reports it would seem that it is closed, as indicated on our map; and seal and walrus are said to abound in its western part, which is formed by low land. If this information is correct, this would be an excellent starting-point for the exploration of the archipelago west of Ellesmere Land and the west coast of this large island. Such an expedition would not be very expensive, and almost without danger. The American expeditions of Schwatka and Hall show that sledging in the Arctic is the most successful and least dangerous way of making explorations. This district is of the greatest importance from a geographical point of view, forming the northern limit of the American continent. It will be very interesting to know the configuration of this district and its extent towards the north-west. The study of this region will show how far the heavy ice met with at the outskirts of the Arctic islands extends south-eastward.

Another exploration which might be easily accomplished is that of Fox Basin and Hudson Strait. A ship stationed in these waters for two years might solve all important questions of that country. Ethnologists wish for an exploration of the central parts of the Arctic coast, particularly between King William Land and the Mackenzie, where the Eskimos may be studied uninfluenced by Europeans. These are tasks for American travellers. But where is the patron to-day who would encourage and support such enterprises? Who will be the next to carry north the little Henry Grinnell flag, which waved in so many parts of Arctic America? The means which are required to carry on such researches are so small that they will not hinder the resuming of the work as soon as it may be considered desirable.

Such work is not the adventurous 'polar expedition,' the only aim of which is to push north; but these explorations will enable us to go on step by step, and to reach the unknown regions of the Arctic Basin without running great risks. Explorations in Jones Sound will show how far we can go. East Greenland offers a safe basis for expeditions towards the north, and so does Franz Joseph Land. Hazardous expeditions into the open ocean without the shelter of land and without any line of retreat, such as de Long's expedition, must be abandoned, as they will almost always end in disaster. The exploration of the pole is not a work for a single adventurous expedition, however lucky and successful it may be, for the risk such travellers run is not adequate to the probable results. Progress must be made cautiously, and founded on the discoveries and experiences of past expeditions: therefore we believe that spasmodical efforts now in East Greenland, now in Smith Sound, now in Franz Joseph Land, are not desirable, but that one plan ought to be pursued by Arctic explorers. It is only thus that scientific results can be obtained.

The problems which must be solved in the Arctic regions are numerous and important. It is more than curiosity if we desire to know the outlines and the interior of the Arctic and Antarctic islands and continents; for without this knowledge geographical science is imperfect. We must know it, if we want to understand the circulation of the oceans and of the air; and researches in the Arctic are indispensable for the study of terrestrial magnetism. It is sufficient to mention these facts. Even commerce will profit by such expeditions. The produce of whale-fishery adds yearly considerably to our national wealth, and by new expeditions new hunting-grounds have always been opened. Many other resources of the Arctic Ocean are not yet made use of. There are enormous herds of walrus in regions easy of access, there are the lakes and rivers abounding in salmon, there is the valuable fur of the black fox and polar bear, and, though the commercial interest will always be of secondary importance in such enterprises, we must not overlook it.

Our map teaches that the problems of arctic exploration must not be looked for in the extreme north alone. The coasts of Arctic America and its numerous islands are a field for travellers which will yield important results for years to come. The explorer of these regions will contribute not less to science than the adventurous traveller who seeks to reach the pole, and his work will be surer of success, and accomplished with less danger and at smaller expense. We hope that researches in these regions will soon be taken up again, and that we may soon see American explorers again at work in this field.

## DISTILLERY-MILK REPORT.[1]—IV.

### *Bibliography.*

IN the replies received from our correspondents in answer to the circular letter, references are made to the following authorities, from which we make liberal quotations:—

*Manual of Cattle-Feeding*. By HENRY P. ARMSBY, Ph.D. New York, Wiley, 1887.

In the manufacture of distilled liquors, the first stages of the process are essentially the same as in the preparation of malt liquors, but after the fermentation the mash is subjected to distillation to separate the alcohol. The residue remaining in the still constitutes distillers' grains, or 'slump.' This has much the same composition as brewers' grains, except that it is more watery, containing only about eight or nine per cent of dry matter. Like brewers' grains, it has lost chiefly non-nitrogenous matters: it consequently has a narrow nutritive ratio, and is a valuable addition to fodder poor in proteine. Moreover, it contains a considerable proportion of mineral matters, which may be of advantage under some circumstances. Distillers' grains are best adapted for cattle, and yield excellent results in fattening or feeding for milk when rightly used. For sheep, hogs, and horses, they are not well suited. In using this feeding-stuff, its watery nature should not be forgotten. Its relatively large proportion of proteine renders it a suitable addition to a fodder deficient in this nutrient; while, on the other hand, the health of the animals requires the addition to the 'slump' of some dry, coarse fodder, like hay or straw. A poor quality of coarse fodder may be rendered more palatable to cattle by saturating it with distillers' grains, and thus the wateriness of the one fodder, and the poverty of the other as regards proteine, can be simultaneously corrected. Used in this way, distillers' grains constitute a perfectly healthy fodder. Much of the common prejudice against the use of distillery slops appears to be occasioned by their irrational application, and frequently by the filthy surroundings of the animals, rather than by any thing injurious in the feeding-stuff itself.

'Milk: its Adulterations, Analysis, etc.' By JOHN MORRIS, M.D. (*Maryland Medical Journal*, June 15, 1882.)

Of all the nutrients employed to rear children deprived of natural food (the mother's breast), I know no one more pernicious than the swill-milk sold in all large cities. Children fed with it appear to thrive and fatten, but their real vitality is much less than that found in those properly nourished. What seems to be fat is merely adipose tissue, just as is seen in chronic ale and beer drinkers, who are also deficient in vitality, and unable to withstand attacks of disease, endure privation or great suffering. During the summer months, cholera-infantum plays sad havoc among swill-fed children. Frequently after a few hours' illness they fall into a state of extreme prostration, collapse and death following rapidly. From the want of tissue-making food, they lack the vital force already alluded to, and all the efforts of the physician to arrest the disease and restore their impaired strength prove unavailing. The infant mortality in our large cities may be attributed in a great measure, I am convinced, to the employment of milk from cows improperly fed.

The draymen connected with the breweries of London are the most unhealthy body of men to be found anywhere. These men have the unlimited privilege of the brewery cellar. Though apparently models of health and strength, the slightest accident that befalls them generally proves fatal. Sir Astley Cooper mentions a case of a drayman, a powerful, flesh-colored, healthy-looking man, who received a slight injury from the splinter of a stave. The wound was trifling, but it suppurated. Sir Astley opened the abscess, but in going away forgot his lancet. On returning to get it, he found the man dying. Beer-drinkers, when attacked by any acute disease, are unable to bear the proper treatment necessary, and consequently die. They cannot undergo the slightest surgical operation with safety. Dr. Buchan says, "Malt liquors render the blood sizy and unfit for the circulation: hence proceeds obstruction and inflammation of the lungs. There are few great beer-drinkers who are not phthisical, brought on by the glutinous and indigestible nature of ale and porter."

[1] Continued from Vol. IX., p. 604.

So it is with cattle fed with slops from distilleries: though, like Sir Astley Cooper's drayman, they look powerful and flesh-colored and healthy, and increase in size and weight, they are not truly healthy, and the increase in weight is not due to additional muscle or genuine fat. What appears to be fat is a soft, flabby degeneration of tissue, and, if they are exposed to hardship or attacked by disease, will at once succumb.

In conversation with Mr. Outerbridge Horsey of Frederick County, a well-known farmer and distiller, I gleaned some practical hints in regard to the use of swill in feeding cows. Mr. H. does not believe that it is injurious if given in proper quantities and in combination with grasses or other food. He has abandoned feeding his own cows with it, however, for the reason that it imparts a peculiar odor to the milk, and notably to the butter. This is no doubt the case, for there is a particular pungency in this character of food. Therefore milk from cows fed on swill cannot be made into condensed milk, for such milk when condensed has a rank smell and a bitter taste. The swill, if given in large quantities and for a length of time, exercises a very pernicious influence on some of the organs of the body. The teeth fall out, and it is said that the tails atrophy and loosen. If this be the case, I cannot explain the exact cause. It is a necrosis, and must be due to some poisonous element in the food. Nearly fifty per cent of the inorganic elements in swill is composed of phosphoric acid; but, as the inorganic elements are scarcely five per cent of the whole, I can hardly ascribe the degeneration which takes place to the excess of phosphoric acid. According to Fownes, the inorganic elements of milk are 4.91 parts in the 1.000, as follows:—

2.31 Phos. calcium.
.42 Phos. magnesium.
.07 Phos. iron.
1.44 Chlor. potassium.
.24 Chlor. sodium.
.42 Sodium and caseine.

4.91

This gives a little more than one part in a thousand of phosphoric acid,—in normal milk a very small quantity indeed. It may be possible that the necrosis is due to the heat of the swill, for the teeth of pigs become decayed from this cause. Cows do not like the hot food at first, but after a time become exceedingly fond of it,—so fond that they do not care to partake of cold food. Mr. Peter G. Sauerwein relates to me a very singular circumstance in regard to this point. Whilst acting as revenue collector, the machinery of one of the distilleries in his district which supplied slop to the milkmen became deranged for several weeks. During this time the milkmen came daily to the distillery and filled their hogsheads with the boiling water, paying the same price for it that they usually paid for the same quantity of swill. They gave as a reason for this that their cattle were so used to hot food that they cared for nothing else.

Swill, if used judiciously, that is, in combination with good grasses or cereals, is not injurious or objectionable. It serves the purpose of the glass of ale or porter to the nursing mother; that is, it increases the quantity of milk, but I do not believe it improves the quality. There is another form of food given to cattle still more deleterious than swill; viz., the *débris* or refuse left after the extraction of glucose from corn. This is highly injurious, if not poisonous. Fortunately there is not much of this to be procured in Baltimore, as we have but one glucose-factory in our midst; but it is given very freely to cattle in Buffalo and Chicago, where immense quantities of glucose are manufactured.

Inasmuch as the analyses of swill made by different chemists show it to be rich in certain forms of food-elements, it may be asked, why is it so injurious to cows? This is a question more easily asked than answered. The alcohol and fusel-oil which ordinary swill contains are not sufficient to produce the bad results which it is asserted follow its liberal use. Can it be that the excess of nitrogenous and albuminoid substances in this form of food lead to non-assimilation, or other functional disturbances, thus proving its unfitness for the animal economy? Experience is certainly more important than mere chemistry, and therefore the judgment of those feeding cows as well as those consuming the milk must determine the whole question. Popular prejudice, which in many cases is founded on ignorance, or mere science independent of experience, should not be allowed to determine a matter of this character. Whilst I myself do not think swill proper food for cows, except, as I have before stated, in small quantities and in judicious combination with grasses, and whilst I think that swill-milk is equally unfit for children, I am willing to give those entertaining different views a candid hearing.

Analyses have been recently made, at the instance of those largely interested in this matter, of the swill fed to cows, and also of the milk resulting from its use. These analyses are by two well-known chemists,—Professor Simon of this city, and Mr. Peter Collier of the Department of Agriculture, Washington. Professor Simon furnishes the results of the analyses of three samples of milk,—the first drawn by himself at the stables of Messrs. M. Crichton & Co., from different cows, on April 7, 1882; No. 2 sample bought from Pikesville Dairy Company; No. 3 sample bought from a store in the south-eastern section of Baltimore.

| Specific Gravity. 100 Parts Milk contain | No. 1. 1.029 | No. 2. 1.031 | No. 3. 1.026 |
|---|---|---|---|
| Water | 86.47 | 87.12 | 89.93 |
| Fat | 3.77 | 3.40 | 1.45 |
| Caseine | 4.44 | 4.23 | 3.83 |
| Milk-sugar | 4.56 | 4.51 | 4.16 |
| Ash | 0.76 | 0.74 | 0.63 |
| | 100.00 | 100.00 | 100.00 |

Mr. Simon says, "In looking over the results of my analyses, you will see at once that the sample drawn by myself from your 'swill-fed' cows compares most favorably with sample No. 2, produced by cows receiving no distillery refuse. Both these samples represent very good milk; and especially No. 1 is, in the amount of cream and total solids, far above the average milk.

"No. 3 sample represents an adulterated article, from which no doubt not only cream had been removed, but to which also some water had been added. I selected this sample out of about two dozen samples, brought from different dealers, as the worst milk which has come under my notice."

Professor Simon furnishes the result of an analysis of swill drawn by himself from about 1,000 gallons at the Melrose distillery on March 6, 1882.

One hundred parts of sample contain of—

| | |
|---|---|
| A. Volatile products (expelled at 212° F.) | 94.63 |
| B. Organic matter | 4.83 |
| C. Inorganic matter (ashes) | 0.54 |
| | 100.00 |

ANALYSIS OF PORTION A.

Volatile Products.

| | |
|---|---|
| Water | 99.74 |
| Alcohol | 0.08 |
| Fusel-oil (chiefly amylic alcohol) | 0.12 |
| Loss | 0.06 |
| | 100.00 |

ANALYSIS OF PORTION B.

Organic Matter.

| | |
|---|---|
| Starch isomers | 26.68 |
| Cellulose | 23.83 |
| Albuminoids | 25.30 |
| Gum | 6.73 |
| Sugar | 5.44 |
| Fats | 7.37 |
| Glycerine | 1.20 |
| Organic acids | 1.46 |
| Extractive and coloring matter | 1.14 |
| Loss and not determined | 0.35 |
| | 100.00 |

51.98 flesh-producing food.
20.68 fat-producing food.

Analysis of Portion C.

Inorganic Matter.

| | |
|---|---|
| Phosphoric acid | 48.63 |
| Sulphuric acid | 1.80 |
| Silicic acid | 2.22 |
| Chlorine | 0.20 |
| Carbonic acid | 5.06 |
| Potash | 20.14 |
| Soda | 8.47 |
| Lime | 6.12 |
| Magnesia | 7.10 |
| Oxide of iron | Traces |
| Loss | .26 |
| | 100.00 |

Mr. Simon says, in his note appended to the analysis, that "swill is a highly nutritious form of food, and that he sees nothing in its composition that could possibly work injury to cattle feeding on it."

The results obtained by Mr. Collier are very similar to those furnished by Professor Simon, but are even a little stronger in statement. He compares swill with corn and rye and other products, and shows that it is richer in food-elements, and decidedly richer than ensilage, which is so highly prized by certain cattle-feeders. In reply to interrogatories, Mr. Collier expresses the belief that swill is a wholesome and highly nutritious form of food, and can be given to cows with great advantage. He, however, adds that much will depend upon the amount given, the circumstances and surroundings, and the proper combination with other aliments.

The truth is, the whole matter in discussion hinges upon this last point, and Mr. Collier has not made it any clearer by his statements, however honestly made. It is to the physiologist, in my judgment, and not to the analytical chemist, that we must look for a scientific solution of the problem. Analytical chemistry serves but a feeble purpose in solving many important questions. By it butter and oleomargarine appear equally wholesome and nutritious; and it can detect but little difference in impurity between water-closet matter, and sewage from which excrement is excluded.

'Milk for Babes.' By E. M. Nelson, M.D. (*St. Louis Courier of Medicine*, May, 1883.)

In regard to the feeding of the cows, there is almost as much variation between different dairies as there is in regard to cleanliness. Nearly all the city dairies make use of the products of the breweries and distilleries as a considerable part of the feed of their cows. So far as the malted grain is concerned, perhaps nothing can be said in objection to its use as a part of the food. It is recommended by the best writers as a valuable and economical constituent of the food of milch-cows. The same cannot be said of the hot distillery swill. The effect of this food has been found by the best and most careful observers to be prejudicial to the health of cows, and to produce a milk that is lacking in nutritive quality as well as being specially liable to speedy change and fermentation. Mr. Lake, who was for many years the largest feeder of distillery swill in the city, asserted that cows fed on this article invariably become diseased within a period of six months, and the lungs show constantly the evidences of tubercular infiltration. Mr. Cabanne states, that, when he formerly fed swill in his own dairy, he butchered over one hundred and fifty cows, and never found one in which there was not tuberculous disease of the lungs.

'Our Milk-Supply.' By W. K. Newton, M.D. (*Fourth Annual Report of New Jersey State Board of Health.*)

Swill-milk is rarely heard of now, but not many years ago it was a fruitful cause of disease and death in children. Fearing that the lessons of the past may be forgotten, we are constrained to mention it as a possible cause of disease. Distillery swill, "if properly fed in limited quantities, in combination with other and more bulky food, may be a valuable article for the dairyman; but if given, as it too often is, without the addition of other kinds of food, it soon affects the health and constitution of the animals fed on it. Where this forms the principal food of milch-cows, the milk is of a poor quality: it contains often less than one per cent of butter, and seldom over one and three-tenths or one and one-half per cent. tIs effect on the system of young children is therefore very destructive, causing diseases of various kinds, and, if long continued, certain death. The adulteration of pure milk from the healthy cow by water, though dishonest and objectionable in the highest degree, is far less iniquitous in its consequences than the nefarious traffic in swill-milk, or milk produced from cows fed entirely on still-slops, from which they so become diseased, after which the milk contains a subtle poison, which is as difficult of detection, by any known process of chemistry, as the miasma of an atmosphere tainted with yellow-fever or cholera. The fact is sufficiently palpable, that no pure and healthy milk can be produced by an unhealthy and diseased animal, and that no animal can long remain healthy that is fed on an unnatural food, and treated in the manner too common around the distilleries of many large cities." (*C. L. Flint*, pp. 144, 208, 216.)

Where swill-milk was sold in New York a few years ago, "it was found different in alimentary character from that produced by cows that were fed on grass, hay, or grain. It was not so well digested in the stomach, nor had it the nutritive power to create flesh and sustain strength. The children lost flesh, and failed to gain it. Their skins were pallid, sometimes discolored and corrugated. Their countenances had the appearance of old age, rather than the bright and lively bloom of childhood. They suffered from diarrhœa and dysentery and great debility, and many died." (*Jarvis.*)

Fortunately, no swill-milk is sold in this State at the present time, but it is well for health officers to be on the lookout for it. The sale of it is, in this State, considered a misdemeanor, punishable by a fine of fifty dollars and imprisonment for thirty days. The laws of Massachusetts, New York, Michigan, and other States also forbid its sale.

'Report of Committee on City Milk.' By S. R. Percy, M.D. (*Transactions New York Academy of Medicine*, Vol. II. Part IV., 1859.)

This report, which occupies fifty-three pages of the transactions, is the fullest statement of facts in connection with distillery swill and milk which we have seen. In June, 1858, the New York board of health adopted a resolution that the Academy of Medicine be requested to lay before the board such facts and evidence as they may have in relation to the milk furnished to the citizens of New York. The academy appointed a committee of five of its members, including Drs. B. Fordyce Barker and S. Ratton Percy, and in March of the following year presented its report. The greater part of the labors of the committee was performed by Dr. Percy, and his report is the most valuable. It includes chemical analyses, which we have already given under that head, microscopic examinations and drawings, and cases of disease resulting from the use of distillery milk. Associated with Dr. Percy in his investigations was Mr. Solon Robinson, who had been long conversant with the raising and fattening of cattle, and Mr. Thomas Devoe, who had been long and extensively engaged in the slaughtering of cattle, and in supplying the markets with wholesome beef. Mr. Robinson accompanied the committee to the distillery stables, and, as the result of his observations, said, "From my personal experience in feeding cows with various agricultural products, and in producing milk and butter, I am well satisfied that cows fed as described, and kept in such an atmosphere as I could not remain in ten minutes without feeling severe sickness, must produce poisoned milk. And I do not consider the beef any more fit for human food than the milk; not so much on account of the bad food, as the poisonous atmosphere in which the poor brutes are confined. I would no sooner touch this swill-milk than I would use milk from the most 'milk-sick' region of Illinois." Mr. Devoe, in speaking of the quality of beef furnished by animals fed on distillery swill, says, "I have slaughtered, and seen slaughtered, the various kinds of animals that have been fed, wholly or partially, on this swill, which appears to have produced almost as many varieties of beef, and I think I may be better understood by placing them under three general heads; viz., first-class, second-class, and third-class. The first-class beef, no doubt, is produced from thrifty steers, fed in some of the distilleries in the northern counties of New York, where only a small portion, or the liquid portion, of the food, is swill; the rest being of meal, roots, hay, and grass: and, when brought to our markets in a fat,

healthy condition, their flesh proves to be tender, juicy beef, but not so firm or so sweet and well flavored as if wholly fed on grain, or even grass. The second-class beef is from animals wholly confined in these large distilleries, fed the greater portion on swill, with plenty of hay, and occasionally a little grain. I might add, that the Northern distillery swill is of a superior quality to that which is run into troughs at the various distilleries where it is sold by the hogshead or other particular quantities. These Northern distilleries own both the swill and the cattle, and the quantity of swill made by them is fed up clean. This second class of animals, although they may be fat, produce a softer quality of beef, not so well flavored, but juicy and tender. When they are slaughtered, the flesh will show or produce the peculiar smell attached to this beef. The third class is to be found in some of your neighboring distilleries, where the visitor could almost swear (unless he could see the hay given to the animals) that they had little else to eat than the thin, poor, and sometimes spoiled swill. The beef from the general run of the third class has a very peculiar, unpleasant smell, especially when slaughtered. I have known it so disagreeable as to create nausea, especially on opening the animal to take away the paunch or belly: this and some other parts I have sometimes opened to discover some signs of hay, and in some instances found none. This class of beef retains that smell, especially when cutting it up fresh into pieces, and also when cooking it. It is usually flabby or soft, and often appears adhesive or sticky, like very young veal that had not yet lost nature's first flesh. My conclusions and convictions were made up long before this subject was so strongly agitated, both as to the meat and milk of the distillery-fed cow, which I have considered under the third class; and these conclusions are that neither the milk nor the flesh of these animals can furnish healthy human food." The committee, in summarizing its labors, says that the beef produced from the animals fed in the distillery stables is unsavory, and easily recognized by its offensive odor; that the odor is not dissipated even by the process of cooking; and that the fibre is flaccid, and its cellular tissue is infiltrated with watery fluids instead of solid fat. The milk of these cows does not exhibit the characteristics of wholesome milk: it presents almost invariably an acid re-action. The cases collected by Dr. Percy demonstrate the fact, independent of any chemical examination or any *a priori* reasoning, that the milk procured from these swill-fed animals is injurious to those who use it. In view of the disclosures made, the committee states that it is evident that the traffic in the milk of swill-fed cows is one which is detrimental to the health of the community, and should be discontinued.

'Sanitary Control of the Food-Supply.' By W. K. NEWTON, M.D., health officer of Paterson, N.J. (*Third Annual Report of the State Board of Health of New Hampshire.*)

Distillery waste, and sometimes beer-grains, produce a quality of milk of low nutritive powers, and dangerous to infants.

References are also made to the following authorities: 'Milch-Cows and Dairy-Farming,' by C. L. Flint (Boston, 1874 and 1887); 'Infant Mortality,' by E. Jarvis (*Fourth Annual Report of State Board of Health of Massachusetts*); and 'Milk,' by C. F. Chandler (*Johnson's Cyclopædia*).

[*To be continued.*]

## BOOK-REVIEWS.

*Preliminary Report of the Commission appointed by the University of Pennsylvania to investigate Modern Spiritualism in accordance with the Request of the late Henry Seybert.* Philadelphia, Lippincott. 12°.

THAT peculiar medley of alleged fact and fanciful theory, of Occidental pseudo-science and Oriental mysticism, which goes by the name of 'Modern Spiritualism,' has been examined more or less frequently, publicly and ably. The advocates of the tenets which this belief imposes have given little attention to the adverse opinions, explaining them away by a piece of logic which would be admirable did it not need such frequent modification, and were it not so evidently manufactured for the purpose, and have vaunted and gloried over all their successful efforts, large and small, in securing proselytes. The commission, whose long-expected report is now before the public, is most favorably constituted for receiving a hearing destined to be called authoritative, and for registering an important turning-point in the rather sad history of the modern movement. The commission takes its name and its resources from the fund intrusted to the University of Pennsylvania by the will of Henry Seybert, a strong believer in Spiritualism and its physical manifestations. The *personnelle* of the commission leaves nothing to be desired. Its members originally appointed were Dr. William Pepper, provost of the University of Pennsylvania, Profs. Joseph Leidy, George A. Koenig, Robert Ellis Thompson, and George S. Fullerton, all of the same university, and the eminent Shakspearian Dr. Horace Howard Furness. To these were afterward added Mr. Coleman Sellers, Drs. J. W. White, C. B. Knerr, and S. Weir Mitchell. The members individually expressed entire freedom from all prejudices against the subject, and readiness to accept any conclusion warranted by facts; Dr. Furness, moreover, confessed to a leaning in favor of the doctrine.

The method of work of the commission was to take a definite subject for investigation, invite both professional and non-professional mediums (had they been able to procure them) claiming the power of presenting the desired manifestations, and to meet them under fair conditions. The mediums were often exorbitant in their charges (asking a hundred dollars from the commission for what they would do for five for a private citizen), and arbitrary in their conditions. Nevertheless the commission has seen enough to tell a very important and a very interesting story.

They first looked about for a 'professional independent slate-writing medium.' This medium was to take a double slate firmly fastened together, with a bit of slate-pencil placed between, and produce writing on the previously blank slate, professedly the work of spirits in answer to questions addressed to them. Their first medium (a Mrs. Patterson) kept them waiting one hour and a half, and on another occasion one hour and twenty minutes; but the slates remained as clean as at first. Their next medium was the famous Dr. Henry Slade, with whom they had several sessions, all with the object of obtaining the slate-writing under conditions varying in detail, but not in principle, from that above described. Dr. Slade has two methods: for the long, clearly written messages, he substitutes at a favorable moment a prepared slate for the one given him; for the short, hardly legible messages, he in one way or another writes on the slate while hidden from view of the two or three observers (he allows no more) seated with him. Every particular of the process has at one time or another been seen by the committee. In fact, on the day when Dr. Slade received three hundred dolllars in payment for his services, he was so excited that he could hardly sign the receipt; and the cause of this excitement was simply that shortly before, Dr. Furness had kicked over a slate placed at the foot of the table, and thus exposed the prepared writing upon it. In short, their verdict with regard to the doings of this their most famous medium is, "that the character of those which passed under our observation was fraudulent throughout. There was really no need of any elaborate method of investigation: close observation was all that was required."

Next with regard to rappings. Their preliminary conclusion reads that "the theory of the purely physiological origin of the sounds has been sustained by the fact that the mediums were invariably and confessedly cognizant of the rappings whenever they occurred, and could at once detect any spurious rappings, however exact and indistinguishable to all other ears might be the imitation."

The commission attempted to procure some 'spirit photographs,' but were asked three hundred dollars for this luxury, and were to be excluded from the room at the critical moment. They very properly refused any such terms.

The brother of the would-be photographer (Keeler is the family name) is also a medium. His specialty is to 'materialize' a right hand when apparently holding his neighbor's wrist with both his hands, and have this hand perform the usual simple tricks with the musical instruments, etc. The trick was afterwards repeated by one of the commission, and consists in really holding the wrist with one hand only, but producing the feeling in the owner of the wrist of its being clasped by both. The right hand is then free to do all the hocus-pocus.