



Dr. Herbert C. Clark

Except for time out to study effects of poison gases in World War I, Dr. Herbert C. Clark, Director of Gorgas Memorial Laboratory in Panama, has since 1909 carried exact laboratory methods into the thickest jungles and most isolated Indian villages of the Caribbean area. The result: Numerous important discoveries on the nature and control of tropical diseases of man and beast, especially on the spread of yellow fever by monkeys. Now 73, Dr. Clark still hunts, works and deep-sea fishes like a man half his age and can get a whole native village "cackling with laughter" in 15 minutes.

MAIN ADDRESS

# A Discourse on Jungle Medicine

HERBERT C. CLARK

IT is a very great privilege to attend, as a guest, this international Conference on health problems of industries operating in tropical countries. I want to express appreciation to General Simmons and the Harvard School of Public Health for originating and developing the idea to its present status. The United Fruit Company, in 1921, held a somewhat similar conference in Jamaica, and many of us felt, even then, that such a conference should be held at regular intervals, perhaps every five years. It is hoped that this organization will decide to become a permanent one. It could exert great general influence extending beyond the medical sphere of the company possessions.

### *The Snake in the Pullman Car*

I have been told that I have the privilege of rambling about among several subjects, so long as they have some bearing on problems in the underdeveloped regions of the tropics.

Since the toastmaster has mentioned the name of a very dear friend of mine, Dr. Thomas Barbour, I shall first pay my respects to him. He was always willing to receive and identify for us at the Harvard Museum of Comparative Zoology anything from wild life that we had under study. It was he, in cooperation with the United Fruit Company, who supplied the necessary funds for us to undertake a snake census of Central America. To be brief, this census now includes almost 18,000 specimens. It covers 22 species of poisonous snakes and shows that about 21 percent of our lowland and midland snakes are poisonous. However, this does not mean that the medical hazards are great or that deaths from snake bite are common. My personal experience in Spanish Honduras and Panama is that deaths due to lightning and snake bite are exactly the same.

Now back to Dr. Thomas Barbour, a great scout and a great scientist. I have personal knowledge of two instances where he falls right back into our class of unreliaables. First, he had me place a bounty of \$10 for any snake 10 feet or more



Dr. Clark takes a blood sample from a native girl on the upper Chagres River, Panama.

long. He wanted it for physiological experiments on the 10th nerve. We did get a large boa constrictor which he thought might do. He left Tela, Honduras, and took it via Havana and Key West. Once on board a Pullman coach in Key West, he thought his troubles were all solved. He had placed the snake in a corrugated paper carton, which it filled completely, and then tied a string only one way around the box. He placed the box at the foot of his lower berth. Some time during the night all hell broke loose in the car, and the porter and others broke out fire axes and ended the life of the snake. It was thrown off the train, but Dr. Barlow, when he left the car in New York, took his empty box with him as if it still contained his specimen! A similar thing happened to him coming from India with a cobra in an old suit case. He was a grand man, but we never depended on him to carry anything for us on a train or ship.

#### *Chill Pills and Yellow Fever*

Let's drop back now, for a moment, to the building days of the Panama Canal. My own personal experience began late in the year 1909. I never saw a case of plague or yellow fever that originated on the isthmus.

Colonel Gorgas, as he was then known, had considerable trouble getting sufficient funds to fight malaria and dysentery. Even though plague and yellow fever were not on the varsity team, he didn't dare let them be forgotten, for he would be short of funds—they were better "fund raisers" than malaria and dysentery. One southern politician in those days was hard to keep in line, but the Colonel knew he manufactured chill pills, one grain of quinine to the pill, so he put in a large order for them and had them placed on every dining room table. All of us were supposed to take one each meal time. This seemed like a perfectly harmless routine, except that at about that date the x-ray was placed in fairly general use.

We soon learned that these pills did not dissolve, and x-ray pictures showed false calculi in the most unexpected places.

At the present date, we know that yellow fever does exist in remote rural places from time to time, but we never see it in the better class settlements. However, the wild life surveys of 201 tree animals during the past 18 months in Eastern Panama (Canal Zone to Colombia) show that 51.7 per cent had yellow fever at some time during life. In Western Panama (Canal Zone to Costa Rica) 30.3 per cent of the 221 animals examined were positive for immune bodies. Fifty-seven infant and juvenile monkeys were tested in the entire republic, and 22.8 per cent gave positive reactions for immune bodies. It is safe to assume then that we still have in the remote, undeveloped regions a wild life reservoir for yellow fever.

#### *Preventive Medicine Raised Cane Output*

My personal experience in Central America and the West Indies leaves me with the feeling that our industrial organizations are still too lenient in their selection of labor forces. This was forcibly brought to my attention in 1926 and 1927, when it became my duty to confer with the Superintendent of Immigration in Haiti about labor to be used in the Cuban cane fields. No selection had been made prior to these years. In 1926, we only refused about three per cent of the applicants, but the following year we had a large labor camp where the men were stripped and given a general but quick physical examination. They were inspected fore and aft, soles and palms. They had to have enough teeth to chew food and at least one good eye and arm and two good legs. In addition, if there was a large, hard spleen and very low hemoglobin, the candidate was rejected. A thick blood film was taken and examined, and all positives for malaria were treated with liquid quinine. You see, our work began the middle of November, and the shipment to Cuba began Jan. 1. We were thus able to treat malaria and vaccinate for smallpox. All were treated with oil of chenopodium and magnesium sulfate solution twice. We had no time to hold and examine all of them for worms; so mass treatment was employed. The company for eight years had never been able to get more than 0.90 or 0.92 tons of cane per man per day out of these people, and yet what few Cuban laborers it could get were good for 1.5 tons per day. After the second year's selection, the men from Haiti were good for 1.58 tons per day per man.

These labor camps contained only men. They worked six months during grinding season and then were shipped back to Haiti, minus the number for which death certificates could be shown. During these years, the officials of Haiti and Cuba found that about 113,000 Haitians had reached Cuba by illicit travel and also that many of those whom our company brought over at its own expense went AWOL in Cuba and worked for other companies. It now develops that 3,500 laborers given attention in the camps are doing the work of 10,000 supposed to be in camp but uncared for in a medical way. In the fruit companies of Central America, where the work is year 'round and the camps contain women and children, we expect these days a positive malaria rate of eight to 10 per cent on a thick blood film survey, while in the cane fields it can be held to about one per cent. This means an efficient labor force.

#### *Ducks Carry Insect Eggs*

These days, with DDT residual sprays indoors from one to three times a year, depending on the environment, and weekly suppressive doses of such drugs as

chloroquine, one can forget expensive drainage and larval control measures. However, about port towns or important centrals\* even these measures should be maintained.

The effort in Sardinia to control or to eradicate its special mosquito has greatly interested me and also one of our staff, who has recently spent about six months over there. Although excellent control of this mosquito has, over the years, been accomplished, it is still true that a few loci of breeding can be found.

This brings back to me some experiences at our La Jagna Duck Club about 32 miles east of Panama, in the swamps a mile or two behind the Pacific ocean. We were asked by some office in Washington to collect the lice off the early arrivals among the pintails, blue-winged teals and broadbills in the migrating season and see whether these lice were of the same species as the lice our three native species of ducks harbored.

We used a few metal pails containing water from a driven well or impounded rain water and proceeded to douse the ducks up and down until the feathers were wet. It is not too easy to wet a duck's feathers! Nevertheless, the lice collected were reported to us to be of the same species as those taken from the native wild ducks in this country. On emptying the pails, it was noted that mosquito eggs were floating on the water. More than one species of mosquito was hatched from the collected eggs. I made a note of this about 1934 in discussing a paper in Birmingham, Alabama.

The question that comes up is, how far north can these ducks go, carrying such eggs to other feeding grounds? We know that *Anopheles albimanus* eggs would not stand that long a migratory trip. Furthermore, this species has never gained a serious foothold in the Southern States. However, on the return to their northern nesting grounds, the ducks can pick up the eggs of *Anopheles quadrimaculatus* in the lower tier of states and carry them into the Northern States in the spring, and the mosquitoes can pass the summer months there.

I mention this because I think it may have a bearing on the problem in Sardinia. Ducks would be apt to stop in seacoast water, but cranes and herons travel the length of a stream. This is one quarantine service that cannot be managed as it is on planes and ships. Fur-bearing aquatic animals can serve in the same way, but not over long distances.

#### *O. Henry on Hoof Rot*

I cannot avoid calling attention, again, to the self-contained business communities your organizations control in the tropical regions. The target of these business places is naturally a good profit, but unconsciously your communities not only teach health measures but also teach by example men and women in all lines of endeavor.

As an unexpected guest at the 100th anniversary of Guilford College,<sup>†</sup> I was shown the many Quaker records of marriages, births, deaths, migrations, misbehavior, etc. and to my great surprise I was informed that far out on the rim of my genealogical chart were the names of O. Henry and of Lydia Pinkham! This information seems quite foreign to our subject, but in the case of O. Henry it is not.

While he was hidden away in Spanish Honduras, he wrote a small book disproving the story that hoof rot of the horse and mule in those countries was due to the bite of the tarantula spider. He found that the short brown and black

\*A central is a sugar mill which crushes cane for a wide territory.

†Near Greensboro, N. C.

"... the patience of Job and the persistence of a horsefly..." Dr. Herbert C. Clark, jungle scientist, tells the conferees about chill pills, yellow fever in animals, bird-borne mosquito eggs and a cuba in a cardboard carton. At 73, he is an outdoors and old-fashioned enthusiast, critical of half-baked ideas, beloved of primitive peoples. He outwalks, outworks and outthunts most men 20 years younger. "Best of all," a friend reports, "he likes to get out in the bush and watch the birds and animals."



hairs that accumulate in the ground holes where the tarantula lives are the hairs left after the death of the spiders. We know that these spiders will not bite horses or mules even when closely confined with them in concrete stalls. We also have learned since then that a male tarantula taken from a hole and pitted against a male from another hole will fight him for hours. The victor eats the soft parts of the victim, and later the hairs drop off the long legs, giving rise to the false idea of horse and mule hairs in spider dens.

#### *Candy Melts Indian Matrons*

My experience has been entirely confined to the Caribbean region. In all this region it requires patience and perseverance to inaugurate management of the labor class. This is particularly true in contacts with the Indian tribes. I shall mention only one experience, in which it took many months to even gain an entrance to the tribal area. We had a Navy medical officer and a pharmacist's mate stationed near this tribe for 18 months, and yet they could not get in to survey for yaws. These men in addition sought to take blood films and stools for examination and make a survey for cancer. A Swedish post trader, well known among the Indians of the valley, claimed that the bald head of one of our men kept them both out. None of the Indians in these tribes ever lived long enough to have white hair or bald heads.

The post trader asked that I be brought down, because he thought my white hair and eyeglasses would turn the trick. I got a very chesty feeling about it and arranged to go down. Fortunately I took my seven year old son along. We were two days at the trading post before the three chiefs consented to take us up into the area. It was a Sunday morning. I was turned over to be examined by the wives of the chiefs. Their permission was necessary before we could examine the women and children. These women walked around me and looked me over as if I were a horse that was up for sale. They didn't act as if I were a living human being, and no questions were asked me through the interpreter. After a long time, they reported to the chiefs and refused us permission. When pressed for a reason, the eldest woman said that she had never seen an Indian man with a stomach like mine! Only old women with many children got like that!

We were then offered some fruit. By this time, my boy had a gang of Indian children playing with him, and they talked as if they thoroughly understood each other. My boy then opened two pounds of candy. There was a rush of women and children. When the candy was finished, they came back and told the chiefs we could proceed. It was the boy and his candy that did the trick. Later we supplied them with large, thick glass carboys in wooden crates or boxes for chicha, their ceremonial drink. They painted the woodwork with the tribal symbols. My son complained that this native corn drink tasted just the same going down as it did coming up!

#### *Corn Meal Girls*

In spite of the hazing they put me through, they showed a remarkably keen mind in the making of corn meal. The corn is shelled and cracked; then all grains of one color are piled in a heap. This corn has lots of blue grains as well as yellow, white and red. A girl is elected to each pile, and the one getting the most votes is assigned the largest pile. It's an exciting game for the girls even though it entails a lot of hard work. They place the corn, cracked and shelled, on a rough, hammock-shaped stone. Then, with another stone the size and shape of a loaf of bread, they grind the meal hard, back and forth, until the job is finally done. During all this work, the girls wear their mothers' necklaces, rings and arm bands plus wreaths of flowers on their heads. The older Indians chant and do a slow dance while the work proceeds. They make quite a ceremony of a very hard job. The girls are as proud of being corn meal girls as if they had won an Atlantic City beauty contest.

After a few weeks, these people became very friendly and cooperative. There was a lot of delay and uncertainty, but there was a deep seated reason why they did not want us to pursue our studies. The oldest chief told me that they did not want us there because he was the medicine man as well as the senior chief. We would excite his people and cause him to lose face. He had to spend his life with his people, and he wanted their confidence. They had never sent but five people to Panama hospitals during his lifetime, and all five had died! He then informed us that some of his own patients died, but not all of them! We found that the five he allowed to be taken to Panama had gunshot and machete wounds. We met the chief's wishes and allowed him to give all the medicine except hypodermic injections. Even in these, he assisted by helping to sterilize needles and syringes. He gained prestige rather than lost it. Indian psychology is both good and bad, just as ours is. One must have the patience of Job and the persistence of a horselily when dealing with the primitive classes of labor or with the Indian. When there is mutual understanding, one can usually carry on.

#### *Psoriasis Disappeared in Tropics*

I have enjoyed my life in the tropics, but I must admit to you that psoriasis, of a general and severe type, is the cause of my long service in the tropics. Two attempts to relocate in a temperate zone were followed by the reappearance of the trouble. I can think of no reason why it should disappear in the tropics. I spent nine summers in Philadelphia, and the heat there was as great as or greater than it is in Panama. I mention this subject here so that you may record observations, pro and con, in your tropical regions.

I thank you very much for the privilege of being your guest.