which this institution has accomplished. "When it is considered," he continues, "what splendid technical training the workshops and manufactories of England have afforded, there will appear to be very good reasons why, originally, technical schools were not so extensively instituted in England as on the continent." The speaker pointed out that England was, taken as a whole, after all not in such a deplorable state with regard to technical education, and then described that education as of two kinds, general and special. "General technical education may be said to be that necessary in all large centres of population, being the preparation for such callings as engineering, architecture, medical science, and other professions which a certain percentage of the inhabitants will always follow, besides training of another kind suitable to the artisan class. Special technical education is that necessary in a locality where there are special industries, instances of which will readily suggest themselves." The remainder of the address was devoted to considering the educational work of Liverpool and its technical requirements. This brief abstract will suffice to show how diverse are the means of approach to the manual training problem which are being followed in England and in this country.

## PHYSICAL TRAINING.

THE American Association for the Advancement of Physical Education held its third annual meeting in Brooklyn on Nov. 25, and was well attended. Prof. Edward Hitchcock of Amherst College presided. Papers were read by him, and also by E. H. Fallows of the Adelphi Academy. The title of the latter paper was 'Physical Training in Elementary Schools in the United States,' being an extract from the report of the Board of Health of New Hampshire. Dr. Edward Hitchcock, Jun., of Cornell University, read a paper on the uses of physical measurements to the individual. In the attempts to establish anthropometry on a scientific basis the weight of individuals was first taken as a standard, but this had to be abandoned, and he thought we could now say with a certain degree of exactness that human measures increase with the height. It is extremely difficult, if not indeed practically impossible, to secure the exact dimensions of any man. Especially is this so when it is attempted to obtain the measurements of the chest and shoulders. Six experts might examine the same individuals, and their measurements would probably all differ. The testing of lung capacity is very variable, some individuals giving results which are of value, while others do not use the thoracic muscles at all, but simply bring into play the muscles of the pharynx. Some foreign countries, recognizing the difficulties in the way of obtaining exact measurements of parts which were liable to vary, had adopted the length and breadth of the head, ear, foot, and finger, and the height of a man in the sitting position, as the best, making use of them in descriptions of criminals. Dr. Hitchcock thought that to determine the physical powers of an individual, good judgment on the part of the examiner was of great value. In fact, a good judgment without measurements he regarded as better than good measurements without judgment.

Dr. Savage, director of the Berkeley gymnasium, New York, and Dr. Sargent of Harvard University discussed Dr. Hitchcock's paper. The latter said that while some foreign nations had done more in obtaining and recording measurements of parts of the human body, the United States was far ahead in true anthropometry, that is, the measurement of the whole man; but this subject was still in its infancy, and it would be folly for the association to publish views which in the present inexact state of the science of anthropometry might and probably would be controverted in a short time. He did not think it was proper for an association which had had but two or three years' experience to express views which might be taken by the world at large as a basis for physical education. For his part he regarded it as a life-work, and he proposed to remain silent until he had arrived at results which he could swear by. Dr. Hitchcock of Amherst differed with Dr. Sargent. No science ever approached exactitude except through a long course of mistakes and subsequent corrections.

The next paper was on military training as an exercise, by Dr. J. W. Seaver of Yale College. He took the ground that while military training was well adapted to the adult, it was not the best for the young. The element of sport or fun which characterized the active life of all animals in their early years should not be wanting in the exercise of the human young. General Molineux of Brooklyn, in the discussion of this paper, said that although colleges, by their well-equipped gymnasiums, had done much for their students, they had done but little for the masses. He hoped to see physical training adopted in the public schools, and urged the association to do all in its power to accomplish that object. He thought that military training even for the youth was very valuable, not only as a means of developing their strength but as fitting them for the defence of their country, a duty which they might be called upon to perform. John S. White, LL.D., head master of Berkeley School, New York, took similar ground with General Molineux, but believed that calisthenics and military drill should be combined in the development of youth. At the termination of the discussion the association adjourned.

## AMERICAN PUBLIC HEALTH ASSOCIATION.[1]

ONE of the most instructive papers read before the American Public Health Association at its recent meeting at Memphis was that of Dr. E. M. Hunt, Secretary of the State Board of Health of New Jersey. It is entitled 'The Prevention of Microphytic Diseases by Individual Prophylaxis.' It is so full of suggestion, and the subjects which it discusses are matters of such general interest, that we reproduce the paper *in toto*.

[PAPER BY DR. E. M. HUNT.]

During the last twenty-five years no subject has been more prominently before the students and practitioners of hygiene than the consideration of new methods, or new applications of old methods, for the prevention of disease.

This inquiry, to some extent, involves investigation into the specific entity of disease. But a still more hopeful direction of investigation is to find out what fertilizes it or makes it more likely to be severe, what sterilizes it or makes it more likely to be mild, or what will make the human system resistful to the sedation or propagation of the disease, so that it will not occur.

The first great discovery in this direction was that of the modifying influence of inoculation.

It could not have been merely the cathartic and the changed diet of a few days that reduced the mortality from inoculated small-pox to such a minimum. The prevalence of the custom was at once the certification of the terror of the caught disease and the innocency of the conferred or inoculated disease. Yet it was the same disease without any effort at attenuation.

It was the introduction of the virus into the skin or areolar tissue, instead of by inhalation, that seemed to result in modification. Its approach was through the periphery, instead of by a central and vital organ. The chief safety was in the fact that the involvement of the lungs and the secondary fever were avoided.

Somehow, by the metastasis or diversion or mode of attack, the system grew tolerant of the malady, and was able to throw it off with comparative harmlessness.

It has fallen to my lot frequently to see the same remarkable mitigation in the inoculation of cattle with the virus of contagious pleuro-pneumonia.

When the infection is conveyed by the breath, it seizes upon the lungs and pleura. Frequently, in three days after it is manifested, the spongy organ of two or three pounds has become so solidified with tenacious lymph that it has a weight of thirty pounds, and death is the speedy result.

But introduce this virus into the muscular tissue of an extremity and all symptoms are more gradual. There are local swelling, the throwing-out of lymph amid muscular tissue, and slight constitutional disturbance; but the lungs escape, and fatal cases are exceedingly rare. Not only this, but other animals will not contract the disease, and immunity is secured. These facts as to the effect of the different modes of conveyance of a disease have their practical bearings, and still invite investigation.

[1] Continued from *Science* of Dec. 2.

It was another wonderful fact when scurvy yielded to the preventive art. The great naval hospital at Haslar, England, had been built with special reference to the fearful inroads that this disease was making amid the British fleets. When, in 1796, Sir Gilbert Blane and other medical officers of the navy obtained the order that lime-juice be supplied to the seamen, the terror of that disease was taken away. Studying the facts by the history and peculiarities of that disease, we cannot dismiss it as a mere error of dietetics. It was not simply that fruits and fresh vegetables prevented the disease. It was a far-reaching lesson as to how diseases may be modified by medicines as well as by foods; how the presence of something administered may prevent a disease.

As to the next wonder of the preventive art, that of Jennerian vaccination, it is so often presented as to need only our passing recognition. Yet it is to be remembered that it is a subject not yet exhausted. Whether something of the modification is owing to the mode and place of introduction, whether it is a modified small-pox, whether it is attenuated virus and may be in different degrees of attenuation, and so differently protective, these and other questions are left over to be determined in this period when the microscope, the pathological, the chemical, and the biological laboratories have come to the aid of the clinician, and we can study and compare the accumulated facts.

The Pasteurian vaccination may stand next, if not in order of time, since Pasteur opened his Copenhagen address by profound acknowledgment of his indebtedness to Jenner as the great forefather of preventive medicine.

Here the mode and place of introduction, degree and permanency of effect, and the nature and cause of the so-called attenuation, are still before us with unanswered inquiry.

Next, while the doctrine of the prevention by isolation is old, yet new methods and new results, as to it, almost make it a new preventive art. Sea and land quarantines are modified, and ought to be. How far it is to be isolation of the person, or only isolation of the personal effects, is unsettled. What the forsaking of an infected house or ship will do, what the camping-out of all the well from a sick city will do, what isolation alone will do, as in Leicester, with small-pox, and what is the most perfect plan of organized systematized isolation, — all these are before every health-officer as large and most practical questions.

Next comes disinfection, in all it means by the new light of biology and the study of micro-organisms — whether it be the destruction of animal or vegetative parasitic life — of these as larvæ, as spores, or as sporeless plants, at any and all stages of existence and development; also what is meant by inhibiting or thwarting action, even when we do not destroy life; also what disinfectants can do with the surroundings in destroying the pabulum or nutrient media; also what these can do in the system, either to destroy the microbe which is setting up pernicious activity there, or in some way to deprive it of its food or limit its power.

For the present we confine ourselves to the last item. So soon as it became certain that many diseases depend upon, or are associated with, micro-organisms, the inquiry was in order, whether there could not be some method utilized and applied by which the presence or activity of these in the blood-tissues or secretions could be so interfered with as to prevent or mollify disease. Passing for the present certain facts as to septic and non-pathogenic organisms, which, introduced into the system, may of themselves, or by their ferments or alkaloids (ptomaines), cause disease, we confine our inquiry to the question whether it is possible to thwart the action of the specific or pathogenic micro-organisms in their attempt to invade or after they have invaded the system. We get some light or some analogy as to this from considering the life-history and behavior of these organisms outside the system. First of all, we find that pathogenic organisms are dependent for their growth on the presence of the suitable nourishing material. In this respect they are far more selective than the septic organisms, which "find in almost all animal and vegetable fluids the substances necessary for nutrition." It is further found that there are substances which inhibit the growth of, or altogether destroy, these micro-organisms, such as corrosive sublimate, salicylic acid, etc. To do this they do not always need to be germicides.

Far short of destruction, such substances are capable of restraining the morbid action so far as to thwart their pernicious activity, which, in the case of an invading disease, is really the gravity of the disease.

Klein gives abundant evidences and references, on p. 208 of his book on 'Micro-organisms and Disease,' to show that "pathogenic micro-organisms are capable of suffering some modifications in their morphological and physiological behavior." He adds, "Now, it is known of many micro-organisms, bound up with infectious diseases, that temperature, the medium in which they grow, and the presence or absence of certain chemical compounds, are capable of materially affecting them" (Klein, p. 207).

Inasmuch as this growth and multiplication are known to go on in the bodies of living animals, and to constitute the identity and gravity of many diseases, it is a radical and very essential and hopeful inquiry whether we may not, by some change in the animal, or in some of those chemical compounds referred to, either destroy the micro-organism or inhibit its activity.

It is very suggestive of the possibility of this to remind ourselves of the probable reason why some are unsusceptible to disease. Dr. Klein (p. 247) argues that it is because there is "something or other present in a particular tissue to which the latter owes its immunity."

He infers, that, although this is "dependent upon the life of the tissue, it is not identical with any of the characters constituting its life." He says, "The most feasible theory seems to me to be this, that the inhibiting power is due to the presence of a chemical substance produced by the living tissues." This puts the body in such a condition that in the particular case, "the organisms cannot thrive and produce the disease." It is true that he suggests that the germicide or inhibitive material is a product of living tissue. This is not necessarily so, or, if so, would not necessarily be a product of the living tissue of the human body.

If the non-activity of the organism, and so the non-occurrence of the disease, is owing to "the presence of a chemical substance" in the tissues or blood, it is a very pertinent and natural inquiry whether we can not and do not produce the same result by putting, and for a time sustaining in the system, certain "chemical substances," which, so introduced, interfere with the processes sought to be set up, and which would constitute the disease.

The analogy is strengthened by the fact that chemical products are so much coming to be suspected or recognized as constituting the virus or specificity of diseases in which the micro-organisms are the initiative factors.

Still more, however, it behooves us to find out whether, either in chemical or laboratory experience, there has been any confirmation of such views. In clinical experience we have long had not only the fact that quinine will cure chills and fever, but that it is a substance which, introduced into the human system in advance, will prevent those processes which constitute the disease. So soon as it was made probable that the malarial diseases belong to the species or genera of microphytic diseases, so soon it seemed probable that the result was due to this inhibitive effect of the alkaloid. As a result of experiences with epidemics of diphtheria and scarlet-fever, so long ago as at our Chicago meeting in 1877 (see *American Public Health Association*, vol. iv. p. 348), I presented a paper on this mode of assisting and preventing pestilential diseases (see also two articles on the subject in *The Medical Record*, vol. ii. 1877).

The next year the subject was more fully presented in a paper read at the Richmond meeting.

In the intervening time Professor Cabell was so impressed by the facts presented, as to note it in his address before the American Medical Association in the spring of 1878. A reference to the paper of 1878 will show how fully this idea was insisted upon and illustrated. It was claimed that by the use of certain medicines we could prevent the sedation or interrupt the development of that which constituted the infection. Many of the facts in support of this view at that time were collated, and since then, from time to time, medical men have corroborated these views from their own experience.

It is of value that since then we have come into a knowledge of several other diseases as microphytic, and this has greatly fortified the position then taken.

Says L. Brunton, "Facts seem to point to ferments or enzymes as the agents by which the tissues are built up and pulled down in their constant change, which continues during life; and the action of drugs on these enzymes is becoming one of the most important questions of pharmacology" (see *American Public Health Association*, vol. vi. p. 103).

From time to time in the last five years the journals have contained records as to this possibility of individual prophylaxis. But all this was only the clinical experiences of physicians. Too often these are not accorded the same consideration as what are called crucial or laboratory experiments.

It has recently been necessary for Sir James Paget, as president of the Pathological Society of London, to contend that clinical observation is scientific, and that the sick-room is a laboratory with its crucial experiments, as real as those in which culture-experiments are instituted.

But now experimental tests have come directly to our aid in determining the effects of prophylactic remedies. Before this we knew that arsenic, potassium chloride, quinine, and excess of iron, etc., could be made constant for days and weeks in the blood by medication.

In 1884, under the direction of the Local Government Board of England, Dr. J. T. Cash instituted a series of experiments as to chemical disinfectants, and made report thereon. The object of the earlier investigations, recorded in a late report, was to inquire whether certain substances belonging to the aromatic series, when introduced into the body of a living animal, were capable of preventing the development of a particular virus within that animal. Later research was extended to a metallic salt (corrosive sublimate), which acts otherwise than aromatics with regard to albuminous bodies.

It was with this that the most decided result was secured. The result sought was to find "its power of resisting, in the condition in which they occur within the animal body, the multiplication of the active principle of the virus against which they are directed to such an extent that the virus is destroyed, or only reproduces itself so fully as to cause a modified or abortive attack of the disease in the animal body experimented on." The disease chosen for the experiments was anthrax, the severest test of all. The result of the first series of experiments was such as to show that the previous administration of corrosive sublimate may considerably modify the course of the anthrax disease in rabbits. The paper concludes by saying, "that, although these few experiments are not conclusive, they cannot fail to encourage the hope that we may yet succeed in creating with precision, within the animal economy, by the action of this and perhaps other drugs, a temporary condition of resistance (in this case seven weeks), which may so limit the activity of the anthrax virus that it will merely produce a passing, and at the same time protecting, disorder, instead of a fatal disease."

The next year (1885) Dr. Cash made to the Local Government Board a further report on mercury as a means of prophylaxis to anthrax. In this he says, "I have followed up the investigation of the prophylactic action of the perchloride still further, and the favorable opinion I was before led to entertain of its efficacy has been abundantly confirmed."

Dr. Klein has also satisfied himself of the restraining powers of the perchloride of mercury. Tomassi-Crudelli and others claim that arsenic has the same control as a preventive of malaria. These results may be taken as a confirmation of the clinical evidence given, and of the view we long since expressed as to the coming importance of various allied modes of prophylaxis in the prevention of various communicable diseases.

Heretofore we have mentioned some other prophylactics which we believe to have been effectual in preventing or mitigating some of the parasitic diseases. With this new evidence, I believe the time has come for a thorough testing, both by the practitioner and the biological investigator, of this new method of preventing and controlling disease. There are now many who believe that the real action of some of our most successful remedies is just this: the mitigation or prevention of a microphytic disease does not necessarily mean the destruction of the organism, but its inhibition *in loco*, or the modification of its chemical action on the tissues or of its products so as to render it harmless. It is a part of that antiseptic medication which Professors Yeo and Brunton, and many others, recognize as steadily gaining ground for approval.

If, in an individual case of exposure, or an outbreak in a family or a neighborhood, this kind of prophylactic treatment is available, it is easy to forecast the wonderful beneficence of the result.

If, for instance, in an outbreak of diphtheria in a family or in a neighborhood, we can put all persons exposed to it for a few days upon a prophylactic treatment, or if in the first outbreak of cholera in a locality all exposed persons can be rapidly brought under the inhibitive effect of a prophylactic administered promptly and continuously, we will have in our possession a mode for the limitation or prevention of epidemics far more likely to have practical application than any system which involves the cutting of the skin, or the introduction in any form of the actual virus of the disease. At any rate, with two such modes of defence at hand, we might hopefully expect to substitute the word 'sporadic' for 'epidemic,' and to bring many a vagrant pestilence within the range of our control.

The present age of advancing medical art will be rendered still more notable if it can be found that simple and active medication, on the outbreak of any communicable disease, will protect all those exposed thereto from contagion, or so modify its effect as to make the attack benign.

## THE ALASKAN SOCIETY OF SITKA.

IT seems that the opening-up of Alaska to tourists is to result in some real benefits to science. An exceptionally intelligent and influential body of visitors appears to have visited the Territory during the past summer; and in the last issues of the *Alaskan* and the *North Star*, both of which are published at Sitka, are to be found the practical results of the presence of the body of visitors referred to. The *North Star* states that the training-school at Sitka particularly interested the tourists, and their interest seems to have taken a practical form. In this paper's account of the visit we read that at the instigation of President Butler, of the College for the Training of Teachers in New York City, and under his leadership, a large subscription was made for the purpose of equipping the kindergarten and the wood-working departments of the training-school. The list of subscribers is printed in full in the Alaska papers, and it contains the names of many prominent persons in the educational, political, and business worlds.

The same visitors were very much impressed with the necessity of taking steps to preserve information concerning the folk-lore and arts of the native Alaskan population. After leaving Sitka, Presidents Gilman and Butler were appointed a committee to draw up a constitution for a society which should have for its object the collection and preservation of such information. This constitution was drawn up, and signed by most of the visitors, and was then submitted to the residents of Sitka, who a few weeks ago called a public meeting, and proceeded to organize a society, which is to be known as the Alaskan Society of Sitka. The constitution as adopted states that the purpose of the society is to collect and preserve information in regard to the arts, history, language, religion, and folk-lore of the native population of Alaska, and also in regard to the structure, climate, mineral resources, fisheries, flora, and fauna of the country, and in brief to observe, collect, record, and publish facts in regard to the entire Territory, continental and insular.

The members of the society are the following founders, and such others as may be elected to membership from time to time. The founders are Pres. D. C. Gilman of Baltimore, Pres. Nicholas Murray Butler of New York, Senator C. B. Farwell of Chicago, Edwin H. Abbott, Esq., of Milwaukee, Prof. Louis Dyer of Cambridge, Prof. A. V. Young of Evanston, Ill., Thomas Hill, Esq., of San Francisco, and Elliot F. Shepard, Esq., and John B. Pine, of New York.

Resident members are to be chosen from the residents of Sitka who by their tastes, studies, or pursuits are qualified to promote the objects of the association. Corresponding members are to be chosen from those interested in the object of the society in all parts of Alaska, and from those officers who have been stationed in the Territory. Honorary members are to be chosen from those who have in any way distinguished themselves in promoting the study of Alaskan geography, natural history, ethnography, or other branches.