

SANITATION IN THE PHILIPPINE ISLANDS  
SINCE AMERICAN OCCUPATION,WITH PARTICULAR REFERENCE TO REDUCTION IN MOR-  
TALITY BY ELIMINATION OF INTESTINAL PARA-  
SITES, ESPECIALLY UNICINARIA

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In response to the kind invitation of the Association to prepare a paper on tropical sanitation, it was not considered amiss to give a brief description of the work which has been done in the Philippine Islands, in order that the profession at home may be in a position to judge whether the same high standard achieved in Cuba and Panama and other American tropical possessions nearer home has been reached there.

The Philippine Islands are so far away from the United States and it so frequently happens that conditions there are not known that I will take the liberty of giving a brief description of the islands as they appeared at the time the United States took possession of them.

## GEOGRAPHY OF THE ISLANDS

The group is composed of about three thousand islands and extends from 21° 25' latitude to 4° 45' latitude, and from 116° to 127° longitude, has an area greater than the states of Pennsylvania, New York, New Jersey and Maryland, and has a coast line equal to that of the United States. There are two prevailing winds during the year, one known as the northeast monsoon, which blows almost continuously from November to April, and the other known as the southwest monsoon, which blows from April to November, the latter being the period during which the destructive typhoons occur. These conditions produce a climate which varies greatly in different portions of the islands, in fact, the rainy season on some parts of the eastern coast occurs during one monsoon period, and on the western coast during the other monsoon period. In general, it may be said that the dry season, in which there is an average rainfall in Manila of 379.5 millimeters, corresponds to the period of the northeast monsoon, and the rainy season, during which there is an average rainfall of 1,537.1 millimeters, corresponds to the period of the southwest monsoon. The temperature varies from an average of about 80 F. in the lowlands to an average of about 75 in the mountains of Benguet, where the summer capital of the Philippine Islands is located. The lowest temperature of the lowlands is about 65; the highest rarely goes above 95 F. In the mountains it ranges from 35 to 80. The conditions as to warmth and moisture are such that mosquitoes, other insects, bacteria and parasites thrive throughout the year, and cold, that great aid of the sanitarian of the temperate zone, is not available.

With the exception of three large valleys in the Philippines, the interior is very sparsely inhabited, most of the towns being found along the coast. Three valleys, the Cagayan and Dagupan, in the island of Luzon, and the Cotabato, in Mindanao, are traversed by great rivers, of which the Cagayan in Luzon is navigable for a distance of 200 miles. The soil in these valleys is as rich as any found in any portion of the world, but as yet the conditions are such that the mosquitoes breed in abundance.

## SANITARY CONDITIONS BEFORE AMERICAN OCCUPANCY

It is estimated that, at the time of American occupation, the population of the islands was about six and one-half millions, and the death rate so high that the population had been practically at a standstill for many years. There are no records in existence in the Philippines from which even a rough estimate could be formed as to what the actual death rate had been, but judging from the mortality at present, with the positive knowledge that a large reduction in the death rate has been brought about, it certainly must have been over 50 per 1,000.

At the time of American occupation, at least forty-thousand persons per annum died of smallpox. So far as could be ascertained by a careful sanitary survey, not one artesian well existed. The examination of water from practically every section of the Philippine Islands showed that all wells, rivers, springs and other surface sources contained amebas.

There was no sewer system in Manila, a city of over two hundred thousand inhabitants, and the night-soil and kitchen and other waste was disposed of in a most crude manner.

The water supply for the city was derived from a river, the watershed of which was inhabited by about ten thousand persons who considered it their inalienable right to bathe both themselves and their animals in the river and otherwise pollute the same.

In the city about thirty-one miles of esteros or canals existed which were nothing more than open, filthy water-courses into which all waste material, mostly liquid, found its way.

There was practically no provision for the care of the insane, a common custom being to tie them to a stake with a dog-chain.

About two hundred lepers were taken care of at San Lazaro and the Palestine Leper Colony for charity's sake only; four thousand or more roamed about the islands at will.

The remains of human beings were interred as many as four or five in one grave, the remains of former persons being frequently thrown carelessly about in order to make room for a more recent corpse.

Cases of and death from beriberi in penal institutions were very numerous. Malaria claimed its victims by the thousands. On account of there being no adequate quarantine system, diseases like plague, cholera, leprosy and smallpox were frequently introduced from the great infected centers of the Orient. Amebic dysentery claimed its victims by the hundreds without any hope of relief. Devastating cattle diseases were literally sapping the wealth out of the country. Great epidemic diseases like cholera sometimes claimed as many as a thousand victims a day in the city of Manila, and at times are said to have depopulated entire villages. Bubonic plague was found in Manila some time after American occupation.

## SANITARY CHANGES

Pleasing as it might be to state that all the foregoing conditions have now been entirely eliminated, yet in all candor it must be said that the work is so enormous, the funds so inadequate, and trained helpers so few that much yet remains to be done. Yet when it is remembered that the Philippine Islands are eleven times larger than all the remaining tropical possessions of the United States, that it requires over six months to have

even small requisitions for supplies from the United States filled, and that their financial resources are meager, it will not be considered strange that the conditions have not yet become perfect.

Soon after occupation, the general campaign of cleaning and scrubbing so characteristic of the American sanitarian was at once inaugurated throughout the islands. The health requirements were crystallized into compact shape and enacted into laws. About three hundred boards of health were organized, so that the needs of the different municipalities could be systematically studied, and the results enforced. Garbage collection, sewage disposal, street sweeping, the isolation of dangerous communicable diseases, etc., all received attention, and improvement soon became everywhere apparent.

The vaccination of over six million people in a more highly educated country with the best transportation facilities would be no small undertaking. The work in the Philippines was begun by permitting each municipality to vaccinate on its own account, but after several years' faithful trial this scheme was abandoned, and a plan of systematic vaccination by groups of about twenty-five vaccinators directly under the charge of a competent physician was started in various parts of the islands. The plan found to work best was to commence on the border of a province and systematically work across it until every person was vaccinated. In the provinces near Manila, which represent a population of about a million, there were formerly six thousand or more deaths from smallpox annually. Last year after the systematic vaccination was completed, not one death occurred from smallpox.

To-day dozens and dozens of artesian wells exist, and in many localities the death rate has dropped as much as 20 per 1,000 after the use of artesian water became general.

The new gravity water system, which brings water from an uninhabited watershed, will be completed July 1, 1908. The new sewer system for Manila, which is being constructed at a cost of nearly \$2,000,000, will be ready for use next year. In the meantime, however, the sewage is being disposed of in a system of septic tanks which are as effective as could be desired, and have deservedly earned for Manila the name of the city without odors. There is no longer any pollution of the canals or the Pasig river. The thirty-one miles of esteros or canals have been dredged and cleaned of the filth which accumulated during the several centuries. The moat which surrounded the walled city has been filled up, and is now being parked. Thousands on thousands of malodorous wooden structures used over tight vaults have been replaced by the modern enameled closets, and hundreds of acres of lowlands have been raised above tide level and drained. The present watershed is patrolled by United States troops to prevent pollution of the water supply, and a modern ice plant produces daily 100,000 pounds of ice and 5,000 gallons of distilled water, which is sold to the public by the Government at a nominal rate.

Hygiene is taught in the 3,500 public schools of the islands, and the simple rules of health are repeated like a catechism in thousands of Filipino homes.

A hospital of 160 beds was promptly established for the treatment of civil employés, and over half a million dollars have now been appropriated for a new hospital which will not only be large enough to meet the

needs of the government employés, but will be used as a general hospital as well. The same is now actually under construction. A modern hospital building for the insane is already completed, and facilities are available for the care of 500 of those unfortunates.

In the establishment of the leper colony on the island of Culion one of the most extensive segregations recorded in history is being undertaken. Of the 4,000 estimated lepers in the Philippines only about 1,000 remain to be collected. (It may be remarked in passing that the policy of segregating lepers will apparently be fully vindicated. Our experience during past years has been that in those provinces from which the lepers were removed and in which more than 300 new cases have appeared annually, not more than fifty new cases were found.)

The burial of the dead is now properly regulated in over half of the provinces.

The free distribution of quinin has greatly reduced the incidence of malaria. Some drainage and other mosquito extermination has been undertaken, but lack of funds and trained assistance has prevented much headway in this direction.

Great advances have been made in prison sanitation. Diseases like beriberi have been almost eliminated and the death rate brought down to normal.

The management of that great devastating disease, cholera, has been so perfected that even with the funds and help available in the Philippine Islands only dozens now succumb where hundreds died heretofore, and almost positive assurance can be given that the disease can be eradicated from any community in a period of a few weeks. This last fact has done much to allay public apprehension; panics of fear have entirely disappeared, and a community in which cholera makes its appearance moves along in the even tenor of its way as if nothing unusual had happened.

The foregoing sanitary measures, as well as many others too numerous to mention, have produced the same satisfactory results that have heretofore been recorded in other communities in which they have been faithfully applied; the death rate has no doubt been reduced by ten or more per 1,000, which in itself means the saving of many thousands of lives. The morbidity has also been lessened, but even after all of this was brought about the feeling still remained that more should be accomplished.

However desirable the necessary cleaning up and ordinary sanitary measures may be to a community, still our experience in the Philippine Islands leads us to believe that such work alone is not nearly so effective in improving the public health as has heretofore been believed to have been the case. Experience in eradicating yellow fever from Cuba by the elimination of the mosquito and not by the removal of filth, the destruction of the rat for the eradication of plague, the killing of anopheles for the suppression of malaria, all go to demonstrate that there are other more important factors to be taken into consideration than the mere cleaning up in improving the public health.

#### CAUSES OF MORTALITY

Practical work and experience change many apparently well-grounded theories.

In casting about for the cause of the still high mortality in the Philippine Islands two factors seem to stand pre-eminently to the front. One is the infant

mortality, and the other intestinal parasites. After some consideration, infant mortality was dismissed because this is a subject which is much the same all over the world, and has been given much study and attention by persons working in communities where ample funds and trained help are available, and still no great progress has been made, so that we concluded to take up the question of intestinal parasites first.

A fortunate incident occurred at this time which aided materially in the study of this problem. The death rate in Bilibid Prison under the administration of laymen had increased from year to year until the appalling figure of 238 per 1,000 was reached. The management of the sanitation of the prison was then transferred to the Bureau of Health. Ordinary sanitary measures, like relieving the overcrowded condition, improving the methods for the disposal of night soil, regulating the diet along scientific lines, improving the drainage, etc., in a period of six months succeeded in bringing the mortality down to about seventy per 1,000; but persistent efforts carried on for nearly six months more failed to lower it further. Prisoners seemed to be dying from illnesses which should not have killed them. At this juncture a systematic examination of the stools of prisoners was begun. The same was undertaken by examining all the prisoners in a brigade, usually 300 in number. In the first batch examined most astonishing figures resulted.<sup>1</sup> Eighty-four per cent. of the prisoners were found to be afflicted with at least one intestinal parasite, 50 per cent. had two or more, and 20 per cent. had three or more, and of the total number examined 52 per cent. had hookworms.

Active treatment for eliminating the intestinal parasites was begun in one brigade, and after this work was completed it was noted that the incidence of disease in this brigade was much less than among the remaining brigades which had not yet been so treated. The work was actively continued until all the prisoners, numbering over 3,500, were examined and the intestinal parasites removed. The percentage of parasites in the remaining group was about the same as that given for the first brigade. After the treatment was well under way the death rate in the prison gradually commenced to fall, and several months after the intestinal parasites from the last prisoner under observation had been removed the death rate dropped to thirteen per 1,000 and has remained so up to the present time, a period of over a year. These figures show in a most convincing manner the effect of the intestinal parasites on the general health. It seems probable that they so reduce the resistance of the individual that he becomes a ready victim to any intercurrent disease which he may contract.

Records of over 1,000 stool examinations made of persons at large in the Philippine Islands show that practically the same condition of affairs exists among the general population and that as soon as the intestinal parasites of the inhabitants can be removed and the environment made so that they will not readily become reinfected it may be confidently predicted that the death rate in the Philippines will be lowered to figures corresponding closely to those in temperate climates.

It will thus be seen that the magnificent work which has been done in connection with intestinal parasites by Stiles Loos, King, Ashford and others has pointed the way toward a sanitary reform which will no doubt stand in medical history as one of its greatest triumphs.

1. Shattuck and Garrison before the Philippines Medical Association, 1908.

## CRANIAL TECHNIC \*

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The most frequent causes of death following operations on the brain are shock and sepsis. Shock is given by Horsley as the cause in 8 per cent. of tumors diagnosed and removed and in 37 per cent. of those inaccurately diagnosed and not removed. Sepsis increases just in proportion as one is obliged to drain and is unable to heal by primary union; 30.8 per cent. of deaths is the usual proportion.


### THE PRIME REQUISITES


To avoid these dangers the following five requisites must be secured:


1. Instruments which will open the skull quickly over any desired area and to any extent. The preferred instruments are the motor, saw and guard, osteotome, drill, fraise and measure used by me.

2. A method of craniocerebral topography which will permit an accurate exposure of the intended cerebral area. It should be so accurate that the flap is neither too large nor too small. Chipault's is the best method, as it adapts itself to the skull of all ages, races or individual peculiarities.

3. Osteoplastic flaps cut so that they will expose the desired area in the easiest manner.

(a) For the lateral region the flaps radiate like the leaves of a fan, the broader part being toward the vertex, the narrower extremity or hinge at the temporal fossa. These flaps are frontal, rolandic, parietal or occipital. They are four-sided as 

(b) For the exposure of both sides at once, bilateral flaps with their hinges in the temporal fossa, or single flaps with their hinges in the median line, are used. These flaps are either frontal, sagittal, occipital or occipito-cerebellar. The bilateral flaps are four-sided as 

The single flaps are usually six-sided as 

4. The replacement of the bone flap in every possible case or the covering of the defect with an accurately fitting foreign material (celluloid or aluminum). I prefer autoplasty to heteroplasty because bone implanted when still in connection with its periosteum undergoes an immediate reparation if the circulation is not disturbed. Where the apposition is the most intimate, there one will find the least disturbance in healing, the slightest bone absorption, and the surest safeguard against infection. Necroplasty is my second choice.

5. The assurance of a perfect hemostasis both in the preliminary as well as in the final steps.

These five points are to be mastered in any operation in which the cerebrum is exposed for the removal of a tumor, the draining of an abscess or cyst, or for the relief of an injury.

I would divide every operation into two steps, in which the preliminary step concerns only the skull, etc., and the final step, the cerebrum.

### OPERATION—I. PRELIMINARY STEP

All drugs are given up several days before operation.

A record of pulse rate and blood pressure is taken twenty-four hours before operation.

\* Read in the Joint Meeting of the Section on Surgery and Anatomy and the Section on Laryngology and Otology of the American Medical Association, at the Fifty-ninth Annual Session, at Chicago, June, 1908.