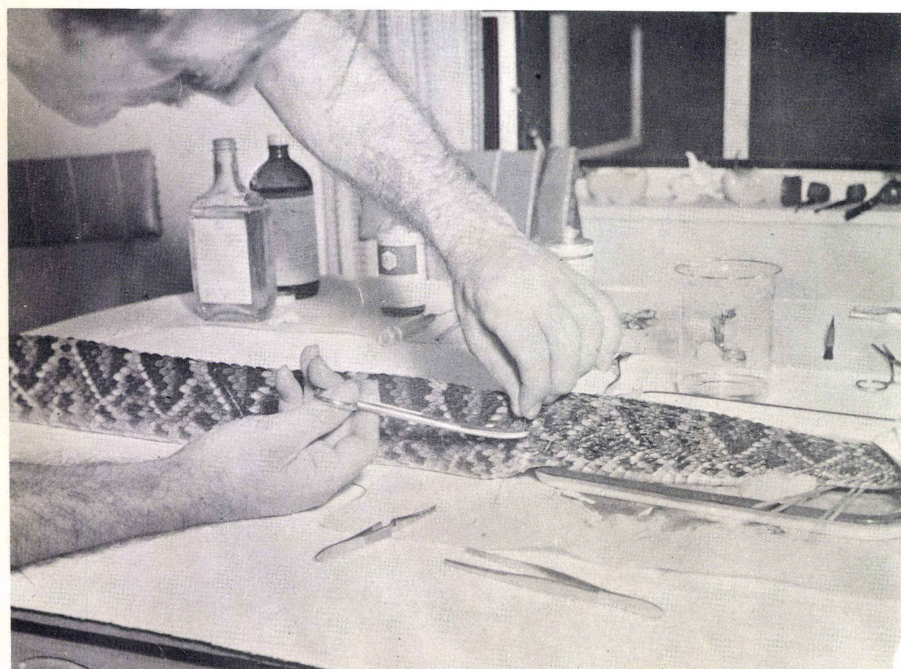


Photo by Dade W. Thornton

Before he built a modern laboratory, Bill treated snakes in an apartment at rear of Serpentarium.



Bill Haast, microphone around neck, discusses "their majesties, the cobras," with noted Marlin Perkins, producer of famed NBC-TV network show, "Zoo Parade." Shortly after this live telecast from the Miami Serpentarium, Bill, hospitalized and near death from cobra bite No. 26, was placed in iron lung. Mr. Perkins saw Bill in office only minutes after the bite.

Taken through shield only inches from lens, this remarkable close-up of cobra, its hood spread in anger, shows intense, cold stare of lidless eyes. Bill Haast has survived unprecedented number of venomous bites — eighty-five as of March 1, 1965, nearly half of them cobra bites. Dr. Ben Sheppard, well known Miami physician, has treated Bill for more than fifty bites and believes now that Bill is about “ninety-five per cent” immune to neurotoxic venoms of cobras. Bill was first human ever to attempt self-immunization against cobra bites.

Photo by Kurt Severin

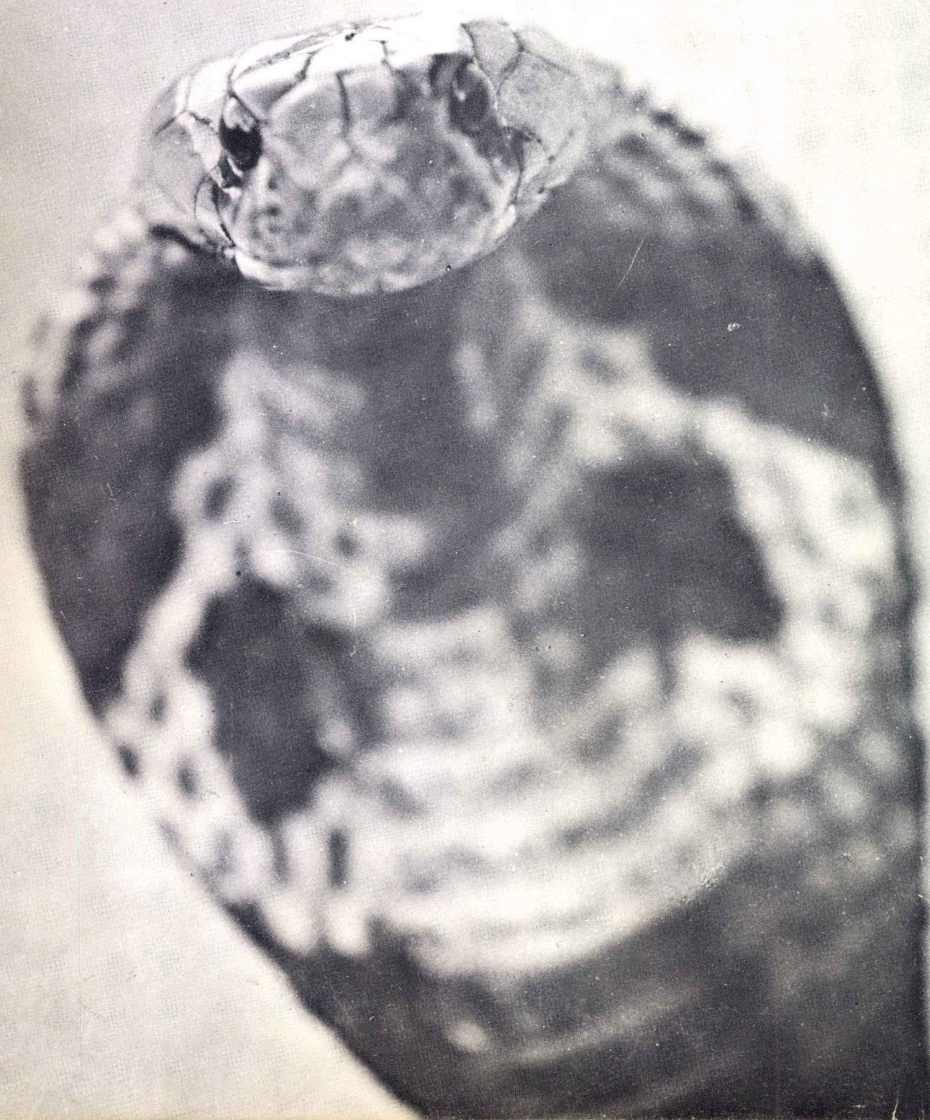




Photo by Kurt Severin

Over the years, Bill Haast has handled cobras several hundred thousand times! Gloves and other protective gear are impractical in his venom-extraction procedures. Small, vicious cobra shown here, starting to strike at right hand, will be caught with Bill's left hand.

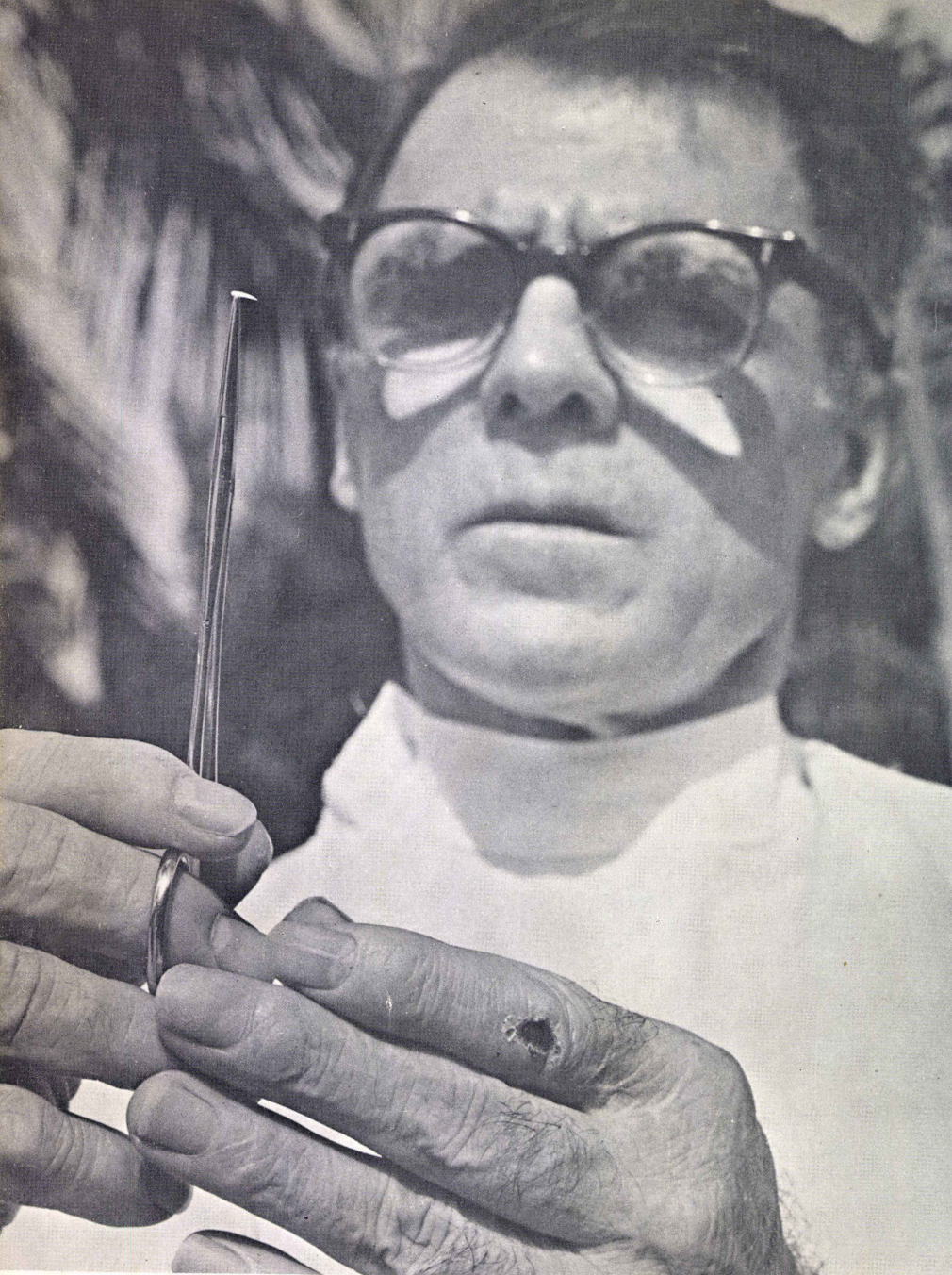
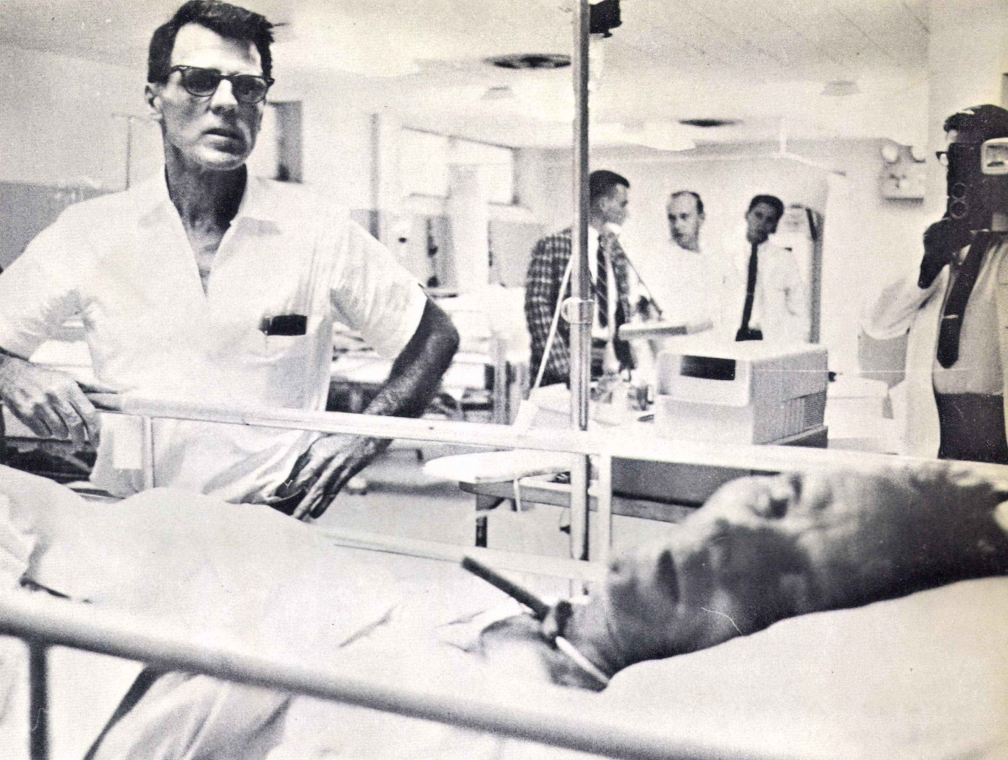


Photo by Kurt Severin

Bill shows small but effective cobra fang, typical of African cobra that bit him shortly before this photo was taken. Dark wound on left index finger shows tissue-destroying damage caused by chemical substance in snake's venom.

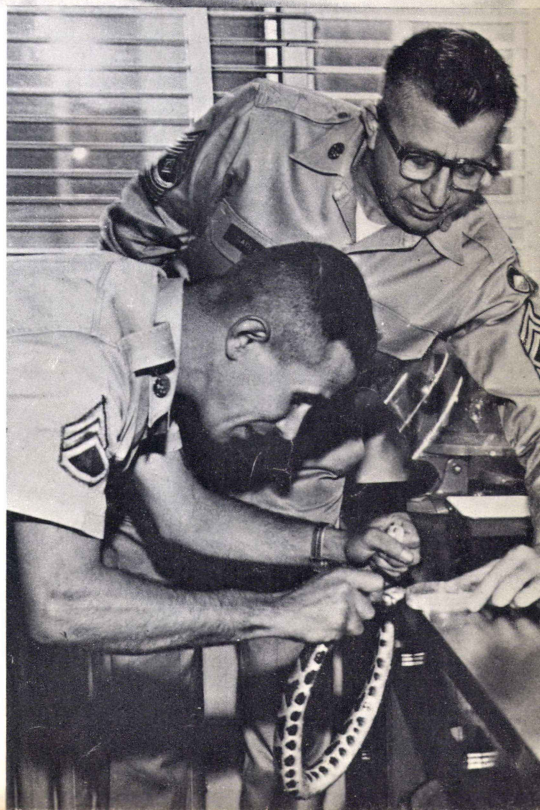


Florida Times-Union Photo by Bart Parker

At Duval Medical Center, Jacksonville, Fla., Bill stands at bedside of victim of lethal coral snake bite, Feb., 1965. It was ninth time Bill had responded to emergency call for transfusion of his immunized blood serum. Patient, showing tracheotomy, was in critical condition before transfusion.

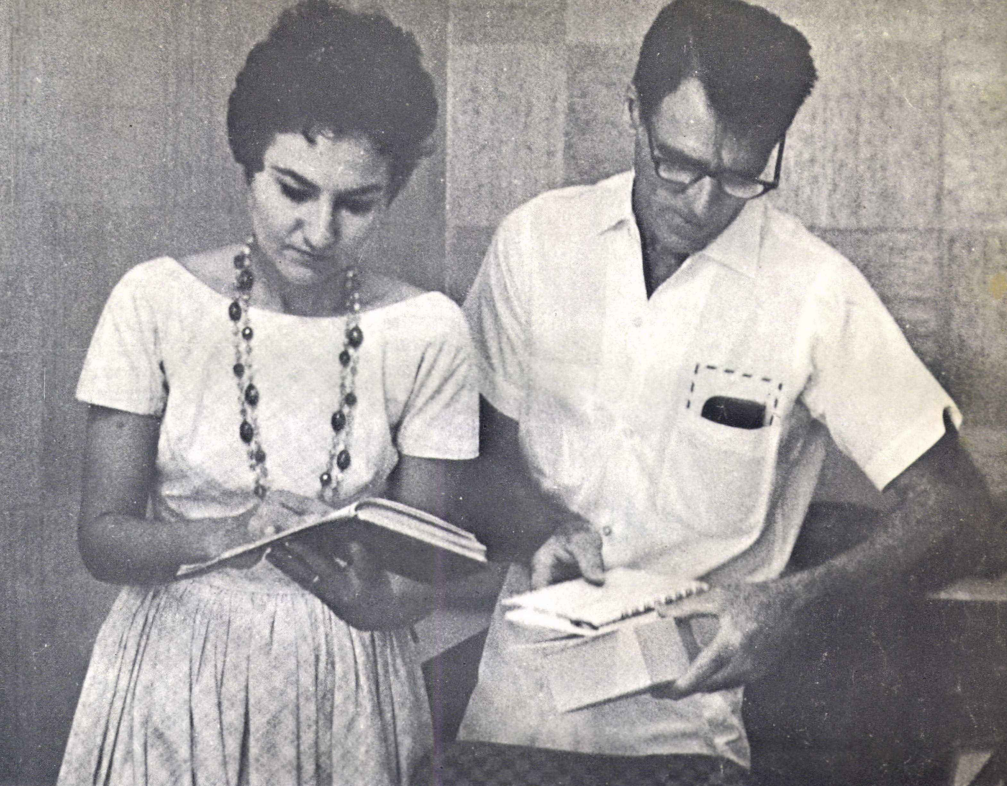
Research interest in venoms is world wide. At right, July, 1964, U.S. Army technicians, stationed in Japan, extract venom from *One Hundred Pace* snake (*Agkistrodon Acutus*) with reported "kill" rate of about twenty-five per cent of its human victims. Purpose of venom extraction here is to help produce antivenin.

Army News Features



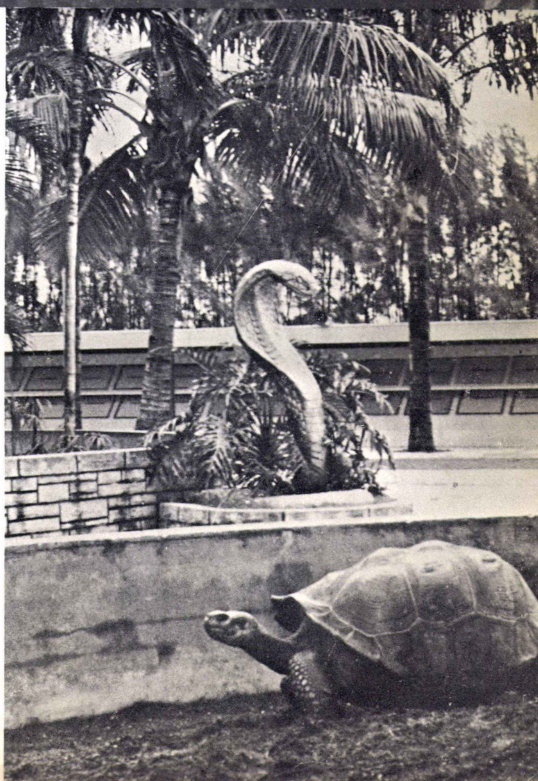


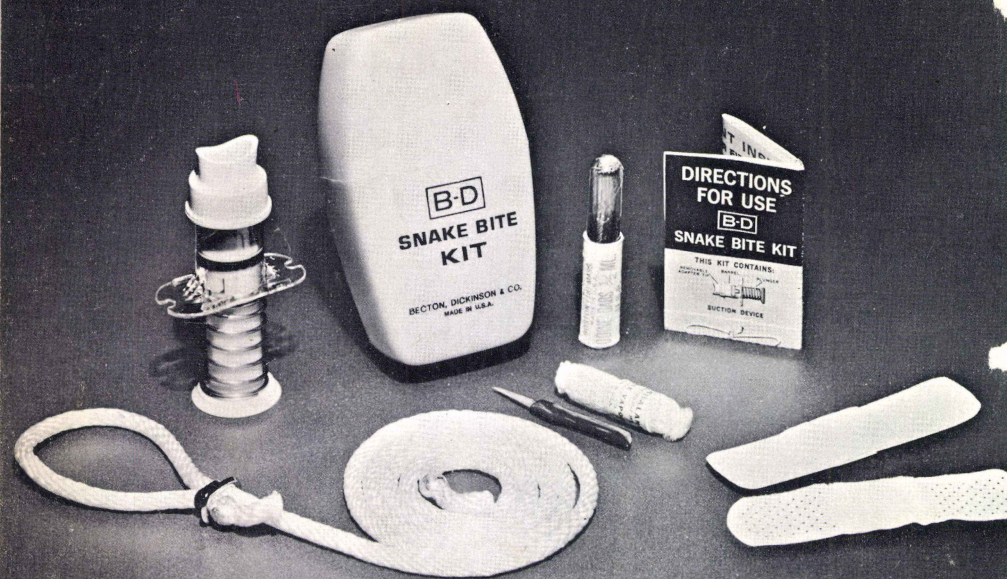
Naia Hannah, one of two Haast daughters, both of whom were virtually raised at Serpentarium, plays with live python. Both children, bright and sensitive, love all animals.



At modern Miami Serpentarium, Bill Haast, shown above with secretary, Mrs. June Nadel, checks shipment of processed venoms. His daily routine at Serpentarium, including extractions, care and repair of hundreds of snakes and their cages, keeps him busy with seemingly endless 'round-the-clock details, seven days a week.

Natural setting of Serpentarium garden includes other animals for visitor interest. Shown here is one of two enormous Galapagos turtles. Other pits contain crocodiles, alligators and snakes.





Becton, Dickinson & Co.

The universally approved treatment for venomous snakebites is prompt administration of antivenin, made from the serum of immunized horses. What about emergency first-aid? Scientists and experienced physicians differ. But the most widely approved method includes immediate application of a tourniquet above the site of the wound and excision of the fang punctures to drain or suck out envenomated blood. Shown here is typical snakebite first-aid kit, produced by Beckton, Dickinson & Co., Rutherford, N. J. On the market more than thirty-five years, thousands of kits are distributed annually to drugstores, hospitals, state troopers, Boy Scouts and armed forces. Left of coiled tourniquet (center of photo) is small spring-operated suction "pump." Kit is small enough to carry in pocket or handbag.

Now chairman of the Department of Biological Sciences at the new Florida Atlantic University in Boca Raton, Dr. Sanders has certainly not lost interest in snake venoms. He was particularly interested in a neurotoxoid venom which, he said, "has been extremely successful over a long period of time in saving a significant number of people's eyesight." He said the toxoid had been used for ten years by "two distinguished ophthalmologists" in treating an eye disease known as herpes simplex. "As a matter of fact," said Dr. Sanders, "these doctors are still studying the extremely promising effects of the medication in patients who have suffered deep multiple infections which have produced blindness or near blindness."

Meanwhile, Bill has gained much from his polio research experiences.

Once again he has found that human frailties seem to exist at all levels of society. The world of science is not exempt from peculiarities.

He has acquired more confidence in his ideas.

He is convinced that his survival after numerous cobra bites during the polio project proved his immunity against neurotoxic snakebites, or at least demonstrated that the experiment could be attempted without harm, and has encouraged others, among them an Army veterinarian and an Australian snake collector, to try it. They, too, believe they have been successful. Several researchers believe also that Bill's immunization has particular significance for the United States armed forces and those of other nations, the Peace Corps, United Nations teams and many others whose work brings them into constant contact with deadly snakes or snake-infested areas—a significance that might save lives, improve morale, and lessen fear of snakebite.

Referring to his own snakebite experiments and Bill's

immunization, one university professor, a physician who speaks highly of Bill, said: "Knowing today what I do about snakebites, if I were to be bitten I'd a lot rather be bitten by one whose vaccine is in me." Then, noting that the report of the Office of Naval Intelligence on poisonous snakes makes no reference to human immunization, he said: "They're really missing the boat. Bill has proved that."

Bill's views on snakebite treatment are now highly regarded by a number of researchers and physicians experienced in such treatment. One of them, also a surgeon, said: "I believe the best thing all of us can do is to hold a nationwide conference. Let all the scientists and physicians who know something about snakebite get together, for at least a week, someplace where we would not be disturbed, and just talk about snakebites, argue up and back, exchange views, ask questions of each other. A standard method of treatment might come out of it. And I believe one of the most important men who should be there would be Bill Haast."

Finally, the man who has treated Bill for most of his snakebites, thereby acquiring a unique experience, Dr. Ben Shepard, who happens to be also a lawyer and a judge and who uses words sparingly and precisely, said that after the krait bite he was convinced that Bill "has ninety-five per cent immunity to neurotoxic venom."

"Why not one hundred per cent immunity?"

"Well, he's liable to get a big injection. I would prefer to say that there is no absolute immunity."

As for Bill, the "big injection" was yet to come—the King Cobra bite in 1962.

6 . . .

their majesties, the cobras

I had heard the same blood-curdling scream before. Only this time, it was louder and even more terrifying.

It was late afternoon, September 6, 1964, the bright warm Sunday of a brilliant Labor Day weekend holiday. The endless buzz of traffic streaming by the highway outside the Serpentarium came through the walls of Bill's office, where I had just completed making a telephone call. The last time I had heard a similar scream, two years earlier, it was an almost hysterical cry of terror. Clarita had been narrating during one of her husband's King Cobra extractions and when the giant snake had lunged at Bill, narrowly missing his neck, Clarita cried out:

"Oh no, no, no! Bill! Bill! Did he get you?"

Then I ran from one end of the Serpentarium to the other, just in time to see Clarita rip the pendant microphone from her neck and retreat to an adjoining room crying, tears rolling down her cheeks like blobs of honey-colored molasses. She stood against the frame of a door, her back to the crowd that had gathered in the familiar semi-circle to

watch Bill extract venom from the King Cobra on the lawn. Her body shook, her slender shoulders hunched as if trying to restrain a violent spasm.

"I can't stand it anymore," she sobbed repeatedly. "I can't stand it. I can't stand it. I love you, Bill. I love you. But I can't stand it anymore."

Bill was grim-faced, perhaps a bit shaken, unnerved by Clarita's emotional reaction. It was unusual for her, even though by this time she had virtually died a thousand times as she had stood at his side witnessing so many vicious bites and near-misses. That particular King Cobra "bite" was a false alarm, as I reassured Clarita when I tried to help her recover her equanimity. She did so, quickly, and the King Cobra extraction was resumed uneventfully. But her reaction was entirely understandable and worthy of sympathy. It was only a week before, at almost the exact hour with the same snake, that Bill had lived through the world's most-feared attack, the bite of the King Cobra.

Now, as I heard the scream through the thick glass of the picture window in Bill's office, I wondered. Another false alarm—or the real thing? A cobra? A King Cobra?

I snatched my camera from Bill's desk and raced down a long narrow corridor to a glass door leading into the public area. I came to an abrupt halt at the door. It was the real thing! The sunlit scene burst upon me like a view through the darkened box of a camera with its front removed.

For a few moments I was petrified. It was as though my feet were impaled to the floor. I could feel blood draining from my face. I did not know whether to cast my camera aside, go out to snap rare dramatic photos, or do something useful. What *could* I do? Bill had been through this before. It was routine for him. Surely, he'd understand if I took a few pictures. Why not? Wasn't I there for that purpose, to

learn and record as much as possible about his life and work, his dreams and pains and everyday problems?

Uncovering my lens, but leaving the camera hanging from my neck, I rallied my nerves and walked out, trying to appear as unperturbed as I knew Bill would want me to be.

He was in the concrete snake corridor and was carrying the snake that had bitten him—an Asiatic cobra from Thailand, a beautiful 5½-foot specimen.

Later, Bill explained how it happened.

Normally (if such a word may be used in his unusual calling), he catches a snake for extraction by removing it from its cage on a small hooked rod which he has designed himself. By holding the snake in the open hook—something like draping it in the crook of a curved umbrella handle—he can carry it to a “catching board.” Almost (but not always) limp in the hook, the snake is off balance for striking. The catching board is a flat, rubber-covered platform of wood built to fit like a firm saddle over the concrete wall that separates the snake-cage corridor from the public pathways. The catching board may be placed anywhere along the wall as Bill proceeds from cage to cage. In this manner, the top of the wall being almost level with the adjacent pathway but at a working height for Bill standing in the corridor about three feet below ground level, he places the snake on the board. Then, with the round part of the rod over the snake’s neck, gently pinning it down, he quickly snatches it behind the neck and picks it up while the public observes from a safe distance. Usually, when a snake falls, wriggles or lunges off the hook it lands in the concrete corridor, safely away from people who are standing above.

Occasionally, in reaching for a snake in its cage, on the floor of the corridor, or on the catching board, Bill uses the rod as a kind of fencer’s weapon to parry a sudden thrust

from the snake. Sneaking the rod over the snake's neck, however, isn't always smoothly accomplished. Handled this way many times, some snakes are wary of the procedure and seem to know just when to whip up or around for a strike at Bill's hand or face. But with the rod poised above, Bill is in a better position to frustrate the snake's movements.

Handling cobras, however, involves a variation of technique. With its famous hood spread, an ominous warning of its anger—and its taut readiness to strike in self-defense—the cobra, often hissing frighteningly to compound the hooded symbol of its terror, almost always rears up, its eyes icily fixed on the approaching enemy. In its raised position, the cobra can strike readily. The direction of the strike is usually forward and downward, limited in distance to about half the snake's length. It is this limitation that enables a genuine snake charmer to perform, exactly beyond the distance of his cobra's strike.

It is because of this normally fixed pattern of strike that Bill prefers to hold the cobra in one hand, slightly above the level of his eyes or head. Then, sometimes with a coil or two of the snake's writhing body wrapped in his hand to keep it off balance, Bill takes advantage of the audience. He turns the snake toward the crowd where even the slightest movement (a trick on the snake) keeps its attention fixed, as do the imperceptible movements of a snake charmer's flute. At the very instant of fixation, Bill reaches over with his left hand to snatch the snake just behind the head. Benefiting from long experience and seasoned by more than a half million cobra handlings, Bill's entire cobra-catching procedure, from cage to venom extraction, is accomplished as swiftly and as gracefully as a dancer going effortlessly through his choreographed movements. Both are acts of skill made to look simple because of a lifetime of training and rehearsal.

Explained academically, the technique of catching snakes, even cobras, seems simple enough; and it is. To avoid a bite the handler needs only to be faster than the snake and to be possessed of immense powers of concentration and—no fear! Practice is not always enough. Not all snakes behave according to their textbook characteristics, and cobras are no exception.

In the literature, information about cobras is confusing, if not contradictory. Some experts have called them docile, easy to “tame.” Others have said they are aggressive, treacherous and downright dangerous. In a sense, the contradictions blossom from ignorance, however sincerely the study of cobras might have been attempted. Sometimes, cobras are characterized by persons who have observed them only in the wild, or only in captivity, or by persons with limited experiences in both environments.

Bill Haast, however, is perhaps one of a handful of people in the world who have encountered cobras under almost every circumstance imaginable—accidentally in the jungle; deliberately hunting, cornering and digging them out of their lairs; collecting them in open-field pits, packing and shipping them in crates and caring for them in transit; walking into a cageful and picking them up and shuffling them by hook into burlap bags; unpacking them from crates and bags and placing them one or two at a time in separate cages; handling them for extractions, force-feeding, skin-shedding care, and medication.

His personal record of handling cobras in captivity is unquestionably without peer in the history of herpetology. In all, he has extracted about thirty gallons of venom from cobras, a test of tenacity and endurance—to say nothing of boldness—that may be compared with trying to fill a swimming pool with an eyedropper.

One of his admirers is C. J. P. Ionides, sometimes called "Mr. Iodine," a retired African game warden who is now a professional snake hunter, collector and trader in Newala, Tanzania, formerly Tanganyika. Mr. Ionides is perhaps the world's most famous and most respected snake hunter in the wild. His experiences have given rise to two recent books about him. A man of few words who has met Bill Haast in Africa, Mr. Ionides once saw a filmed television show on which Bill demonstrated cobra handling, and wrote: "Mr. Haast is indeed a most remarkable handler of snakes. I was very impressed by seeing him handle an adult King Cobra."

If Bill were to characterize cobras in one word it would be "unpredictable." That's why he usually avoids pinning them to the "catching board" where, *with or without its characteristic hooded stance, the cobra could slip out from under Bill's rod or from his grip and strike like a flash of lightning.* That is exactly how it happened that Labor Day weekend.

This cobra was unusually active. It seemed to be fiercely strong, angry, determined to get away. Bill, holding its tail in his right hand, placed it on the catching board and quickly reached for the back of its head with his left hand. At that moment, the cobra was just going over the edge of the board. It was impossible for Bill to hold him firmly, flat against the board. It was like trying to keep a firing pin from striking a bullet by holding it back with a toothpick. Just as the cobra's head rolled over the edge of the board, Bill could see the strike coming. Instinctively, in that micro-second of time, Bill knew the snake was going to get him on the left hand but could do nothing about it. Any other movement, even an attempt to draw his hand away, would have given the snake a better surface to bite. It was as though he had to let the snake strike to prevent it from get-

ting a good bite anywhere else on Bill's body. With both fangs in its victim, a cobra may chew into the surface of an arm or limb, injecting more venom with each chew. It worked as Bill had expected in that instant of thought. While it was a deep bite, the cobra sank only one fang into Bill's left index finger.

Even then, with the amazing dexterity and speed that comes only from reflex action equal to instinct, Bill, as the snake opened its jaws, whipped its tail around with his right hand just in time to make it impossible for the second fang to get him, and the cobra actually sank that fang into its own tail! Generally, snakes are immune to their own venom.

When I looked at Bill through the glass door, only seconds later, thick blood was oozing from what seemed to be a gaping hole in his finger. As I went through the door, I could see Clarita, who had backed away a bit, looking directly at Bill; her face was ashen. Now he had the snake striking over the venom-collector vial and it was obvious that he had turned from Clarita so that she might not see the blood. But she was not to be fooled. She knew Bill too well by now. His expression was more taut, more business-like than usual.

Her voice quivering slightly, she asked, "Did he get you Bill?" Bill didn't answer. He doesn't really know how to lie and would prefer silence to deception. His silence was an admission.

"He did get you!" Clarita cried, stifling a gasp.

I went over to her. "I can see blood," I said. "What can I do?" Blood, to Clarita, is a sure sign of a serious bite.

"As soon as he puts the snake away," she said, "I'm going to make him take an injection of antivenin. You go into the laboratory. There's a telephone on the wall and a card with

emergency information in green ink near the telephone. Call the hospital, Dr. Sheppard, and the police. Tell them Bill was bitten again and ask for a police escort to the hospital."

In spite of her belief in his immunity, Clarita always lives in fear of the day when by some quirk, some unknown factor—perhaps too much venom in his system, one bite too many, or a sudden deadly allergic reaction known as anaphylaxis—Bill might collapse, dead at her feet. Two physicians close to Bill told me that it is entirely possible he might soon develop, if he hasn't already, hyperimmunity, an unusual sensitivity to the venom in his body. One serious bite could over ride his immunity, and he'd be dead with or without antivenin. Hyperimmunity could be caused by excessive venom in his blood, a combination of all the snake venom he has received from bites, from antivenin serum and from his own immunizing injections. Bill knows it.

"I don't know, maybe no one really knows, how much immunity I have," he says. "It may be just enough to protect me against a bite that would be lethal for thirty adults. But if I get a bite that is lethal for thirty-one, that extra drop might cause trouble."

These thoughts were racing through my mind as I telephoned first the police to be sure Bill would get to the hospital in a hurry. Then Clarita came into the laboratory with Bill immediately behind her. His shirt was already off. Ragged, crimson stains from dripping blood speckled his white trousers. Clarita took over the telephone to resume the calls for assistance. Bill, remarkably calm, almost as if he were looking for a lost tie pin, opened a cabinet to search out the proper antivenin and hypodermic needle.

At his request, when he sat down to inject himself, I held the skin of his left arm taut so that he could more easily

insert the needle and avoid breaking it. After the injection, he left the needle in his arm and merely removed the syringe, which he refilled with antivenin and replaced in the needle for another injection, and then another.

My hands were shaking, and I was not of much use to him when he asked me to press the syringe slowly. Clarita simply reached over as she continued on the telephone and used her free hand to help him with the injections.

Bill looked at the camera hanging from my neck. He smiled, winked, and said, "Go ahead, take some pictures. I know you've been waiting for something like this. Don't worry about me. I feel fine. I'll be all right. I'll do some push-ups to prove it." His humor eased the tension for me, and even Clarita relaxed.

"Goodness, Harry," she said, "better take those pictures. He'll do it, too. He got out of bed in the hospital once and exercised to prove he was ready to go home when the doctors didn't know whether he'd be dead or alive the next hour."

After I had taken a few photos, two men came down the office corridor into the laboratory wheeling a stretcher behind them. It was the first time an ambulance had been sent instead of the police. Bill looked at the stretcher and said, "Never mind that. I can walk out."

Clarita stared at her husband as if to say, "Am I going to have trouble with you again!"

I intervened. "Why don't you take some of your own advice," I said, "you know, about remaining immobile after a bite until you can receive medical aid."

Silent, Bill rose and placed himself gingerly in the stretcher. Clarita rode with him and an attendant in the back of the ambulance, continuing antivenin injections, while I slid in alongside the driver. On the highway, siren going full

blast, dome light flashing, the ambulance quickly accelerated to more than 100 mph just as a light drizzle started. At times, as we sped along the rain-slicked highway, I was startled to see the speedometer needle flickering about the top number in the dial which simply said 125+.

The highway was clogged with holiday traffic. It was now about 5:30 P.M. Ahead of us at the horizon there was a huge, multi-colored rainbow in the sky; it looked like the arch of a tunnel through which we were about to pass. Cars were scattering to the right and left, some slowing down on the right shoulder, others pulling into a grassy median that separated the dual-laned, north and southbound strips.

Apparently, many automobiles, equipped with air-conditioning, their windows shut completely, could not hear the siren until the ambulance was almost on top of them. The driver beside me just grimaced as he snaked in and out of lanes. At one point, a car entered an intersection about a block ahead of the ambulance and then suddenly stopped, as if frozen. I could almost see the driver's face. He turned towards us, a look of fright in his eyes, seemingly uncertain about whether to continue across, back up, or just stay there. He remained in the middle of the road, directly across both lanes, blocking the ambulance. We just screeched around his right like a whip.

At the hospital, a distance of exactly 8.1 miles covered from the Serpentarium in nine minutes, Bill was quickly wheeled into the emergency room and placed on a table. Two physicians and four nurses were waiting. One of the doctors was a Cuban refugee, a pediatrician, who told me that he was then seeing his first snakebite victim. The other doctor, also a resident in pediatrics, apparently had already received telephoned instructions from Dr. Sheppard and continued the antivenin treatment.

About forty minutes later Bill was taken to a private room upstairs, where Dr. Sheppard was waiting for him. One of the nurses, a veteran of snakebite emergencies with Bill, having been on his bites since 1950, came over to ask me what time the bite occurred. I said, "Exactly 5:19." She looked at her wristwatch and said, "Well, we have nothing to do now except sweat—until midnight." Later, I knew what she meant. When I was in Bill's room, I heard him ask Dr. Sheppard, "When did we run into trouble with the King Cobra."

"About three or four hours after the bite," said the doctor.

Meanwhile, Bill's secretary, June Nadel, had arrived looking pale, tense and worried. For the next five hours, all of us sat in almost icy, tense silence. Once a nurse brought a tray of coffee. Occasionally, we tried to make small talk among ourselves and with Dr. Sheppard. The doctor sat in an arm-chair next to Bill and every time Bill moved the doctor's eyes followed his movements. He had long since completed antivenin injections, had ordered intravenous glucose feeding for Bill and was now taking his pulse and blood pressure almost every fifteen minutes. He left the room only once, apparently to make a telephone call. Except for a sensation of stuffiness in his nose, Bill seemed to be in no distress. He lay on the bed bare-chested, his shoes and trousers on, his arms folded across his chest, his legs straight out but crossed. Only once did Bill make an abrupt movement, turning to the side, as though in pain. Dr. Sheppard, a gentle-faced man with smooth, thinning brown hair and a touch of grey at the temples, immediately rose from his chair. "Pain?" he asked. Bill just shook his head slightly.

The communication between Bill and Dr. Sheppard was almost in a kind of code. One-word questions and one-word replies. These two knew each other well and obviously

shared mutual confidence and respect. At one time, the tension was broken when Dr. Sheppard's wry humor came forth with the sharpness of a stand-up comic. We had been discussing this book. Bill, obviously trying to lighten the tension for Clarita, smilingly asked, "What happens to the book if I die?" Before I could answer, Dr. Sheppard said, "I've got a better question for you." We all turned toward him, and he said, "*Venom* I going to quit?"

Bill laughed heartily, and said, "Well, I guess we can quit right now, Doc. This one has been an easy ride. I'm ready to go home." Dr. Sheppard just shook his head, and said one word, "Tomorrow."

Just before midnight, Dr. Sheppard announced that he was going home, and we knew that Bill would be all right. Clarita, smiling, rose from her chair, walked briskly to Bill's bedside and kissed him. She took him home early the following morning, and by the time I had returned to the Serpentarium shortly after 10 A.M. I found Bill at work again, already having extracted venom from cobras. Bill said he had a restless night but only because Dr. Sheppard had left instructions for his blood pressure to be checked every hour.

It isn't necessary to witness a cobra bite to be awed by this most regal of reptile creatures. It is chilling merely to watch it bolt erect, framed in all the majestic splendor of its hood then striking, striking, striking, time after time, striking at a human adversary, its anger increasing with each vicious, frustrating near-miss. This is the spectacle of violence that continues to lure visitors to the Serpentarium. It is a contest of wits, a battle of strength, a test of endurance, the challenger and the challenged without arena.

The cobra's hood, several times larger than its head, is actually an expansion of ribs in its neck and its mark of

eminence in the reptile world. As one authority, Vivian F. M. Fitzsimons said in his book, *Snakes of Africa*, the hood is "like the ribs of an umbrella pushing out the covering of cloth," and it is spread only when the snake is alarmed, defensive, or angry, which is frequent enough. Otherwise, the cobra, relaxed, appears no different from other snakes its size except, of course, for the physical marks of its class.

There are many species of cobras distributed throughout Africa and Asia. Despite the "snake-charmer" reputation of the Indian continent, there are more cobras in Africa than in India. According to Fitzsimons, there are three species in Africa, three in Asia, including the Philippines and other islands, and "one, the Egyptian cobra, shared by both continents." Others believe there are two species in Asia and seven in Africa, plus subspecies, totalling fifteen.

The common Indian cobra, sometimes known as the spectacled cobra, is perhaps the most colorful and most familiar of all. When its hood spreads, the snake reveals a distinctive design on the back of its head. In exquisite contrasts of black or dark gray or brown, the marking looks like a pair of spectacles. Similarly, the snake that sent Bill to the hospital with bite No. 84, the Thailand cobra, has a distinctive marking on its hood which looks like the eye of a needle enclosed in a circle. In Asia, it is known as the "sign of Buddha," and it symbolizes not only terror, but a legend, a tale which tells how the snake acquired its marking. It happened when Buddha, awakening from one of his deep meditations at the side of a road under a blistering sun, found that he had been protected by a cobra which had spread its hood over him to shield him against the sun. The gentle Buddha patted the cobra appreciatively on its hood and the mark appeared.

Some unusual species (the South African Ringhals and the black-necked cobra) can also spit their venom, as well as

bite. The stream of venom can be ejected several feet from tiny openings at the tips of the fangs, and the aim is amazingly accurate, almost always directly at the victim's eyes. In this way, the spitting cobra can make its adversary or prey defenseless from a safe distance. Venom in the eyes can cause blindness if not instantly diluted or washed out. Clarita's only nasty incident at the Serpentarium involved just such an attack, which was accidental. Bill had been force-feeding a spitting cobra when the tube he was slipping into the snake's mouth twisted and as the cobra bit it the venom squirted into Clarita's eyes. She felt a burning sensation immediately. She ran into the laboratory, flushed her eyes under running water at the laboratory sink and for several days suffered severe and painful inflammation of the eyeballs and eyelids.

An adult cobra ranges from four to six feet in length, sometimes exceeding eight feet, but the largest of the genera, the King Cobra, averages twelve to fourteen feet with a massive, powerful girth about double the size of a man's fist. King Cobras have been known to reach lengths of more than eighteen feet. Cobra colorings and skins vary as much as those of other snakes. Some are all dark brown, even black looking, with smooth, shiny scales, others appear to have large freckled scales with mixtures of whites and browns and nuances of grey.

The "snake charmer's cobra," the common Indian cobra, also widely distributed throughout Pakistan and Ceylon, is often used by snake charmers because of its spectacled beauty, although some say because of its "docility," too. But in Bill's language there is really no such thing as a docile or "tame" venomous reptile, and the cobra is no exception. A cobra, or almost any snake, might become accustomed to a certain familiar, gentle handling and under such conditions might be less inclined to strike. It is a form of "psychological

conditioning” and cobras may submit more readily to it because of a seemingly superior intelligence. But those who believe cobras can be “tamed”—for charming or otherwise—eventually learn that all cobras are deadly. Several amateur herpetologists and commercial collectors have been killed by cobras in the United States in recent years, including one who was bitten through a burlap bag.

Perhaps one of the most dramatic kills by a “tame” cobra occurred before the eyes of Daniel P. Mannix, an outstanding writer and photographer, who caught a photo of the snake at the instant of strike. The victim was Grace Wiley, a tiny, gentle woman, sixty-four years old, who kept a variety of venomous reptiles in a barn on her property at Cypress, California, where she often exhibited cobras as “pets.” She took out a spectacled cobra, patted it on its head and “played” with it to get a real high, classic, hooded stance for the photograph. A few times Mr. Mannix had seen the cobra strike and hit Grace Wiley, but with its mouth closed. But this time the cobra wasn’t performing according to expectations. “It’s getting nervous, and I’d better put it away,” said Grace Wiley. Too late. The cobra struck her finger just as Mr. Mannix clicked his shutter. She returned the cobra to its cage. The rest of the details, including fruitless first-aid measures, were vividly described later by Mr. Mannix in *True* magazine. Grace Wiley was rushed to the hospital and placed in an iron lung but died within an hour and a half of the bite.

When Bill is bitten by a cobra, no matter how much it might have challenged him in anger, he is never upset or irate at the snake, and the thought of destroying the creature as a “man killer” is abhorrent to him. Not because he is a “snake lover.” Bill feels no emotion toward snakes, has none as a pet, feels no remorse when one dies, unless it is a needless death. Unnecessary pain or suffering, human or

animal, is to Bill an act of immorality on the part of those who countenance it.

He knows the snake bites only in what it believes to be self-defense. His only reaction is one of anger at himself, or disgust, for permitting himself to be bitten. One of the worst bites he ever suffered, the one that put him in the iron lung, was perhaps aggravated by momentary disgust or frustration at the time of the bite.

This incident, cobra bite No. 26, occurred just before one of the world's most famous and most respected herpetologists, Marlin Perkins, Director of the St. Louis Zoo, arrived at the Serpentarium. Mr. Perkins, whose NBC network television shows have brought sheer delight and enlightenment to tens of millions of adults as well as children, had recently completed a telecast from the Serpentarium and had returned to thank Bill for his cooperation. It was about four in the afternoon. Bill was holding a Thailand cobra in the air and was attempting to throw it off balance to catch it. Then, almost as if it were resisting, "sort of going against the wind," says Bill, the cobra uncoiled and struck Bill on the right arm between the wrist and elbow.

Bill tried to pull the cobra off but couldn't. "It seemed as though the harder I pulled, the harder it dug in with its fangs and teeth," says Bill. Clarita was screaming. "Pull him off! Pull him off!"

Bill held the snake by the neck and for a few seconds, an eternity of seconds, it seemed as though he was so angry with himself that he simply permitted the cobra to "walk" across his arm. The cobra did walk — with its fangs. When Bill finally yanked the cobra away, there were eight distinct, deep fang marks in his flesh! "This cobra, a five-footer," says Bill, "was a good producer. According to my records he gave about fifteen to twenty lethal doses of venom with each bite!"

Remarkably, however, there were no immediate, alarming

symptoms. Bill went back to his office to greet Mr. Perkins, who was astonished to learn that Bill had just been bitten and was walking about as though it were a harmless incident, swatting a fly off his arm. Actually, Bill did not say a word about the bite. Clarita spoke up, and Mr. Perkins was appalled, almost incredulous, until he looked at Bill's arm.

"How do you feel, Bill?" Mr. Perkins asked, genuinely concerned.

"O.K."

"Are you going to the hospital?"

"Don't know. Might have to."

But Bill was more interested in discussing other matters as he always is when in the company of a professional herpetologist, one he respects. Bill reminded Mr. Perkins of his immunity. Apparently, this reassured Mr. Perkins who departed to meet a scheduled flight at the Miami Airport. By the time Mr. Perkins reached the airport, he heard a news bulletin. Bill was in the hospital, in critical condition, in an iron lung. Mr. Perkins dashed to a telephone to ask if there was anything he could do, then departed when he was told what he had expected to hear. Bill had received anti-venin. There was nothing more to do — except wait.

The first symptoms crept up on Bill almost immediately after Mr. Perkins left Bill's office. Bill had been sitting on the edge of a desk, his legs dangling. When he slid off the desk, he felt weak, unsteady on his feet. Nonetheless, he went out to the cages to place new drinking dishes in them. He noticed his hand shook as he set down the shallow water dishes. It was exactly 5:30, after he had completed more extractions, when Bill decided to lie down in his living room. Clarita came in, and Bill asked her to help him get on his feet. She tried, but Bill couldn't move his legs. She ran to the gift shop up front where Bill's son was behind the counter.

Bill Jr. raced back to the living quarters, immediately

picked up his father, carried him to an auto outside and, with Clarita at his side, sped to the hospital. About twenty minutes later, struggling for breath, Bill was carried across the room and placed in an iron lung at Dr. Sheppard's orders. Before that, Bill was surrounded by four physicians and six nurses, while Clarita stood almost helpless against a wall.

"My entire body went numb," she recalls. "I didn't know whether I was holding up the wall, or the wall was supporting me."

A few minutes after Bill had been placed in bed, it looked as though he were drowning in his own saliva, and Clarita stood by trying to help the saliva flow out with the aid of a suction tube dangling from a corner of Bill's mouth.

At the time he was being lifted from bed into the iron lung, Bill recalls some of his most unusual "death visions": "I was supposed to be unconscious, they tell me. But I had a feeling of team work all about me. I felt as if I were floating in air. My body was dead, detached from my mind, and I was looking down, watching what they were doing with my body.

"A distinct, vivid thought flashed repeatedly through my mind. It was the famous war scene of the Marines raising the flag atop Mt. Suribachi on Iwo Jima. My eyes were closed, lids paralyzed, completely shut. Yet I could 'see' that team raising the flag. I was in some infinite void.

"Just before I was put in the respirator, I was struggling and fighting for breath. I had no concern or consideration for anything, no flashback of events in my life. I was battling with every fiber of my body to live. But the instant I stopped breathing, nothing mattered any more. It was a wonderful feeling. I had just finished a hard day's work, sat down to relax, and was glad it was over. I felt an uncanny sense of relief. Later, I thought that if this is what the moment of

death is like, it is nothing to be afraid of. It's just wonderful, serene!"

As soon as Bill's head came through the iron lung, an oxygen mask was clamped over his nose. Doctors and nurses standing about the artificial respirator thought Bill had breathed his last.

"They were all watching a maze of gauges and instruments which didn't mean anything to me," Clarita recalls. "They had already inserted a tracheal tube into Bill's nose and down through his throat to help him breathe. Suddenly, they all looked at each other, just exchanging grim glances, as though silently asking, 'Did we lose him?'—and I could feel myself sinking.

"Dr. Sheppard, whose wry sense of humor seems to come through at the right time, turned to me and said, 'Grandma, why don't you go out and get yourself a cup of coffee.' It was one of the few times he had asked me to leave the hospital room during Bill's care. I went into the hall to cry, but I did not leave the hospital for two days."

Bill's entire body was paralyzed. He could not utter a syllable. Only once, when struggling for breath, did he manage to utter a noise which sounded like a pitiful plea for air. It came out in bursts, "Urr . . . urr . . . urr . . ."

Through the night and next day, Bill continued to receive antivenin injections and supportive therapy. "The thing that bothered me most after I recovered consciousness," says Bill, "was that I couldn't touch my teeth with the tip of my tongue. When I was finally able to do that, I knew I'd recover."

He was in an iron lung for more than two days, during which Dr. Sheppard was almost never out of sight. Another doctor later told Bill that had he been brought in without prior knowledge of the snakebite, he might have been treated as a classic case of bulbar polio, or possibly strychnine poison-

ing. Bill remained in the hospital five days, the longest period of all his hospitalized bite treatments. He came out ten lbs. thinner.

“Cobra! With most people this name is invariably linked with India * * * snake charmers and the great jungles of the orient,” says Carl Kauffeld in the book he has co-authored with C. H. Curran. “The word itself is enough to send most people into a peculiar state of mind in which they are unconsciously on the defensive as they picture the deadly cobra with head elevated and hood spread. No snake is so widely known or universally feared, even by people who have never been, and probably never will be, within thousands of miles of its native habitat.”

Perhaps it is because of this attitude that many people, even herpetologists who should know better, put Bill on the defensive, continually forcing him to justify his methods of snake handling. Even one of the world’s best known authorities on snakes, a true scientist, a man as intelligent as any, as dedicated as any to the study of snakes and their venoms, remarked, “Why does he do it? He must be some kind of nut!”

Even if Bill were doing it purely for “showmanship” — the remotest possible attribute of his character — it is paradoxical that his display of daring cannot be accepted with the same intellectual elan that greets assorted playboys and vacationing college instructors who risk their lives climbing perilous peaks just to get to the top.

The one man who perhaps understands it best, Mr. Ionides, the world’s greatest snake hunter, has also offered the best explanation. I was surprised at first when Mr. Ionides told me that “Mr. Haast took too many risks.” Then, he explained further:

“I catch snakes, place them in bags and send them to their destinations. In these circumstances, I do not have to handle

the same snake often. My methods would therefore differ from those of Mr. Haast. I use bare hands and do not like gloves. In catching such active snakes as cobras and mambas, I use sticks adapted from one originally given to me by Mr. Haast in 1951 and which he was using then. It has a grab at the end which is worked from the handle. I also use tongs about twenty-two inches in length to enable me to grasp the mouth of the snake and keep it shut until I can secure a hold on the neck behind the head.

“With the slower snakes, like the gaboon viper and the horned viper, I just pick them up in bare hands. By these methods, I have taken over three thousand mambas and I have only been bitten by one once, through carelessly mistaking a juvenile green-mamba for a harmless green snake and grabbing it by the middle of the body with my bare hand.

“I have taken 277 cobras without ever having been bitten by one. For this reason, I intend to continue using my methods, rather than to use the more dashing and skillful methods used by Mr. Haast, at the cost of eighty odd bites. However, I do realize that when continually handling snakes, as Mr. Haast does, far more care in handling them gently is necessary.”

At any rate, now there is a new “native habitat” for cobras, in the gardens of the Miami Serpentarium where there seems to be no fear of them within its verdant grounds, not even on Sundays when the big attractions, the King Cobras, are taken out of their cages to be goaded into delivering their venoms into a glass. They have performed many times, fiercely, majestically, harmlessly, except once — when their poison, the most massive of any beast, was delivered into the bloodstream of the keeper of the gardens, Bill Haast.

7 . . .

duel with a king cobra

“The cobra is quite a gentleman and will never attack unless provoked,” wrote the Ceylon Zoo director, Maj. A. N. Weinman. It’s probably an accurate observation. The trouble is, however, that almost everything provokes the cobra.

Actually, the cobra doesn’t attack in the aggressive sense. He is not apt to go out of his way to attack, except when seeking prey for food. But there is an exception – the King Cobra.

Many herpetologists believe the King Cobra is the only snake that is truly aggressive and belligerent and that it will actually search out and attack any human it chooses to pursue in the jungle, particularly any passerby who might be innocently walking in the vicinity of its nesting mate.

The great Bronx Zoo reptile expert, Dr. Raymond L. Ditmars, the man who had been unable to provide a job for schoolboy Bill Haast, described the King Cobra as the “deadliest reptile” and the “most dangerous of all living wild creatures.”

“Combined with the deadliness of its fangs,” Dr. Ditmars wrote, “it is extremely active and commonly inclined to

attack. Coupled with insolence, sometimes prompted by curiosity, but more often by anger, it has an intelligence that renders it unique."

When the late Dr. Ditmars had a King Cobra in his zoo and was forced to medicate it, or perhaps remove a piece of unshed skin from its eyes, he used a specially designed cage with movable sides which forced the King Cobra into a straightened position, and never worked without a net and the help of four or five men to hold the King down. Once, in northern India, Bill Haast met a missionary, Father John Knapek, who was an expert at catching cobras. When Bill asked for his help in catching a King, the priest replied, "I dare say I wouldn't want to tackle a King Cobra without some help. I've been told they have too much invested in me to permit me to go after a King Cobra."

The intelligence and mystique of the King Cobra have inspired many vignettes of stark drama and terror in fiction. Only in Asia, for instance, would a newspaper dare to print as a straight news account this brief report taken from a Bombay newspaper:

"A would-be murderer today was reported killed by a King Cobra in the jungles of Hyderabad State as he prepared to fell his sister with an ax. The girl reportedly had refused to part with some gold, her share in family property. As her brother raised the ax, it brushed against a bush, rousing the snake, which bit him fatally. A search party found the man's body with the snake coiled around it and the girl lying in a faint nearby."

If such a story seems apocryphal to herpetologists it is only because a snake, even a King Cobra, usually strikes and retreats, although when striking in anger the King is apt to chew several times into his victim. But in King Cobra habitats if anyone wants to do away with an antagonist, using a

convenient poison or some other invisible means of destruction, he needs only to leave the *corpus delicti* in the jungle, whereupon the conclusion would undoubtedly be that death was caused by the strike of a King Cobra.

Drop for drop, many venoms are more toxic than the King Cobra's. But because of its enormous size, the King Cobra can easily inject in a single bite, without anger, enough venom to kill more than thirty men. Maj. Weinman said he once "milked a big King Cobra, 13'6" long, and gave one *minim* of its venom to a full grown guinea pig, which died exactly thirty-three seconds after the injection. Rarely has a King Cobra victim lived long enough to receive medical aid, and if by some miracle such aid were given in time it would probably be the injection of some other cobra antivenin in the hope that it might offer some cross-protection against the King's venom.

Once, while on a 'round-the-world snake-hunting trip, Bill met a Burmese scholar who displayed some remarkable photographs and told fascinating stories regarding an ancient but genuine "snake-charming" art, a dance which culminated in "kissing" a King Cobra. The "kissing" act is the dramatic climax of a long, painstaking process by which King Cobras are conditioned to accept a "kiss" from a performer, usually a woman. The technique is to tickle the head of a King Cobra, using a feather attached to the tip of a long pole. The pole is gradually shortened until the performer, practically standing over the snake, can tickle its head without provoking a strike. This conditions the snake to a certain light touch which is apt to be accepted later as a "kiss" on top of its head. It works most of the time, but not all the time. In this form of drama there are only two kinds of actors — live or dead. The failures are rarely made known. Apparently, nobody wants to deprive the act of its reputation as an awesome skill.

To illustrate how well the Burmese know the deadliness of the King Cobra, the scholar told about a "kisser" who became one of the uncounted failures. After the King Cobra bit her, she refused any sort of emergency treatment, preferring to lie down to die peacefully. Her wish was shortly fulfilled.

In Burma and Thailand, elephant handlers who move teak logs in the jungles, have been known to report the loss of several elephants each year due to King Cobra bites. The Kings sink their huge, rigid fangs into a soft, vulnerable spot on the elephant's toe or into the tip of the trunk, and the bulky victim usually dies within three hours.

If there is any single "show" in America that might be characterized as one of the greatest wild animal acts of all time, it is the weekly Sunday performance of Bill Haast dueling with a King Cobra on the lawn of his Serpentarium garden. Only it isn't a show. It's part of his ceaseless routine to extract venom on a regular schedule.

It was a few days before the King Cobra bite – bite No. 33 – that an expert visiting the Serpentarium from Bombay told Bill he had never known any human or animal to survive a King Cobra bite. It was not the sort of information that Bill's wife enjoyed hearing. Even after Bill had survived the bite there were reminders that caused her to shudder in horror.

In 1962, for example, Bill received a letter from Dr. Herndon G. Dowling, curator of reptiles, New York Zoological Society (Bronx Zoo), who said he had five King Cobras "and there is always the possibility that someone will get bitten." Referring to the hospital in Thailand in the heart of the King Cobra habitat, Dr. Dowling added: "They advise me that they have had no cases of King Cobra bite to treat and that they have no specific instructions to offer for such a case." He asked Bill what treatment he would "recommend

in relation to these bites," adding "I know of no other source better than you that could be called upon."

After the King Cobra bite, Clarita, for the first time in her life, had to take tranquilizers so that she could continue working alongside her husband. But the drug deprived her of much-needed alertness and was soon discarded. Her substitute for the drug was a readjustment of her philosophy of life, a realization that fear was something she was going to have to live with the rest of her life — or Bill's life — and she might as well make the best of it.

The King Cobra is known in Asia as the Hamadryad, or *Naja hannah*. In scientific circles it is *Ophiophaqus hanna*. It ranges almost throughout Asia, from the southern portions of China to the Celebes, including the Philippines. Its color is most often olive green embellished with bands and speckles of darker green. At rest, particularly when coiled, it does not appear to be a large snake. Its spread hood is the most elongated and most regal of all the cobras and in anger it can easily rise three feet. According to Dr. Ditmars it is, of all snakes, "the most intelligent." "Its certain, snappy actions," said Dr. Ditmars, "indicate good reasoning powers. Their movements appear well premeditated — not so hysterically nervous as the smaller cobras." In captivity, Dr. Ditmars added, "it can never be trusted, as its touchy nature flames into anger upon slight provocation and the fearlessness of the snake prompts it to actually attack one." He said this had happened to him "several times."

The King Cobra bite was the one Clarita had always feared most and yet she knew it was inevitable. Just by handling King Cobras several hundred times a year, Bill was bucking the law of averages. Even his immense power of concentration was bound to be disrupted at least once, momentarily. And that moment would be more than enough for the huge, crafty beast to lunge at Bill and score.

It finally happened on a Sunday afternoon in August, 1962. Ironically, it was exactly one week to the day and hour after I had told Bill, just before I was departing Miami following a social visit to the Serpentarium, that there would be no point in my coming back again to write another story about him because there could not possibly be anything more dramatic than the blue krait bite — except a King Cobra bite!

“But for God’s sake,” I said in jest, “please be careful. I don’t want it ever said that you were bitten by a King Cobra just to give me material for a good story.”

Smiling, Bill replied, “I may be called a lot of things, but I’m not *that* crazy.” Then he quickly added, “I never take my eyes off them.”

As a matter of fact, Bill rarely, if ever, blinks his eyes when he faces a King Cobra on the lawn, which is the only place he can catch them because they are so big and active and violent. He matches the cold, bronze eyes of the King Cobra stare for stare. The snake’s large, round eyes often give him a clue to its intentions.

On this Sunday afternoon, Clarita, as usual, had cautioned the spectators not to move once Bill had placed the King Cobra on the lawn. This is to minimize distractions for the snake, as well as for Bill. But now, for the first time, there was a slight difference in setting. A professional photographer wanted an unusual photograph of Bill and the King, face to face, preferably in profile, with the King reared as high off the ground as possible, its hood spread in maximum anger. This meant, as Bill knew, that he would have to duel a bit longer with the King, provoke it more and, consequently, ward off more than its usual number of quick strikes and lunges at him. Bill had promised that he would not do anything extraordinary for the sake of the photograph and would take no chances at all. After he placed the snake on

the lawn, he kept that promise, except at one moment when the snake reared beautifully, regally off the ground.

Then, it seems, for just a fraction of a second Bill gave his attention to the photographer, waiting to hear that click of the shutter so that he could snatch the King behind its neck. Bill is not sure what happened after that.

"I do recall raising my hand higher and higher," he says, "tempting the snake to rise even more dramatically. I was easing my left hand behind him. Suddenly, his eyes shifted to my left. I expected him, at that moment, to make a strike for my left hand. That's what he had done many times before and I would pull my hand away just in time.

"But now the King, like a clever boxer, had outwitted me. His shifting stare was actually like a fighter's short, left feinting jab. Then he rapidly countered to the right. I turned with him, swinging my right hand out of the way — too late. He got me just above the knuckle of my right index finger. It happened so fast, nobody thought I was hit."

But so swift was Bill's movement to the right, so deep and vicious was the King's bite, that one of its fangs was yanked almost completely out of its upper jaw. The fang hung by a mere thread of tissue.

However, as soon as Bill had completed his whip-lash swirl to the right and was again facing the spectators, cries and gasps came from the audience. His finger was bleeding profusely, once again gruesome evidence for Clarita that it was a "good" bite. Clarita was hysterical, crying, "He bit you, honey! He bit you! Oh, oh, oh!" The tears flowed copiously. Meanwhile, fanning the snake back with his bleeding hand to parry continuing attacks, Bill finally caught him.

"Put him back, put him back!" Clarita cried. She wanted Bill to go immediately to the hospital.

"Take it easy," Bill said calmly. "I'm O. K." His first con-

cern was to prevent alarm and panic among the visitors. Later, he learned, that a man leaving the Serpentarium after the King Cobra bite had a heart attack outside, and when one of the doctors who treated Bill for the King Cobra bite later saw a book on snakebites and venoms, he said: "I'm glad I didn't see it before. I would have had a heart attack, too."

Instead of returning the King to its cage, however, Bill continued his usual procedure; he extracted venom from the snake, force-fed it and even took time to remove the loose-hanging fang. As he was putting the snake back in the cage, it lunged at him again, barely missing his face. Bill then returned to the laboratory to wash his instruments. He was fully prepared to go to the hospital right then. But during these precious minutes of delay, expecting immediate symptoms from the massive dose of neurotoxic venom — perhaps a heavy droopiness in his eyes and a sore throat — Bill, much to his surprise, felt nothing. This King Cobra was a good-size adult, 14 feet long, weighing over twenty pounds. According to Bill's records it was capable of delivering at least thirty drops of venom at a single blow, enough to kill thirty men Bill's size. Moreover, as a venom producer, this snake, from which Bill had extracted venom eighteen times before, was rated in the records as "exceptional," meaning it gave a good yield of venom almost every time it was handled. Could it be that this time the snake bit without delivering venom? Or gave only a sub-lethal dose of it?

With confidence in his immunity, Bill decided he'd wait for at least one symptom before going to the hospital. But there was no calm in the laboratory. In a corner, at Bill's desk, Clarita was sobbing uncontrollably while the photographer was on the telephone attempting to reach Dr. Shepard. After the krait bite, Clarita clearly regarded Dr. Shep-

pard as Bill's savior. But as soon as Bill heard the photographer talking to Dr. Sheppard, he dashed over, grabbed the telephone and said, "I'll call you if I need you, doc," and hung up.

Startled, Clarita screamed, "No, no, no! You've got to go to the hospital now, right now!"

Bill was in complete sympathy with Clarita. His only emotion was one of anger at himself for allowing the King to bite him. He washed the blood from his hand and decided to go to the hospital, if for no other reason than to prevent pandemonium at the Serpentarium.

He and Clarita rounded up every bit of antivenin available, including some for the black widow spider, to be used as a last resort because there simply was not enough specific antivenin for the bite of the King Cobra. The nearest to an effective antivenin, Bill felt, was that of African Cape cobra, of which Bill had only six vials, the barest possible minimum for an ordinary cobra bite. These were in a package to be mailed to an Army research center that was working with cobras. Fortunately, the package had not yet been mailed.

Meanwhile, Mrs. June Nadel, Bill's secretary, a slender, comely brunette, then a ten-year veteran of handling snake-bite emergencies at the Serpentarium, went to the telephone to locate other possible supplies of antivenin and to arrange for police-escorted deliveries to the hospital. She quickly located a total of fifteen additional ampules at the University of Florida, the Ross Allen Institute at Silver Springs, Florida, and at C. C. McClung's "Snake Farm," Laplace, Louisiana, near New Orleans. A few years before, ironically, Mr. McClung's eighteen-year-old niece had been bitten by a cobra at Laplace, and Bill had been rushed to Laplace in a Marine Corps jet to try to save her with a transfusion of his immunized blood. But thirty minutes after take-off, the jet

was turned back. The pilot had received a radio message. The girl was dead.

Shortly after Bill had arrived at the hospital the ampules from the University of Florida and from Ross Allen, himself a famed herpetologist and venom producer, were picked up by a combination of Navy jet fighter and C-119 aircraft flying from Jacksonville to the University of Florida at Gainesville, then to the Ocala Naval Air Station to pick up Ross Allen's supply. Mr. McClung sped to the airport at New Orleans, where a National Airlines passenger jet, holding its take-off, picked up the antivenin on the runway for delivery in Miami. Then it was taken by speeding police car to the hospital. Bill was later amazed to learn how fast and efficiently all these movements had been synchronized. The Southern Bell Telephone Company kept a trunk line open for a call to be placed at any moment to any place in the world.

Meanwhile, he says, his own ride to the hospital was more frightening than the bite. The route, via U.S. Highway 1 and the Palmetto Turnpike, was jammed with the usual late-afternoon Sunday traffic. Clarita was at the wheel, reaching speeds in excess of eighty mph. One hand was almost constantly on the horn, which burned out before they reached the hospital. Bill, sitting alongside the photographer in the rear seat, kept himself busy sorting the box of antivenins, giving instructions as to the order in which they should be used if needed.

He still did not feel any sense of emergency. On the way to the hospital, a normally twenty-minute ride accomplished in less than ten minutes, he was completely devoid of symptoms except for a swelling around the bite. At the hospital, Bill, unaided, climbed casually into bed and lay down fully clothed as though relaxing on a couch at home. Clarita, her

eyes red from uninterrupted crying, stood by the bed while two nurses and an intern, pending the arrival of Dr. Sheppard, prepared the antivenin ampules for the hypodermics and had an iron lung moved into the room. They worked quietly and efficiently.

Suddenly, Clarita noticed that Bill's face had lost its normally ruddy complexion and his lips were turning as white as the bed sheets. Just then, Dr. Sheppard arrived. Promptly, in his usual unperturbed manner, he took over, giving Bill an injection of antivenin and a mild sedative. He checked Bill's pulse, heart and blood pressure. Everything appeared perfectly normal and remained that way for the next ninety minutes.

"I felt mildly elated," Bill recalls. "To anyone familiar with King Cobra bites, it was something of a phenomenon. I could tell that even Dr. Sheppard, usually unresponsive to the point of being sphinx-like, seemed to be amazed. In fact, several times I told Dr. Sheppard I felt fine and was ready to go home."

But Dr. Sheppard, who rarely raises his voice above a whisper, smiled wanly and said, "Not so fast young man."

He was right.

At about the start of the third hour after the bite, while Dr. Sheppard and Clarita were quietly conversing at the foot of Bill's bed, he suddenly felt a powerful, sinking feeling, as though his bed, drifting on a cloud, had dramatically plunged into a huge chasm. Then, within seconds, the sensation reversed itself, and he was rising with equal force. At the same time, he felt a severe tightening in his abdomen, like an immense cramp under pressure. Bill placed his hands over his stomach and grimaced in pain and called Dr. Sheppard.

One look at Bill, and Dr. Sheppard jumped to his bed-

side. He took Bill's pulse, heart and blood-pressure readings again, also his temperature; all now checked subnormal. Bill's skin was cold to the touch and he started losing peripheral sensation in his body, an absence of feeling in the fingers and toes. His respiration grew increasingly rapid and shallow. He did not know it then but his heart was skipping beats and he was in imminent danger of complete cardiac failure. By coincidence, a Formosan physician, an expert on venoms who had recently visited Bill at the Serpentarium, heard about the King Cobra bite on the local radio news and had already telephoned the hospital to advise that cardiac failure in Bill's case would not be unusual.

Everyone went into action. A hypodermic was plunged into Bill's left leg and, to save time, was kept in his leg, held fast by adhesive tape. Only the syringe was removed. One after another, syringes were rapidly filled with antivenin then inserted into the needle in Bill's leg and injected. Later, Dr. Sheppard said Bill had received enough antivenin "to sink a battleship."

At no time did Bill lose consciousness, nor did he feel overwhelming pain — just repeated sensations of a "sinking feeling." These were sensations of impending death. It was the first and last time Bill thought he was going to die, and for the first time Dr. Sheppard permitted one of his young daughters, Naia Hannah, then nine years old, to visit Bill in bed. He leaned from the bed to kiss her, told her to be a good girl, not to worry about him, and to go home to play with her four-year-old sister, Shantih. Then Bill asked to see Clarita, who was outside, still weeping.

He spoke briefly to her, telling her to be sure that the photographer was not to feel guilty. "His camera work at the scene was not responsible for the bite," said Bill. "It was my fault. I made the mistake." He also told his wife what

to do with the Serpentarium. Clarita burst out of the room, sobbing, "Bill's dying. He's dying." Then, still crying, she returned, but Dr. Sheppard, using his customary term of affection for Clarita, said, "Grandma, will you please leave. You're in my way."

"When I saw Clarita walk out of the room," says Bill, "I wasn't sure I'd see her again."

Dr. Sheppard continued checking Bill's heart and blood pressure every few minutes. Bill did not know it then but at one point the doctor could not get a pulse. His pressure had fallen to 80 over zero. His entire neurocirculatory system was rapidly collapsing. When Dr. Sheppard attempted to inject an intravenous solution into one of Bill's veins, he had great trouble. He tried again and again to insert the needle into a vein, but the solution simply did not drip into Bill's blood. Finally, after a half hour of frantic effort, Dr. Sheppard succeeded only after he had sent for a hair-thin, baby-scalp vein needle. He had included some cortisone in the intravenous solution and he also gave Bill a direct injection of cortisone. At that point there was not much more Dr. Sheppard could do, except to continue checking Bill's pulse, heart and pressure, every few minutes.

The hours dragged. By eleven o'clock that night, according to Dr. Sheppard, Bill was only minutes away from being placed in an iron lung when — just as suddenly as he had "fallen" into a chasm — his blood pressure picked up. "A half hour later," says Bill, "my recovery was complete, dramatic, miraculous. I felt as if I could have walked out of the hospital on my own two feet."

At 1:30 the following morning, Dr. Sheppard announced that he was satisfied Bill would recover and went home. The next afternoon, almost exactly 24 hours after Bill had entered the hospital, he was back at the Serpentarium once more at work, extracting venoms.

More than anything, this bite convinced Bill that he had successfully achieved immunity.

A week later, I arrived at the Serpentarium – to get the King Cobra bite story – just as Bill was about to extract venom from the very King Cobra that had struck the Sunday before. Having acquired a certain amount of research background on cobras, I thought it might now be interesting to take note of Clarita's reaction to Bill's first encounter with the same King Cobra after the near-fatal bite. Just as I had set up my tape recorder and plugged in the microphone, placing it where I could pick up Clarita's voice over a loud-speaker, I heard her terrifying cry. I ran to the office window in time to see Bill dueling with the same King Cobra and Clarita running away, crying, ripping the microphone-transmitter from her neck.

Later, I asked one of the doctors who had attended Bill during the King Cobra bite, "What did you think of that bite? How did it affect Bill?"

"I think," said the doctor, "if Bill goes back to his work, the venom must have affected his mind."

8 . . .

life among the killers

Bill Haast insists that he is not averse to publicity and advertising for the Miami Serpentarium. He does not deliberately ignore it. "I'm very pleased," he says, "that about 40 per cent of gross income now comes from venom sales. That isn't bad, considering that it was zero a few years ago. But I depend on income from admissions to support my work and possibly a future research institute here. I know publicity and advertising are really needed to increase paid admissions, but I don't have the time to devote to it."

Time is the paradox of Bill's life. It is his most precious commodity, yet he is compelled to devote most of it to the work he deems to be least productive. He needs admissions income to support venom production and to stir interest in venom research but tears himself from venom production only with great reluctance to give more time to those activities which might help to increase admissions income. Much of Bill's publicity has been produced in spite of him, not because of him. Harold Farkas, a writer on a national magazine assignment, once sat almost an entire week in the Serpentarium office waiting for an hour's interview with Bill.

Bill was courteous and apologetic. He wanted to cooperate with Mr. Farkas for an article which was to appear in *Science and Mechanics* but simply could not break away from his heavy burden of duties.

Bill's day at the Serpentarium frequently starts at eight o'clock in the morning and seldom ends before eight or nine at night, seven days a week. Often, even later at night, the only light to be seen at the Serpentarium is in Bill's laboratory where he will be alone, processing venoms.

There is almost no let-up in his activities. Between a continual series of tours, when he extracts venoms, he must perform an endless number of chores. When he is not attending to the snake cages, cleaning them, replacing water dishes, disposing of dead snakes, conducting experiments, preparing food for force-feeding; grinding, weighing and packing dried venoms; supervising cleaning, maintenance and repairs, he attends to correspondence and office business and answers telephone inquiries by the score. Occasionally, he pauses for an orange juice, which he drinks by the quart. But rarely does he take time for lunch, and the "coffee break" is to him a ludicrous, time-wasting ritual of the outside world.

He relies heavily on his wife and his secretary, not only to conduct guided tours and assist him at extractions, but to take care of office affairs and keep salesmen away from him. His income allows for the assistance of only a few employees, some part-time, to handle admissions and a small but neat gift shop, and to help with maintenance and with snakes and other animals — alligators, crocodiles and huge Galapagos turtles — kept in open pits for visitor interest. Even if he could afford more employees, his problem would not be solved entirely. There would still be the care and handling of the dangerous snakes and the processing of

venoms. Thus far, he has not had the heart to allow any assistant, no matter how well trained and willing, to deal with the deadly snakes. As for venom processing, he is so concerned with high standards of purity and quality that he feels only he must carry the burden of responsibility for it.

Although seemingly boundless duties absorb his time like a sponge, there are almost no two days alike at the Serpenterium. The bizarre, the unexpected, the dramatic occur regularly. Doctors call to ask whether a certain species of snake that has bitten a patient is poisonous, or for advice on treating a venomous snakebite. There are local and long distance calls from men settling a tavern bet. Parents want to know what kind of snake would make a suitable pet for a child who desperately wants such a pet and request advice on how and what to feed a snake.

One day, I kept a log of some of the calls and callers that Bill attended to. Within a single hour:

There was a woman whose pet snake, a harmless species, would not eat. Would Bill force-feed it please? This was not an unusual request. Bill performs such a service and charges for it, depending on how much food the snake will take. His charge, more aptly labeled a courtesy fee, is about ten cents a notch on the feeding machine and might come to fifty cents or a dollar.

A local resident called to ask for advice on how to get a rattlesnake out of her back-yard swimming pool. Bill sent an assistant to do it. Clarita went along. No charge.

A physician called, keeping Bill on the telephone almost half an hour. He was interested in a medical experiment involving moccasin venoms, wanted a sample of the venom and information from Bill about its effects on humans.

Finally, there was a visitor from the Honduras, a young man who had just completed a tour of the Serpenterium, and wanted to tell Bill about the great number of snakes,

fer de lance, found on his father's banana plantation. Bill, keenly interested, made notes and took names and addresses for use on a possible snake-hunting trip to the Honduras.

Earlier that day, at exactly 8:30 in the morning, Bill was in his laboratory grinding venoms. He works at a counter from which he can look out at the Serpentarium garden through a large picture window. A tall youth with dark brown wavy hair, attired only in shorts and sandals, stood tapping on the window. So intent was Bill on the work before him that he did not hear the tapping. The young man tapped again and again and Bill, without looking up, turned and went to the door instead. Finding no one there, he returned to the grinding. The tap came again. He looked up. The young man seemed vaguely familiar. He should have been. About eleven years earlier, at the age of fourteen, the young man, Atilla Beck, then living in Palm Beach, had been bitten by a coral snake. Bill had responded to an urgent call for help, a request for some of his immunized blood.

Pausing only long enough to arrange for police escorts along the way, he had jumped into his car and raced the entire distance, about ninety miles, in one hour and ten minutes, meeting new police escorts at different town lines. At one point, the transmission in Bill's car burned out. He jumped from his car into a police car and continued the frenetic dash. By the time Bill arrived, half the boy's thumb, the area of the bite, had been amputated.

Now with a passionate and professional interest in venomous snakes, Atilla (living in the Miami area) had completed two and a half years of zoology in college but had to quit school in 1963 because he could not afford it. Looking as handsome as a movie actor with a beautiful toothpaste-poster smile, he spoke with a trace of a Hungarian accent, the country from which he came to America at the age of ten. Atilla's special interest was the viperine snakes, such as

rattlers and moccasins. Between jobs, he'd spend most of his time hunting snakes in the Everglades, camping out alone in a battered 1952 Dodge.

He had been bitten four times after the coral snake incident, once by a pygmy rattler and three times by moccasins and had never been concerned about the outcome. Apparently this one was different. "Here I am again," he said, holding up a swollen arm. It was his sixth bite, this time by a three and a half foot western diamondback rattler. It had happened about fifteen minutes before, while he was trying to put the snake back in its cage at his apartment in town. It was a one-fang bite on the left index finger, but it already looked serious.

Atilla felt that Bill knew more than anyone else about snakebites and did not want to go to the hospital. He wanted Bill to treat him. Moreover, he was afraid of another amputation.

It was not the first such dilemma for Bill who is keenly aware that he is not a physician and has no legal or moral right to treat anyone for anything. But this was clearly an emergency. The arm was severely discolored and the swelling was practically up to the elbow. Bill did what any good Scout would do — applied first-aid. He took Atilla into the laboratory, gave him an injection of antivenin, persuaded him to go to the hospital and then drove him there. Atilla went because of his confidence in Bill, his knowledge of Bill's integrity, and the assurance that Bill would stand by to be certain that a correct course of treatment was followed in the event the attending doctor should not know anything about snakebites. The following day, after he had signed himself out of the hospital, Atilla returned to thank Bill. The youth was especially delighted that another amputation was avoided. A herpetologist without an index finger would be in as bad a fix as a pianist without his.

On another occasion, Bill was awakened at 2:30 in the morning. It was a call from the hospital. The patient, they said, was a twenty-eight-year-old man, Schubert Lee. According to the police, he had attempted suicide by permitting himself to be bitten by a four-and-a-half-foot Pakistan cobra. Bill knew Lee. Ever since he was a boy, Lee had been interested in snakes and he was a regular visitor at the Serpentarium. He often caught snakes and sold them to Bill. Once, carrying a bag of snakes, he was bitten by a moccasin and Bill had to give him an injection of antivenin, too. It was Lee's ambition to save enough money to start a Serpentarium of his own. Now engaged to be married, according to reports, he was despondent because he didn't even have the money for a down payment on a house of his own, which he sorely wanted.

Within twenty minutes, Bill was at the hospital. It was the first time Bill had actually seen anyone dying of a cobra bite. Lee's arm was swollen up to the shoulder and discolored a deep purplish-black. He was lying on the emergency-room floor. Bill was told that Lee's heart had already stopped and had been revived. Now they had him under a portable respirator and a team of doctors and nurses were working frantically to save his life. Bill cautioned everyone not to comment on Lee's desperate condition, not even in whispers. He told them that from his own experiences he knew, even though Lee might seem to be unconscious, he could hear everything. There was almost nothing Bill could do now, except stand by and answer questions for the doctors if necessary. At one point Lee's blood pressure had dropped sharply and Bill recommended a drug that had been used successfully on him under similar circumstances. It worked.

All the available antivenin was administered. It was more than enough, according to Bill, who did not leave the

hospital until more than thirty-six hours later and then only to return home to shower and shave. Within half an hour after Bill went back to the hospital, Lee died.

Seeing Schubert Lee die was a sad and gruesome experience, says Clarita. It made Bill approach the cobras with "perhaps a little more respect, more caution."

"Emphatically not," retorts Bill. "How could I be more cautious! I never want to get bitten. I am always as cautious as I could be. If ever I get fearful, if ever I hesitate to go out that laboratory door for an extraction, that's the time I know I'll quit."

How did Bill manifest more caution with cobras? "Well, it took him just a little bit longer to catch the snakes after Lee died," says Clarita.

Life at the Serpentarium is certainly not devoid of its lighter moments. Visitors, who often react strangely to snakes, are a principal source of humor and comedy, not to speak of bizarre behavior. Many women and children, and occasionally men, say they are visiting the Serpentarium to overcome their fear of snakes, never fully explaining why they feel they must do so.

Once, a man who appeared to be about thirty-five years old fainted during a guided tour. He promptly recovered following a whiff of smelling salts. Offered the use of an air-conditioned room, he declined and resumed his place in the tour. Minutes later he fainted again, recovered quickly, and still declined a resting place. The next time Clarita saw him he had fainted a third time and was on his hands and knees crawling across the grass to sit in the shade. On his way out, he thanked the Serpentarium staff, saying that his visit, recommended by his psychiatrist, had done him a great deal of good!

Immediately after admission to the Serpentarium, the visitors' path to interest in the tour is eased and somewhat

enhanced by the introduction of a large, live indigo snake. Even when severely manhandled this nonvenomous snake, with a beautiful dark shiny skin, rarely bites. Actually its bite is not more serious than a scratch. Visitors are encouraged to handle the indigo and many do, touching a snake for the first time in their lives. Most react with surprise and delight to the discovery that a snake's skin is utterly dry and that a snake can actually be docile. It's the time when nearly all the tourists pose for a photograph or movies, with the snake crawling up their arms and around their necks. Once, during a filming before a large crowd, the snake took an unexpected turn and slid into a woman's blouse. To the delight and hysterical laughter of the audience, including her husband, she was rushed into the office where she could remove her blouse and free the snake.

The modern Serpentarium represents an investment of more than \$250,000, not including many thousands of dollars worth of labor put in by Bill and his wife. His office and laboratories are models of modern decor and efficiency, the former reflecting Clarita's talents in art and fashions, the latter Bill's mechanical, inventive and orderly mind as well as a talent for art. Bill is a precise man who likes everything well organized, in place, and clean.

The Serpentarium garden itself is always immaculate. Broken by neat rectangular patches of green and shaded by transplanted palm trees, the walks are of coral-colored tiles winding about five large circular pits enclosed in concrete. Along the west wall is a series of rooms — office and laboratories—with picture windows, and fronting the east wall are large glass cages containing the King Cobras and pythons. Behind this wall, formerly the Haast apartment, are rooms converted for storage and workshop, plus a back-yard where Naia Hannah and Shantih frequently play after school.

Out of the center-front, tile walk rises the huge replica

of the King Cobra which can be seen from miles off along the highway. In one corner nearby, exposed to the soft rays of the early morning sun, is a pond and miniature jungle waterfall, tumbling over simulated rock into a glistening pool.

The total effect of the garden, particularly under the morning sun, is one of almost breathtaking beauty — a pristine jungle sanctuary, the exemplification of nature at a peak of harmony and peace with man's curious inroads into its reptilian world. To maintain the harmony, Bill has studiously avoided almost all aspects of commercialism. Signs and necessary customer conveniences, including a few vending machines for refreshments, are unobtrusively and expensively recessed in precious wall space.

The only real commercial intrusion is the small gift shop at the entrance. Actually it is almost a concession to public demand for souvenirs and picture postcards. Because it takes some of Bill's valuable time, he has often remarked, "If I could only get someone to take that gift shop off my hands, I'd be so happy." Even so, his standards for the gift shop are high. He will not tolerate cheap trinkets or the display of caricatured souvenirs based on reptilian designs. He has rejected many offers by businessmen seeking concessions at the Serpentarium to "make money." An ordinary businessman would say, "Haast is a fool. He turns down almost every chance to make money." Bill, of course, does not reject the idea of making money; it's the *way* it has to be made that he often doesn't like.

"All our money is in concrete," is one of Clarita's favorite observations, reflecting in a sense an attitude of resignation toward Bill's relentless drive toward continual improvements in the Serpentarium and laboratory facilities. It also reflects Bill's apparent disdain of commercialism and money as an end rather than as a means in life.

For example, it is almost routine for any public attraction to be on the lookout for visiting celebrities whose appearance can be exploited for publicity. Many managers of public attractions make it their business to line their office walls with posed photos autographed by visiting notables. Bill couldn't care less. He has no such photos anywhere. When it is suggested that he install a visitor's register so that whenever a celebrity pays to enter the Serpentarium Bill might exploit it in publicity, his voice rises almost in anger. "Tell me," he demands, "what good would it do? Why would anyone want to sign his name on something he'll never see again and which could be ripped out and thrown away the minute he's gone?"

Then, in a tone of disgust mixed with despair, he adds, "People just don't understand. Nobody'll understand me. I don't give a damn. If I went into this as a businessman — and I don't know if I'd do this as a *business!* — it would be entirely different. I'd devote more time to publicity and advertising and commercialism and make money. But I wouldn't enjoy it. Remember, from morning to night, every minute of this is *my life!* Why should I waste my time on things I don't like — public relations, advertising, autographs, visitor's registers? Why is this a weakness?"

Bill has received considerable publicity, in some of which he has cooperated, sometimes with reluctance, sometimes with ardor. The publicity he loves most is a serious lecture or demonstration on venoms and research and venomous snakes. He and Clarita often devote much valuable time to talks and question-and-answer sessions before groups of physicians and hospital staffs. Once he "performed" on closed-circuit television before a convention of the American Medical Association. He appeared on the largest known color-TV screen in a jammed auditorium and later was amused to learn that when the screen flashed the action of

catching a King Cobra and extracting its venom many seated in the audience involuntarily rose or shrank back in their seats.

The publicity that helps him most, of course, is network television. He knows it and cooperates fully but not without resentment of its inroads on his time, unless it happens to be a program on which he is given an opportunity to mention or discuss his serious purpose and dedication to research in venoms. On September 12, 1962, I met Bill at a New York television studio after he had appeared on the highly popular show *To Tell The Truth*. It was a wonderful opportunity for him. A panel of celebrities, by asking questions, had to find out from three men before them, one of whom was Bill, which of the three was telling the truth; who was the real director of the Miami Serpentarium? I congratulated Bill on having successfully reached an audience in the millions throughout the country, priceless publicity. Bill didn't hear a word I said. He was upset because, on account of nervousness, he had goofed on a question. He had been asked to name the most dangerous snake in South America and had inadvertently named the wrong snake. Bill was worried that his honesty might be impugned because to win prize money he and the others had to try to deceive the panel, although always giving truthful answers.

When Bill is asked to bring a cobra to a television show, the skeptics at the studio, as well as perhaps the audience, are inclined to think that the cobra has been rendered harmless, defanged. In the first place, utterly intolerant of needless brutality, Bill would never defang any snake because it usually results in infection and death to the snake. Furthermore, defanging is a form of "Russian roulette" with serpents. Snakes readily replace their fangs. A defanged snake one moment might be a loaded weapon minutes later.

Trips away from the Serpentarium often provide Bill and Clarita with their own moments of wry humor. In 1957, he

went to the Eden Roc hotel in Miami to appear on the NBC-TV *Tonight* show. He carried a strange-looking straw basket, the kind used by snake charmers. On the way to the hotel, Bill met a friend and the two walked through the lobby where a well-dressed stranger asked Bill what was in the basket. Bill's friend answered, "A King Cobra!" The stranger laughed cynically. "Go ahead, and show him the snake," Bill's friend urged. But Bill, not inclined to dangerous pranks, just shrugged and continued walking. Before the show, a technician stumbled over the basket and he, too, laughed when told that it contained a King Cobra. A few minutes later, the same technician inadvertently stepped on the basket and froze in horror when he heard a fierce, hissing sound.

After the show, Bill was leaving the lobby when he ran into the well-dressed stranger who asked, "No kidding, what's in the basket?" "A King Cobra," Bill replied. Again, the stranger laughed and Bill walked away, a thin smile showing on his face as he looked down at one of his legs. During the TV filming, the King Cobra had made a vicious swipe at Bill and missed by the barest fraction of an inch, tearing a piece of cloth from his trousers. Bill didn't tell anyone, although there were many doubting Thomases who were certain the snake had been defanged.

Bill dislikes wasting time on idle social conversation. But neither he nor his wife are social lepers. Both have many friends and enjoy their company and consider it a perfect evening of recreation to have dinner or visit with them. However, casual socializing is a problem. Those who do not know the Haasts often look upon them as "queer snake people." Yet in all respects, away from the Serpentarium, the Haasts appear just as conventional and as "normal" as others. Because of her strong desire to be "accepted" as a perfectly "normal" person, to prove that she is neither bizarre nor peculiar, Clarita extends herself in fashion. Always

beautifully groomed, she is an avaricious shopper. When she goes into a shoe store to satisfy her hunger for a new style, she is apt to come out, not with a pair of shoes, but with several boxes of shoes and perhaps a handful of costume jewelry and a new handbag. As for himself, Bill prefers simplicity and comfort and dislikes dressing formally; he even avoids wearing a jacket and tie. Often, around the house he'll walk about barechested in shorts, or wearing slacks and an open-collar shirt.

He is not the kind of person who can conceal his emotions. There is nothing subtle about his relations with people. "If he doesn't like anyone," says Clarita, "he shows it. He's never in the middle. He's either positive or negative, for you or against you." Socially, he is not easy to approach for casual conversation. A total stranger with a serious interest in snakes or venoms, or even in some curious aspect of life, perhaps a bit of philosophy or astronomy, can engage Bill in conversation for hours, just as almost any visiting researcher or scientist can and frequently does. But it is not easy to win Bill's confidence.

"I will listen to anyone," he says, "but he must be prepared to prove himself. I feel sometimes when I meet people that there is a barrier between us, and I often learn later that there didn't have to be."

When his friendship is earned, however, it is an utterly loyal one. Once, when Bill was cooperating with a scientist on a research project involving snakes, a laboratory technician who knew Bill slightly but knew the scientist better came to tell Bill, "Don't trust that man. His work is not respected. You'll be embarrassed by him." Bill was outraged. He is rarely profane or vehement — *damn!* is about his most violent expletive — but he told the laboratory technician to leave his office or get thrown out. Later, Bill felt that he was wrong and the technician was right. Today, Bill and the

technician, a highly regarded expert in his own field, are good friends.

Bill's active life at the Serpentarium and his numerous life-and-death encounters with snakes have not been without some impact on his family. For his wife, every day is a cycle of tension, apprehension, cold fear, and restored confidence. There are probably not another dozen women in the world, especially attractive and charming women, who would do what Clarita does day after day. She says she is not fearless. She is not unafraid of snakes, but she has complete confidence in Bill, knowing that he would not and could not endanger her life. As a matter of fact, Clarita actually shrieks and flees in fright at the sight of almost any insect crawling around the house.

I heard one of her piercing cries once when, unknown to her, Bill and I were in the living room. We had entered through the front door and Clarita, returning from shopping, had entered the kitchen through the adjoining garage. Just as Bill and I sat down we heard a frightful cry of fear from the kitchen. Fearing that Clarita was being attacked, I dashed into the kitchen. But Bill, smiling, remained in his chair. He knew what it was — a flying roach crawling along the kitchen floor. It was one of many such incidents to which Bill has become accustomed. Laughing, he calmed Clarita, and with a rolled newspaper in his hand went after the roach. He missed many times before he could drive it out of the house, and this restored Clarita's calm as well as her humor. "Look at him," she said. The man who never misses a cobra can't even hit a roach with a newspaper!"

On another occasion, Bill and Clarita, dressed for one of their rare nights out for dinner, were just about to leave when an aviator friend showed up unexpectedly from South America with a gift. It was a four-foot emerald green tree boa, a harmless constrictor, exquisitely colored but with a

grotesque head that resembled an open skull with venetian-blind stripes along the edges of its face. Clarita put the snake in her oversized handbag and all went to dinner together. During dinner, the three were continually looking into the bag and making comments, which aroused a bit of curiosity. When a waitress asked what was in the bag, thinking she might be told it was a cute little puppy or a kitten, Clarita said it was a snake.

Incredulous, the waitress said, "Oh, yeah!" Whereupon Clarita dumped the entire contents of her handbag on the table and out poured the snake. The waitress fled in panic, and the manager came to throw them out—or so they thought. Actually snakes intrigued him, and today the Haasts are regular patrons of that restaurant and good friends of the manager.

That night at home, having no place to put the boa, a nocturnal tree dweller, Clarita placed it on her bedroom chair, closed the door to keep it from escaping, and went to sleep. Suddenly, in the middle of the dark morning Bill awoke to a terrible shriek of terror. The boa had crawled over the headboard and was leaning over Clarita in bed. It was yawning widely. "I saw huge rows of teeth," said Clarita. "To me it looked like a bear trap. I had handled similar snakes many times, knowing they are docile and really will not bite if properly handled. But after that incident I would not go near it again."

Life at the Serpentarium is so restricting that the Haasts never had the pleasure of a vacation as a family. Only once did Clarita take a trip, a brief three-day cruise to the Bahamas, with the children. But when they returned they found their maid in the hospital as the result of a house-cleaning accident. The maid had taken advantage of an empty household to work with certain cleaning chemicals which gave off noxious fumes. The children, bright and active, who have apparently acquired the moral sensitivities

of their parents, immediately cried and felt guilty. One of them said, "It would not have happened if we were home. Then she wouldn't be in the hospital on account of cleaning like she did."

When Bill is bitten by a venomous snake, the children, well trained, are stoic and unaffected. If Clarita should have to remain at the hospital with Bill, she telephones a friend or relative to care for the children and they are never any trouble to their guardians. But one evening Clarita had to dash to the hospital, leaving the children alone for what she thought might be only an hour or two. Returning much later than she had expected, she found both on the bedroom floor crying hysterically. Because of the circumstances—the telephone call and sudden dash out of the house in their presence—the children thought that this time Daddy had really died.

Whenever Clarita goes out, even if it is only for an hour's shopping, she leaves a name or telephone number where she can be reached at all times. She has to live with the keen awareness that at any moment there could be an emergency requiring her presence at the hospital immediately, if for no other reason than to be sure that antivenin is properly administered to Bill in the event that he should be unconscious, or that Dr. Sheppard or some other experienced physician is unavailable.

Typically, there was the call of February 11, 1961. Clarita had just walked into a store in Coral Gables where she was shopping with the children. The clerk told her there was a telephone call from the Serpentarium. Clarita's heart sank. Bill's secretary, June Nadel, was on the telephone. Bill had been bitten by an African green mamba and was already on his way to the hospital. Clarita paled. Many consider the mamba venom on a par with that of the blue krait and the King Cobra, and Clarita had good reason to know why. This was Bill's second mamba bite.

The first bite, only six weeks earlier, occurred when a mamba lashed out from its cage just as Bill had opened it. He was caught momentarily off guard and was struck on the left hand. The mamba is a fixed-fang snake, and its fangs are so far in front of the jaw that it almost never fails to inject venom when it strikes. "Looking at an angry, striking mamba," says Bill, "is like looking into the face of a snarling dog."

Mamba venom is highly neurotoxic and the average specimen at the Serpentarium was then delivering about six full drops at each extraction. Each drop is equal to a lethal dose of Indian cobra venom. Unlike the venoms of most other snakes which are more viscous, sometimes as thick as syrup, mamba venom is almost watery. That's why mamba venom spreads with incredible speed in the body, Bill believes. He has good reason for this belief.

After the first mamba bite, he had immediately returned the snake to its cage and had walked not more than seventy-five feet when his face suddenly turned ashen and Bill doubled over with severe stomach cramps and pain.

At one time, Bill had one hundred and ninety-five mambas at the Serpentarium and had handled them for about five thousand extractions. Fortunately, he had received specific antivenin only three weeks earlier from Africa. On the way to the hospital and in the hospital, every vial of antivenin was injected into Bill. The symptoms were among the worst he had ever suffered.

"It was as though someone were trying to turn me inside out," says Bill. "I vomited spasmodically but felt a severe need to vomit every few minutes. I alternately experienced tremendous pain and sensations of apathy. At times, I didn't care what was happening to me. My mouth was literally foaming with saliva. It reminded me of the krait bite, but only this time it happened so much faster."

Now, there was the second bite and Clarita immediately

arranged for the care of the children and raced to the hospital, knowing she'd have to go through another day of tension with those awesome, painful symptoms, and she did. This time Bill was unconscious for almost five hours. Dr. Sheppard did not leave his side for a moment, nor did Clarita, to whom Bill looked taut, pale and close to death when she first saw him on entering the hospital.

After his recovery from the first mamba bite, Bill received a letter from a well known herpetologist in South Africa, Bernard J. Keyter, then director of the Transvaal Snake Park. "I read with astonishment," wrote Mr. Keyter, "that you have recovered from a green mamba bite.

"Did you use South African Institute green mamba antivenene, or was it by the grace of God that you recovered. If you use some other treatment please pass the secret on to us. Do write and give me more details about this green mamba episode, as not only we at the Transvaal Snake Park are interested, but the South African Institute for Medical Research as well. We are carrying a stock of ninety-two green mambas."

Since then, Clarita lives almost as much in fear of another mamba bite as a King Cobra or krait bite. In his book, *Snakes of South Africa*, author Fitzsimons says, "There is no doubt that the mamba is fully deserving of its reputation as the 'King' of African snakes, a position comparable only to that of the King Cobra in Asia and perhaps the fer-de-lance in the Americas."

Once, in Africa, Bill met a famous venomologist who told him that making antivenin for the mamba was extremely difficult. It worked so rapidly in the blood that when injected into an animal, the animal often died before they could immunize it to draw off serum. Also, they could not seem to develop a polyvalent serum for cross-protection against the four known species of mambas in Africa. There had to be a specific antivenin for each species.

An adult mamba averages six to seven feet in length. Related to the cobra in the elapid family, it has a slight ability to spread its neck in anger, almost resembling a cobra. But it is an extremely slender snake, barely thicker than a man's thumb, always seemingly fretful and ready to attack.

"They're like wound-up coils of steel all the time," says Bill. "Most snakes will tend to glide away, but if the mamba thinks he's cornered and wants to come out, he'll shoot out and won't hesitate to bite as he goes by. He can do anything without any stance or pose."

To Clarita, the mamba can be described best with only one word, "treacherous." Handling a mamba, she says, "is like playing with a live electric wire. I don't know of any animal used for venom production that is more treacherous than the mamba."

Accordingly, when Bill handles a mamba, even though spectators are quite safe, Clarita always cautions them to move back a bit. Some cynics, on seeing the slender snake in the open cage, prefer not to retreat, as though by standing their ground they could demonstrate their own fearlessness. Once, however, when a mamba cage was opened and the green stick of lightning shot out in one fiery lunge over Bill's shoulder, a man who had declined to retreat when cautioned by Clarita fell to the ground and sped back across the lawn on his hands and knees!

In the final analysis, the mamba is a symbol of everyday life for the Haasts at the Serpentarium—days filled with some humor, endless tensions, and many separate crawling rivers of venomous terror, each seemingly held back by a skillfully constructed dam but ready to burst through the slightest defect in any part of the wall, bent on destroying the engineer in its path.

9 . . .

demand for his blood

“It started as a series of coincidences,” said Bill Haast’s secretary, Mrs. June Nadel. But it ended with the life-saving drama of a man who was then in critical condition and growing more so, according to doctors attending him. He was the victim of a coral snake bite and his recovery began immediately after he had received a transfusion of Bill Haast’s blood.

It was a Wednesday in February, 1965, Mrs. Nadel’s day off. She was listening to the local news on WKAT radio when the newscaster briefly mentioned that a man in Jacksonville, Florida, was in critical condition at the Duval Medical Center. More details came from later reports. He was John B. Lewis, a frail, forty-eight-year-old former circus snake handler and apparently not greatly concerned over his bite, which occurred as he “was picking greens in his garden.” In fact, he did not show up at the hospital until about eight hours after the bite. Possibly, he was unaware that the symptoms of some neurotoxic venoms, especially of the coral snake, do not come on immediately.

But when he arrived at the hospital, carrying the dead

snake, it was obvious he was in trouble. True, it was only a small snake, about two feet. But it was an adult coral snake and could inject a lethal dose of highly toxic venom—and Lewis had been bitten more than once! Angered, he had picked up the snake to kill it, dashing it against a wall, and for this he paid a price. The snake bit him at least three times!

At the hospital, the deadly symptoms came rapidly. Typically, the nerve centers were hit by paralysis. Breathing might be completely halted at any moment. An emergency tracheotomy was performed and he was under a portable respirator, an "iron lung." He was given supportive therapy with steroids, antibiotics, fluids and oxygen. He was also given antivenin, but it was not specific against the North American coral snake. There is no such antivenin, although a research project at the University of Louisville, Kentucky, was then and is now trying to produce it.

Making antivenin for the kind of coral snakes found in the United States is not easy. A major problem is obtaining raw venom from live coral snakes, which happen to be difficult snakes to find, and the amount of venom extracted from each is measured in tiny fractions of a gram. Currently, in fact, one of Bill Haast's most difficult assignments is a contract to produce two hundred grams of coral snake venom, and he fears that it might take years, if ever, before he can produce it.

A coral snake bite is rare in the United States, even though these genera are found in most of the southern and southwestern states. Although Florida is known to have all the types of venomous snakes found in the United States and the second highest rate of snakebites (about one hundred and twenty to two hundred a year, second only to Arkansas), only an estimated one to three per cent are coral snake bites and fatalities are correspondingly rare. In a recent

study of nearly three hundred venomous snakebites reported to the Florida State Board of Health, "only seven were from the coral snake." None was fatal*

But fatalities from coral snake bites do occur and sometimes at a high rate. In a much older study of eight coral snake bites, there were six reported deaths.

One difficulty in accurate reporting of coral snake bite deaths is that many victims are probably children playing in their back-yards or at nearby beaches, in woodlands, swimming holes and farm fields, and their deaths might be attributed to something other than a coral snake bite, perhaps to some other more prevalent and better known type of snake, or even to some natural ailment.

The bite of a coral snake is often difficult to ascertain because the fang holes are extremely small. A child might not even feel the bite, and if he should see the snake he would probably not be able to identify it. Or, in his fright, he might give misleading descriptions and characteristics of the snake. Physicians who are aware of this problem frequently find it necessary to treat hysterical parents who, seeing a scratch on a child's foot, sometimes mistake it for a coral snake bite. Nor is it unusual for Bill Haast to find himself pacifying parents on the telephone.

The coral snake is exceptionally slender and extremely colorful, with variations of banded patterns in crimson, black, and yellow. Invariably, it appears to be lackadaisical (a dangerous conclusion), uninterested in searching for food (except water), and content to remain still in one place. But it is actually a highly nervous creature. Instead of the coiled or raised striking position common to many

*McCullough, Newton C., M.D. and Gennaro, Joseph F. Jr., Ph.D., "Coral Snake Bites in the United States," *Journal, Florida Medical Association*, June, 1963, p. 968 ff.

venomous snakes, the coral snake attack is characterized by violent wriggling motions, erratic twisting and snapping from side to side like a coiled spring. Although its venom is among the least studied, the effects are said to be "purely paralytic."

But the moment Mrs. Nadel heard the WKAT newscast, she knew that Bill Haast might be able to save the victim's life. Several times before, Bill had donated blood to snake-bite patients, among them victims of coral snakes, the first of whom was fourteen-year-old Atilla Beck in 1954. Mrs. Nadel, who began working at the Serpentarium part time when she was an eighteen-year-old education major at the University of Miami in 1953, was by now a seasoned veteran of emergency arrangements. She telephoned the radio station to verify the news because it seemed to be nothing more than a quick, one-line report which was not even repeated in the next hour's news broadcast.

Yes, said Dave Blount, head of WKAT's newsroom, it was true. In fact, because it happened to be just a "filler" for the noon news they did not and had not planned to repeat it. Then the action started.

WKAT immediately telephoned Jacksonville to offer Bill Haast's blood. The offer was accepted. Quickly, WKAT arranged for the police to pick up Bill at the Serpentarium and race him to the Coast Guard air station at Coconut Grove where Bill, accompanied by Harold Dole of WKAT's news department, sprinted to a waiting Albatross amphibian. The flight north to Jacksonville was an uneventful two hours. There was nothing much to talk about over the impossible roar of the engines. Exactly three hours and twenty minutes from the time Mrs. Nadel had first telephoned WKAT, Bill Haast's blood was transfused into the victim. Fortunately, their blood types matched, which meant that Bill's blood didn't have to be processed. Everything happened smoothly and rapidly.

A waiting police car took Bill and Mr. Dole to the hospital. While physicians were still working frantically over Mr. Lewis under the respirator, Bill was taken to the blood bank. His blood was pumped into a sterile plastic bag. The bag was handed to him. He dashed back, about two blocks, to deliver the blood and watched as it dripped into the victim's veins. The response was immediate.

"Before the transfusion," Bill reported, "Mr. Lewis' eyes were closed and only his fingers moved slightly, perhaps involuntarily. After the transfusion, when the doctor asked him a question, he opened his eyes slightly, and soon afterward drew his knees up to his chest and tried to scratch his throat with his hand. All good signs. Everyone was sure the worst was over and plans were made for our return to Miami via National Airlines."

It was about midnight before Bill arrived home. As usual, he neither solicited nor accepted any fee or payment of any kind for his blood, services, or lost time. A few days later, he received a letter from Dr. Thad Moseley, editor of the Florida Medical Association *Journal* and chief of surgery at the Duval Medical Center. "I have been intimately concerned with the care of the coral snake bite patient for whom you donated blood," wrote Dr. Moseley.

"At the present time, the patient is improving rapidly and barring unforeseen circumstances he should make a full recovery. Because of rather marked changes in the patient's condition following the transfusion of your blood, we wish to make a case report for presentation on the subject of this patient. Would you please send me any information regarding your previous experiences with snake bites, describing the situation, results and any thoughts you may have regarding snake bites or the treatment of such bites."

Did Bill's immunized blood save Mr. Lewis?

There's almost no way to prove it irrefutably. There are too many unknown and variable factors.

If there had been two identical victims of the same snake; and if both showed identical symptoms of envenomation and received identical treatment, except that only one was given some of Bill's blood; and that one survived, but the other died, the result might be deemed medically acceptable proof. On the other hand, it might not. Many would consider it an uncontrolled experiment and too small a test.

Of course, controlled animal experiments could be conducted with Bill's blood. Then, at best, the results could be extrapolated. In other words, if Bill's blood were to save animals envenomated with snake poison while identical animals injected with the same poison, but not given Bill's blood, died, it could be interpreted to mean that his blood might be effective in saving human lives. However, even this procedure has defects. A human is a far more complex animal. Many promising laboratory experiments on animals fail when applied to humans. If this weren't so, a cure for cancer would have been announced years ago. It is one of the great frustrations, if not mysteries, of medical research.

Asked whether Bill's blood was responsible for Mr. Lewis' remarkable recovery, one of the attending physicians said, "It's hard to discount that possibility." That's about as much as an honest scientist could say.

Later, Dr. Moseley was reminded of some of the variables and unknowns. For instance, Bill had been bitten by a cobra only a week before the coral snake incident. He had received antivenin. The antivenin, of course, was to combat the effects of neurotoxic cobra venom. The coral snake is neurotoxic. Could it be, therefore, that the combination of "fresh" cobra venom and antivenin in Bill's blood was a factor in Mr. Lewis' recovery? Yes, it was possible, said Dr. Moseley. But he added, "Improvement appeared coincident" with the administration of Bill's blood, and the "patient improved soon after the transfusion."

To his observations could be added the significant factor that, even though there might have been neurotoxic antivenin in Bill's blood, it was not specific for the coral snake bite. Furthermore, Mr. Lewis had already received a type of coral snake antivenin (made in South America) and did not seem to respond to it.

The question of Bill's immunized blood is important—and controversial.

There are no easy answers. The truth lies deep in the fundamentals and perhaps undiscovered secrets of immunology, a complex and not thoroughly investigated science. Among countless medical subjects explored for centuries, it is a comparatively new science. Only recently has immunology received increasing attention because it is one of the key medical disciplines now marshalling forces in the war against one of mankind's most dread diseases, cancer.

What seems to be established and universally accepted is the theory of antibodies. A foreign substance invades the body. It might be a protein, a virus, or bacteria. Antibodies are produced to fight off the invasion. However, if cancer is caused by a virus—a predication that is not proven but widely believed—why is it that some get cancer, others do not? Is there a defect that prevents adequate or specific anti-cancer antibody production in some humans? The same question may be asked regarding a host of other diseases for which the known or suspected causes are viral invasions.

It is believed that human antibody production is influenced by certain lymphoid tissues, including the tonsils, spleen, lymph nodes and appendix. But nobody knows for sure just how the antibody mechanism functions. Neither was Bill Haast sure when he started immunizing himself against neurotoxic snakebites with raw cobra venom.

Some scientists believed at the time that while Bill was following basic immunological procedures, the results would

not be significant because his immunity would be short-lived unless he continued to take booster shots. But Bill's subsequent experiences and his many truly amazing snake-bite recoveries—even after he had ceased booster injections—were enough to convince some that it could be done.

The first to try it was a forty-six-year-old Australian snake collector and hobbyist who had been bitten several times by venomous snakes and following antivenin treatment had acquired a dangerous allergy to the horse-serum origin of the antivenin. Bill's experience was one of the key factors that convinced him and the scientist who administered the immunizing injections that it could be successfully and safely accomplished. Referring to Bill's record, the scientist said "the fact that he eventually tolerated 40 mg of Cape cobra venom proved that a substantial degree of active immunity had been produced."^{*}

Then it was tried by an Army veterinarian, Capt. Herschel H. Flowers, a highly regarded snake-venom researcher, who was interested in immunizing himself and fellow laboratory workers because they were dealing with cobras.^{*} According to many published reports, Capt. Flowers believes he has successfully immunized himself and at least six others against cobra bites.

But apparently Capt. Flowers, as well as many others, do not believe such immunity can be maintained without regular, periodic booster shots. In short, as long as his blood remains actively immune, he, too, can help save victims of cobra bites, and possibly of other neurotoxic species. But without the boosters? That seems to be an unresolved issue.

If Bill, as some believe, is not actively immune because

^{*}See Bibliography *under* Wiener; also *under* Flowers.

he no longer takes boosters, how can his blood be effective in saving victims of snakebite?

How do they know Bill is not actively immune?

At least one researcher said he knew of a recent laboratory test on a sample of Bill's blood and the test showed no effective antibody level against any kind of snakebite. Yet another scientist shortly thereafter reported that a recent test on Bill's blood *did show* an effective antibody level against cobra venom.

Strangely, only a couple of weeks after Bill's blood had been used to help save Mr. Lewis at the Duval Medical Center another drama unfolded. Again, it concerned coral snake venom. Only this time the call came from none other than Dr. Joseph F. Gennaro Jr., an Associate Professor of Anatomy, School of Medicine, University of Louisville, the place where they are trying to produce the antivenin for North American coral snake bite, under Dr. Gennaro and a government grant.

Dr. Gennaro, well known for his snakebite studies and for his research on the biochemistry of venoms since 1956, was concerned about one of his aides, twenty-four-year-old Mary Rayborn. While trying to inject a frisky animal with coral snake venom, the attractive aide accidentally stuck herself with the needle and bled. She was immediately hospitalized. Dr. Gennaro put in a call for Bill's blood, which was flown by Air Force jet to Louisville. She received a transfusion of the blood. But after twenty-four hours, no symptoms of envenomation appeared, and Miss Rayborn walked out of the hospital. Apparently, no coral snake venom had entered her blood stream.

Clearly, some significant questions remain:

Is it possible that laboratory tests for antibodies are inadequate?

Is there some mechanism of immunity which cannot be,

or has not been, discovered through known laboratory procedures?

Is there something in Bill's blood that triggers antibody production only after it has entered the human body, never revealing itself in test tubes?

Is there concealed in one or more of the human body organs or tissues some substance which stimulates antibody production when brought into contact with another substance, perhaps a fraction of snake venom, found in Bill's blood?

"If we could provide these answers," said one doctor experienced in immunology, "Mr. Haast's experiment on himself might be the spark that shall have caused us to revise some of our thinking on immunology."

Meanwhile, for the more than thirty thousand people who will die every year of snakebite throughout the world, and for the countless thousands who will be tortured by the violent symptoms of snakebites and the death throes and the amputations, there is further significance in demonstrating immunization of man to snake venoms. It could be, as Capt. Flowers has clearly implied in his published reports, a step toward the production of a universal vaccine or antivenin.

For the present, however, Bill Haast is convinced that his blood has saved lives and he will continue to offer it as long as he is called on to help and can help. But there have been ironic repercussions for Bill—damage to his personal reputation, slurs on his integrity, questioned motivations. Those who are unaware of the inside details believe that Bill's one-man "rescue missions" are nothing more than astute showmanship, a clever device for publicizing the Serpentarium.

Typically, one well known scientist in the field, a man

who respects Bill as a "good naturalist," said with an apparent touch of skepticism: "I have no way of knowing Bill's motivations for flying around the country to donate his blood for snakebite victims. It is very sensational. However, I prefer to believe he does this for humanitarian reasons." Still, advised that some people in his field scoffed at the thought of a book about Bill Haast, he added, "I don't believe I would let that stop me."

At the other extreme, there was the veteran researcher who spoke bitterly, almost vehemently of Bill's work generally and specifically of his "humanitarian" missions, alleging that even Dr. Gennaro knew that Bill's blood, showing no active immunization level, would be worthless. Then why did Dr. Gennaro send for Bill's serum? "Because Dr. Gennaro didn't know whether his assistant had actually received an accidental injection of coral snake venom, and like any good scientist or human being he was not going to leave a stone unturned to save a life," said the researcher.

When the following question was put directly to Dr. Gennaro: "Did you send for Mr. Haast's serum as an extra precaution, or because you had some reason to believe it might help Miss Rayborn?" he replied: "In retrospect, it seems that Miss Rayborn did only actually receive a superficial scratch and that most of the venom which was missing from the syringe that she had handled was sprayed around the room."

Then he added, "I sent for Mr. Haast's serum because I had to assume that she was seriously envenomated when enough venom was dispersed to be lethal not only to a human, but to a one thousand five hundred pound steer. I can only say that I had every reason in the world to believe that something in Bill's blood would have been of help to Miss Rayborn if she had been seriously envenomated, es-

pecially since she was quite allergic to South American antivenine.”

When hospitals, police and aircraft are involved in a desperate race to save a life, as in the Lewis case, it is drama, the kind newspapers and broadcasting media thrive on, and they make the most of it. Certainly, it helps the Serpentarium at the box office. Bill cannot deny it and does not. But when he goes on a “mission,” the idea of deliberately or actively seeking publicity for himself is utterly alien to his thinking. If a writer or reporter calls for an interview, and if he’s lucky enough, he’ll snare some of Bill’s time on the telephone or in person at the Serpentarium. But rarely does Bill, or even his wife or staff, think of calling anyone to promote the story, or any dramatic story concerning the Serpentarium. These seem to fall naturally into the public domain and are thereafter harvested by the press. As a matter of fact, when I was present during bite No. 84, nobody at the Serpentarium even thought of calling the press until I did so from the hospital and then only to give the story to a newspaperman who is one of Bill’s close friends, although presumably it would have leaked from the hospital or the police.

If Bill were really a showman, as anyone in his position could be, and justifiably might be, he would employ a professional public relations agency which, for a reasonable fee, could exploit any or all of these dramas for millions of dollars worth of publicity. But Bill has never done it and he actively opposes any suggestion that he should do it.

In most instances, the publicity has flowed from the natural course of the dramatic events, sometimes as a direct result of telephone calls and press releases issued by hospitals and other institutions eager to make known their part in the events.

Some of Bill's intensely dramatic missions have never been publicized. Some, with a potential for major headlines, were just given scant space in local newspapers and were totally ignored by Bill. There was the time, for example, when a well known physician took an overdose of a certain compound containing snake venom. It was thought to be a suicide attempt. Bill responded to another dramatic call for his blood. The patient survived. The incident went unnoticed. On another race for delivering blood, the drama was so electric that it would have provided grist for the mills of magazines, newspapers and Hollywood. That time, bent on saving every precious moment, Bill crashed through the barriers of a drawbridge, up and over a sidewalk, to get on the other side before it was too late!

Actually, it would be in Bill's best interests if he were to employ professional public relations counsel. It would bring him the kind of publicity he urgently needs to increase the paid admissions that support his venom production. It might eventually also provide him with the means for starting a full-time venom research institute, his current dream. More significantly, however, it would go a long way toward preventing damage to his reputation.

Often under pressure to meet deadlines, reporters do not always get all the facts and sometimes distort those they do get. More than once seemingly foolish and distorted "facts" have been attributed to Bill. Once, when he was immunizing himself, a reporter of a widely circulated newspaper noted that Bill was going to "test" his immunity by permitting himself to be bitten by a cobra. The remark, attributed to Bill, was completely unfounded and, to Bill, it was the epitome of folly. But the truth has a hard time catching up with the distortions.

With professionally prepared press release information,

even the sloppiest and most indolent of reporters (of whom there are many), would find it difficult to distort facts. Furthermore, short on means and time, Bill needs someone to help him prepare detailed reports of scientific interest on his experiences. Lack of such reports over his byline causes some experts either to question his motivations, views and experiences, or to disregard them.

One of the nation's leading venom researchers, who has never met Bill but purchases venoms from him, reacts typically. "It is hard to evaluate the significance of Haast's work," he says, "because so little has been published. He has certainly demonstrated that a human being can recover from a hell of a lot of snake bites, apparently with the acquisition of comparatively little immunity.

"But no one has, to my knowledge, really tried to assay the venom neutralizing capacity of his blood. He does occasionally donate blood to snakebite victims, but it is impossible to say how much they have been helped by its administration."

Later, this same scientist, a man of enormous integrity and good will, added, somewhat tongue-in-cheek: "Haast is quite a showman!" Nonetheless, he reacted with surprise—but not scorn—on learning that Bill has had no college training.

Bill is keenly sensitive to aspersions cast on his integrity. He has a low boiling point of indignation, but a high degree of morality, and faces his problems, including his antagonists, with determination and philosophical resolve. Perhaps it is best expressed in a thought he recorded years ago in one of his travel diaries: "No one has hindsight who does not take a step forward."

10 . . .

venoms for sale... and for humanity

The indispensable raw material in Bill Haast's laboratory, of course, is snakes. Obtaining domestic species—rattlers, copperheads and moccasins—is no problem. No longer does he have to hunt for these in the Everglades. His Serpentarium is so well known that naturalists, herpetologists and amateur snake collectors throughout the United States frequently offer to sell him more than he needs. Hardly a day passes when some bright, eager lad does not show up personally to sell his prize catch to Bill. Even though he might not need the snake, Bill will buy it. The sparkle of pride in the boy's eyes is too much for Bill to resist.

But other snakes are a problem. In the years to come, for example, Bill will probably need all the secretive coral snakes he can round up in the United States. He has actively sought publicity on this venture, hoping that his urgent need for coral snake venom will be widely broadcast, encouraging snake hunters to seek, capture and send coral snakes to him. He has estimated that before he is only partly through acquiring his goal of two hundred grams (less

than half a pound) of coral snake venom—which is like seeking sugar by the carload during a shortage—his cost of production might come to fifty thousand dollars or more.

His major problem in obtaining the more exotic species from Africa and Asia is shipment of the snakes. A cobra purchased in India, for instance, might cost him two dollars but by the time the snake arrives in Miami the total comes to eight dollars or ten dollars per snake. This adds to his cost of venom production and ultimately to his selling price. The problem of overseas shipments is compounded by an attitude of indifference toward his precious cargo. Snakes, cold-blooded creatures, tend to respond to the temperature of their environment. Because of this, Bill designed his Serpenterium cages with built-in, thermostatically controlled light bulbs to help maintain an optimum temperature of between seventy-five to eighty degrees Fahrenheit. Extreme temperatures below or above are detrimental to the snakes. In cold climates, snakes hibernate to protect themselves. However, contrary to popular belief, snakes do not thrive on heat, certainly not under the direct rays of a summer sun. A snake that has been in a hole, a cave, under a rock, might emerge temporarily for the warmth of the sun. But it will soon return to more comfortable quarters.

Snakes trapped in the sun will die very quickly, sometimes in minutes. Hence, when snakes are shipped from abroad, although carriers are cautioned not to expose them to the sun, especially at a transfer station, the instructions are often totally disregarded, and by the time the snakes arrive in Miami they have long since been dead. This, too, adds to Bill's costs. Frequently, he has had to foot the bill for the snakes, shipment and customs. In response to Bill's claims, airlines have nearly always denied their guilt in mishandling cargo.

But in recent years Bill has solved shipment problems by inducing suppliers, whenever he can, to ship via Scandinavian Airlines System. His "good" luck began when he met Sheldon Good, a passenger-cargo agent for SAS in the greater Miami area. Mr. Good, a frequent Serpentarium visitor, had learned of Bill's sad experiences with dead-on-arrival snakes and suggested that Bill investigate the SAS method for cargo shipments, especially of animals and perishables. Bill did and was delighted to learn that some five years earlier SAS, eager for cargo business with zoos, among others, actually had assigned a research team to examine the problems of snake shipments.

Trial runs were made with snakes from Africa and Asia. SAS quickly learned about the importance of speeding snakes to their destinations by jets whenever possible and sending detailed instructions for all cargo handlers along the entire route, advising on the importance of keeping snakes in comfortable temperatures. Also, airline captains were made personally responsible for perishable cargos.

Moreover, SAS had installed a unique system of simultaneously teletyping ("copying in") every transfer station along the route, from point of departure to destination, advising exactly when, how, and on what flights cargo was being dispatched. This made it possible to pick up arriving cargo at the airport immediately. It was just what Bill needed. Since then, SAS has handled more than one hundred snake shipments for him and only once was there an accidental loss of snakes, which SAS acknowledged as its responsibility. Now, when speaking of SAS cargo handlers, some of whom are Bill's friends and regular Serpentarium visitors, Bill does so with evangelistic fervor, the more so since SAS, without charge, later did a great deal of on-the-scene "market research" for Bill to help him find new snake-

supply sources and possible customers for venoms in Europe; they also provided him with complete information about where and how he might some day set up an auxiliary venom-production station in Europe to help meet competition.

Competition was not Bill's problem at the start. When he first dreamed of his idea for a center in the United States to produce venoms from snakes brought in from all parts of the world, he did not have the slightest idea as to his potential market for venoms. The one immediate prospect he thought of was Hynson, Westcott & Dunning Inc., a highly respected pharmaceutical company in Baltimore, pioneers of *Cobroxin*[®], the remarkable cobra-venom analgesic that relieves intractable pain without side effects or addiction.

In the very first year of the Serpentarium, Bill offered to sell them cobra venom. No thanks, said the company, they were satisfied with their supplies from India. Nor did they believe that Bill could obtain a high quality venom from snakes in captivity. Later, Bill tried again and once more was turned down. About a year later, unexpectedly, came a request for a sample. The carefully worded implication was that if Bill's venom was as good as they had been obtaining, or better, they might give him a trial order. They did. Gradually, satisfied with the high quality of Bill's venoms, they made the Serpentarium their sole source of supply. When Bill's first major order was received from Hynson, Westcott & Dunning, he was at the post office, almost afraid to open the letter. Then he practically danced back to the office. He and Clarita did not know whether to laugh, cry or frame the check.

Elated by his first commercial sale and fired by his earlier contributions of cobra venoms to the University of Miami polio research project, Bill talked of venoms whenever and wherever he could. His aim was to let the world of

science know that if they were interested in experimenting with venoms, any kind of snake venoms, perhaps just for basic research on the chemical composition of venoms, to test the effects of venoms in medical therapy, or even in industrial compounds, he would cooperate by making samples available at nominal prices and would do his best to supply any venom asked for.

Since then, he has sold venoms from more than fifty different species to many customers all over the world. Currently, he has a roster of about fifty regular customers. Among them are physicians, chemists, research institutes, private corporations, government agencies, universities, hospitals, the armed forces, and an atomic research plant. One government agency has a standing order for Bill to supply a sample of every new venom he produces.

Presently, Bill faces some competition which, ironically, is due in part to the interest he has stirred in venom research. He knows of several dozen venom producers throughout the world who have gone into business, selling to some of Bill's old customers and soliciting some new ones of their own. Almost all are able to undersell Bill for three reasons: (1) They are close to their source of supply and can obtain all the snakes they need at a fraction of Bill's cost, not caring a bit about the longevity of the snakes; (2) they seldom produce venoms, as he does, under laboratory conditions involving expensive equipment; and (3) many, unlike Bill, who needs the Serpentarium to support his work, simply operate in their back-yards and have no staff, rents or high cost of living to worry about.

It is for this reason that Bill thought of meeting competition by establishing, with a trained assistant or two, a venom-production center in Europe, closer to the sources of supplies and to prospective new customers. Meanwhile, he relies on quality rather than price, confident that in the

long run customers "stolen" from him will come back. Not long ago, a well known German firm, a major customer, switched from Bill to an Asian source. About a year later, they were back buying from Bill at his regular prices, which are double the prices they paid in Asia.

The art of producing venom at the Serpentarium does not start with the extraction. Actually, the basic step is to maintain the snakes on a well balanced diet, for which Bill developed his force-feeding methods. Through force-feeding, Bill believes, he consistently obtains a high quality venom of the greatest possible toxicity. Also, together with his "gentle" handling, it contributes toward the increased longevity of snakes in captivity.

His force-feeding techniques and results have attracted the attention of zoologists and herpetologists throughout the world. Some, with Bill's cooperation, now do their own force-feeding. One well known scientist, who could not permit the use of his name because of the nature of his work, was among the first to adopt Bill's force-feeding principles and methods. "Through the publicity that has arisen from Bill's work and from work in our laboratory," he said, "many people now use a similar force-feeding method. It is the only way many species of snakes can be maintained in captivity."

There is increasing evidence to support Bill's rationale for force-feeding. Dr. Sherman A. Minton Jr., who has studied the variations in toxicity of venoms, once reported that while the venoms of rattlesnakes seemed to decline in captivity their yields could be maintained at normal levels if they were properly cared for and fed regularly. Not all species need such care. According to Bill, the cottonmouth moccasin almost takes care of itself in captivity, will feed readily on live prey and will breed.

Bill's force-feeding started with a crude compound of vita-

min concentrates, cod liver oil and eggs. It resembled a thick malted milk and was poured into the snake's mouth through a funnel, often held by his wife, Clarita. It did not work too well. Snakes regurgitated the food. After years of painstaking trial-and-error experiments, involving several hundred formulas, he finally came up with a solid-food preparation and a unique instrument, like a caulking gun, made according to his specifications at a cost of more than forty dollars. The food, prepared in advance and frozen until used, is packed into the "gun" and squeezed through a plastic tube inserted into the snake's mouth. The ingredients, measured in careful proportions, are: eggs, milk, vitamin concentrates, liver, gelatin, chicken blood and bone meal. Blended, the food looks like hamburger. The amount given each snake is based on a weight-length ratio that took Bill years to evolve from exhaustive records which he maintains. The exact amount forced into each snake is easily measured according to calibrated notches on the "gun" and recorded on the snake's "health chart."

Whereas venom producers in Africa and Asia might use ten or more snakes to yield a gram of venom, Bill has produced many grams from a single snake. He has extracted venom more than five hundred times from one cobra over a period of ten years! It's not a world record for longevity, however. Snakes live longer in zoos because they are seldom handled and only rarely for venom extractions.

But not all herpetologists agree that Bill's force-feeding is meritorious. A zoo reptile curator, visiting the Serpentarium, for instance, once told Bill, "Why should I bother to force-feed snakes? It's a lot easier to replace a snake than a snake keeper."

Snakes inject their venoms into glass vials. Each precious drop accumulates with others of the same species. Separate

vials are used for each species. Immediately after injection, the vial is placed in a portable freezer which Bill wheels out, along with other instruments, including an antibiotic spray, during extractions. The medication is used to spray each snake's mouth after venom extraction since the mouth is the principal source of infection for snakes.

The collected venoms are then stored in a large freezer in the laboratory. When a suitable amount has been collected, Bill processes the venom in a RePP Sublimator, a costly but highly efficient piece of equipment used in many leading laboratories for freeze-drying. Because of this method of freeze-drying it has been possible to preserve chemicals that otherwise might have a short storage life, a fact that has helped reduce the cost of many chemicals and drugs and has made them more readily available — off the shelf.

After the venoms are dried, Bill spends hours blending and grinding by hand to come up with a product that is consistently uniform. The uniformity of quality is important to a scientist who must be sure if he experiments with a substance more than once any variations in results are not attributable to the physical characteristics of the substance itself—for instance, contamination.

Therefore, it is extremely important to Bill that venoms be processed, from extraction to shipment, under the most advanced laboratory conditions possible. Because many venoms produced abroad are dried in open dishes, exposed in back-yards, kitchens and on window sills, they are frequently contaminated by all sorts of foreign substances, including butterfly wings! Bill has seen venom contaminated with albumin to increase its weight.

Dr. Jon J. Kabara, Professor of Chemistry at the University of Detroit, said: "I think Bill Haast should be commended for setting up a place where a really reliable supply of properly processed venoms has been made available for

research. Until Bill Haast came along, many scientists were getting totally unreliable supplies of venom. I'd hate to tell you of some of the things that have been found in venoms supplied from other sources."

At least one major supplier of biochemicals in the United States admits to the hazards of possible contamination. In its catalog of venoms it states frankly: "Our offering of many of these venoms is based upon faith to an unfortunate degree; since we do not actually capture and milk the snakes ourselves, we must depend upon numerous individuals around the world who have agreed to cooperate. We try to select these people carefully, but there is always a possibility of an unscrupulous or inexperienced individual getting into the organization. We realize that this could conceivably result in a substandard or mislabeled venom." Then, adding a thought all too familiar to Bill, the catalog states: "In our brief experience with these items, we have not yet learned enough about species' differences to provide the basis for an intelligent evaluation of each shipment." This situation only increases Bill's desire to assume complete and personal responsibility for his venoms.

Only rarely does Bill "milk" a snake, and again his reason is fear of contamination. "Milking," unlike extraction, which is a voluntary ejection of venom, involves a technique of massaging the snake's glands. It is harmful to the snake and could result in gland tissue entering the venom.

Finally, to fill orders, measured in milligrams and grams, Bill uses a costly precision electronic balance onto which the precious powders are practically poured grain by grain. Prices of venoms vary according to species, ranging from a low of about thirty dollars a gram for moccasin venom, the easiest to produce, to about one hundred dollars a gram for King Cobra or krait venom. A few venoms are costlier because the species are rare or the yield is extremely low. The

highest priced venom, because of its rarity and low yield, is that of the coral snake; it sells for about \$1,000 a gram. On the average, a gram of dried venom represents about twenty per cent of its liquid volume. Generally, Bill produces about one gram of dried venom from five cc's of liquid venom, plus or minus about five per cent. A King Cobra might eject one cc of venom at a single extraction, but it might take four, five or six or more extractions to obtain one cc of other venoms.

Even though venom sales do not support the Serpentarium, Bill is still surprised that, starting virtually from scratch, he has made venoms account for about forty per cent of gross income in spite of his need to devote what he estimates is seventy per cent of his time to the public-exhibit aspects of the Serpentarium. He calls the exhibit part "a necessary evil."

"If I had my way, he says, "I'd sell the exhibit and do nothing but extract and process venoms — that's all I ever really wanted to do — and devote every other minute to promoting and encouraging research in venoms and doing my own research. My dream now is to find some way to convert the Serpentarium into a research institute and let someone else run the exhibit."

That he has the facilities, integrity and desire to do so cannot be questioned. In fact, on March 1, 1965, the American Cancer Society gave a thirty-six thousand dollar one-year grant to Dr. Julia Lampkin-Hibbard, a scientist with many skills, including biochemistry, for the purpose of continuing a cancer-research experiment on mice. Dr. Lampkin-Hibbard, who is interested, among other things, in determining whether genetic changes take place which make cancers more resistant to certain treatments, chose to do her work at the Serpentarium.

Bill has cooperated with many scientists and is privy to their research secrets. Ethically, he cannot and does not dis-

cuss what these scientists are doing, or what they have told him.

Currently, the most prominent use of venoms is in pharmaceuticals to relieve pain and to help stem excessive bleeding. But one well known scientist, requesting anonymity, volunteered the information that his laboratory was on the verge of identifying the chemical fraction of cobra venom which is responsible for its ability to relieve pain. He said it was a surprising discovery that may be significant in the immediate research future of biochemistry and pharmacology.

In the final analysis, Bill lives in hope that whatever scientists do will — shall! — result in benefit to humanity.

What Bill can do is limited by his lack of formal, higher education. He has a knowledge of the fundamentals of scientific techniques but not an intimate understanding or appreciation of its many complex ramifications. Because of this, he is sometimes impatient, believing that if a particular venom toxoid proves *at least harmless* to patients and holds promise of success, it should be made readily available to anyone who wants to try it.

To some extent, Bill admits his impatience. "I'm not a man of formulas and equations," he says, "but one of imagination and action." Actually, he is a man of both, except that his zeal to prove the value of venoms tends to tip the scales in favor of the latter.

A prominent physician, researcher and member of the faculty of the University of Miami, believes that Bill has long since "earned" a college degree and has been urging the university to award an honorary bachelor's degree in zoology to Bill. But he was made an honorary member of *Beta Beta Beta*, a national fraternity for outstanding collegiates in biology. Such honorary inductions usually go only to persons "of outstanding achievement in some field of theoretical or applied biology." When Bill was notified of the

honor, the secretary of *Beta Beta Beta* at the University of Miami chapter wrote: "Your exceptional work in the Serpenterium as well as your extraordinary kindness and cooperation with the zoology department more than merit the honor."

Among Bill's outstanding characteristics are his compassionate regard for human welfare, his sensitivity to needless suffering, his high moral sense of justice, and his strong belief that every person fulfills or limits his own potentials in life according to how he is guided by powerful, almost subconscious desires. "You can do almost anything," he says, "if your wish to do it is strong enough." A lover of astronomy and eager student of the heavens in his youth, Bill has derived a sense of humility from his appreciation of the vastness and power and orderliness of the universe.

His impatience, however, was manifest many times during the polio research project, when he saw so many dramatic recoveries following administration of the cobra-venom toxoid. In fact, unknown but to a few, there were times when he pleaded personally with high authorities to make the toxoid available to all physicians, to lift the curtain of secrecy at the hospital where it was administered as a "vitamin." It did not mean anything to him that the customary controlled clinical experiments had not been conducted.

"I couldn't care less about it," says Bill. "If it was harmless, and that *was* proved, why not use it. If it could save just *one* life, or save *one* person from living the rest of his life as a cripple, it would be worth all the time, effort and money."

Once, learning of a polio outbreak at a Key West naval station, Bill sped there in his own car, hoping medical authorities, when told of the secret clinical use of the toxoid, would obtain it and use it. But he ran into a solid wall of refusals and bureaucratic referrals to "chain of command." He returned disgusted and despondent.

The "failure" of the polio research project was a shock from which Bill has not completely recovered. It's a subject he'll discuss and debate with anyone for hours. He feels strongly that many "internal" factors, among them politics in science, frustrated all reasonable attempts to administer the toxoid clinically at a time when it could have saved hundreds of lives and forestalled tragic paralysis in thousands. At best, he feels, "politics" prevented a controlled clinical trial of the toxoid.

To an important degree, Bill's strong feelings may be justified. Whether the toxoid was or could have been effective in humans is almost an academic question now, although not irrelevant. What Bill's experience has disclosed is a problem that should be of interest and concern throughout the nation:

Is so much money, hence power, concentrated in so few philanthropic, fund-raising health groups that the politics of science may be controlled by only a few well placed individuals?

Does this oligopoly of scientific handouts discourage and prevent new, bold, imaginative thinking?

What chance does a scientist have to obtain financial support when his concepts are considered unorthodox by a committee which controls practically all the purse strings in his field of research, be it cancer, heart disease, diabetes, arthritis, or any other malady?

Does such a concentration of power make it easy for personal and professional antagonisms to discourage financial assistance for otherwise meritorious research?

Does it compel scientists to channel their thoughts into accepted, orthodox paths so that they run less risk of being refused a grant?

Referring, for instance, to the polio research project under Dr. Murray Sanders at the University of Miami, a top uni-

versity officer, intimately familiar with the project's work and progress at the time, says:

"His (Dr. Sanders') trouble was that he was working along lines of a cure instead of a preventative, and a lot of them didn't feel that was the approach. The approach should be to destroy and eliminate the disease and not to try to cure the patients. Dr. Sanders had his troubles.

"I may be making something out of nothing, but unless you were working pretty well hand-in-glove with that group (the National Foundation for Infantile Paralysis) at that time . . ." He paused, then asked, "There was a pretty definite effort to control and direct polio research on the part of that group, wasn't there?"

"I had high hopes for the success of Dr. Sanders' work," he continued. "I am not a medical man, but I am a biologist. I had probably as good an understanding of what he was trying to do and what success he was having as anyone else. I know *I was encouraged*, and I still think that had Salk, Cox and Sabin not come through with their work, Dr. Sanders' work today would be the right-hand tool of every doctor that ever looked at a suspected polio case."

Perhaps even more significant is the recent revelation that post-polio patients, those already afflicted by paralysis, were also secretly treated with the cobra venom toxoid during the course of the University of Miami polio research project. Dr. Kabara, who was one of the University of Miami research associates on the polio project, from 1949 to 1953, said he remembered at least one girl who had recovered the use of an arm that had been paralyzed by polio ten years prior to treatment. *Several months after treatment, she regained the use of her arm.*

"This led to interest in a possible nerve growth factor in cobra venom," said Dr. Kabara, now also Director of Biochemical Research at the University of Detroit. "I left the

University of Miami because this interest was not pursued. It was and remains one of the most exciting discoveries. Today, many other scientists, whose discoveries were independent of the polio research project, are working intensively to determine what the chemical nature is of this nerve-growth promoting factor. It is not beyond the realm of possibility that such a discovery could help us grow limbs on human bodies. We all know that this phenomenon takes place in the salamander. If you cut a limb off a salamander, it will grow a new limb."

Proof of a nerve growth factor in venoms could also be of great value in the treatment of those who have suffered nerve damage as a result of other afflictions. Plainly, much valuable time and information was sacrificed when the polio project was discontinued.

"Bill Haast is a layman with a keen sense of observation," Dr. Kabara added. "Those of us working around the laboratory at the University of Miami knew that the work on polio was stirred by his idea that there was a close relationship between polio and the effects of cobra venom. We are all excited by venom research of recent years, and I feel that there will be some exciting developments in the fields of pharmacology and biochemistry in the next five to ten years. Bill Haast has been a tremendous boon to this research and the entire scientific community should give him credit for his efforts."

But now Bill Haast looks entirely to the future and thrives on the dream that continuing and increasing research in venoms promises more for mankind than the highest hopes he had ever held for the polio project. Many scientists echo Bill's dream. Dr. Melvin L. Winer, of Los Angeles, who has specialized in the treatment of blood diseases and cancer and has been in cancer research for fifteen years, said:

"My interest in venoms is great in that I feel the surface

has not even been scratched in regard to their potential value in alleviating man's ills. I definitely believe that research in venoms will yield great results to medicine."

Meanwhile, Bill Haast will doubtless continue to devote his time — perhaps his life — to encouraging the world of science to scratch deeper into the mysteries of venoms. It won't be easy. Our era is witnessing the greatest explosion of scientific knowledge in history. Competition for brains and talent to engage in many new fields of investigation is unprecedented. In biomedical research alone more than six thousand journals are published throughout the world.

Doubtless, too, Bill Haast will continue to face the leers and jeers of the pessimists and the cynics. But in this arena of challenge he has an advantage, not much perhaps, just an inspiration, so nobly expressed by the eighteenth century German philosopher Immanuel Kant:

Two things fill the mind with ever new and increasing wonder and awe — the starry heavens above me and the moral law within me.

bibliography...

What follows is by no means intended as a bibliography on snakes and venoms. It is simply a listing of those publications which proved of particular interest to the author and served as useful background information to prepare for the writing of this book. Also included are scientific and technical articles which were of special value to the author or to which specific reference is made in this book.

American Association for the Advancement of Science: *Venoms*, Papers Presented at the First International Conference on Venoms, December 27-30, 1954, at the Annual Meeting of the AAAS, Berkeley, Calif.

Boys, Floyd, and Smith, Hobart M.: *Poisonous Amphibians and Reptiles, Recognition and Bite Treatment*, Charles C. Thomas, Publisher, 1959.

Caras, Roger A.: *Dangerous to Man*, Wild Animals: A Definitive Study of Their Reputed Dangers to Man, Chilton Co., 1964.

Christensen, Paul A.: *South African Snake Venoms and Antivenoms*, South African Institute for Medical Research, 1955.

Conant, Roger: *A Field Guide to Reptiles and Amphibians of Eastern North America*, Houghton Mifflin Co., 1958.

- Crompton, John: *Snake Lore*, Doubleday & Co., 1964.
- Gennaro, Joseph F., Jr.: *Observations on the Treatment of Snakebite in North America*, in *Venomous and Poisonous Animals and Noxious Plants of the Pacific Area*, Percamom Press, 1963.
- Fitzsimons, Vivian F. M.: *Snakes of South Africa*, T. M. Miller, Capetown, 1921.
- Flowers, Herschel H.: *Active Immunization of a Human Being Against Cobra (Naja naja) Venom*, *Nature*, December 7, 1963.
- Kauffeld, Carl, and Curran, C. H.: *Snakes and Their Ways*, Harper, 1937.
- Lane, Margaret: *Life With Ionides*, Hamish Hamilton, 1963.
- McCollough, Newton C. and Joseph F. Gennaro, Jr.: *Evaluation of Venomous Snake Bites in Southern United States; Coral Snake Bites in the United States; Summary of Snake Bite Treatment*; *Journal of the Florida Medical Association*, No. 12, June 1963.
- Minton, Sherman A. Jr.: *Venomous Animals, Spiders and Insects*, *Pest Control Magazine*, January, February, March, April, May, 1959.
- Minton, Sherman A., Jr.: *Variation in Yield and Toxicity of Venom from a Rattlesnake, Copeia*, Nov. 4, December, 1957.
- Minton, Sherman A. Jr.: *Snakebite*, *Scientific American*, January, 1957.
- Navy, Department of (U.S.): Office of the Chief of Naval Operations, Office of Naval Intelligence, *Poisonous Snakes of the World*, a Manual for use by U.S. Armed Forces, ONI Study 3-62, U.S. Government Printing Office, Washington, D.C., June, 1962, \$2.
- Parker, Hampton W.: *Snakes*, W. W. Norton & Co., 1963.
- Parrish, Henry M.: *The Nature of Poisonous Snakebites*,

- Epidemiology, Diagnosis and Treatment, Veterinary Medicine*, April, 1958.
- Parrish, Henry M.: *Analysis of 460 Fatalities from Venomous Animals in the United States, American Journal of the Medical Sciences*, February, 1963.
- Parrish, Henry M.: *Ophidiiasis, an Unusual Occupational Hazard, Industrial Medicine and Surgery*, February, 1958.
- Sanders, Murray; Soret, Manuel G.; and Akin, Benjamin A.: *Interference in Poliomyelitis by Toxoid*, paper read at Convention of Society of American Bacteriologists, San Francisco, August 12, 1953.
- Sanders, Murray; Soret, Manuel G.; and Akin, Benjamin A.: *Neurotoxoid Interference with Two Human Strains of Poliomyelitis in Rhesus Monkeys, Annals of the New York Academy of Sciences*, 58: 1-12, Nov. 30, 1953.
- Sanders, Murray; Soret, Manuel G.; and Akin, Benjamin A.: *The Role of Naja flava Toxoid and Toxin in Experimental Poliomyelitis, Acta Neurovegetativa*, Jan., 1954.
- Sanders, Murray; Soret, Manuel G.; and Akin, Benjamin A.: *Neurotoxoid Interference in Late Experimental Poliomyelitis*, Paper read at the Pathological Society of Great Britain and Ireland Conference, University of Birmingham, England, January 8, 1954.
- Sanders, Murray; Soret, Manuel G.; and Akin, Benjamin A.: *Antipoliomyelitic Action of Certain Toxoids, Acta Neurovegetativa*, based on data presented at the Sixth Symposium of Vegetative Neurology, Strasbourg, France, September 29, 1955. (Undated reprint).
- Sultanov, M. N.: *Poisonous Bites, Treatment and Protection*, U.S.S.R., English translation provided by U.S. Department of Commerce; Available through Office of Technical Services, Joint Publications Research Service,

East Adams Drive, 4th & 6th Streets, S.W., Washington, D.C., 20443, \$2.

- Wiener, Saul: *Active Immunization of Man Against the Venom of the Australian Tiger Snake* (*Notechis Scutatus*), *Journal of Medicine, Australia*, 1, 658: 1961.
- Winer, Melvin L., and Haast, William E.: *Complete and Spontaneous Recovery from the Bite of a Blue Krait Snake* (*Bungarus Caeruleus*), *American Journal of Tropical Medicine and Hygiene*, November, 1955.
- Wyeth Laboratories; *Antivenin* (Crotalidae) *Polyvalent* (equine origin) (North and South American Antisnakebite Serum), Box 8299, Philadelphia 7, Pa., 1963, revised.
- Wykes, Allen: *Snake Man*, Simon and Schuster, 1963.
- Note:* Additional excellent bibliographic references may be found in Wyeth Laboratories', *Antivenin*; and in *Venoms*, American Association for the Advancement of Science, above.

appendix...

Antivenin Sources

For Assistance And Information

The appendix below is provided for two reasons: (1) It may be useful to those concerned with emergency or hospitalized snakebite treatments; (2) Antivenin producers are often excellent sources of information regarding venomous snakes, venoms, antivenin production, snakebite treatment and research. Those with more advanced interests in these subjects may find the sources listed here cooperative and helpful in obtaining data and replies to specific inquiries.

Again, it should be noted that one of the most useful references available is the publication *Venoms* (see bibliography under American Association for the Advancement of Science). Of particular value in *Venoms* is a comprehensive index to subjects and authors. It should also be noted that a similar publication of perhaps more current value may follow a scheduled second international conference on venoms to be held in San Diego, California, in January or February, 1966. This may be followed by another conference on venoms, Sao Paulo, Brazil, during the summer of 1966.

Finally, those concerned with hospitalized or emergency snakebites should note that most hospitals in areas that have venomous snakes are excellent sources of assistance, as are

most zoos throughout the country. In the United States, perhaps the single best source of immediate information, in addition to the Miami Serpentarium, is Wyeth Laboratories, Philadelphia, Pa.

<i>Country</i>	<i>Source</i>
Algeria.....	Institut Pasteur d'Algerie, Algiers.
Australia.....	Commonwealth Serum Laboratories, Department of Health, Melbourne.
Austria.....	Serotherapeutisches Institut Wien, Triesterstrasse 50, Vienna.
Brazil.....	Instituto Butantan, Sao Paulo, Caixa, Postal 65. Instituto Butantan, Sao Paulo, Sampaio 1860, Sao Paulo.
Burma.....	Burma Pharmaceutical Industries, Rangoon.
Colombia.....	National Health Institute, Bogota.
Egypt.....	State Serum & Vaccine Institute, Agouza, Cairo.
France.....	Institut Pasteur Service de Serotherapie, 36 Rue du Doctor-Roux, Paris.
India.....	Haffkine Institute, Bombay.
Indonesia.....	Gedung Tjatjar Den Lembaga, Pasteur Dj., Pasteur 9, Kotak Pos, Bandung.
Iran.....	Razi Institute, Hessarak-Karadj.
Italy.....	Instituto Sieroterapico, Milan.
Japan.....	Institute for Infectious Diseases, University of Tokyo, Tokyo.
Mexico.....	Laboratories Myn, Av. Coyoacan 1707, Mexico 12, D.F.
Natal.....	FitzSimon's Snake Park Laboratory, Durban.
Pakistan.....	Pakistan Bureau of Laboratories, Karachi.

Philippines.....	Alaban Serum and Vaccine Laboratory, Manila. Serum & Vaccine Laboratory, Alaban, Muntinlupa, Rizal; or Department of Health, Manila.
Taiwan.....	Taiwan Serum-Vaccine Laboratory, Taipei.
Thailand.....	Queen Saovabha Memorial Institute, of the Thai Red Cross, Bangkok.
Turkey.....	Refik Saydan, Central Institute of Hygiene, Ankara.
Union of South Africa.....	South African Institute for Medical Research, Johannesburg.
United States of America.....	Wyeth Laboratories, Philadelphia.
West Germany.....	Behringwerke Aktiengesellschaft, Marburg-Lahn.
Yugoslavia.....	Central Institute of Hygiene, Zagreb.

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