ducement for teachers to attend the meeting. Perhaps the most valuable feature of the session will be the papers on industrial education, by President Walker of the Massachusetts institute of technology, and by Prof. Felix Adler of New York City, together with the discussions that will follow. But the smallest benefit to be derived from a meeting of this sort is that which comes from listening to papers and discussions. There is the stimulus that comes from seeing and meeting fellow-teachers from all parts of the country, from feeling the sense of professional co-operation. It is this which the teachers of the country most need at present, and it is this which they must have before their profession can occupy the place in the public mind that rightfully belongs to it. It is because of the part that the meeting of the National association plays in bringing about this feeling, that it is chiefly to be commended.

THE SUBJECT of the professional training of teachers is one which will bear all the discussion it can get, and Col. Francis W. Parker of Cook county Normal school, Illinois, Prof. Nelson B. Henry of the University of North Carolina, and Principal William M. Giffin of Newark (N.J.), are peculiarly qualified to write on it. To the student of education, to whom the necessity for such training is so imperative, further argument in its favor may seem useless; but it is surprising how little below the surface these arguments have as yet penetrated. In spite of all that has been so ably said and written on the subject, school boards continue to appoint untrained and incompetent persons to teachers' positions, and untrained persons continue to apply for positions which are as far beyond their capacity as those of a skilled draughtsman or electrician would be to any one ignorant of drawing or electricity. It is for this reason that the point must be unceasingly presented to the public. It must be admitted, too, that the normal schools are not in a true sense professional schools. They combine a large measure of general education with a moderate allowance of professional training. What we want is an institution or institutions that shall be as truly professional as the Harvard medical school or the Columbia law school. If the college to be opened in the autumn in this city by the Industrial education association shall occupy this place, it will contribute largely to put teaching upon a truly professional and scientific basis.

BY THE DEATH of Prof. Thomas Spencer Baynes, which was announced a few days since, the literary and scientific world is deprived of an influential and valuable worker. Professor Baynes's work is not as well known in this country as it ought to be, for the reason that much of his critical thought found expression only in articles and papers published in British magazines or in the proceedings of various associations. Professor Baynes was born in England, not in Scotland as it is sometimes supposed, at Wellington, Somersetshire, on March 24, 1823. He received his early education at the schools of Bath and Bristol, and then went to the University of Edinburgh. He sat at the feet of Sir William Hamilton, and undoubtedly received great mental stimulus from Hamilton's teaching. After taking his degree he became Hamilton's assistant. From 1857 to 1863 he was examiner in philosophy at the University of London, and was also connected with the London *Daily news*, to which he contributed many articles on the American war of the rebellion. In 1864 Mr. Baynes was chosen to fill the chair of logic and metaphysics at St. Andrews. In 1851 he had published his popular translation of the 'Port Royal logic,' which has gone through seven editions. In 1852 appeared his 'New analytic of logical forms,' being a prize essay on Hamilton's logical system, and the best exposition of it that we have. In 1874 Professor Baynes received the degree of LL.D. from the University of Edinburgh, and about that time undertook the preparation of the ninth edition of the 'Encyclopaedia Britannica.' Prof. Robertson Smith has since been associated with him as editor. Professor Baynes's most important contribution to the 'Encyclopaedia' is the article on Shakspeare, which was published in the volume lately issued.

DISTILLERY-MILK REPORT. — I.

IN seeking for information on the use of distillery swill, and its effect on the milk produced by cows to which it was fed, the results were so meagre, that *Science* determined to undertake an inquiry into the subject for itself. With this object in view, the following letter was prepared, and sent to the health officers of all the principal cities, and to the most prominent sanitarians, in the United States and Canada: —

Inasmuch as there appears to be a difference of opinion among sanitarians as to the wholesomeness of distillery waste, or distillery swill, as food

for milch-cows, some believing that milk from animals so fed is not only of poor quality, but actually detrimental to health, and even poisonous to young children, while others regard such milk as simply inferior in quality but not harmful; and inasmuch as the matter is a vital one to the thousands of children in our large cities who depend upon milk as their sole sustenance, — *Science* has deemed it of sufficient public interest to endeavor to obtain and put on record all the facts which bear on the question, and also the opinions of those whose experience and observation have been such as to enable them to express intelligent opinions on the subject. With this end in view, the accompanying questions are sent you, with the request that you will answer them at your early convenience :

1. What opportunities have you had for observing the effect of feeding distillery swill to milch-cows?

2. Please state any facts within your knowledge which will help to determine its effect on the milk.

3. What references can you give to any recorded facts in published or unpublished reports bearing on this subject?

4. What analyses can you give of milk obtained from cows so fed?

5. What is your opinion as to the wholesomeness of distillery swill as food for cows?

6. Are there any laws or ordinances in your city and state which bear on the question? If so, please send copies thereof, or, if this is not convenient, a reference to them.

To this letter many answers have been received. Some of these are from those who state that they have never had any experience with the use of distillery swill or its effects on the milk, while others give the results of the feeding of brewery grains, evidently confounding them with distillery waste, — a subject of great interest, but which is not within the scope of our present inquiry. Still other responses are from those who have had opportunities of investigating the subject and have availed themselves of them, and whose testimony is therefore of great value. In addition to this, letters have been received from physicians and others, who, while having had no practical experience with the article of food in question, are still competent to speak on the subject from their general knowledge. It is our purpose to present this testimony so far as it bears on the matter in hand, and invite criticism from our readers. It may be stated, that, from the information which has come to us, we are justified in assuming that distillery swill is at the present time being fed to milch-cows in the following places : Baltimore, Md. ; Blissville, N.Y. ; St. Louis, Mo. ; Louisville, Ky. ; Peoria, Ill. ; Philadelphia, Penn. ; St. Paul, Minn. ; and Toronto, Can. ; and up to 1885, in Chicago, Ill. We do not suppose that these include all the places in which this food is used, but no others have been reported. If any of our readers know of other localities, they will confer a favor by sending the information. The first two questions propounded in the circular letter sent out were as follows : 1°, What opportunities have you had for observing the effect of feeding distillery swill to milch-cows? and, 2°, Please state any facts within your knowledge which will help to determine its effect on the milk.

To these the following replies were received :—

[J. L. HAMILTON, M.D., Peoria, Ill.]

I have practised medicine in Peoria, Ill., for over thirty years, — a place where more still-slop is manufactured than in any other place in the world, I suppose. For many years most of our dairies fed entirely on swill-slop. The effect on children given only this kind of milk was very noticeable; and when they got sick (as almost all of them did during the summer months), they nearly all died, unless the food was changed. As health officer, a few years ago, at a time when our city was mostly supplied with swill-milk, I visited most of the dairies, and learned the following facts : the calves of cows fed only on swill-feed would live only a short time if allowed only their mothers' milk ; that a cow brought to the dairy while with calf invariably lost it, if fed on the slop alone ; that cows kept in the dairy and fed only slop would become diseased by the second year, with a skin-disease (large scabs would appear all over them). Some of the cows I examined, and found in this condition ; and the dairymen said these cows would soon die if kept in more than two years.

[E. M. COLBURN, M.D., also of Peoria, Ill.]

I regret that I am unable to give you any reliable information, from the fact that I have never paid any particular attention to the subject. Peoria has about forty-five thousand inhabitants, is considered a healthy locality, and has probably the largest distilling interest in the United States. Nineteen-twentieths, at least, of our citizens receive their milk-supply from dairies situated from two to five miles in the country, and these all have good bluegrass pastures for their milch-cows. I think (though they deny it) that they all use slops, though only as an auxiliary to other substantial food. The proportion of slops used is so small that the subject has never been investigated here from a sanitary point of view. I have consulted

our city health officer, Dr. Thomas McIlraine, who says, that, having never examined the subject, he has no definite opinion to give; and the same answer is made by several of our leading physicians whom I have consulted. Of course, all our physicians, when treating infants who are fed from the bottle, advise the use of pure country milk from cows not fed upon slops, which is easily obtainable here; and in consequence our experience of the ill or good effects of slop-feeding is very limited.

[NORMAN S. BRIDGE, M.D., Chicago, Ill.]

No special opportunities for observing the effect on the cows; the opportunities of a physician in general practice for observing the effect on the milk. Repeated declarations of families who have had the opportunity of using alternately and at various times milk from country dairies, and from such distillery-fed cows; which declarations are somewhat as follows: that the milk in question sours quicker than other milk; that it has an odor at times that is peculiar to it, which odor is, to some persons, very disagreeable; that the milk disagrees with and makes sick both adults and children. I have observed sick children who were, I had good reason to believe, made sick in this way. The sickness consisted chiefly in disturbances of the alimentary canal and other derangements depending on these.

[L. MCLEAN, M.R.C.V.S., Brooklyn, N.Y.]

I have frequently made post-mortem examinations on the carcasses of such animals. The digestive organs of cows so fed are, as a rule, in an anaemic and atrophied condition.

[D. W. HAND, M.D., St. Paul, Minn., member of state board of health.]

Very limited. Many cows in this vicinity are fed partially on the distillery waste from numerous distilleries, but I have known of no cows fed exclusively on it. I have not been able to notice any detrimental effect on the milk.

[WILLIAM OLDWRIGHT, M.D., Toronto, Can.]

Toronto has, I believe, the largest distillery on this continent, and one would suppose we here should have no difficulty in determining the result of feeding distillery swill; but there are so many other associated circumstances, such as uncleanly surroundings, etc., that it is hard to speak positively. My opinion is, however, that milk obtained from cows so fed is bad.

[E. H. BARTLEY, M.D., Brooklyn, N.Y., chief chemist of board of health.]

Five years as milk-inspector and chemist for Brooklyn health department. Have seen swill fed, and have examined the milk. Have been in active practice, largely among children, during that time, and have watched children fed upon such milk. Have seen two cases of sudden death from swill-milk, which have, I believe, been referred to in articles that appeared in *Science* of May 13. Have seen other cases of indigestion from such milk, which have been cured by change of milk, without medicine.

[WILLIAM K. NEWTON, M.D., Paterson, N.J., state dairy commissioner.]

I have had no personal experience with the feeding of distillery swill, but have always held that it is not only an improper food, but produces unhealthful milk. The fact that the health of cows fed on this substance is soon undermined, and that they become diseased, seems to prove that the milk produced by them must be diseased.

[J. BLAKE WHITE, M.D., New York, N.Y.]

From 1876 to 1886 was chief inspector of milk for the New York board of health. Have paid particular attention to the subject. Have seen hundreds of cows fed on distillery swill, and have noted the effects of such food on the animals' physical condition, as well as on the milk furnished by them. Have made analyses of the milk of swill-fed cows, and also microscopic examinations of same. The milk of swill-fed cows is always of an acid reaction; bluish, watery appearance; sourish, insipid taste; spoils quickly; and has an odor similar to that of the swill. The caseine is very prone to coagulate, and children are very apt to vomit it in large coagulated masses soon after the milk is taken. Analysis shows excess of aqueous element, and great deficiency in the fatty constituent. The globules of fat under the microscope have a great tendency to aggregation, instead of being individually distributed throughout the caseine investment, as in good wholesome milk. The fat-globules are also diminutive and scanty. The cows depreciate in health, are prone to consumption, become emaciated, and ulceration of the mouth, stomach, and bowels occurs; also abscesses of the liver and lungs sometimes occur.

Swill-food hyperstimulates the secretory and excretory organs, causing excessive urination, and consequent disease of the kidneys, diarrhoea and dysentery, and not infrequently degeneration of the mammary gland. Pus is sometimes found in the milk. The natural conditions of the animal's life are in every respect grossly violated by this sort of food, and the necessary consequences are deranged health, loathsome and fatal diseases, which render the secretions diseased, and the milk, *especially, unfit* for human sustenance. The

cows are forced, by this method, to become drunkards; and their milk is, without any exaggeration, positively poisonous to infants and very young children. The systems of adults are not so susceptible to the ill effects of such milk; but I am convinced that it is unwholesome, if not immediately poisonous to the human family generally.

Such milk, when given to young children, far from furnishing nourishment, rapidly undermines the constitution, and opens wide the avenue to every prevailing disease, though particularly to diseases of the digestive organs, which often terminate fatally.

Some of the most obstinate forms of cholera-infantum have been directly traced to the milk of cows fed to a great extent on brewers' grains and distillery slop, which latter is the most detrimental.

Language too strong cannot, in my opinion, be used in condemning distillery swill as food for milch-cows, and the severest punishment that the law allows is not adequate for the human brute that would wantonly inflict such cruelty on dumb animals as this method of feeding entails; but most important are the evils which milk from such sources imposes upon human beings, when sold to nourish children, thus polluting at its very source the fountain of life.

[GEORGE H. ROHÉ, M.D., Baltimore, Md.]

None recently. During my early life I had moderately good opportunities, but never observed any ill effects from feeding distillery swill. I may note, however, that swill was not the only food fed to the cows under my observation. They were likewise well stabled, and kept otherwise in fair sanitary condition.

[WILLIAM H. BREWER, professor of agriculture, Sheffield scientific school of Yale college, New Haven, Conn.]

By way of explanation, I may say, that, aside from my profession, I have been a member of our city board of health for about fifteen years, and its president some years, so have given the matter some thought; although there is no distillery here, and, so far as I know, no distillery milk sold in this city.

I wish to add to the notes in this circular, that I have a decided *opinion* that swill-milk is unwholesome; but this opinion is founded on general facts rather than on specific proof.

The following are among the facts inducing this belief: —

1°. That the health of cows affects the wholesomeness of their milk is proven beyond any doubt; and the health of cows fed largely or wholly on distillery swill is poor, as is abundantly shown by their general condition and by their high mortality.

2°. It is well enough known that the food of cows affects their milk, and that their chief food largely determines its character. No one claims that distillery swill is the normal food of cows, or is wholesome food when fed in relatively large quantities. Odors of food (as of onions, etc.) show that some of the chemical compounds of the food go into the milk unchanged; and the same is shown by abundant experiment on animals. The experience with drugs (particularly the alkaloids, as morphine) with women in lactation is in the same direction, and is familiar to all medical men.

3°. When swill-milk is undergoing spontaneous decomposition, it behaves differently from normal milk: it is usually acid when drawn, while normal milk is alkaline; it behaves differently in the processes for the manufacture of butter and cheese (and therefore probably also under the digestive processes), — so differently that creameries and cheese-factories refuse it. This is universal so far as I know any thing about them. I have heard this matter discussed by butter and cheese makers; and, so far as the general facts are concerned, I think there is no difference of opinion, that, where distillery swill forms a large or chief part of the food of the cows, milk is much injured for butter and cheese; the only difference of opinion being as to whether or not some may be used along with other food without injuring the milk.

4°. We have abundant and sad proof that milk readily absorbs infections, and numerous epidemics of disease have been traced to this source. It also absorbs odors, and swill-milk stables are proverbially foul and stinking: so this doubtless adds to the possibilities of unwholesomeness.

5°. These, with other facts taken in their connection, with the scattered and more or less vague data as to sickness in specified cases following the use of swill-milk, where this seems the factor most open to suspicion, — all together make me believe, that, as compared with other milk, swill-milk is unwholesome.

6°. I have never found any facts pointing in the opposite direction. Some are negative, others point in this direction. I know of none that point positively in the opposite.

7°. The use of distillery waste for feeding cows has been more carefully and scientifically investigated in Germany (as I understand it), with the conclusion that it may be used in limited quantities, along with other food which forms the chief part of the ration, without injuring notably the milk. As I understand it, I may compare it

with the use of turnips, cabbage, etc., which make the milk 'taste,' if fed in large quantities or at indiscriminate times, but which may be fed in limited quantities, and at certain times in respect to the milking, without flavoring the milk at all. I have often heard this matter discussed among farmers and milkmen, and, similarly, I think it very probable that *some* distillery swill may be used, regulated as to the quantity, the time of feeding, and the other food which goes with it, without practically injuring the milk. But because of the difficulties of supervising the production of milk for cities, and of controlling its sale, I would forbid, under heavy penalties, the sale of all milk in cities and towns, produced by swill-fed cows, whether much or little swill was used.

I have made many inquiries among physicians on this matter, and I think the vast majority believe that swill-milk is not wholesome for children, and that this unwholesomeness is not merely negative, arising from its poverty in fat, sugar, or total solids, but that it has positively injurious qualities; and that, too, is my own belief.

[HENRY HARTSHORNE, M.D., Philadelphia, Penn.]

Dr. Bispham, a practitioner in the first ward, Philadelphia, tells me that he knows of the use of milk from cows fed with distillery swill, in families under his medical care; and that he has seen evidence that such milk is too stimulating, and unwholesome for children.

[W. SIMON, Ph.D., Baltimore, Md.]

In the spring of 1882 I gave my attention to the feeding of cattle with swill for a number of weeks, visiting the stables belonging to distilleries in and near Baltimore during feeding-time, and drawing samples for analysis. The cattle which came under my examination at the time were fed with plenty of hay and swill only, and were in a good healthy condition, notwithstanding that some of the cows had not left the stable for several months. Neither in quantity nor quality of the milk could I find any abnormal conditions.

[JAMES LAW, M.D., professor of veterinary science, Cornell university.]

Being from home, I cannot profess to answer your questions as to the effects of swill-feeding on milk as I could have done had I been beside my library. I have been accustomed to see brewers' and distillers' grains fed to milch-cows without any noticeable evil effect on the milk. If fresh, these are, in the main, grain robbed of much of its starch and some of its salts. Even when slightly acid from preservation in a closely packed condition, it has not seemed to affect the milk injuriously. It is difficult to see how the same material, ground into a fine farina, and floating in a large amount of water, can be any more injurious, further than as the excess of the water must produce a relative diminution of the solids in the milk. But swill is not always fed in this pure and unchanged condition. As preserved for feeding-purposes, it is often found to have undergone not an acid fermentation only, but even a putrid one as well. In other cases it is alleged that it contains chemical agents of a more or less pernicious nature, that have been introduced with the object of securing a more abundant yield of alcohol from a given measure of grain; and in all such cases the milk cannot fail to be injurious in exact ratio with the baneful nature of the fermentation products, or of the chemicals introduced by the brewer. The question cannot, I think, be settled by a mere general statement of the effects of swill-feeding, but it must have reference to the condition and ingredients of any particular specimen of swill fed. I can easily understand two different observers experimenting at the same time, and reaching diametrically opposite results, because due regard has not been paid to the varying condition of the swill as it was fed, and the different conditions of life of the animals consuming it.

[D. E. SALMON, M.D., chief of Bureau of animal industry, department of agriculture, Washington, D.C.]

As I have not the exact data at hand which would be needed to answer your questions properly, I prefer to write you a short letter on the subject. In my investigations of animal diseases, I have frequently had occasion to observe the manner in which cows are stabled in sheds where distillery refuse is fed, and I also have quite a clear idea of the way in which the milk is handled. In a general way I have watched the discussions of sanitarians in reference to the wholesomeness of milk produced in this way. In some cases, at least, chemists have reported that milk from cows fed upon swill was equally rich, and, from chemical tests, was as good as, and even better than, milk produced from cows fed upon country pastures. It is extremely doubtful whether such tests as these indicate in any degree the wholesomeness of such milk. From the nature of the food, stables where swill is fed are much more difficult to keep clean, and the milk produced in them is contaminated with more filth and foreign organic matter than ever should be the case in properly kept milk-stables. This would indicate that such milk would undergo changes from the multiplication of microscopic organisms more rapidly than other milk, and that dangerous germs would be more apt to find their way into it. Some sanitarians contend that

the albuminoid constituents of swill-milk coagulate more firmly than in other milk, and that consequently it is much more difficult to digest. I have made no personal observations in regard to this, and therefore can give no personal information of value. The question is certainly an important one, and I hope you will be able to collect information which will clear up some of the disputed points.

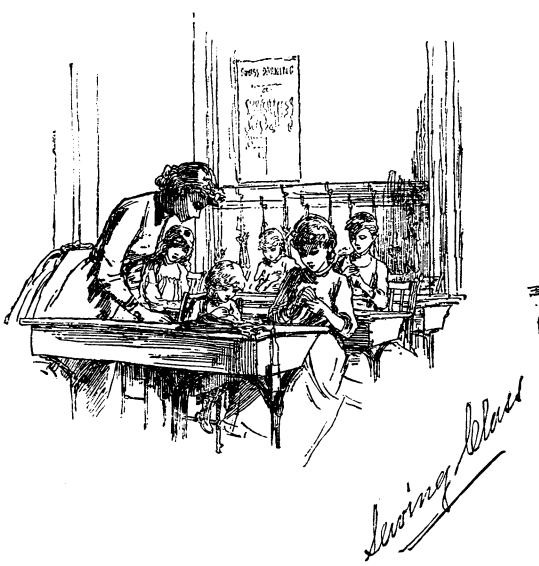
[*To be continued.*]

THE INDUSTRIAL EDUCATION ASSOCIATION.

THE appearance of the third annual report of the Industrial education association of New York City, and the importance of the work which it has undertaken and is accomplishing, serve to direct anew the attention of educators and teachers all over the country to a force which is growing mightier week by week, and which is making itself felt as a power for good in our educational system.

The growth of the association's work is a most excellent example of the development of an idea. In April, 1880, there was incorporated in New York City The kitchen-garden association. The objects of this association were the promotion of the domestic industrial arts among the laboring classes, by giving to the children of the same, and to such others as might be deemed desirable, gratuitous instruction in the household arts, according to the principle of the kitchen-garden system; and also to promote a wide and correct diffusion of the principles upon which the system had been founded, and to prevent its degenerating into careless and erratic methods of teaching, which might expose the system to misconception in its objects and operation.

It cannot be claimed that the kitchen-garden system was educational, save indirectly. It was practical philanthropy. The term seems to have originated with Miss Emily Huntington, who published a book on the subject in 1878. By 'kitchen-garden' Miss Huntington denoted an application of some details of Froebel's kindergarten system to domestic service. The association was convinced of the value of the application, and in its first annual report, made in May, 1881, was able to state that during the year the principles of kitchen-garden had been applied in



29 classes, comprising 990 children, in New York City and vicinity alone. Many other cities followed New York's example, and similar classes were reported as existing in Brooklyn, Philadelphia, Boston, Albany, Troy, St. Louis, Cincinnati, Wilkesbarre, Meadville, Newark, Poughkeepsie, Elmira, and Newport. In this initial report the same note is sounded that is heard again in the last report which has just been issued. It is that too much stress cannot be laid upon the importance of training teachers for this work. Persons must not be permitted to take it up without adequate preparation. In thus insisting on a professional training for teachers, the association, in the earliest days of its history, placed itself upon a proper plane, and made its future successful development possible. One year later, in May, 1882, one or two points of advance were chronicled.