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ORIGINAL ARTICLES.

REPORT OF THE STANDING COMMITTEE ON METEOROLOGICAL CONDITIONS AND THEIR RELATIONS TO THE PREVALENCE OF ACUTE DISEASES.

BY N. S. DAVIS, M.D., LL.D., OF CHICAGO, ILL., CHAIRMAN OF THE COMMITTEE.

[Presented to the American Medical Association in session at Cleveland, Ohio, June 7, 1883.]

In the report which your committee had the honor of making to the Association at its last annual meeting, it was stated that the plans had been completed and the work actually commenced on the first day of January, 1882, for securing the results of three parallel series of coincident observations in twelve different localities, namely: Boston, New York, Philadelphia, Baltimore, Mayport, New Orleans, Cincinnati, Chicago, St. Paul, Pittsburgh, Denver and San Francisco. To these were subsequently added Lansing, Mich., and Lawrence, Kansas. One series consists of the observations and records made at the Signal Service stations in the several places named, full abstracts of which have been kindly furnished to the chairman of your committee under the order of the official head of that bureau of the general government. Another series consists of a daily record of the ozone or active oxidizing agents in the atmosphere in the same localities, made by competent scientific men whose names were given in the report of last year. In this series all the observers are furnished with uniform test papers, and uniform instructions with scales and blanks, under the supervision of Prof. J. H. Long, of the Chemical Laboratory of the Medical Department of the Northwestern University (Chicago Medical College) in Chicago. In most of the places this series of observations has been continued through the year 1882, the time covered in this report, with entire faithfulness, and the results neatly tabulated for each month by Prof. Long, which tables constitute a part of this report. A few of the observers, located in the central part of large cities where the results were almost entirely negative, became negli-

gent, as will be seen by inspecting the tables in detail.

To this series was also added in Chicago a daily record of the organic or albuminoid matters in the atmosphere, as carefully determined by Prof. Long, whose complete observations commenced on the first of September, 1882, the result for the first six months of which will be given in this report as tabulated and explained by himself. So far as your committee are aware, this is the first record of reliable determinations of the quantity of organic matter in the atmosphere *daily* through an entire year, made in this or any other country.

The third series of observations consists in ascertaining and recording the date of commencement of all acute diseases by physicians in active practice in the same localities where the other series of observations are in progress.

In the report of your committee last year, it was stated that a sufficient number of active practitioners had volunteered their services in all the places selected except in New York and Philadelphia. In the latter only three, and in the former not one, out of a large number of members of the Association who were applied to, appeared willing to engage in a work of much profit to themselves, and of great importance in obtaining data for determining more accurately the real causes of disease. In using the expression "profit to themselves," we do not, of course, mean direct pecuniary profit, but what is of more value to the physician, namely, the acquisition of a habit of closer inquiry concerning the origin and progress of the diseases he is called upon to treat, and of much greater exactness of mental discipline, with a corresponding increase of professional knowledge. The whole number who did volunteer their services for this part of the work was forty-one; of whom only eleven, however, actually reported the results of their observations at the end of the year. Small as is this number, the facts they furnish, taken in connection with the other series of observations, are of much value, as will be seen in the sequel. But if the work of your committee is to be continued, the number of workers in this department can be steadily increased until the results are all that could be desired. By the three series of observations and records just described, we are placed in possession of the facts concerning all appreciable conditions of the atmosphere, including the barometric pressure, temperature, moisture, direction and velocity of winds, rainfall, sunshine and clouds, in twelve localities, in one of which is added the oxidizing and organic constituents, for every day and night of 1882. And to a limited extent, in the same localities for the same

period of time, the facts in relation to the beginning and prevalence of acute diseases. These facts, observed and recorded by independent workers, acting coincidentally under uniform instructions, are capable of analysis and study in several important directions. First, we find much that is of interest and value in comparing the various items contained in the meteorological part of the records with each other, and tracing both the relations and absolute changes connected with the different seasons of the year. And when the records have been carried through a series of years, deductions of still greater interest can be made by comparing the variations of all these items in one year with those of another.

Second, by comparing the date of commencement of the several acute diseases with the atmospheric conditions, we are enabled to determine with much greater accuracy the direct agency of certain of these conditions in determining the degree of prevalence of several important endemic diseases, as typhoid fever, pneumonia, and bowel affections of children. In some of the localities we have been able to carry this comparison through three successive years, thereby ascertaining very definitely the reasons why the same disease (pneumonia, for instance) reaches its highest point of prevalence in January of one year and in April or May in another year, in the same community and under the same sanitary measures. We have also been able to find very satisfactory reasons why there were four or five times as many cases and deaths from typhoid fever in the same community in 1881, as in 1880; and 33 per cent. more than in 1882, notwithstanding the logical inference and expectation based on the popular germ theory of its propagation would be, that the extraordinary production and diffusion of the supposed germs during the epidemic of 1881, would be followed by a still greater prevalence of the disease in 1882. To give the detailed results of the analytical examination of the three series of records before us would weary your patience, as they can be appreciated only by careful reading in print. Consequently we will pass them, and only detain you with a brief but interesting statement from Professor Long in regard to the progress and results of his daily observations concerning the ozonic or oxidizing agents and the organic matters, and the relations of these two classes of agents to each other.

“Observations on the amounts of free ammonia and nitrogenous organic matter present in the atmosphere have been carried out during the past nine months by the method proposed by Chapman (*Chem. News*, 1870, page 65), and elaborated by Remsen (*Nat. Bd. Health Bull.*, Sept. 11, 1880).

In brief, the method consists in aspirating a certain definite volume of air through an absorbent tube containing coarsely powdered pumice-stone, which possesses the property of absorbing nitrogenous gases. If the contents of the tube be now thrown in a retort with pure distilled water and a little carbonate of soda, on the application of heat what is known as free ammonia distills over. This includes the ammonia existing in *ammonium* compounds.

Then, after driving off the free ammonia, if a

strong solution of caustic potash and permanganate of potash be added, what is known as albuminoid ammonia distills over. This ammonia does not exist as such, but is formed by the action of the strong oxidizing solution on nitrogenous matter.

The ammonia, as it distills over, is collected and tested by the Nessler reagent, as in the examination of water by the Wauklyn method.

As to the method itself and results obtained, there are several points suggested by this long trial which might be mentioned. Prof. Remsen showed in his paper that by careful work fairly comparable results could be obtained, and in a number of preliminary experiments tried by myself a year ago, and reported on at the last meeting of the Association (through Dr. N. S. Davis), I was able to verify this statement. Subsequent work showed that the liability to error is about the same as in the testing of water by the method just referred to.

While examining these sources of error several very interesting papers appeared in print, and observations I had made were fully confirmed by them. More recently, these sources of error in the determination of free and albuminoid ammonia have been pointed out very fully by Prof. J. W. Mallet (*Am. Chem. Jour.*, Vol. 4, Nos. 4 and 6), and precautions for avoiding them as far as possible suggested. Experience had already pointed most of these out to me. The condensation of the ammonia evolved is a very important part of the process, and more difficult than usually supposed. To save the ammonia, it is necessary to distill very slowly, and to pass a good stream of cold water through the condenser.

At the commencement of the investigation (April, 1882) another source of error suggested itself. I found that in operating on artificially polluted air, the amount of ammonia obtained by treating the pumice stone in the retort directly with the permanganate solution was much greater than the sum of the free and albuminoid ammonia obtained in the usual way. I convinced myself of this fact by a number of experiments, but other duties interfering, I was obliged to drop the investigation for the time, and some months elapsed before I could take it up again.

In the meantime I learned that a similar phenomenon had been observed by Prof. Remsen, while engaged in investigating the water supply of Boston a year before, and in a paper by Mr. Marsh (*Am. Ch. Jour.* IV., 3,) experiments illustrating the same point are described. It appeared, then, that in the distillation certain nitrogenous compounds were volatilized before being converted into ammonia. In my experiments with an artificial atmosphere the amount of organic matter present was very large, and it would be hardly fair to assume that a natural atmosphere would show the same results. During the past few months I have carried out a number of parallel experiments to decide this point, and without going into details, I will simply say that very little, if any, volatile albuminous matter seems to be lost in the first distillation. In a number of tests I could observe no increase of ammonia by direct treatment with the oxidizing liquid. In other tests a slight increase was noticed, but the excess was within the

limits of error of observation. Other parallel tests are still in progress, and perhaps the atmosphere will show different results at different times.

On the whole, then, it may be said, the method is fairly accurate and gives good results, but when one takes into consideration the very minute quantities of matter dealt with, it will readily be perceived that the greatest care must always be observed in manipulation. In the hands of a single observer results can be obtained which are comparable with each other, but I fear that results obtained for free ammonia by different observers could hardly be compared with fairness, as the difficulty of measuring such minute traces with anything like accuracy is very great, and different persons would approach the true result with different degrees of sharpness. This I consider the weakest point in the method. Of course large volumes of air might be aspirated, but there are practical objections in the way of aspirating more than 100 liters daily.

A few words as to results of observations. The amounts of free and albuminoid ammonia expressed in grammes per thousand cubic meters of air are as follows:

The results are means of daily observations.

	Free.	Alb.
September.....	.051	.110
October.....	.021	.093
November.....	.022	.085
December.....	.024	.105
January.....	.022	.091
February.....	.044	.096
March.....	.019	.073
April.....	.016	.059

It will be noticed that the free ammonia is always much smaller than the albuminoid. In September a large amount of free ammonia was registered, and this I can not now account for. In February also the amount is large. On several days during the fall of sleet in this month considerable quantities of free ammonia were detected. On many occasions I have noticed that a large amount of albuminoid ammonia could be connected with a very bad odor coming from the direction of Bridgeport (a dirty manufacturing part of the city).

Another point noticed seems to me of considerable interest. Several times during the winter a certain window of the college dissecting room was left open by the janitor, and by this means the external air became contaminated immediately over the point where my aspirator was at work. I found that at such times there was a marked increase in the amounts of free ammonia, but scarcely any change in the albuminoid. These results suggested several additional experiments. I placed a piece of decaying meat in a shallow dish, covered the bottom of the dish with water (leaving the surface of the meat exposed, however), and allowed the whole to remain in a closed room for some days. A number of examinations of the air were then made by the above method, all of which showed a considerable increase in the amount of free ammonia, but very little in the albuminoid over what might be expected from the external atmosphere. Now, without removing the meat, a Siemens ozone generator was put in operation in the room, and suf-

ficient ozone generated to give a slight reaction on test paper, Schönbein and Thallium, suspended near the aspirator.

The ozonizer was operated at short intervals during a day, and at the same time air was drawn through a pumice-stone tube for examination. This showed a marked reduction in both free and albuminoid ammonia. This experiment was followed by other similar ones, all of which went to show that the moist organic matter could be oxidized into something not capable of yielding ammonia.

About a week later the experiments were repeated. In the meantime the meat had become thoroughly dry and the stench had nearly disappeared. An examination of the air now showed a decrease in the free ammonia, and a considerable increase in the albuminoid as compared with the previous experiments. Ozone papers failed to show a reaction now, when suspended as before, although the generator had been kept at work a much longer time. These results seem to indicate that dry decaying matter is capable of producing more albuminoid ammonia than moist, a probability which has been pointed out by Dr. Carmichael and Prof. Remsen. During the summer I expect to carry out more extended experiments on this question.

JOHN H. LONG,

Chemical Laboratory of Chicago Medical College."

FINANCES.

In regard to expenditures, your committee report that, on the completion of the first six months of his work in determining and recording the organic constituents of the atmosphere, \$250, being one-half of the special appropriation made for that purpose, was drawn from the treasury and paid to Professor Long, leaving of that appropriation \$250 still in the treasury, to which the professor will be entitled as soon as the year's observations are completed. For the other departments of your committee's work no money has been drawn from the treasury during the past year, although bills to the amount of \$108.60 have been paid by the chairman of your committee. Sixty dollars of this was for one Kilo Thallium Metal imported from Germany free of duty, the rest for printing and blanks, for all of which vouchers in the form of receipted bills accompany this report. At the date of our last annual report there remained in the treasury an unexpended balance available for the committee's expenditures of \$290.28. If the sum just named as the amount expended during the past year is paid, there will still remain of the original appropriation an unexpended balance of \$181.68 in the treasury. Your committee will therefore close this abstract of their report by asking the Association to adopt the following propositions:

First, That your committee be authorized to furnish their report for publication as a part of the Transactions of the Association, and to continue the investigations now in progress, with the privilege of drawing on the Treasurer for so much of the unexpended balances of former appropriations as may be necessary during the coming year.

Second, That the thanks of the Association be

tendered to the Superintendent of the Civil Service Bureau, Gen. Hazen, for the enlightened and generous aid he has rendered by causing your committee to be furnished with full abstracts of the meteorological records made at the several places selected, and that he be requested to continue the same favor during such time as the committee may desire.

All of which is respectfully submitted.

N. S. DAVIS, Chairman.

P. S. Details of observations and analysis of the same will be given in the next number of the JOURNAL.—EDITOR.

REPORT OF A CASE OF DOUBLE-HEADED MONSTROSITY.

PRESENTED BEFORE THE MARION COUNTY MEDICAL SOCIETY, INDIANAPOLIS, IND., NOV. 14, 1883.

BY JOSEPH EASTMAN, M.D., PROFESSOR OF DISEASES OF WOMEN AND CLINICAL SURGERY IN CENTRAL COLLEGE OF PHYSICIANS AND SURGEONS.

[Reported by Dr. H. I. Raymond.]

There is a two-fold interest in the subject-matter of monsters. First, as it presents itself to the mind of the practical obstetrician; and second, as it calls into exercise the subtle reasonings of the speculative physiologist.

The simple scientific investigation of the subject may in the end yield as practical results as the investigation of the matter for purely clinical purposes, inasmuch as the scientific teratologist may some day afford some rational clue to the semiology of monster formation, and the physiologist be enabled to suggest much looking toward the prevention of psychical impressions likely to modify the normal processes of nutrition and growth.

The clinical features of this subject-matter will be best brought out by simply relating the history of the present case.

The size of patient's abdomen was enormous, so much so as to excite in her own mind an apprehension of twin conception. To remove suspense, she called me in as her medical adviser ten days previous to her expected confinement. I could map out but one body, and that with difficulty, owing to the excessive accumulation of the liquor amnii.

I assured the patient that the head of the child was downwards; that nothing was wrong; no twins; simply an enormous accumulation of waters.

One week later, the patient was confined at night, the first intimation of labor being rupture of the membranes with escape of one and a half buckets of water, literally flooding the bed.

I was in attendance immediately, and found a dry labor in a primipara of nineteen. The abdominal swelling had disappeared; the uterus was reduced in size; but one child could be mapped out by external

palpation, and but one head felt by vaginal examination.

The head soon advanced to the perinæum, the chin rotating under symphysis pubis; labor then only slightly progressive.

The pains were inefficient; three hours had been spent in waiting.

Forceps delivery was decided upon, and the instruments applied. On making traction, great difficulty was encountered in the withdrawal of the head.

The forceps were then removed, and the finger of the accoucheur was passed up the parturient canal, for the purpose of hooking down the child's arm. But the finger found no axilla. It detected a hard, round object, sensibly a second head. By conjoined manipulation but one body could be mapped out.

The pains were hard, but not sufficient to effect delivery. The first head was now brought up sharply over the pubis. The second head pressed against the perinæum. Forceps were applied and delivery effected.

During these manœuvres the accoucheur's attention was abstracted for the moment from the administration of the chloroform, which was done by the friends, and, as it happened, the patient passed into the third stage of anæsthesia, so that she was profoundly under the influence of the anæsthetic at the time of delivery of the second head, and it is thought this condition of complete muscular relaxation enabled the operator to deliver such heads with but a slight abrasion of the perinæum—so slight as to require no surgical treatment. There was neither any laceration of the cervix uteri. The diameter of the second head, and neck of the first head of the monster, as apposed in the genital outlet, measured a little more than six inches.

The subject of monsters in relation to practical obstetrics is treated of very meagerly in works on midwifery. It is frequently dismissed with the statement that such developments do not usually carry to full term, and no difficulty, therefore, will be met with

