A short and plain history of cholera : its causes and prevention written for popular use / [William E.C. Nourse].

A

SHORT AND PLAIN HISTORY

OF

CHOLERA;

ITS CAUSES AND PREVENTION;

WRITTEN FOR POPULAR USE.

BY

WILLIAM E. C. NOURSE, F.R.C.S.

FELLOW OF THE ROYAL MEDICAL AND CHIRURGICAL SOCIETY; AUTHOR OF "TABLES FOR STUDENTS;" LATE SURGEON TO THE EAST AND WEST COWES DISPENSARY; AND FORMERLY DISTRICT ACCOUCHEUR TO ST. MARY'S HOSPITAL, AND MEMBER OF THE BRITISH ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE.

"The developement of the public health is a scienee and an art. . . . . It is the office of medicine to raise men up to a high standard of health, and not merely to heal the sick. . . . . Cholera only shows in high relief what exists in ordinary circumstances. Medical men rarely, if ever, treat the beginnings of diseases; and are scarcely ever consulted professionally on the preservation of the health of cities or families. . . . . But the preservation and the restoration of health are parts of one science."—*Mr. Farr's Report on Cholera*

LONDON:

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WOOLWICH: W. P. JACKSON, THOMAS STREET. ELTHAM: JOHN LACEY.

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PREFACE.

It is only of late years that the prevention of disease has received any other than a partial and exceptional attention, and has bid fair to grow up into an established art. The origin of this art is worthy of note. Its first steps have always been promoted, and its practice continues to be urged upon the public by the very men who reap their emoluments from the existence of what they thus endeavour to remove. It is but just that this should be borne in mind by the public, in their dealings with the medical profession. For, with very little thought of themselves, medical men for many years past have worked on and on, unthanked and unpaid, in the task of investigating and exposing the causes of disease, ever seeking how best to impress them on the mind of the people, and to induce the adoption of preventive measures. The public may in time so far appreciate this, as to seek the advice of medical men for prevention as well as for cure. Medical counsel may come to be sought not only as to the sanitary state of towns, but also respecting that of ships, manufactories, places of public meeting, and private houses. The magnificent country seats of England, often rife in unsuspected causes of disease, may be sometimes inspected, that means to make them more healthy may be pointed out. And it may also be discovered how many fruitful causes of disease exist in the condition of farms, villages, and tracts of country, whereof a large proportion might be obviated at a moderate cost, under judicious advice. But that time has not arrived. Society is not yet sufficiently advanced. There is not sufficient knowledge of these things, or care for them, nor is there yet sufficient appreciation of the honest and disinterested labours which have set them forth to an almost unwilling public, nor faith enough in an honourable profession, which, with some shortcomings, has always in the main laboured for the good of its country. In the meantime it is our duty, every one in his own place, and not forgetting what is due to the profession which each of us in that place represents, patiently to continue the labours thus far began, and on all fit occasions to warn those about us, and to contribute as far as possible to the diffusion of clear views as to the causes and prevention of human suffering, weakness, and death.

Eltham, December 10th, 1857. W. E. C. N.

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CHOLERA, ITS CAUSES AND PREVENTION.

1.—The Subject Proposed.

The steady advance of cholera towards this country, along its old lines of communication, and the occurrence even now of some well-marked cases of it in and around the metropolis, together with the negligence and apathy which still prevail respecting measures of prevention, betoken at no distant date a fresh visitation of the pestilence, aggravated, as on each previous occasion, by human neglect.

It would, therefore, seem useful, notwithstanding the numerous treatises on the subject, to publish a plain and brief history of cholera, designed and written for popular use, without quackery, and without technical pedantry, especially directing attention to its origin, causes, and prevention.

With these it behoves the non-medical public to be well acquainted. Cholera is now likely to be a frequent visitor to this country; and upon the completeness of our preventive sanitary measures, depends, under God, our safety from it. The medical treatment of cholera rests with the profession alone; but in measures of prevention all classes and parties must concur, each heartily doing his duty in his own place. It is hoped that the short-comings of many persons in this matter, short-comings only too common, and too fruitful of melancholy results, are more frequently due to imperfect knowledge and remembrance of the fostering causes of disease, than to wilful neglect, selfishness, or obstructiveness. And it is certain that the fatality of cholera in former visitations was much increased by insufficient acquaintance on the part of the public with its nature and premonitory symptoms, and with the necessity for *early* medical advice. To put some in mind, then, of these two points, and to press once more their importance upon as many of the public as can thus be reached, is the object aimed at in the following pages.

2.—History of Cholera.

The exact point of origin of an epidemic disease is always difficult to make out. Commonly, in the first instance, some mild and not very important disorder of the kind is occasionally observed. After a time, perhaps, when men have become familiar with it, an aggravated form of it breaks out, lasts its day, and subsides; and thus in the course of years other outbreaks occur, and the disease at length becomes more formidable and frequent, and attracts greater attention. By and bye, in connection with some particular place or event, a new and malignant type of it suddenly appears as a violent epidemic, defies all medical treatment, and commits frightful ravages. It then begins to travel, moving at a rate and in a course which definitively accords with the circumstances of certain agencies that seem to propagate it; and, traversing many countries, it long retains its orignal intractable character, while committing its first havoc among the various races of mankind. Finally, after many years, becoming more amenable to remedial measures, it assumes an erratic tendency, and takes rank as a known and established

epidemic disease, wandering up and down the world.

Such has been very much the history of cholera; an epidemic, which, long known in a milder form, and prevailing like any other ordinary disease, after a while began to make itself notorious by more prominent and dangerous outbreaks, burst at length upon the world like one of the ancient pestilences, and now continues to move about from country to country, filling them with desolation and alarm. So threatened, and so situated with regard to it, all educated persons, who are not already familiar with some work upon the subject, must desire to be rightly informed concerning the principal points in its history and manifestations.

In the form of ordinary *bilious cholera*, this disease was known to the old physicians of Greece and Rome, as well as in later times both in Europe and Asia. Cases of a severer kind now and then occurred; and, multiplying in the course of years, became noted as *spasmodic cholera*, which chiefly prevailed between the tropics, and, though more rarely, in unusually hot seasons, in northern countries. Occasionally, either the bilious or spasmodic cholera became epidemic, in some particular season or country, committed more or less extensive ravages, and then disappeared again. Such were the violent English epidemics of 1669 and 1680, and the Indian one of 1695. In the subsequent century, cholera became principally known in connection with India. Various epidemics of the spasmodic form occurred in different parts of that vast country, but all local and temporary, and none equal to the fierce pestilence of later years. Thus, in 1762 it prevailed in Upper Hindostan; it was also frequent in the Carnatic, and on the Coromandel Coast, in which latter locality it assumed upon one occasion a remarkably malignant type; again, in 1780 and 1781, it prevailed in many parts of India, and in 1783 it broke out in a great concourse of pilgrims at Hurdwar on the Ganges, and carried off some thousands of them, but did not spread to any distance.

At length, in 1817, a new, malignant, and rapidly spreading form of the disease appeared in the marshy and jungly tract of country which forms the Delta of the Ganges, among the crowded, filthy, low-lying native towns. This was the *pestilential or malignant cholera*. It swept off the population by thousands, defied all medical treatment, and was communicated from place to place with fatal effect.

In 1818 it spread in every direction from its place of origin, east, west, north, and south; travelling not rapidly, but at a certain fixed rate, apparently about 60 miles a month. It visited in succession all the surrounding countries, even to the Indian Archipelago, the Philippine Islands, China, Chinese Tartary, Mongolia, Thibet, Persia, Arabia, and Palestine; and by the year 1823 arrived at Orenburg and Astrachan. Here it ceased for a time, prevailing in the interim in Persia, and in Chinese Tartary; but in 1829 and 1830 it re-appeared in Orenburg and Astrachan, from whence it ascended the Volga, and got to Moscow. It further proceeded to Riga, St. Petersburg, and the central parts of Russia, and followed the Russian army in Poland. It extended through Austria and Germany, and in September, 1831, appeared at Hamburg. At the same date it was at Smyrna and Constantinople, and was conveyed by a caravan from Mecca to Cairo, where 10,400 Mahomedans shortly died of it.

Having reached Hamburg in September, 1831, its first appearance in England was at Sunderland in October, at Newcastle-upon-Tyne in November, and at Shields, Tynemouth, Gateshead, and other places in December. It

appeared in London *close to the shipping* in February, 1832. In Scotland and Ireland its first appearance was *at the seaports on the eastern coast.*

Conveyed across the Atlantic in an emigrant ship, it appeared at Quebec in June 1832, and spread to Montreal and other places. New York was shortly attacked. From thence it passed successively through the states, and so traversed almost all America.

It appeared at Calais in March, 1832, and was believed to have been brought from England. In that and the subsequent years it ravaged France, Spain, and Italy, re-appeared in England in 1834, and continued to devastate various parts of Europe up to the end of 1837.

About the year 1838, pestilential cholera disappeared from Europe. But in 1842 it broke out in Burmah, and in the following years it spread through the various provinces of India, until in 1846 it reached Persia, where it experienced a considerable aggravation. During 1847 it proceeded into Russia, at the same rate and along the same lines of communication, by which it had passed before. In this year I predicted its speedy re-appearance in England. In June, 1848, it got to St. Petersburg and Berlin; it was at Hamburg in September, and at Edinburgh in the beginning of October. It appeared in London at the end of September, increased rapidly in October, and continued prevalent in November and December, until it receded for a time before the cold of winter.

At this point it is well to note, how remarkably the public health in a manner advanced to meet the pestilence, or was prepared for its reception. Mr. Farr observes, " The deaths from Cholera in England were 331 in 1838; 394 in 1839; 702 in 1840; 443 in 1841; and 1620 in 1842. The deaths from diarrhœa in the five years (1838-42) were, 2482, 2562, 3469, 3240, and 5241." (*Report on Cholera.*) Compare these numbers, and the dates in the next paragraph below, with the history of the second approach of the epidemic cholera just given.

The summer of 1842 closely resembled that of 1857, now passed; the heat being both unusual and of long continuance, more like an African than an English summer. I saw a good deal of choleraic diarrhœa in Sussex, and one case (related by me in the " Medical Times and Gazette,") of true cholera, which nearly proved fatal. The same was observed in most parts of the country. Cholera and diarrhœa increased in the following years, 1843, 1844, and 1845, and in the summer quarter of 1846 a severe epidemic prevailed. The form was English cholera, running on to spasmodic cholera in some of the extreme cases. It was in this very season that the epidemic cholera acquired great force in the East. In 1847, a severe winter, the famine in Ireland, and general distress among the poor, contributed to depress the public health; inflammation of the lungs, typhus, and the eruptive fevers, prevailed; and the deaths from cholera and diarrhœa still increased in number. The same influences continued in undiminished power in the spring and summer of 1848. Thus while the pestilence was still afar off, was its approach hinted at by certain changes in the public health, which paved the way for it.

The cholera having destroyed 1,934 persons in England and Wales in 1848, advanced rapidly in the summer of the succeeding year. It attained its greatest height in August and September; in the following months it declined, and died away at the end of the year, having carried off 53,293 persons. Its

ravages were in proportion in Ireland and Scotland; as well as in Norway, (where, at Bergen, a well-filled graveyard was pointed out to me), in Sweden, Prussia, and other parts of Europe. In 1850 it had almost disappeared from London. In 1851 and 1852 it continued wandering about in Europe, America, and other parts of the world, and then, by its approach again towards these shores, induced me once more to predict the visitation of 1853-54. Mr. Barwell, at the same period, took other and remarkable ground in foretelling the advent of cholera, which he predicted from observing the steady increase in zymotic diseases, especially typhus fever, which had taken place. In fact, as the epidemic deliberately travelled towards us, corresponding changes, as before, took place in the public health. The following table, selected from the Returns of the Registrar-General, shews, first some instances of these changes, in the increase both of zymotic diseases, and of diseases of the digestive organs; and, secondly, the outbreak and ravages of the pestilence itself, in the London district:

DEATHS IN LONDON.

In the Years . .	1850.	1851.	1852.	1853.	1854.
From Typhus	1,923	2,346	2,164	2,649	2,669
Pneumonia	3,108	3,684	3,271	3,938	3,976
Diseases of Stomach, Liver, and other digestive organs	2,955	3,196	3,235	3,349	3,420
Cholera	127	213	162	881	10,708
Diarrhœa	1,881	2,271	2,164	2,310	3,235

The whole mortality from Cholera in 1854 in England and Wales, was considerably less, especially in country districts, than in 1849. It was, however, very general; and deaths occurred from it in almost every county. It also prevailed in Ireland and Scotland, carried off thousands of persons in some parts of Europe, visited the Mauritius, North America, the West India Islands, &c. and was even said to be decimating the Esquimaux! It disappeared from England in the winter of 1854-55, but as the summer advanced, it once more showed itself, as usual, in different parts of Europe and America, and especially ravaged Venice, Rome, and Dantzic. Sporadic cases occurred in London, and a petty epidemic of it at Sunderland. At Dantzic there were 1900 cases, and 1200 deaths.

In the commencement of 1856, we find typhus unusually prevalent in London, though the general mortality was below the average. In Vienna 12,000 cases of typhus were reported to have occurred during the winter. Later in the year, cholera was heard of at Lisbon. Then, "cholera broke out at sea, among some Portuguese troops, that left Lisbon on the 20th of June, and when they landed at Funchal a fair was being held, the troops mixed with the inhabitants, and cholera broke out amongst the latter." It is also mentioned as being at one of the Cape Verd Islands, in India, and at Moscow.

In the spring of 1857, the mortality was for some time below the average. Typhus was less fatal than usual; but a disproportionately large share of it was observed in the east of London. In April there was a brief epidemic of asthenic bronchitis throughout the London district; but in May a marked improvement took place in the public health, which continued unusually good, as long as the weather, hotter than had been known for years, remained steady. As soon as it became variable, which was about the 28th of June,

diarrhœa began to prevail with more force than had hitherto been observed so early in the season, and ran on as an epidemic.

The following table shews how it has swelled the mortality beyond that of the corresponding quarter in the last two years, and also portrays the ebb or flow of some other important diseases :

DEATHS IN LONDON

During the quarter ending with September	1855.	1856.	1857.
From Typhus	647	573	572
Pneumonia	492	581	455
Diseases of Stomach, Liver, and other digestive organs	799	807	883
Diarrhœa	1,258	1,610	2,343
Cholera	106	131	177

The steady increase of the last three items is significant ; while the absence of increase of two such diseases as typhus and pneumonia, possibly denotes less general proclivity towards pestilential disease, than was observed on former occasions. The probability therefore is, that the cholera will come, but will prevail more partially. In the country districts, however, fevers and other zymotic diseases have prevailed extensively, in addition to epidemic diarrhœa, and a few cases of cholera. Typhus among cattle has been noted up and down the country, and, in one locality, cholera. ("Lancet," June 20). Typhoid fever has of late shewn itself in the environs of the metropolis more frequently than usual; and an epidemic sore throat is now beginning to prevail in different parts of the country.

Such is our present state of health in England. Let us now see what the cholera has been doing. It has appeared in several parts of India, at St. Petersburg, and in Sweden. Past experience has shewn that we must always view with suspicion its presence on the shores of the Baltic or the Elbe. In 1855 it was at Dantzic. In 1856 it seems to have receded from those regions, but we hear of it at Moscow. Now, in 1857, it is at St. Petersburg, and in Sweden, having carried off, in the latter country, more than 5,000 persons. Later accounts speak of it at Hamburg, and Gluckstadt, besides several of the Baltic ports. Next, we find it in the Thames, on board a ship which has touched at Gluckstadt. Then it breaks out at West Ham, in a row of houses past which cattle imported from Hamburg are driven. Of the smell from these animals the inhabitants complain. The water, also, which supplies these houses, is bad, being contaminated by soakage from cesspools, and from a foul tidal ditch communicating with the Thames. One or two suspicious cases occur here and there about London ; and on the 29th of October a seaman dies of cholera on board a ship in the Commercial Dock.

Thus is brought as nearly as possible to the present time the history of cholera from its earliest origin. For the future of cholera, everything appears to indicate its settling down into a familiar epidemic, divested of its first terrific and intractable character, but still a most formidable disease.

3.—CAUSES OF CHOLERA.

The purpose and object of cholera, or of any other pestilence, in the economy of Providence, can be at best but darkly understood. That it is like everything else, an instrument or means to some unseen end, we cannot doubt, and

should ever bear in mind, reverentially acknowledging the hand of God. But this must not prevent us from enquiring into its physical nature and causes, as into those of any other natural phenomenon. There are successive orders of causes; nor is it the will of the Great First Cause of all things, that man should refrain from examining the operation of the subordinate and secular agents which He sets in motion, and ordains to bring about His will. Therefore we consider and discuss them, and in doing so, do right; nor can any approval be given to the narrow proceedings of those who would displace such a rational searching into the causation of things, to substitute for it the barren assertion, that God intends them to serve such and such a purpose. For this is a confounding together of *causes* with *reasons*; the causes of a thing being widely distinct from the object it is intended to effect, nor is the study and setting forth of the one any substitute for that of the other. Undoubtedly in this pestilence we cannot but recognize the finger of God; but *why* He has brought it upon mankind, is not so readily discerned. It is sent as a judgment, just so far as any other affliction after its kind is sent; but the particular transgression it is sent for, might perhaps be best demonstrated by investigating its physical causes. Sins of *omission*, as well as commission, ofttimes bear within them the seeds of their own punishment.

In approaching, then, the important question of the *causes of cholera*, it must be borne in mind what very various ideas are comprehended under the term. The end or object for which a thing is intended, is by many called its cause. It is customary to denominate this the final cause; though it would seem more logical to confine the term "cause" to that agency by which anything is brought about. But nothing is ever brought about by any single cause; there are many agents, all commonly spoken of as causes, which stand each in a different relation to the thing effected, be it ever so simple; and few proceedings lead to more misconceptions and disputes, than the habit of thinking and speaking dogmatically of *the* cause of anything, without first understanding and specifying *which* of its causes is intended. For, first of all, there is the Great Primary Cause and Father of all things, who permits us to investigate the workings of the countless inferior agents which He calls into operation and sustains. Then, among these inferior agents, there are some causes which directly *originate* a thing, and having done so, cease; there are others which cannot originate, but can only *perpetuate* that thing; other causes may be said to be capable of doing both, because they *continue regularly to originate;* others are *predisposing* causes, preparing the way for more powerful ones of either kind; and others, though immediate in their action, are only *contributing* causes, whether originating or perpetuating. And it would be easy to multiply instance upon instance like these. Perfect and truthful clearness in this matter it is impossible to attain, especially in a question so complex as the causes of disease, where, from the variable nature of the phenomena observed, the difficulty of assigning to each its true and no other value, the number and subtilty of the agents at work both within and in outward relation with the thing in question, and the constant interference of unseen cross influences, induction has to be carried on with exceeding caution, and inferences have repeatedly to be annulled or re-considered, before the true ones are arrived at.

In the present state of our knowledge, the physical causes of cholera can be only provisionally described as,

1. Causes purely and exclusively *predisposing*. These favour both its origin and spread.
2. Mixed causes, both *predisposing* and *exciting*, which favour, more or less actively, according to their degree of intensity, both the origin and spread of the disease.
3. The special *causes which called the pestilential cholera into existence.*
4. Causes of the *spread* of cholera when originated.
5. The *proximate* cause of cholera.

(1.) The principal *predisposing* cause of any very prevalent disease, is to be sought in the constitution of the people themselves. Some silent and gradual change, not itself visible, and known only by its effects, takes place in the bodies of men, preparing them for this or that disease, and such appears to be the case with regard to cholera. Again, climatic and atmospheric conditions of an unusual or very changeable kind, constitute another predisposing cause. Some persons, indeed, attribute the entire origin and spread of cholera to atmospheric influence. But a state of the atmosphere does not journey deliberately over a continent at the rate of sixty miles a month; it does not strictly confine itself to the main lines of human traffic and communication; nor does it slowly creep from village to village according as human intercourse takes place, nor accompany ships, armies, and caravans in their course.

(2.) Mere *topography* aids or determines the appearance of cholera. The immediate neighbourhood of gas-works and other offensive manufactories, foul drains or ditches, canals, rivers, ponds, thick tangled vegetation, decaying animal and vegetable matter, crowded collections of animals, manure, &c., will predispose to cholera. *Elevation of soil* is a most important element in the causation of cholera, including as it does the question of drainage. A house or a town placed upon a rising ground, has a natural drainage. Its refuse matters are washed down, whether roughly on the surface, or more perfectly in sewers, to some lower spot. Wherever they rest, whether near or far off, there they decompose; and it is the decomposition of these matters, the *emanation from organic compounds in a state of change*, that does mischief and causes disease. And where the decomposition takes place, there disease will arise. If the drainage is by the surface, the dangerous locality will be about the bottom of the slope, where the run begins to be retarded; if by sewers, at any spot where their contents leak or become exposed, and if the refuse is retained in pits or cesspools, there will the air and water be poisoned, and disease be generated. About dwellings on a flat surface, refuse naturally tends to accumulate; and the deleterious decomposition, in this case, goes on close to the houses, unless extra precautions be taken to dispose of the sewage. In towns upon a slope, the lower parts are of course most prone to disease, as everything from the other houses runs to them; and of houses by the side of a river, those nearest the mouth will be most unhealthy. For as it is the detestable custom to drain into every river and stream, the water, limpid at its source, becomes fouler and fouler as it passes down, from the contributions of filth it receives from towns and factories on its banks or from boats upon its surface, and its exhalations become deadly in proportion as they are more loaded with the products of increasing decomposition. *It is organic matter in a state of change that causes disease.* So, in a butcher's yard, not so much illness is caused, as in houses some little distance away, where the drainage from blood and offal undergoes its final decomposition.

The defective and unwholesome state of the large majority of human habitations, is one of the most active agents in aiding the progress of cholera. Even in country dwellings, this is universally the case. Rooms occupied for many hours at a time, are without sufficient means of renewing the air, which, soiled by use, is breathed by the inmates over and over again. In school dormitories, in servants' bedrooms, and in the cottages of the poor, so many persons are often crowded in one apartment, that its atmosphere becomes very deleterious. Vegetation, water, swampy ground, and collections of decaying organic matter, are permitted close to the doors; draining is imperfect, and filth is either accumulated in cesspools, or drained away to the nearest hollow, ditch, fish-pond, or piece of ornamental water, whence rise its baleful emanations. In towns, and even in some villages, these evils increase in proportion to the number of people crowded together. Here the ill-ventilated room is a minor evil; want of light is added, and dirt, its necessary consequence. The over-crowding of apartments is still carried on to a fearful extent, even in spite of the law, whose provisions are too slow and too tamely enforced to meet the evil. Deleterious exhalations rise from foul heaps and open drains, and miserable flooded courts, and rubbish-strewn alleys; on every side unwholesome manufactures, or dirty cowstalls or pigsties, scent the air, and the drainage, defective or absent, leaves the sewerage to steep the rotting floors and blackened foundations, and to soak away into the fætid, saturated earth.

In the last described unclean and crowded dwellings of the poor, cholera is often produced, or when communicated, runs riot, and sweeps off innumerable victims. But in these abodes of misery, it is aided by another cause—deficient or unwholesome food. Many of the poor are kept in a chronic state of semi-starvation. Though not actually without food, they never have enough, and often what they get is hurtful: bad bread, half-putrid fish or shell-fish, refuse scraps from the butcher or poulterer, fragments of diseased meat, and crude fruits and vegetables. Fed thus scantily and badly, if the nature of their food does not directly produce cholera, they are at least strongly predisposed to it, or to any other dangerous epidemic.

Qutting the instances of the very poor, in every class of society errors in diet cause or predispose to cholera. Over-eating, indulgence in strong drinks, and the partaking of ill-cured or ill-dressed meat, fresh pork, goose, pickled fish, shell-fish, unripe fruit, stone-fruit, or cucurbitaceous vegetables, are all causes which operate as powerful predisposants or excitants to cholera; and aperient medicine injudiciously taken has the same effect, also bad water. In like manner, any errors in the mode of living, anything which depresses the powers of life, may conduce to its origin or spread.

(3.) That which first gave origin in India to the pestilential cholera was no unusual or novel morbific agent. In the Delta of the Ganges nothing can be discovered beyond an intense aggravation of the conditions known to originate lesser outbreaks of cholera elsewhere. "The crowded ill-ventilated "native huts are on mounds surrounded with pits, which are the receptacles "of stagnant water, and of every kind of filth. Dr. Barnes asserts unhesi- "tatingly that in these circumstances the Asiatic epidemic was generated "from the *exhalations* arising from the decomposition of *animal and vegetable* "*matter*, and the *use of water in which this process was continually going on.*" Thus, as *organic matter in a state of change and decomposition* favours and

originates disease in temperate climates, so is it the direct cause of spreading pestilences beneath the fierce sky of the tropics, when circumstances concur to heighten its effects in any extraordinary manner.

(4.) The *causes of the spread of cholera* when originated, have occasioned much debate. The disease is certainly portable, and is conveyed by man in his journeys and voyages. It is propagated in some way or other by human intercourse, but in what way has not yet been discovered. The mere contact of skin to skin does not communicate it; nor, so far as we know, does breathing the tainted air of the sick room. Dr. Snow's theory is one of the most practically important. He regards the mucous membrane of the alimentary canal as the central point of the disease in the human frame, and directs attention to the peculiar nature and copiousness of the excretion from that membrane, the frequent and forcible ejection of which, scattering itself on every object within reach, is a prominent symptom in cholera. He says, "The bed-linen always becomes infected by the cholera evacuations, and as "these are undistinguishable by the common tests (being colorless) the hands "of persons waiting on the patient become soiled, and unless these persons "are scrupulously cleanly in their habits, and wash their hands upon taking "food, they must carry into the alimentary canal the means of contagion, and "affect in like manner the food they handle or prepare, which has to be eaten "by the rest of the family, who, amongst the working classes, often have to "take their meals in the sick room. Hence the thousands of instances in "which, amongst this class of the population, a case of cholera in one member "of the family is followed by other cases: whilst medical men and others "who merely visit the patient generally escape." Contamination of wells and water-pipes by leakage from sewers or cesspools, soaking through the soil from one to the other, is a most common occurrence; and in this way the matter of cholera evacuations may actually get into the water used for drinking, and so communicate the disease to persons who have never even seen the patient. Running streams may thus spread the disease from village to village some miles distant, since they rarely escape contamination, and are most commonly used for drinking, without heed of what places they may have flowed through. Dr. Snow strengthens his argument by adducing repeated and detailed instances of each mode of contamination of drinking water, and of the communication of cholera thereby from person to person. Whether this theory be strictly correct or not, it is admitted on all hands that the condition of the water used for drinking has the most intimate connection with the production of cases of cholera, and it is impossible to over-value Dr. Snow's services in directing public attention to the point.

(5). Vital, telluric, and atmospheric peculiarities, locality, the decomposition and chemical change of organic matter, and some sort of infection, thus stand as *causes of cholera*; but what result do they produce in the human constitution? In other words, what is the *Proximate Cause of Cholera?*

All investigations indicate the passage into the system of a peculiar organic matter, which acts as a direct depressant and poison on the nervous centres. The nervous system, thus acted on, receives more or less of a shock, and then begins the train of morbid phenomena peculiar to the disease. These are, in brief, intense congestion of blood in the alimentary viscera, with a pouring forth of colorless evacuations, and excessive depression of the powers of life,

with spasm and coldness. These conditions must be held, in the present state of our knowledge, to represent the proximate cause of cholera.

4.—Symptoms and Course of the Disease.

Cholera always tends to the following succession of symptoms. It begins with *Diarrhœa.* This which is easily curable, lasts from a few hours to as many days, passing suddenly, if not interfered with, into the stage of *Collapse.* There are now extreme depression, painful cramps, coldness of the breath, tongue, and skin, and blueness or lividity of the surface; violent discharges of watery matter from the stomach and bowels; a thick viscid condition of the blood, from this copious separation of its serum; impeded circulation, the blood remaining black; intense congestion of the alimentary viscera, and rapid sinking of the powers of life. If the patient survive, *Reaction* supervenes, which, when moderate, tends to recovery, when excessive, to fever, with suppressed secretions and inflammatory complications. Lastly, if the case continue, the patient passes into a dangerous state of *Exhaustion.* These four distinct stages of the disease are merely the more prominent and fully developed points of a continuous series of morbid phenomena.

5.—Treatment of Cholera.

It is of the utmost importance that medical aid should be sought *early* in the disease; and that every case of diarrhœa, even the most trifling, should be at once attended to. The imperative necessity of this is now universally recognized by those conversant with the epidemic.

Great mischief is done by the publication of so-called remedies for cholera by the non-medical press, as it tempts patients, in a malady which requires the best medical skill, to try and treat themselves, whereby "much precious "time is lost, and the medical attendant is only called in when, perhaps, too "late." If, however, much time intervene before professional aid can be obtained, the following should be done:—For Diarrhœa, take 10 or 20 grains either of the Aromatic Confection or of compound Chalk Powder, remain quiet, apply warmth to the skin, and take no food except warm broth or arrow-root. If there be coldness, external or internal, take further a little brandy mixed with plenty of hot water, to which some peppermint or ginger may be added. No opiate, or purgative, should be taken without medical advice. Dr. Robert Dickson judiciously says, "If you have eaten some indigestible article of food, "take an emetic. In most houses some flower of mustard is to be found; a "small table spoonful of this, with two table spoonfuls of common kitchen salt "put into a tumbler of water, and drank off quickly, will generally act as an "emetic, which will relieve the stomach." If cramps, vomiting, and blueness or coldness of the skin are present, the mustard and salt emetic should be given immediately; the patient should rest in bed, with plenty of bottles of hot water applied wherever they are required, and a large mustard poultice should be put over the whole abdomen. These and similar measures are all that can with advantage be done until the medical man is seen.

6.—Prevention of Cholera.

Careful perusal of the preceding pages will have suggested many preventive measures; which will be most successful if not so much directed against cholera as against all causes of ill-health. First, all those personal means usually re-

commended to maintain the highest state of bodily vigour, are to be employed here. Clothing should be warm, and flannel next the abdomen is useful.

Secondly: It is essential that all such sources of malaria as gas-works, leaky cesspools, open soil pits, mixen or manure heaps, grave yards, poultry yards, cattle sheds, pigsties, slaughter-houses, &c., be removed from the vicinity of human dwellings; or if this cannot be done, there is no choice but to abandon the houses as unfit for human residence. One or the other must give way. Near country houses, ditches should be cleaned and kept free from impurity, wet land be drained, farm-yards be decently ordered, and the over-growth of plantations and hedges be limited.

The proper location of residences is of great importance in preventing cholera. "The habitations of a people should be raised on dry, drained land of a certain "elevation, washed by rains, and ventilated by the breezes of heaven." There should be shelter to the north and east, and free exposure to the south and west. Situations or houses irremediably unhealthy should be quitted; nor are landlords justified in building houses, a commodity of which the law of supply and demand is so peculiar, in unhealthy spots. House owners who let, have much to answer for. To their negligence and cupidity is owing a large share of the physical and social evils of the people. Some powerful interference is loudly called for. It is well to respect the rights of property, but even property itself must not be erected into a Moloch to be fed with human sacrifices.

(3.) The internal arrangements of houses should be made thoroughly wholesome. Light, cleanliness, and space, are essential. Ventilation is most important, and may generally be effected by simpler means than the learned contrivances recently in fashion. Dryness is not less important, and no pains should be spared to secure it, both by proper selection of site, and by structural contrivance. Lastly, proper drainage and water-supply demand the most careful attention. It is by an unfortunate concurrence that the two have to be viewed in conjunction. They ought to be widely separate subjects. It is most strange to have to urge a civilized community not to drink the filterings from its own cesspools, but present circumstances make it necessary. Wells and cesspools cannot co-exist. Sewers contaminate water-pipes, and do so every day, even when the contents of each pass quickly along. It is most difficult to prevent them. How impossible, then, must it be to prevent contamination when each fluid is retained in a great reservoir in a state of rest? If cesspools are necessary, they should be water tight and air-tight; they should never be opened without a liberal use of Burnett's solution, and some other water-supply must be sought. If wells are necessary, cesspools must be abolished, and sewer pipes be laid down to take the sewage to a distance. But wells and cesspools cannot co-exist.

In long inhabited places, the ground is necessarily saturated with foul organic matter, so that even if the cesspools be done away with, the wells cannot yield pure water. In such cases, it is better to seek a fresh water supply first, and, if financial reasons prevent the cesspools from being abolished at the same time, to provide that they shall be properly constructed and managed, and never opened but with the use of Burnett's Disinfecting Fluid. Where sewers exist, *all indoor* communication with them should be carefully trapped, not the smallest aperture being anywhere allowed by which the smell from the sewers can get into the honse. Ground likely to be tainted should not be

opened except in cold weather. Finally, all water used for drinking should be filtered or boiled.

(4.) That the labouring classes should be able to procure *proper* and *sufficient* food, is essential. Famine always aids pestilence. So, on the other hand does intemperance, which leaves its victims peculiarly liable to cholera.

(5.) The knowledge that cholera is capable of communication from case to case, should excite no panic, or disposition to abandon the sick. There need be no fear of its spreading, if the following precautions be observed :—Strangers should not come into an infected place, nor should persons quit their usual home and occupations, except for very special reasons. The sick should not be collected or crowded together. The healthy should not unnecessarily be associated with the sick; and one or the other should whenever adviseable be removed, always to higher ground. Dr. Snow observes, "Hand-basins and "towels, with sufficient water, should always be in readiness in the sick per- "son's room, where every one should observe strict cleanliness; nurses and "other people should invariably wash their hands before touching food. The "healthy should be separated from the sick, and be removed to another abode "when they have no place but the sick room in which to prepare and take their "meals. Soiled linen (and blankets) should be (at once) immersed in water "until they can be scalded and washed; for if they should become dry the matter "might be wafted about in the form of dust. . . . . Water into which sewers "flow, or which is navigated by persons living in boats, or which is in any "other way contaminated by the contents of drains or cesspools, should be "entirely disused." Bedding, clothing, and all utensils about the sick, should be thoroughly cleansed before being used again. The sick chamber must not be kept too close, and it will be well to avoid inhaling the emanations, and to use disinfecting fluid.

7.—Conclusion.

I have thus endeavoured to set forth, winnowed from extraneous matter, the essential points in the History, Causes, and Prevention of Cholera. Of measures having for their object the prevention of disease, it is impossible to over-rate the importance. To save lives, to avert a pestilence, and to raise the physical condition of the people of our land, are surely noble objects, and worthy the attention, not of a professson only, not of a class, but of all for all are interested, and all can co-operate. It is too much the fashion to look to authorities and acts of parliament for assistance. But authority in this country is slow, and always travels two days' journey behind public opinion. A man's best legislator is himself. Facing his responsibilities, rightly valuing his powers, it is for every one to banish causes of disease by simply and fully doing his duty in his own place.

Eltham, Kent, November 17, 1857. W. E. C. N.

W. P. Jackson, Printer and Publisher, "Journal Office," Woolwich.

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PENITENTIAL RITE OF THE ANCIENT MEXICANS.

WHATEVER views may be held concerning the religion of the Ancient Mexicans; whether we adopt the ideas promulgated by the Berlin school of Mexican mythology, which speaks of a Mexican "pantheon," and crowds its labyrinthian passages with innumerable "gods" and "goddesses;" or whether, as many analogies indicate, the Ancient Mexican sociological and religious system was a development on the same lines of thought which produced that of the Zuñi and Pawnee people of today, there is one point on which all must agree, namely, that the Ancient Mexicans practised their religion with a zeal and devotion worthy of a better cause.

It was not only the priesthood which subjected itself to a stern discipline which enforced prolonged fasts and excruciating self-torture, but the painful rite of drawing blood from one's body and offering it to the deity, commonly practised by all persons, young and old, was a feature of everyday life. Some time ago, whilst making a special study of the rituals of the Ancient Mexicans, I collected and translated, from the works of various writers, a number of passages relating to the native rite of drawing blood from the ear, the tongue, and other parts of the body. The fact that, in passages describing the rite of blood-sacrifice, the piercing or cutting of the helix of the ear is usually mentioned first, tends to show that a particular sanctity or significance was associated with this particular organ. The precedence accorded to this rite, which must not be confounded with the ceremonial of piercing the lobe of the ear for the purpose of wearing ear-ornaments, is particularly interesting in connection with Miss Alice Fletcher's recognition of the importance attached to the ceremonial piercing of the ear amongst the tribes of the Siouan group.

It has seemed to me that the most satisfactory method of presenting the material which I have collected from the writings of Friars Sahagun, Motolinia, Duran, Mendieta, the Chronicles of Tezozomoc and other authorities, would be to present literal translations of such passages as best preserve details and local coloring.

In honor of the Lord of the Night, this being one of the

FIG. 1.

many titles bestowed upon Tezcatlipoca, the Lord of the North, of the Underworld, etc., a festival was held once or twice a year on the day Nahui Ollin. According to Sahagun the priests fasted during the four days preceding this festival and, at noon, blew conch-shells, flutes, and whistles, and then passed slender twigs or sticks through their tongues. An interesting bas-relief preserved at Jalapa (Fig. 1) illustrates

this painful rite, the most graphic description of which is given by Friar Mendieta in his Historica Ecclesiastica Indiana (chap. XVII): "At Tlaxcalla . . . the priests . . . performed an unheard of and horrible self-sacrifice . . . the servitors of the temple brought together a great quantity of sticks, as long as an arm and as thick as a wrist. These had been manufactured by a number of carpenters who had prepared themselves for doing so by fasting and praying during five days. The master stone workers, after praying and fasting, also made many black obsidian knives which were to be used in perforating the tongues of the priests and which, after having been sanctified, were laid on a clean cloth."

"They first performed a dance with songs and beating of drums. Then a master who was an expert in this office came with the obsidian knife, and made a large opening in the tongue of each of the principal priests . . . The Achcauhtli, or high priest then drew through his tongue, on that day, four hundred of those sticks. Other old, practised and strong-minded priests, imitating his example, also drew the same number of sticks through their tongues. The less aged priests used three hundred sticks, some of which were either as thick as a thumb, as a great toe or as the index and middle finger together. Younger priests did not employ more than two hundred sticks, but all according to their strength and valor, performed this rite, at the termination of which their aged leader intoned a chant, although he could hardly raise his voice on account of his lacerated tongue. All made efforts, however, to sing and offer sacrifices and then those of the temple began an eighty day fast during which, at intervals of twenty days, they drew the sticks through their tongues four times . . ."

In chapter XVIII Mendieta specially describes the ear sacrifice performed by the priests who fasted during periods of four years and who, at intervals of twenty days, passed through the holes, cut in their ears, sixty pieces of cane, as long as an arm, some thick and some thin. "These blood-stained offerings were placed in a heap, in front of the idols and were burnt at the end of the four years . . ." Friar Sahagun relates that, every day of the year, the priests offered blood from their ears

to the sun at sunrise and also at noon, on the day Nahui Ollin, when all persons, old and young, also drew blood from their ears in strictly observed silence and in front of the sculptured and painted image of the Sun which was in the temple named Quauhxicalco. This image, the Friar adds, represented the sun as a human face encircled with rays. The partly unpublished MS. of Sahagun's work, preserved in Florence, contains an interesting illustration to this passage, in which the image of the sun is held by a man whose body is partly hidden, and two men, seated opposite to each other in the foreground, are in the act of piercing the helices or external borders of their ears (Fig. 2). On the same day and at the same hour, blood was

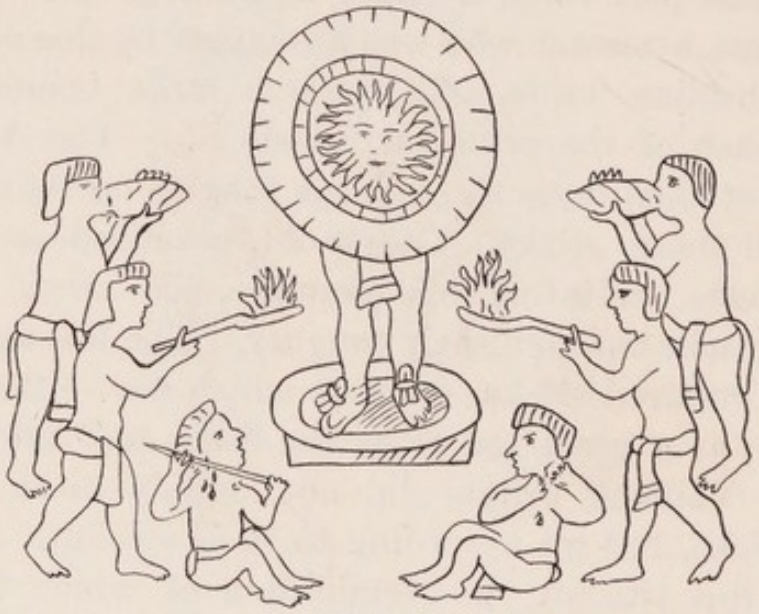


FIG. 2,

also drawn from the ears of "babes in their cradles," who were thus made to participate in the general blood-offering. All adults made offering of their blood during five days preceding the fixed festivals held at intervals of twenty days. The men made incisions in their ears and painted lines on their faces with the blood thus obtained. The lines they drew were straight and extended from the eyebrow to the jaw-bone. The women drew circles on their faces and, as an act of special devotion, sometimes offered blood in this way during a consecutive period of eighty days, cutting themselves at intervals of three or four days. This ceremony was named Nenacaztequiliztli (lit. the ear-cutting).

Another rite, named Tlazcaltiliztli, was performed, as an

act of homage to the sun or to the element fire, whenever any one finished building a new house, or when the sign of the sun reigned in the native Calendar.

This rite consisted in drawing a drop of blood from the ear and catching it on the nail of the first finger and filliping it towards the sun or into the fire.

Sahagun distinctly states that this rite was the same as that named Acxoiatemaliztli which he describes as follows: "As an act of devotion some offer their blood in the temples during the vigils of the festivals. In order to make their offering more acceptable they first went and gathered branches of the wild laurel named Acxoiatl which grows in great quantities in their woods, and brought them to the calpulcos or houses of communal government, situated in their respective quarters

FIG. 3.

of the city. There they took two of the sharp points of the agave leaf and drew blood from their shins, then carried these blood-stained points to the temple where they offered them to the god to whom they rendered devotion on a sort of circular cushion or mat made of the young branches of the wild laurel." Sahagun's association of this ceremony with the drawing of blood from the ear, is corroborated by an illustration contained in the Anon. Hispano-Mexican MS. preserved in the National Library at Florence entitled "The Book of the Life of the Ancient Mexicans" (Fig. 3).

This represents a step-pyramid surmounted by an image of the "Lord of the North or of the Underworld," and the per-

formance of what the text designates as "a penitential rite" in his honor.

The penitents who are respectively piercing tongue and ear, also exhibit bleeding wounds in other parts of their bodies. At the base of the pyramid, on a mat of leaves presumably of the wild laurel, lies the ball of woven grass, which Sahagun names the "çacatapayolli," in which two agave points are sticking.

The above illustration accords with Friar Duran's statement (Historia, vol. II, p. 195) that, at a certain festival, "all priests and dignitaries took small obsidian sacrificial lancets and made incisions in their tongues, ears, breasts, arms, and legs. Some penitents pierced the ears and pushed many reeds through the opening — others perforated their tongues and drew a number of straws through them . . ." The above references to the rite as being penitential are corroborated by Duran's distinct statement that, "according to the number of grave offences committed by a penitent, he or she took a number of straws, of the kind used for making brooms, each one a handbreadth in length. With these he went to the temple, perforated his tongue with a lancet and passed the straws through it, and then threw these in front of the idol . . . Later on, the priests gathered up all these blood-stained straws and burnt them in what was called the 'divine brazier,' after which the penitents were declared free of their offences."

The same author describes (vol. II, p. 244) as follows, the penitential rites performed by the priesthood during the festival Etzalqualiztli: — "The priests fasted for four days, and each night, after midnight, went to where the agave points were kept which had been cut on the previous day and had been brought sticking into pieces of the fleshy agave leaf. They then cut their ears with small obsidian knives and stained their faces and the agave points with blood. According to the devotion of each priest the number of the agave points he stained with his blood was five or more or less." Elsewhere it is stated that each priest carried with him a piece of the fleshy part of the agave leaf, into which he stuck the thorns used in performing the penance. The duty of collecting and preparing the agave leaf points used in the performance of penitential rites devolved upon the larger boys who were being educated, by the priesthood, in the Calmecac. According to the Codex Ramirez

(Ed. José Vijil, p. 113): "after the performance of certain rites, the priests went, at midnight, into a wide room in which there were many seats" — a fact to which I will revert further on. "The priests, being seated, took either an agave point or an obsidian lancet and pricked or cut their ankles. They then smeared their blood on their temples as well as on the agave points or lancets and stuck these into the prepared grass balls, which were afterwards usually placed between the turrets on the wall enclosing the courtyard. These balls were allowed to remain there so that all should see that the penitential rite had been duly performed by the priests on behalf of the people."

"In the great temple there was always a large number of these lancets and agave points because those stuck in the grass balls were constantly being removed and replaced by others. They were never used twice and were preserved with great reverence, in memory of the blood offering made to their god." The foregoing mention that the thorns were reverently preserved is of special importance and is further corroborated by Friar Sahagun's statement that Vitztepeoalco, the name of the 23rd edifice of the great temple, signified literally: the place wherein the thorns or agave points are thrown. This structure is, moreover, described as "a square, surrounded by a low wall, into which the priests cast the agave points with which they had performed penance. Pieces of green reeds or cane, stained with blood, were also thrown there, as an offering to the gods."

A perusal of the following detached quotations teaches further that, in Ancient Mexico, according to circumstances, the performance of the rite of blood sacrifice, constituted an act of humility, of thanksgiving, of penitence, or of propitiation. A passage in the Chronicle of Tezozomoc (p. 639) relates how certain representatives of a conquered tribe, on reaching the Mexican capital, first went to the temple of Huitzilopochtli where, "as a sign of true humility and abasement, they pierced their ears, arms, the calves of their legs with agave points and then betook themselves to the house of Montezuma." Duran records (vol. I, p. 424) that on a certain occasion, the Mexican ruler "bled his ears and limbs as an action of thanksgiving" and it was possibly as such that the rite was solemnly performed by the newly elected rulers of Mexico during the elabo-

rate ceremonies which accompanied their inauguration. The following curious details are preserved in Duran's account of the preparation made for the ceremonies of Montezuma's inauguration. "On the floor of the temple, near the brazier, were laid the royal robes and diadem, an incense-burner and three sharp-pointed bones . . . After his investment with the royal insignia Montezuma burned incense in honor of the god of fire and then pierced his ears with the sharp-pointed ocelot or tiger bone, incised the fleshy part of his arm with the puma's bone, and his shins with the eagle's bone." Later, in the great temple, on the "Stone of the Eagles," he again drew blood from the same parts of his body, with the same bone instruments, observing the same order. In the discourse addressed to him on this occasion by the ruler of Tezcoco, Montezuma is exhorted to attend to his new duties, one of which was the observation of the stars, another that of sacrificing his blood and offering it to the gods on behalf of the people. Montezuma's use of an ocelot bone for piercing his ears is corroborated by Tezozomoc who repeatedly alludes (pp. 573, 577, 587) to the thin, sharp instruments made of ocelot or puma bones, which were used by the same ruler for bleeding his ears and limbs. In describing the inaugural festivities of Tizoc, Duran states that the sharp ocelot bone instrument used by the ruler was "garnished with gold" (vol. II, p. 310). Finally the same author relates of Ahuitzotl that:—"after sacrificing quails before the idol of Huitzilopochtli, he asked for the bone of an ocelot. An extremely pointed and sharp one having been handed him, he perforated the helix of his ears, . . . his arms and legs . . . (vol. II, p. 376). On another occasion, however, when Ahuitzotl entered the temple at Chalco in which the idol of Tezcatlipoca was a special object of worship, he "sacrificed a number of quail and then, asking for an eagle's bone, bled his ears, arms, and shins . . ." (vol. I, Duran, p. 378).

The following passage demonstrates that the performance of the rite was supposed to insure success in the hunt. "On the seventh day of the hunters' festival, Quecholli, there was a great gathering in the courtyard of the temple of Huitzilopochtli. A large number of arrows were ceremonially manufactured and all participants" cut and bled their ears. If any

one omitted this rite he was fined by the men named Tepanmani who took his mantle from him and never returned it. All of the youths assembled were sent up to the temple of Huitzilopochtli where they were obliged to cut their ears and anoint their faces and brows with their blood. "This rite was called momaçaçio (lit., the deer sacrifice), because it was performed with reference to the deer the youths were going to hunt." (Sahagun, book I, chap. XXXIII).

During the fifteenth festival period named Panquetzaliztli, the following rite was performed "by those women who were going to sacrifice slaves. They went to bathe in the stream which flowed past their dwellings, each woman carrying four agave points. Before bathing they cut their ears and after smearing blood on the agave points they cast one of them into the water; they stuck one in the bank of the river, and offered the remaining ones to the idol in the adjacent oratory. . . "

Sahagun relates that when the youths who were being educated in the Calmecac, wish to perform voluntary penance, they "set out alone and walked towards the hills, woods and rivers. Each one carried pine torches, a bagful of copal gum, an incense burner, a conchshell trumpet, and agave points. When he reached his destination he bled himself with the latter and inserted them into the grass ball, and then returned homeward, alone, blowing his conchshell." It is also recorded that the priests of the Calmecac used the agave points in inflicting such minor punishments upon their pupils as pricking their ears or bodies, or beating them with nettles. In the description of a certain festival it is recorded that the priest used a flint knife to cut the ears of the youths who displayed a lack of self-control and succumbed to fatigue on reaching the summit of the temple after a certain race. The same priests are said to have tortured their prisoners by "piercing their ears, arms, and legs with agave points, making them cry out in pain."

The following passage affords a somewhat more pleasing glimpse into the life of Ancient Mexico:

"Every fourth year, in the last day of the eighteenth festival period named Izcalli, the ears of all children born during the preceding three years were bled. This rite was performed by means of a sharp bone instrument and the wound was sub-

sequently dressed with parrots' down and pine-pitch.'' The children's parents appointed so-called ''aunts and uncles'' to act as ''sponsors'' during the operation, after which they made offerings of a paste made of the seeds of a kind of salvia, named Chian. In recognition of their services the parents presented an ''uncle'' with a red or fallow Tilmatl or mantle and an ''aunt'' with a Huipil or sleeveless upper garment. The friar records that, while their ears were being pierced, the children made a great outcry, and that, immediately afterwards, their sponsors led them to a bonfire prepared for the purpose around which they were made to walk. They were then taken to their respective homes, where their sponsors feasted with them and all danced and sang together. At noon all returned to the temple with jars of pulque, the native agave-wine, and there performed a dance the sponsors carrying their respective charges on their backs. Then each child was given some pulque in a tiny bowl, for which reason the festival was also known as ''the intoxication of the children.''

In the description of the same quadriennial festival in Serna's ''Manual de los Ministros,'' chap XI, it is stated that besides piercing the ears of the girls and boys, the high priest perforated the lower lip of the boys so that they could subsequently wear labrets.

Sahagun alludes to the latter custom in the appendix to book II of his Historia where he states that it was ''in honor of the devil, that the natives pierced their ears and wore earrings and pierced their lower lip and wore labrets;'' operations which were respectively designated by the Nahuatl words: Nenacazxapotlaliztli (lit., the ear perforating) and Netenxapotlaliztli (the lip perforating).

While it is thus evident that the ceremonial piercing of the ears and of the lips was associated with religious or superstitious ideas, it is evident that, in the case of the little children, all was done in order to palliate the pain inflicted and to make the occasion one of festivity and rejoicing.

We are indebted to Serna for the record of the peculiar circumstance that during the joint festival of Chicome Xochitl= Seven Flower, the patron of the painters, weavers and embroiderers, and of Xochiquetzal, the inventress of weaving, the

principal offering made by their devotees was blood drawn from the fingers or eyelids.

During the third movable festival all married people made offerings of blood drawn from the left breast or from their eyelids, the blood being caught on strips of paper which were then thrown into earthen jars and burnt in front of certain idols.

In the "Book of the life of the Ancient Mexicans", published by the University of California, and elsewhere, it is recorded that men, desiring offspring, offered blood drawn from their organs of generation.

During the sixth movable festival those who rendered homage to the god Quetzalcoatl sent to the temple what are described by Serna as "small salt-cellars" containing eight to ten drops or more of their own blood, absorbed by means of strips of paper which were subsequently burnt, with copal gum, on the altars of the temple. The allusion to tiny earthen vessels in connection with similar blood-offerings naturally suggests an explanation for the purpose of the small terra-cotta dishes and particularly of the enigmatical receptacles with two deep holes which are found at Teotihuacan in great numbers.

The question as to the origin of the peculiar sanguinary rites of the Ancient Mexicans is next to be considered. According to Friar Duran, the custom of piercing the flesh with agave points was first taught to the priesthood by "Quetzalcoatl of Tula" (vol. II, p. 244) and his testimony agrees with that of the commentator of the Codex Telleriano Remensis. Other evidence tends to prove, however, that the origin of the rite was assigned by the Ancient Mexicans to remotest antiquity and to the gods themselves. In the creation-myth as recorded in chap. VII of the Codex Fuenleal,* the gods Quetzalcoatl and Tlalocantecuhtli "fasted and drew blood from their ears" before creating the sun and the moon. In chap. VIII it is related that later on, at a certain date, the god Camasale (Camaxtli) also named Mixcoatl, "performed penance with agave leaf points, drawing blood from his tongue and ears, and for this reason it is customary to draw blood from the same whenever one made any petition to the gods."

*The Codex Fuenleal or "Historia de los Mexicanos por sus pinturas," published in Vol. II of the Anales del Museo Nacional, 1882.

Sahagun's version of the creation of the sun and moon (book VII, chap. II) differs from the foregoing and relates that it was Nanaoatzin who, "after offering agave points stained with his blood and stuck into grass balls," voluntarily cast himself into the fire and became the sun; while Tecuciztecatl, following his example became the moon.

From Bishop Diego de Landa, who devotes a whole chapter to the "Cruel and obscene rites of the Yucatecs," we learn that similar forms of self-torture were practised in Yucatan. The ear-sacrifice is described as follows: "They sometimes made an offering of their own blood by making incisions all around the external border of their ears, leaving the lacerations as records of their penance" (ed. Brasseur de Bourbourg, p. 161). Bishop Landa expressly states that "the women of Yucatan did not make blood-offerings although they were very

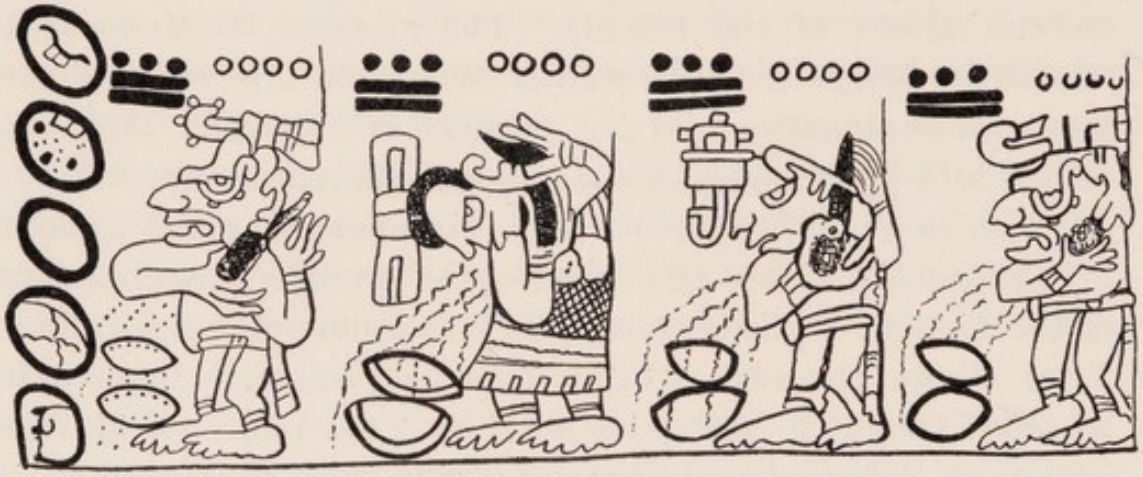


FIG. 4.

devout." It is therefore remarkable that the Maya Codex, named Troano, contains representations of three men and one woman in the act of piercing their left ears, from each of which a stream of blood falls into what are presumably small bowls placed in front of each penitent (Fig. 4). The finely carved bas-relief from Menché (Yāxchilan) which was presented to the British Museum by Mr. Alfred P. Maudslay proves that tongue-perforation was also practised in the Usumasinta valley. It represents a seated personage in the act of drawing a cord, with thorns, through his protruding tongue.

Briefly summarized; the foregoing evidence establishes that while blood was drawn from different parts of the body and offered to the gods, it was the ear-sacrifice that constituted

the salient characteristic features of the ancient native religion, being practised in every day life, by persons of all ages. After having been offered, the blood-stained pieces of cane, agave points, obsidian lancets or straws employed in the performance of the penitential rite were carefully preserved. In some cases the instruments themselves, in others strips of paper saturated with blood, were burnt, and their ashes deposited in some sacred spot. It is recorded that a feature of the great temple of Mexico was the square enclosure into which were thrown the agave points, etc., used by the priests in performing penitential rites. No documentary evidence has, however, as yet been found indicating the place where the high-priests and rulers preserved their blood offerings after performing rites, which, in their case were of such special sanctity.

On the other hand the National Museum of Mexico possesses some monuments exhibiting sculptured representations of the performance of the ear-sacrifice which yield valuable information on the subject.

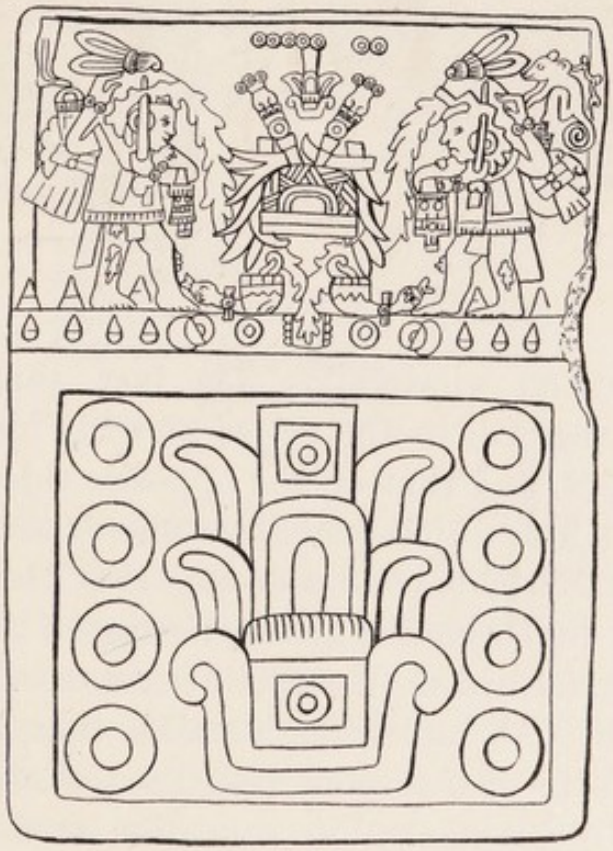
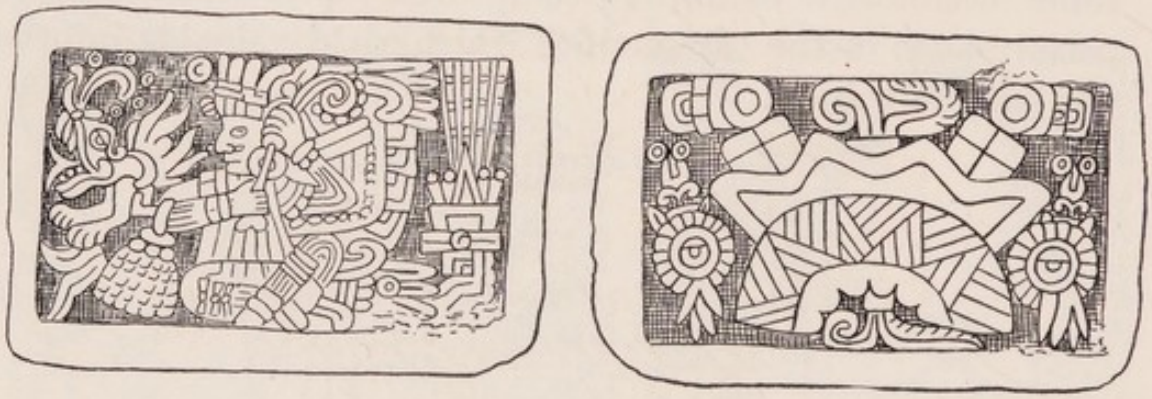


FIG. 5.

The first (Fig. 5) is the well-known historical bas-relief representing the Mexican rulers Tizoc and his successor Ahuitzotl,

each with an incense-burner at his feet in the act of piercing their helices. Between them and on a stand surrounded by laurel leaves, lies the round cushion into which two bone instruments with handles in the form of a flower, are inserted. A stream of blood falls, from each ear, into an open jaw carved in the symbolical border beneath the figures. The date recorded in the bas-relief is that of the dedication of the Great Temple and it is evident that this sculptured slab must have been inserted in some wall or monumental structure. Besides commemorating the historical event and the performance of the sacred rite it may have also marked the site where the blood offerings of both rulers were reverently deposited. Figure 6 (*a* and *b*) represents the square stone box which is preserved at the National Museum of Mexico and has been identified by different authorities as a funeral urn, or "a receptacle for the



a *b*

FIG. 6.

blood of human victims." The fact that a seated, one-footed personage (*a*) in the act of piercing his ear is carved on one of its sides, and that on the opposite side (*b*) is carved the grass cushion into which bone instruments are inserted appears to me to establish, beyond a doubt, that the stone receptacle was destined to receive the blood-offerings of the high-priests and rulers who performed the ear-sacrifice represented, in carving, on the box itself. An interesting detail is that, behind the seated figure, the form of a serpent is distinguishable, whose tail and head, with a recurved armlike projection, studded with star-symbols are like those of the twin serpents on the great Calendar Stone. The symbols of fire, carved on the two sides of the box, and the star-symbols accompanied by conventionalized flowers, which

figure at each side of the bone instruments, furnish evidence that the rite was associated with the god of fire and the festival of Flowers, Xochilhuitl, at which a certain form of star-worship took place. It was on this festival that, once a year, certain loaves of bread, named Xonecuilli, were eaten. The shape of these loaves resembled that of the constellation Citlal-xonecuilli, Ursa Major or Minor, described as "situated in the trumpet of the North and composed of seven stars, which formed a separate group and are resplendent" (Sahagun, book VII, chap. III).

The low square hollow stone "seat" preserved at the Royal Ethnographical Museum at Berlin (Fig. 7) is of particular interest

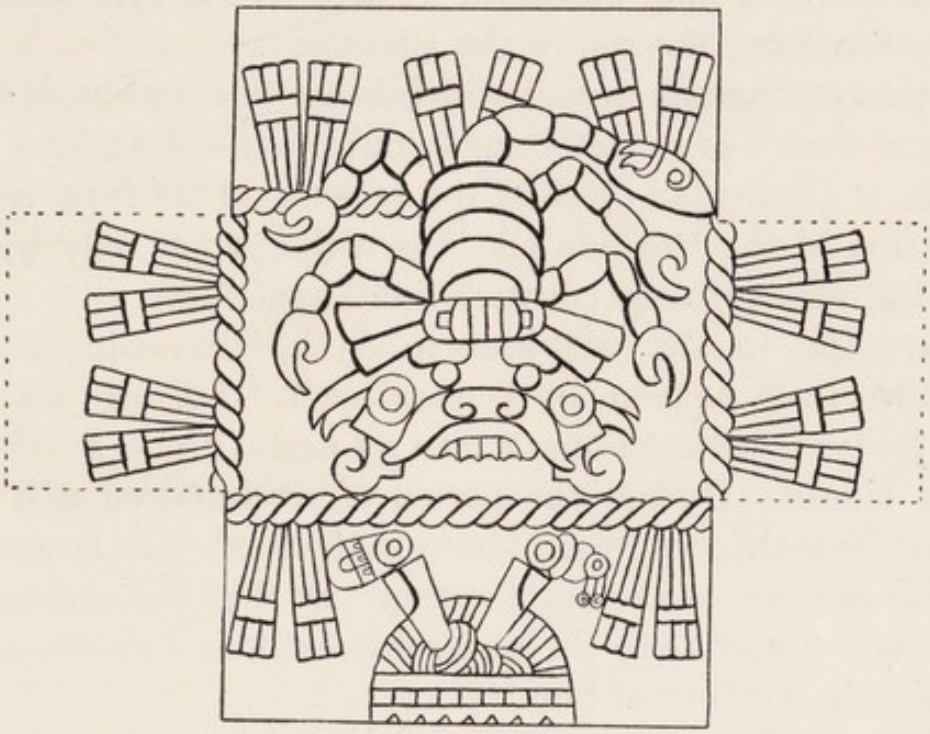


FIG. 7.

in connection with Sahagun's statement, cited above, that the hall in which the priests assembled to perform the penitential rites, "contained many seats," . . . This object was obviously associated with such rites, because its front is carved with a representation of the familiar grass cushion and the sacrificial bone instruments. Its top and back are covered by the figure of a large scorpion whose tail ends in a tecpatl or flint-knife, the native symbol for the North. This carved scorpion, before which lie the woven grass ball and the bone instruments, is particularly significant because Sahagun distinctly states that the Mexicans

gave the name of "Citlal-colotl," = Star-scorpion, to the northern constellation, Ursa Major, "because it resembled the figure of a scorpion" (op. cit. book VII, chap. IV). The existence, in Mexico, of a similar hollow stone cube, much too small to have been used as a seat, but which exhibits, on its sides, two penitents piercing their ears and on its top a shallow circular receptacle, throws some doubt as to the Berlin Museum "seat" having really been intended as such.

The most important monument, which exhibits proof of having been associated with the native penitential rite and star-cult is the great statue of a crouching ocelot or native tiger (Pl. I, 1, 2, 3), which was discovered in December 1901 in the courtyard of the new Palace of Justice in the City of Mexico, by Captain Diaz, the son of the President.

This imposing monument which is the finest piece of animal sculpture that has as yet been found on the American Continent, is of particular interest, on account of its form and the association of the Mexican god Tezcatlipoca not only with the ocelot but also with the constellation Ursa Major.

According to the well-known myth, Tezcatlipoca, when cast down from heaven by Quetzalcoatl, "fell into the water where he transformed himself into an ocelot" and arose to kill certain giants. During the period of six hundred and sixty-six years Tezcatlipoca "went about in the form of an ocelot" and all "this appears in the sky for they say that the constellation Ursa Major descends to the water *because it is Tezcatlipoca* and is on high in memory of him."*

While the foregoing myth suffices to show that the great statue of an ocelot must have been considered as an image of the god Tezcatlipoca, the fact that his insignia are worn by the two personages which are carved in bas-relief on the bot-

*Historia de los Mexicanos par sus pinturas, Anales del Museo Nacional, vol. II, p. 88. The Spanish text is as follows: — ". . . Queçalcoatl fué sol y dexalo de ser Tezcatlipoca porque le dio con un gran baston y lo derribo en el agua y alli se hizo tigre y salio a matar los gigantes, y esto paresce en el cielo, porque dizen que la Ursa Mayor se abaxa al agua porque es Tezcatlipoca y está alta en memoria del . . . y ansi andava hecho tigre . . ." In my publication, "The Fundamental Principles of Old and New World Civilizations" (vol. 2 of the Peabody Museum Papers), by some unaccountable mistake, which I deplore, the name Huitzilopochtli was substituted for that of Quetzalcoatl in my quotation, of the above myth on page 8.

tom of the deep circular receptacle in the back of the statue positively proves the association of the god with the monument.

The relative proportions of the latter and of the stone receptacle, as shown in Pl. 1, 1, 2, 3 reveal that this was an accessory only.*

The bas-relief carved on its bottom clearly indicates the purpose for which the receptacle was destined (Fig. 8).

It represents two seated personages in the act of piercing

FIG. 8.

their ears with bone instruments. In front of each is an object of the shape of an isosceles triangle, into which four agave thorns are inserted.

As in the case of the penitent carved on the stone box (Fig. 6a) both individuals are minus one foot, with the peculiarity

*It was strictly in accordance with native usage to make some form of receptacle in stone idols, for the reception of different kinds of blood-offerings. "The Book of the Life of the Ancient Mexicans," for instance, describes how bowls of human blood were poured on the head of a certain idol which presumably had, like a native stone image in my possession, a bowl-like hollow on its head.

that in one case the right foot and in the other the left foot is missing. This seemingly insignificant detail assumes a certain importance when it is realized that it recurs in the two figures sculptured in bas-relief on the rocks at the Peñon Viejo, situated near the City of Mexico (Pl. II, 1, 2) both of which likewise display the same insignia as the two personages carved on the bottom of the receptacle. A comparison of Pl. II, 1 with the carved personage to the right in Fig. 5, reveals a striking identity, for in both cases the left foot is missing, the same feather head-dress, with Tezcatlipoca's hieroglyph (the Smoking Mirror) at its side and a recurved ornament above the forehead, is worn and the identical nose-ornament and band over the face is displayed. As carved on the rock the personage thus arrayed, like the similarly one-footed victors on the Stone of Tizoc, is erect, armed with spears, and grasps the hair of a warrior who bends before him and lowers the bundle of spears held in the left hand, his right hand being uplifted and holding the atlatl or spear-thrower in the position for throwing the spear.

The date, I Tecpatl, carved beneath this group corresponds to A. D. 1480 in which year, according to the Aubin MS. the Mexicans conquered the people of Quauhnahuac or Cuernavaca, in this case the island town situated in the lagoon of Xochimilco and depicted in the Map by Alonzo de Santa Cruz preserved at the University of Upsala, Sweden. The reader is referred to the Chronicle of Tezozomoc for an interesting and graphic account of the warfare waged by the Mexicans upon the Tecpanecans and inhabitants of Xochimilco, etc., at this period, which resulted in their complete subjugation.

A comparison of the figure to the left in Fig. 8, with Pl. II, 2, reveals that, in both cases also, the right foot is missing, a similar head-dress with Tezcatlipoca's glyph is worn and as far as can be distinguished the face bands are alike.

In Pl. II, 2, the individual also stands, but is unarmed and grasps what appears to be a tree, in blossom, issuing from a circle in a square—evidently the hieroglyph of a locality. The semi-effaced date carved beneath this figure which incontestably belongs to the same period as Pl. II, 1, seems to be the year III Tochtli — corresponding to 1482, a date two years later than that carved on Pl. II, 2.

The striking identities which have been pointed out and especially that of the same feet being missing, appear to justify the inference that the two individuals carved on the bottom of the receptacle in the ocelot's back were historical personages, represented as wearing divine insignia, in accordance with established custom. The peculiarity that, in the group, both figures display both rows of teeth causes it to appear as though they wore death-masks under their face-bands — a fact which is explainable since one of Tezcatlipoca's titles was "Mictlantecuhtli," or the "Lord of the North," the Underworld, and by extension, of the dead who go there.

The indications that the above individuals were historical personages not only accord with the evidence furnished by the commemorative tablet described above (Fig. 5) but suggest the interesting explanation that the sculptured ocelot was also commemorative and possibly votive, and dates from after the year 1482. The view that the ocelot was an actual image of the god Tezcatlipoca and that the ear-sacrifice was particularly associated with his nocturnal worship, is sustained by the following significant details.

A critical examination of the sculptured ocelot discloses that the large side whiskers at each side of its head are undoubtedly purely conventional. The ocelot does not possess them in reality and their existence could not have been suggested to the sculptor by a study of the animal from life. Thus far no other similar representation of an ocelot with side whiskers, is known to exist in Mexican carving or painting — the usual mode of figuring the sparse bristly hairs on the upper lip of the ocelot being more true to life.

Strange to say, the only similar instance I have found, of the ocelot with conventionalized whiskers, is that carved on a slab discovered by Dr. Le Plongeon at Chichen Itza, Yucatan.*

While this remarkable coincidence, which is in keeping with other analogies between Chichen Itza and Mexican art, furnishes fresh food for reflection, it is well to bear in mind that other sculptured representations of the ocelot also exist at Chichen Itza and do not exhibit the conventional feature.

*An illustration of this slab was first published by Dr. Le Plongeon opposite to p. 85 in "The Sacred Mysteries of the Mayas." New York, 1886.

What is more: The only native American beast of prey which possesses a similar hairy fringe is the wild cat, the lynx or *Felis rufus*, which is remarkable for its brilliant eyes and habit of prowling about at night.

Whilst the possibility naturally suggests itself that the native sculptor might have purposely combined the features of both beasts of prey in order to add to the impressiveness of his statue, the indications are that his aim was not to produce a naturalistic image but an imposing idol of Tezcatlipoca under the form the god had according to the myth assumed and borne for "six hundred and sixty six years."

A side light is thrown upon the symbolism of the hirsute appendages and the reason for their presence by one of the bas-reliefs carved on the remarkable stone box* which belonged to the late Señor Islas de Bustamante, the photographs of which are published here, for the first time (Plates III, IV and V).

The bas-relief (Pl. III, 2), exhibits a seated personage with crossed and sandalled feet, in the act of piercing his ear with the usual bone instrument. To his right lies a smoking incense-burner whose handle terminates in a serpent's head. To his left, standing upright, is the same pointed object which figures in the bas-relief on the bottom of the receptacle in the back of the ocelot. It is noticeable that this object is of the same form and exhibits the same markings, resembling a woven pattern, that recur on the four agave points stuck into it. This circumstance and the incisions at its base and side appear to indicate that it was the thick fleshy top of an agave leaf such as Sahagun describes as having been used by the priesthood as cushions for the thorns employed in performing their penance.

The most important and interesting features in connection with the seated figure are that he not only displays a peculiarly shaped beard, resembling the hairy appendages of the ocelot statue, but is also associated with the ocelot itself. At the back of his head, above his left hand, the head of an ocelot is visible, whose skin hangs behind his back, the tail ending below his knee. Besides this the personage wears leggings made of the spotted ocelot skin and a rattlesnake girdle from which hang two conventionalized hearts.

* Dimensions: 34 × 52 centimetres, interior depth 16 centimetres, exterior height 20 centimetres.

It is interesting to find that in a note written beneath its photograph the late Señor Islas de Bustamante, independently identified the above figure as a representation of "Ocelotl-Tezcatlipoca," or Tlatoca-ocelot, lit. the Lord Ocelot (a title which is also recorded by Serna in chap. IX) and described as wearing "the beard of the mask of Tezcatlipoca." Pointing out that in the above figure, as in the ocelot statue, there is a combination of the ocelot, the beard and the ear-sacrifice, I will briefly review the sculptured figures on the other three sides and on the interior and exterior base of the stone box under discussion.

Plate III, 1, exhibits a seated personage in the same attitude and with the same accessories as in Fig. 6 , but displaying the same head-dress with Tezcatlipoca's glyph, and the same face markings as those of the left figure of the group in the ocelot receptacle (Fig. 8). A noticeable difference is that, in one case the right and in the other the left foot is missing.

A third seated and one-footed personage also exhibiting Tezcatlipoca's insignia, is carved on the side of the stone box (Pl. v, 1) which has unfortunately been mutilated, a hole having been bored through it and a lead pipe inserted by a previous owner, in order to employ the box as a water fountain. The symbols carved on the fourth side of the box (Pl. IV, 1) closely resemble those on the stone box of the National Museum (Fig. 6).

The grass ball which figures in both of these recurs on the bottom of the stone box under discussion (Pl. IV, 2), while a remarkable and unidentified monster, covered with spines, and figured as on water, covers the exterior of its base (Pl. v, 2).

A résumé of the foregoing archaeological material brings out the interesting fact that there are known to exist no less than ten sculptured representations of individuals performing ear sacrifice.

In the case of the commemorative slab the personages are unquestionably historical and the performance of the rite associated with the dedication of the Great Temple of Mexico. The two one-footed personages carved on the bottom of the receptacle of the ocelot statue appear to be identical with the con-

querors carved on the rocks at the Peñon with the dates I Tecpatl and III Tochtli (A.D. 1480 and 1482).

These conquerors, like the sixteen carved on the so-called "Stone of Tizoc," the penitents carved on the bottom of the ocelot receptacle and those on the exterior of two of the stone boxes described, making a total of $2 + 16 + 2 + 1 + 3 = 24$ individuals, are, with only one exception, one-footed, while all exhibit the insignia of the god Tezcatlipoca. This overwhelming evidence, by the way, amply substantiates my identification of the one-footed god depicted in the Codices as Tezcatlipoca.* The sixteen one-footed warriors on the "Stone of Tizoc" and those on the Peñon rocks — all of which may, possibly, represent one and the same person — either prove that a native conqueror existed who was actually one-footed and had adopted the insignia of Tezcatlipoca, or that it was customary, in representing living personifications of the god, to emphasize one of his symbols, the lame foot, even if the mutilation did not exist in reality.

I am indebted to Father Hunt Cortès for the interesting fact which he has also published, that after having been tortured by the Spaniards, the unfortunate Quauhtemoc the last of Mexican rulers, was named Xonecuiltzin = the lame lord; a title or nickname which may well have previously been bestowed on other personages equally lame.

To Don Mariano Rojas, the oldest inhabitant of the town of Tepoztlan (Morelia) in which the Nahuatl language is not only spoken, but cultivated, I am indebted for the interesting personal communication that one of his earliest recollections is that of his old grandfather pointing out to him the seven stars of the constellation of Ursa Major and telling him that its name was Xonecuilli.

This valuable testimony in conjunction with Sahagun's statement that "the stars which are in the mouth of the trumpet of the North were named citlal-xonecuilli and that the

*See Fundamental Principles of Old and New World Civilizations, p. 10, etc. Dr. Theodor Preuss has criticised this identification of mine, stating his opinion that in a certain case, the god appeared to be "Tlauizpantecuhtli." I merely point out here that the latter name is a title only: "the lord of the dawn" and that, in several publications, Professor Seler has observed that "Tlauizpantecuhtli not only wears the same insignia as Tezcatlipoca but may be regarded as a form of this god."

natives figured its seven stars in a group of the shape of an S, definitely associates the name Xonecuilli with one or both of the Ursa constellations,* and with Tezcatlipoca who is found figured in painting and sculpture as a Xonecuiltzin or "lame lord."

While the bas-relief figures described definitely connect one-footedness with Tezcatlipoca, they also prove the association of the ocelot with this god. The representation of the ear-sacrifice on the exterior of three and interior of one in the stone receptacles clearly indicates, moreover, the purpose for which the latter were destined; namely to contain the blood-stained thorns, sticks or papers, which constituted the sacred offerings, or their ashes.†

In conclusion: The main result of the foregoing investiga-

*Rejecting Sahagun's testimony in this case and stating that the friar "could not have meant what he wrote," Professor Seler prefers to adopt the statement on the subject made by Don Hernando Alvarado Tezozomoc who is supposed to have been born in 1520 and to have written his work at the age of 78.

In Tezozomoc's description of the ceremonies held in honor of the inauguration of Montezuma II as ruler of Mexico, he gives a résumé of the exhortation addressed to the new ruler by the twelve electors. In this Montezuma is enjoined particularly to yield homage, at the break of day, to "the star Xonecuilli, which is the cross of St. Jacob, which is in the region of the South, in the direction of the Indies and the Chinas."— (Cronica Mexicana, p. 574.)

I cannot but think that Professor Seler and his follower Dr. Preuss will find it difficult to persuade American scholars to accept as authentic the Mexican priest's allusion to "the direction of the Indies and Chinas;" to interpret this direction as that occupied by a Southern constellation; and to prefer Tezozomoc's evidence so clearly tinged with European influence, to that preserved in the notes written by Friar Sahagun under the dictation of the aged and most learned of native chieftains whom he gathered around him in Texcoco and questioned about their ancient beliefs, etc.

†In a recent publication, the Spanish translation of which was published in the Anales del Museo Nacional de Mexico (tomo VII, p. 260), Prof. Edward Seler, on account of the carved feather-frieze on the interior wall of the receptacle in the Ocelot statue's back, pronounces *ex cathedra*, that this monument is a "Quauhxicalli" or vase destined to hold the hearts of human victims. In making this identification Professor Seler entirely overlooks what appears to be so obvious a fact, namely that the scene carefully depicted on the bottom of the receptacle furnishes more important testimony as to the object for which it served than the decorative feather frieze, which is a mere accessory. It stands to reason that a "vase of the eagles destined to receive the hearts and blood of human victims," would be more likely to exhibit carved representations of eagles, human hearts and human sacrifices, than the images of two persons in the act of drawing blood from their ears.

What is more: in treating of this native statue of an ocelot Professor Seler ignored the relation of this animal to Tezcatlipoca, just as he passed over in silence not only the existence but the prevalence of the rite of ear-sacrifice in his discussion of its performance by the two sculptured personages whom he identifies as "gods" or "Tezcatlipoca under two forms."

tion is a recognition of the hitherto disregarded fact that the rite of voluntarily drawing blood, principally from the ear, was a feature of every-day life in Ancient Mexico which was performed by young and old. It is but just to recognize what a meritorious deed the Spanish Conquerors performed when they summarily abolished so barbarous a practice, which, of itself, sufficed to fill them with disgust for the native ritual.

The other results obtained are the certainty that the three stone boxes described and possibly the "seat" in the Berlin Museum, as well as the receptacle in the back of the ocelot statue, were destined to hold ear-blood offerings made to Tezcatlipoca; that the ocelot-statue was an image of this god under the form he had mythically assumed for 666 years; that a close chain of evidence connects Tezcatlipoca with the circumpolar constellations and establishes his identity as the one-footed or lame star-god of the Codices, the personification of Xonecuilli or of Ursa Major, who, like pole-star gods in other parts of the world, was conceived by the Mexicans as fastened by one foot to the pole and performing a perpetual circuit around it by means of the foot which remained free.

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FIG. 1.

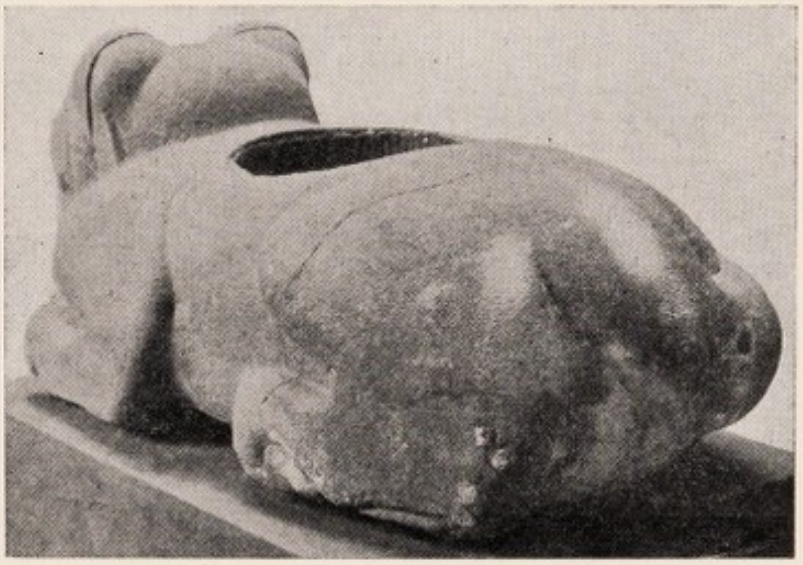

FIG. 2.

FIG. 3.

FIG. 1.

FIG. 2.

Fig. 1.

Fig. 2.

Fig. 1.

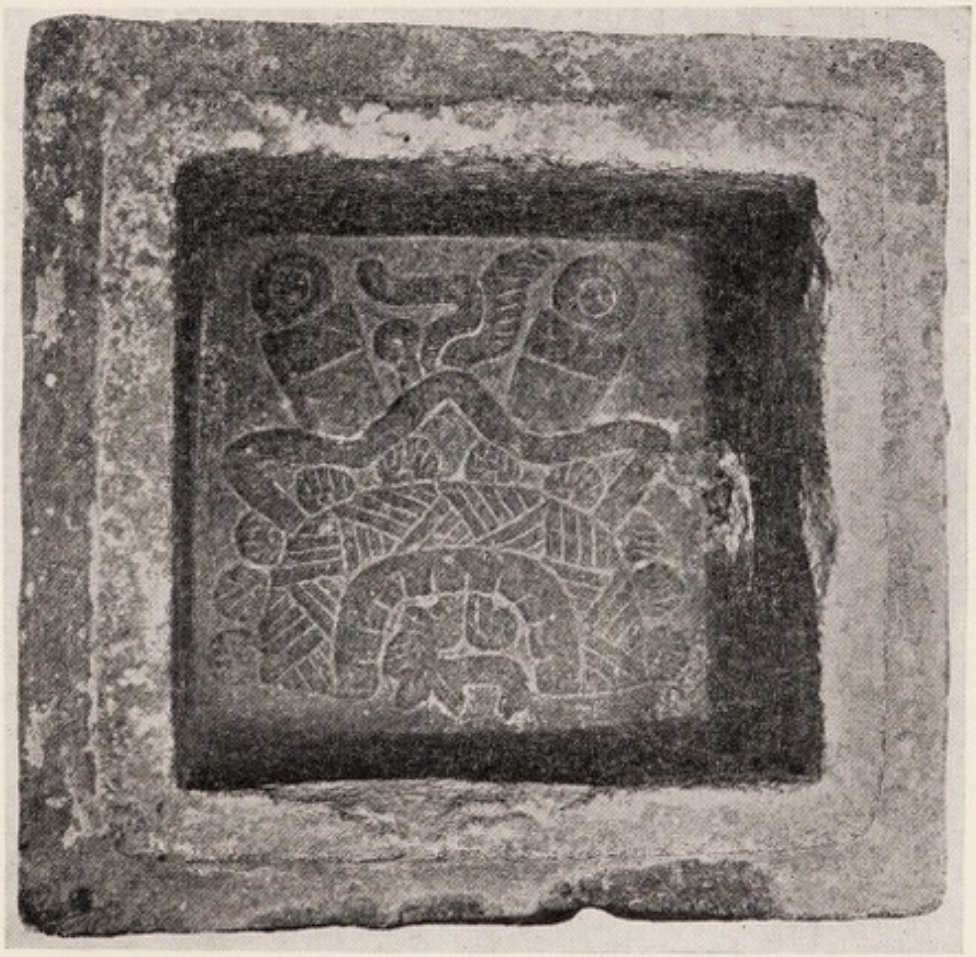

Fig. 2.

FIG. 1.

FIG. 2.